The D word, Dementia, is a diagnosis that none of us want to hear, but it’s on the rise and currently there are 850k people with dementia in the UK. By 2025 there will be 1m, and there could be more than 2m by 2050.\(^1\) It is the leading cause of death in UK women: 13.7% of deaths ~ approximately 40K per year. In contrast with invasive breast cancer there are 53K new cases of cancer each year but, because there are effective treatments there are 11.4K deaths (survival rate is 78% and 27% of cases could have been prevented).\(^2\) Two thirds of dementia patients live in the community and currently, there are 670K carers. So what can be done? How can we treat it and prevent it?

Given that there are different types of dementia (Alzheimer’s is the most common type), there will be different causes. Sadly we know very little about any of them and there are no effective treatments. On the assumption that Alzheimer’s sufferers have a deficiency of cortical acetyl choline, a potential treatment is a centrally acting anticholinesterase drug, and Tacrine was the first. Discovered by Adrien Albert in Sydney, and then patented by William Koopmans Summers in Los Angeles in 1984, the drug offered hope. The FDA approved its use in 1993 under the trade name of Cognex but by 2013 it was withdrawn because it was hepatotoxic, and new drugs promised to have a better safety profile.

Today there are two types of drugs available for dementia. None of them cure the disease or slow the inevitable deterioration, but they may help by temporarily by reducing the symptoms. Three anticholinesterases are available (Donepezil, Rivastigmine and Galantamine) and a glutamate antagonist (Memantine). These may help with reduced anxiety and improvements in motivation, memory, concentration and daily living but the unpleasant side effects are typical of cholinergic stimulation and include diarrhoea, nausea, vomiting, abdominal discomfort, dizziness, headache, anxiety, blurred vision, dry mouth and insomnia. Memantine may help reduce agitation or aggressive behaviour but can cause dizziness, headaches, tiredness, increased blood pressure and constipation. Other drugs that elderly patients often take include anti-depressants and anti-psychotics and both can cause a dry mouth which is a factor in the build-up of dental plaque.\(^3\)

Anaesthesia (or sedation) should be used with great care in patients with dementia. Firstly, patients are likely to have pre-existing diseases (e.g. heart failure, hypertension, diabetes) which incur a burden of professional care and attention that calls for special healthcare staff and facilities. Secondly, there is a possibility that anaesthesia itself causes a loss of cerebral function.\(^4\) Whereas the evidence in humans does not support this view, it is possible that anaesthesia causes deterioration in some patients. Yet dental decay is likely to be common in dementia patients\(^5\) and it would be a reasonable consideration in a confused irritable patient that they could have dental pain which, if relieved, could calm them. For these people, a dentist could make a big difference.\(^6\)

Mike Sury

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(2) http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer
(4) https://www.scientificamerican.com/article/can-general-anesthesia-trigger-dementia/
Welcome to the 2018 issue of SAAD Digest. The last year has been another busy but productive one for SAAD. The Diamond Jubilee was marked with a really special opening to our Annual Symposium, with a piper playing the President into the Hall followed by the Presidential Diamond Jubilee Proclamation, the text of which can be found in the Autumn 2017 Newsletter.

Ian Brett and Chris Holden did a double act providing an interesting and informative personal view of the History of our Society. Many of the issues we have faced throughout our history are the same as those we face today, although as a result of the IACSD and AoMRc publications, I feel that there is now a better understanding between anaesthetists and dentists on the way ahead for sedation. Whilst it is always good to learn the lessons of history to avoid repeating previous mistakes, it is also important to look forwards rather than back. There is still a huge need for sedation, as there is no sign of a reduction in the number of patients who are anxious or phobic of dental care. The Society’s motto of “Abolish Pain to Conquer Fear” appears too simplistic, as despite advances in pain control, patients with no experience of dental care are still presenting as “too anxious to have treatment under local anaesthesia.”

In June 2017, a commissioning guide for sedation in primary dental care in England was published by NHS England. This document was so heavily based on the IACSD 2015 standards that it has now laid to rest any further debate about whether these standards should be implemented. It is written for commissioners, not providers, and is available on the NHS England website. Once again members of SAAD were involved in advising on the content. The group included two SAAD Trustees (David Craig and Nigel Robb) and a member of SAAD Course Faculty (Leah Adams).

The SAAD Courses for new starters in sedation for both Dentists and Dental Nurses have now run three times. Enrolment is increasing and those who have successfully completed training are now moving to provide sedation in their practices. More details can be found on page 72.

This issue of Digest again covers a wide range of articles, which I trust will mean there is something of interest to all members. Our “What’s New in” series article is on dementia. This is particularly timely as, in the autumn of last year, the Faculty of General Dental Practitioners published “Dementia-friendly Dentistry: Good Practice Guidelines.” The management of patients with dementia is going to become an increasing part of our practising lives, with all the challenges that it entails.

Our other refereed papers include two audits of sedation services. Given the increasing emphasis on audit, I hope that these papers may give members ideas that they can use to audit their own practices.

In a departure from our normal practice, the essay prizes last year had a set title rather than free choice. The title was “Anxiety Management and Sedation in Dentistry; the next 60 years?:” We are publishing the three winning entries in the Dental Nurse’s, Dental Student’s and Drummond Jackson prizes. The articles provide different views on the future. Whilst it is unusual to have three papers with the same title in a journal, the differences in approach make an interesting read.

Our online CPD continues to attract members and non-members to participate and collect their CPD hours. The CPD will be available again this year, and I would encourage readers to take advantage of the opportunity to use these towards the required 12 hours in every 5-year cycle.

In last year’s Digest, we included an article by Joe Hulin whose PhD was funded by SAAD. Another paper based on his PhD was published this year. It is “Development of a decision aid for children faced with the decision to undergo dental treatment with sedation or general anaesthesia.” A review of the paper is included within the Journal Scan. We had hoped to be able to reprint the entire article for members who do not subscribe to the journal, but were unable to reach a suitable arrangement with the publishers.

I would like to take this opportunity to thank all the members of the Editorial Board for their hard work leading to the production of the Digest. The Digest would not appear but for dedicated individuals undertaking the reading, reviewing, proof-reading etc voluntarily and usually in their own time. One of the strengths of SAAD is that it operates as it is run by a group of family and friends – long may it last.

I would also like to thank all who have submitted papers to the Digest for consideration for publication, as without submissions we would have nothing to publish. We welcome submissions from members and non-members alike covering a wide range of subjects under the theme of pain and anxiety control in dentistry.

We have welcomed Dr Dev Mahtani to the Board this year. Dev is a Consultant Anaesthetist at Guy’s and St Thomas’, where he has a regular involvement with anaesthesia and sedation for dental patients. We are very pleased to have his anaesthetic input, especially his contribution to the Journal Scan covering journals that members of the dental profession would not normally read.

I hope you and enjoy this year’s Digest and that it enhances your knowledge.

Nigel Robb

What’s new in... Dementia and Dentistry

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Abstract
Currently it is thought that over 850,000 people in the United Kingdom (UK) are living with dementia, with numbers set to rise to over one million by 2025. It is known that dementia can compromise an individual’s oral health, particularly as the disease progresses. Dental practitioners can have an important role to play in reducing the impact of dementia on oral health. This article looks at the oral care problems dental teams might encounter when delivering care to patients with dementia, and what evidence is available on how dental care professionals can provide the highest possible level of care for this patient group.

Introduction
Dementia is a largely irreversible clinical syndrome in which there is deterioration in memory, thinking, behaviour and the ability to perform everyday activities.1

The 2014 Dementia UK report revealed that 1.3% of the population of the UK are living with dementia. The prevalence of dementia is set to rise - it is estimated there will be 2 million people living with dementia in the UK by the year 2051. The report also demonstrated that the impact of dementia is widespread - with there being physical, psychological, social, and economical impact on carers, families and society. At present the financial burden of dementia to the wider society in the UK is thought to be £26.3 billion - funded through the NHS, private and public social care, and the contribution of unpaid carers.

Within the UK, the Department of Health’s ‘Challenge on Dementia 2020’ guidance puts the delivery of high quality health and care as one of its core commitments to this patient group. With a shift towards an aging population and a greater portion of patients maintaining their teeth for longer, an understanding in the prevention of oral disease, and the provision and timing of dental care for patients with dementia can be assumed to be essential for future dental practice. The Faculty of General Dental Practitioners’ (FGDP) comprehensive guidance on Dementia-Friendly Dentistry demonstrates the commitment of our profession to this patient group. It ensures that dental care professionals have the knowledge and skills they need to provide high quality dental care for individuals with dementia. This article aims to provide a brief overview on the subject of dementia and its impact on the delivery of general dental care, and to review what recent evidence is available regarding the safety and efficacy of providing sedation and general anaesthesia for people with dementia.

Signs and Symptoms
Early signs of dementia may not be particularly obvious, and may include forgetfulness or losing track of time. As the disease progresses symptoms may become clearer - and can include memory loss, mood or personality changes and problems with reasoning, communication and geographical orientation.1

Risk factors
The leading risk factor for dementia is age. Above the age of 65 years, a person’s risk of developing Alzheimer’s disease or vascular dementia doubles roughly every 5 years. It is estimated that dementia affects one in 14 people over 65 years old and one in six over 80 years old. Women are twice more likely to be affected than men.7 The National Institute of Health and Care Excellence (NICE) also include a number of non-age-related factors thought to increase an individual’s risk. These include certain lifestyle factors such as smoking, excessive alcohol consumption, obesity, diabetes, hypertension and raised cholesterol levels, and genetic factors - such as mutations and Down’s syndrome.

Diagnosis
Dementia can be classified as reversible, that is, dementia that is secondary to a potentially treatable condition, or irreversible. This article will primarily focus on irreversible dementias. The four main subtypes of which are Alzheimer’s disease; vascular dementias; frontotemporal dementias; and dementia with Lewy bodies/Parkinson’s disease.7
If a diagnosis of dementia is suspected, a physician will arrange for a cognitive assessment which should include an examination of attention and concentration, orientation, short and long-term memory, praxis, language and executive function. Examples include the Mini Mental State Examination (MMSE) and the 6-Item Cognitive Impairment Test (6-CIT). Imaging may be used to exclude other cerebral pathologies.6

Dental care professionals are often in a position where they see an individual regularly for ongoing care. It has, therefore, been recognised that general dental practitioners may have a role in recognising early changes in an individual’s behaviour.7 If signs or symptoms of dementia are seen, a referral to an appropriate medical professional should be carried out, if it has not yet taken place.

Treatment

Treatment is broadly split into pharmacological and non-pharmacological interventions. The main non-pharmacological intervention is cognitive stimulation therapy (CST) provided by trained individuals. CST includes group activities such as recalling and discussing past events, or revisiting skills such as using money.10

The main pharmacological interventions are the acetylcholinesterase inhibitors Donepezil, Galantamine and Rivastigmine. These are used to treat the cognitive symptoms of memory and learning deficits in mild to moderate Alzheimer's disease and other dementias. The drug Memantine is used in moderate to severe Alzheimer’s disease or in those individuals with an intolerance or contraindication to acetylcholinesterases.11

Newer techniques, such as deep brain stimulation, are currently being trialled with promising results.12

Dementia and Oral Health

It has long been recognised that oral health is an important part of an individual’s general health. Poor oral health can impact on general health and wellbeing, diet and nutrition, behaviour and cognitive function.13 There are no known oral manifestations of dementia, however, several studies have shown a higher prevalence of oral disease, such as periodontal disease, caries and xerostomia, in this cohort of patients.14,15

Impact of dementia on dentistry

Access

Patients with dementia may have difficulty accessing dental services. Short-term memory loss can affect the individual’s ability to organise and arrange appointments. Consideration should be given to liaising with family members and carers, especially as the disease progresses, as they may play a role in facilitating access to dental care.14 Patients may benefit from reminders of appointments in the form of a phone call or a text message.

The timing of appointments can also be important. Discussion with the patient and their supporting carers may reveal the times of day a patient is more or less co-operative, or certain activities or mealtimes where disrupting the routine should be avoided. Compliance may be better for short periods, so scheduling multiple appointments may be preferred over a single long visit.

Some patients may be frail, have issues with mobility or use a wheelchair. Services should be wheelchair accessible and consider providing care in the wheelchair if the patient has difficulty transferring. Wheelchair recliners can improve the dental care practitioner’s access for examinations and treatment. In cases where transfer is required, aids can be used, or a hoist, providing the dental team is appropriately trained.

In patients who have been regular attenders to a dental service and are the early stages of dementia, maintaining continuity with their regular dental team may lessen confusion and enhance co-operation for dental care. However, these patients may require longer appointments and treatment may be more time consuming. At the present time there is no consideration given to this issue within the NHS remuneration system for general dental practitioners17 hence many patients with dementia are being seen within the Community Dental Service, which is commissioned by NHS England in line with local oral health needs assessments, and provides care for especially vulnerable groups.18

In 2015 the Department of Health released guidance for providing dementia friendly health and social care environments.19 Many of these principles can be applied to dental practices - such as avoiding busy and crowded environments, patterned walls and flooring, unnecessary clutter and noise from televisions and radios. In some cases, care may need to be considered on a domiciliary basis - this may lessen confusion and enhance co-operation as it is provided in familiar surroundings.

Communication

A patient with dementia may have difficulty communicating that they have a dental problem or that they are in pain. For example, they may have trouble finding the right word, or will repeat words or phrases. They may also have other sensory impairments, such as hearing problems, which may hinder communication further. They may have slurred or muffled speech which may be challenging for the clinician to understand. Patients may become frustrated if they cannot communicate their problem, and may exhibit unusual behaviour as they are trying to communicate what they no longer can verbally.20 Perception of pain can also be altered in patients with dementia - some studies have shown that patients with Alzheimer’s dementia have an unchanged pain threshold but a higher pain tolerance.21 These aspects combined can mean it is difficult to ascertain an accurate pain history. Changes in eating and drinking patterns (such as avoidance of hot, cold or hard food), sleeping patterns or noticeable changes in behaviour (such as increased agitation or self-injurious behaviour) can all be indications of dental pain, therefore potential dental pathology should be investigated and excluded if these signs are exhibited.

Consent

Dementia can affect the functioning of an individual’s mind or brain, and therefore may affect their capacity to consent to dental examination and a treatment plan. It should be assumed that a patient has capacity unless assessed otherwise. A dental care professional should be able to assess an individual’s capacity using
section 3.1 of the Mental Capacity Act. This act clarifies that for someone to have the capacity to consent they must be able to understand the information including the risks and benefits of all options discussed, as well as the consequences of no intervention. They must be also able to retain the information, weigh up the risks and benefits of each option and communicate their decision. If an individual is assessed to lack capacity to consent for a specific decision, a best interest decision should be made following the principles of this act. It is best practice to involve the patients care givers and family members in the best interest discussion. If the patient does not have any close relatives or unpaid carers then a referral should be made to appoint an Independent Mental Capacity Advocate (IMCA). Where the treatment proposed is radical or irreversible, there should be documented agreement from two independent health professionals that the treatment is in the best interests of the patient.

Education

Some individuals with dementia may be able to provide their own oral care with minimal support or intervention. Others need more support or are dependent on carers for their routine oral care. It is important that the level of support required is assessed, and that individuals and their carers receive targeted oral hygiene and diet advice in an attempt to minimise the risk of intervention in the future. NICE guidance on ‘Improving Oral Health in Care Homes’ specifically mentions the need for care staff to provide their residents with daily support to meet their mouth care needs. Studies have shown effective carer education improves the oral health and denture hygiene of individuals with dementia. Carers in these studies were taught feasible tooth brushing techniques, handling of interdental brushes and mouth rinses. A randomised control trial looking at comparing the efficacy of electric compared to manual toothbrushes in a nursing home showed that both were effective in reducing plaque scores. Interestingly, it noted that electric toothbrushes may be particularly effective for nursing-home residents with cognitive impairment, but required a period of habituation. Alternatively, the use of a ‘Superbrush’ or Collis Curve, with the facility to brush three surfaces at one time, may expedite effective oral hygiene in individuals who struggle to tolerate oral care.

Surgery

It is beneficial for an individual to see a dentist soon after a diagnosis of dementia, so that appropriate prevention, advice, and treatment planning can be provided. The British Dental Association’s evidence summary ‘The Management of Dental Problems in Patients with Dementia’ stated that treatment planning should have the following aims:

- To prevent further oral disease
- Restore and maintain health
- Make oral health a normal part of the patient’s life
- Treatment plans should be flexible, anticipating a decline in patient health over time
- Be realistic given the patient’s disorder and physical status.

Some patients with dementia will allow the provision of routine dental care without complaint or issue. Some, particularly as the disease advances, may find it difficult to comply with care. In these cases, The BDA document states that consideration should be given to the patient’s level of independence, co-operation, cognitive state and physical impairment; the presence of dental problems and whether they are symptomatic or asymptomatic and the individual’s ability to give informed consent. The British Society for Disability and Oral Health guidelines ‘Principles of Intervention for People Unable to Comply with Routine Dental Care’ provides comprehensive advice on a proactive approach to oral care and treatment provision, including aspects of safe holding and planned physical intervention.

Conscious Sedation and Dental Treatment

Some patients with dementia find it difficult to tolerate dental treatment due to communication difficulties or a lack of co-operation which can be exacerbated by anxiety or stress brought on by the dental environment. Sedation can help facilitate dental treatment by inducing anxiolysis and improving co-operation with care, however, there are several aspects to consider before taking this approach.

In terms of pharmacokinetics, with increasing age there is a relative increase in body fat, a decrease in total body water, and a reduction in plasma proteins available for binding, which results in an increase in drug elimination. The elimination half-life of midazolam in adults over 60 years of age may be prolonged to four times that of a healthy adult. There is also alteration in phase 1 metabolism resulting in a reduction in the P450 cytochrome system. Midazolam is metabolised by at least three different cytochrome P450 enzymes therefore the metabolism of the drug will be reduced. Additionally, an increased incidence in polypharmacy is seen in older adults. Some medications can impact on the sedative action of midazolam. For example, the antihypertensive calcium channel blockers have been shown to enhance or prolong the effects of midazolam, whereas certain anti-epileptic drugs, for example carbamazepine, have been shown to reduce the effect.

The 2015 Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) guidelines defines conscious sedation 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. Particular challenges in relation to this definition when considering a patient with dementia may arise if the individual has difficulty in communicating and therefore may not normally respond to verbal communication or understand verbal prompts. In these cases a clinician has to rely on both the clinical monitoring, as well as observing the patient’s behaviour to assess when an appropriate level of sedation has been reached.

A review of the main biomedical literature databases of the terms ‘sedation; dementia’ and ‘dental treatment’ produces eight articles published within the last ten years. Five of these were on the use of intravenously administered midazolam or propofol, one on the use of oral midazolam, one on the use of nitrous oxide as a sedative agent, and one was an update article on the provision of dental care for patients with Huntington’s Disease. Of the five papers on Intravenously administered midazolam only two were accessible in English.
Sedation with nitrous oxide is a useful and non-invasive technique. No cannula is required and recovery is rapid. However, for it to be successful requires a level of co-operation and understanding from the patient, which is not always possible in patients with dementia. The single paper within the literature review which looked at the use of nitrous oxide as a sedative agent highlighted that it is a very safe way of sedating a medically complex patient, but acknowledged a degree of safe holding is likely needed to allow the placement of the hood. It also advocated the use of a 50:50 mix of nitrous oxide and oxygen delivered by a mask covering both the mouth and nose, referring to this process as an ‘induction’. Once the patient was adequately sedated the mask was removed and treatment carried out. This appears to pertain to a much deeper level of sedation than is defined as conscious sedation by the IACSD guidelines.33

Sedation with a benzodiazepine, such as midazolam is a useful alternative. Thought must be given to the method of administration, as not all patients will be co-operative with cannulation for intravenous sedation. In these situations, transmucosal techniques, such as oral or intra-nasal sedation, may be beneficial. The included paper on the administration of oral midazolam, reviewed the success of orally administered midazolam in 61 adults with dementia to allow dental treatment, using the accepted guidance of 0.2 mg/kg body weight for those under 65 years of age and 0.1-0.15 mg/kg body weight for those over 65 years of age. It found on average it took twenty minutes until sufficient sedation was observed, and for those who no sedation was seen at this stage an additional oral dose was given. 90% of patients allowed the planned treatment to be completed. The reasons attributed to the 10% of failed treatment included poor acceptance or no observed effect of the drug. It concluded that acceptance was not found to be dependent on dose, the type of dental treatment performed or interacting drugs and that poor or no acceptance of treatment at the first sedation does not rule out good co-operation at subsequent appointments.

There were no papers found in the literature review which included the use of intranasal midazolam. However, a broader search of the method showed it to have a quicker onset and quicker recovery time for the patient compared to oral administration, but side effects such as coughing and sneezing and nasal drug delivery have been related to epistaxis.

The risk with trans-mucosal techniques is that with the administration of a bolus dose there is a risk of over sedation. The IACSD guidelines provide a clear definition of the difference between oral sedation and pre-medication, and highlight the need that clinicians using trans-mucosal techniques should be suitably trained in intravenous sedation.

Only one of the papers on intravenous sedation retrospectively assessed the usability and precautions required when using propofol in patients with dementia. All patients included in the study allowed treatment under intravenous sedation where they had previously not allowed dental treatment. It noted dental treatment with water usage (mainly restorative treatment) required a longer sedation time and more propofol usage, and the main complication in these cases was coughing (41.5% of the participants). Bradycardia (13.8%), hypotension (12%) and snoring (16.9%) were noted as other complications seen during the management of these patients.

Finally, a case report on the use of a Bispectral index monitor (BIS) as a way of evaluating the sedation level in a patient with frontotemporal dementia was included in the review. BIS monitors monitor the level of consciousness in patients undergoing sedation and anaesthesia. It analyses electroencephalogram wave forms and quantifies this information to produce a numerical value of 0-100. The study noted a numerical value of 99 was seen in the individual prior to the administration of a propofol infusion (speed of 1.5-3.5 mg/kg/hr) whereas a score in the low 80s was seen at the sedation end point. Dental treatment was provided uneventfully. BIS monitors, therefore, might be a useful adjunct in clinical monitoring in some patients with dementia patients undergoing sedation, where other clinical signs may be a less clear due to cognitive impairment.

General anaesthesia

In some circumstances, general anaesthesia might be the only remaining viable option for the delivery of dental care. It should be considered the most restrictive option for the provision of dental treatment and only explored if all other, less restrictive options have been discussed or explored. The benefit of dental treatment under general anaesthetic is that all necessary treatment can be provided in a single visit. There is a growing body of evidence that there is a risk of a disturbance in cognitive functioning following general anaesthesia within the elderly population. There are two main clinical conditions described in the literature:

i) Delirium. This is the acute onset of disturbed mental function. Symptoms can include visual hallucinations, delusional thoughts, anxiety and distress. It may be attributed to an underlying cause, such as an infection, but is also associated with various drugs such as those with anticholinergic actions. Delirium is a reversible condition which can affect medical or surgical patients. The recently released guidance from the American Geriatrics Society includes the presence of chronic cognitive decline or dementia as being risk factors for postoperative delirium. Delirium can have serious consequences, such as increased mortality and risk of falls as well as a significant association with accelerated functional and cognitive decline.

ii) Postoperative cognitive dysfunction (POCD). POCD can be defined as a long term, possibly permanent, disabling deterioration in cognitive function following surgery. A study by Møller et al including a cohort of more than 1200 patients aged above 60 years old found an incidence of POCD of 25% at one week and 10% at three months postoperatively. These patients were followed up two years after their surgery and it was noted that approximately 1% still had unresolved POCD. This shows the potential long-term effect of this condition. Risk factors are thought to be increasing age, with an incidence close to one in three in those individuals in the study over 80 years old. Pre-existing cognitive impairment is a risk factor for POCD.

Conclusion

Providing dental care for patients with dementia can be challenging, especially as the disease progresses. Through the provision of personalised prevention advice, collaboration with the patient’s relatives and caregivers, and careful planning for the
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The individual's future, the impact of their dementia on their oral health can be reduced. Should intervention be required, all efforts should be made to explore the least restrictive options first, with general anaesthesia used only as a last resort. Research specifically surrounding sedation and general anaesthesia within dentistry is limited, the dental profession would likely benefit if future research was carried out in this area.
The use of intranasal midazolam in a special care dentistry department in a hospital setting; technique and cases.

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Abstract
Intranasally (IN) administered midazolam has allowed patients who require conscious sedation but struggle to tolerate cannulation to receive dental treatment under sedation. Studies have demonstrated a mean bioavailability of 82.4% can be achieved with IN midazolam due to the high vascularity within the nose. These studies have also demonstrated that peak plasma concentrations can be reached within 10 minutes, which signifies the fast onset of action. The standard bolus dose of IN midazolam is 10-12mg, which can be reduced or increased depending on the patient’s age and susceptibility to benzodiazepines. The bolus can also be repeated if adequate sedation is not reached. Some 17 patients received a standard dose of 10mg of midazolam. There were two cases of desaturation below 92%, which responded with oxygen and encouraging the patient to breathe. A protocol for administering IN midazolam is outlined and two cases are discussed.

Introduction
For some people with disability, the continuing management of oral health including periodontal care, routine examinations and the provision of restorative treatment is very difficult.1 The use of conscious sedation in dentistry is one of the most widely discussed and regulated areas in the profession. In the last twenty years, there have been many publications providing guidance and clinical standards for practice in this area.2 The use of intravenous midazolam alone is defined as a standard technique.3 Intravenous (IV) sedation using midazolam has had a greatly positive effect on the provision of dental care; it has improved access to dental care and reduced reliance on general anaesthesia. The patient must, however, be able to tolerate intravenous cannulation, and many patients with disability struggle with this aspect of conscious sedation. To overcome this problem, patients with disability were often premedicated with oral midazolam, but following oral administration it may take up to 60 minutes to achieve peak plasma concentrations.4 The time taken to achieve an adequate degree of sedation is frequently protracted. Oral midazolam is broken down in the liver, and the first pass reduces its bioavailability to between 35-44%.5 Veldhorst-Janssen et al. have found the mean bioavailability of intranasal midazolam is approximately 82.4%.6 The main advantages of intranasal midazolam are, firstly, the high bioavailability, as the nasal route in not subject to first pass metabolism, and secondly, peak plasma concentration of midazolam can be reached after 10 minutes.7

Intranasal sedation is not new, but has not been widely adopted and any method or technique which could help achieve better treatment outcomes for people with disability should be made widely available. The technique has been used in some areas of clinical practice for many years, and in the Special Care Department of Dorset County Hospital for six months prior to the preparation of this paper in 2015.

Clinical pharmacology of midazolam
Midazolam is an imidazobenzodiazepine and is the standard drug used in the practice of intravenous conscious sedation.8 It has anxiolytic, sedative, hypnotic, anticonvulsant muscle-relaxant, and anterograde amnesic effects.9 Midazolam enhances the effect of GABA, which is an inhibitory neurotransmitter. It also reduces the excitability of neurones in the brain by increasing the uptake of chloride ions.10 Midazolam also impairs episodic memory.11

Rationale for the use of the intranasal route
The nasal route is a very attractive method of delivery due to the rich vascular plexus (Figure 1) that is present within the nasal cavity and the ease of accessibility to this vascular bed, allowing delivery of medications directly to the blood stream.12 Other techniques of transmucosal sedation, including sublingual, are described in the literature, but often require a greater degree of patient cooperation.

The safest way to administer the agents in conscious sedation is by titrating them against the patient’s response, and this is the recommended technique for intravenous sedation with midazolam. Intranasal administration of midazolam is, in effect, a bolus dose technique.

The potential for over-sedation is greater with bolus dose techniques. It is standard practice that, for all techniques where midazolam is used to produce conscious sedation, an intravenous cannula should be placed, as the patient may require reversal. For this reason, the technique should only be used by dentists and sedationists who are fully trained and competent in cannulation and should not be seen as a technique to provide sedation for patients with difficult IV access. The same standards of monitoring apply as for intravenous midazolam sedation.
Intranasal Midazolam Dosing

It is widely accepted that the standard dose for IN midazolam is 0.25-0.3mg/kg body weight up to a maximum of 10-12mg given as a single bolus dose. This bolus can be repeated if the patient is not adequately sedated. The bolus can also be increased or decreased. This bolus dose initially seems very high. Veldhorst-Janssen found a mean bioavailability of 82.4% for IN administered midazolam, this would equate to a dose of around 8.24mg of midazolam. This technique has a high record of safety, and Manley conducted an audit of 222 episodes using this technique. Only one episode of significant desaturation was recorded, which responded with the administration of oxygen.

Some patients are tolerant to midazolam. In these patients, the standard dose may not be sufficient to produce an adequate degree of sedation to allow dental treatment to be completed. In some cases, it may be possible to place an intravenous cannula and titrate midazolam to the endpoint. In others, there may be insufficient anxiolysis to allow the patient to accept cannulation. If the patient cannot accept either cannulation or treatment, it is often recommended that they are allowed to recover and reappointed either to have an increased dose of sedative or treatment under general anaesthesia.

To allow treatment to proceed as planned, an appropriately experienced sedationist might consider giving a supplemental intranasal dose of midazolam. The decision as to whether to give the additional dose and, if so, how much to give and when, must be judged by careful patient assessment, including their response to the initial dose. The potential for over-sedation should not be underestimated. This procedure should not be a matter of routine, but a considered judgement taken case-by-case. The second dose would normally be no greater than 50% of the initial dose. The authors would only consider using this approach when the 40mg/ml presentation of midazolam is used.

The technique involves the administration of two bolus doses of midazolam. The advantages of titration vs bolus doses have already been discussed. The administration of a second bolus dose will increase rather than decrease the unpredictability. This technique, whilst practised in a number of centres has not been the subject of any clinical trials, and so must be viewed as the personal opinion of the authors. A third dose should not be administered.

Protocol for Intranasal sedation

The patient must go through a pathway of selection, assessment, history, examination, contraindications and consent. These processes should follow the IACSD standards and are described in the relevant texts. Table 1, outlines a practical protocol which can be followed. IN 40mg/ml midazolam + 2mg/ml Lidocaine is prepared in boxes of five ampoules. Each ampoule has a volume of 0.5ml, thus 10mg of Midazolam would equate to 0.25ml of solution. A Luer lock syringe must be used to attach the MAD
device, as this prevents the mucosal atomisation device (MAD) from detaching during application.

The MAD is locked onto the syringe and then placed into the right or left nostril and the bolus is given (Figure 3). It may helpful to stand behind the patient’s head and use safe holding to gently brace the head when working with patients who might not be able to stay still. If given successfully, the effects should occur within 10-12 minutes, at which point the patient should be cannulated. If the sedation is not sufficiently effective after 12-15 minutes, a decision needs to be taken as to the next course of action, as described above.

### Cases

**Patient 1**

An eighteen-year-old male attended with his parents. He complained of pain in the lower left quadrant. He presented with a mobile tender LL4. He also had an UL1 with an incisal edge fracture. Medically, the patient had adult learning difficulties, was partially deaf and was undergoing testing for Marfan’s syndrome. He communicated with sign language and picture cards on his ipad. All previous treatment had been conducted under general anaesthetic.

The options for treatment were discussed, and a treatment plan was formulated which involved the extraction of the LL4 tooth and the restoration of the UL1 tooth under conscious sedation using IN Midazolam. The patient was consented with best interests. A 10mg dose of IN midazolam was administered in the right nostril, and after approximately 12 minutes the patient was sufficiently sedated to allow cannulation. We were able to extract the LL4 and restore the UL1 without providing the patient with supplemental intranasal midazolam or intravenous midazolam. Pulse, SpO2, and blood pressure remained normal throughout the treatment.

**Patient 2**

A seventy-year-old woman attended the clinic in pain with her husband, who is her carer. Medically, the patient suffers from dementia and can only manage to sit down briefly for dental examinations before getting up and walking around the surgery. On examination, UR6 was symptomatic.

Options were discussed. The plan agreed involved extracting the tooth with IN Midazolam conscious sedation, and if that failed, to extract the tooth under general anaesthetic. The patient was consented with best interests.

A 10mg dose of IN midazolam was administered, and after approximately 12 minutes the patient was sufficiently sedated to allow cannulation. The patient was adequately sedated to allow the extraction of the tooth without the need for additional intravenous midazolam. Pulse, SpO2, and blood pressure remained normal throughout the treatment.

**Lessons from these cases histories**

These two patients had very different needs. Intranasal midazolam (40mg/ml midazolam and 20mg/ml lidocaine) is an off-licence...
medication, and that must be explained and documented as part of the consent process. The first patient with good support managed to have dental treatment using intranasal sedation. This case shows the benefits to both patient and carers. The fact that the patient was not required to starve made his parents’ lives much easier. His parents commented that, as treatment was conducted in familiar surroundings, the episode was less distressing for their son.

The second patient, with the help and support of her husband, managed to have an extraction using intranasal sedation. The patient’s husband was keen to avoid general anaesthetic for his wife when we realised that the treatment plan would involve the extraction of a tooth. The patient was not required to starve prior to treatment, and the total time in which the patient remained in the clinic from admission to discharge was significantly shorter than if she had undergone general anaesthesia. After treatment, the patient’s husband wrote a thank you card and admitted he had been sceptical of the technique, but that it had made things much easier for both him and his wife.

There are some patients who will never accept dental treatment under local anaesthesia without additional pharmacological intervention. Conscious sedation with intravenous midazolam has bridged the gap between dental treatment with local anaesthesia and general anaesthetic, but only if the patient can tolerate cannulation. A significant number of patients with cognitive impairment find accepting any form of injection impossible to tolerate. Both the patients would most likely have been offered extractions under general anaesthetic as the only option for treatment. The use of IN sedation in the special care dentistry department allowed these patients to receive a full spectrum of dental care. There are also a large number of needle-phobic individuals for whom IN sedation offers the chance to access dental care.

Adverse effects, risks and contraindications

The risk from IN administered conscious sedation is the same as for IV midazolam. Some patients have complained of a blocked or runny nose for 24 hours, and teary eyes. The method is contraindicated in patients who suffer from nasal polyps, in patients with cold- and flu-like symptoms, and for patients who suffer from regular nose bleeds. An absolute contraindication is that this technique must not be carried out by practitioners who are not experienced in cannulation, as there would be no way to reverse the patient if required. It is, however, sometimes difficult to administer the solution to patients with challenging behaviour. Training in safe handling is required if considering using this technique in people with special needs and challenging behaviour.

Initial Results

The Special Care Dentistry Department at Dorset County Hospital has seen great early success with this technique. 17 patients received a standard dose of 10mg of Midazolam. This was administered either as a single dose, repeated or used with or without additional IV midazolam or IV propofol. All the patients were men and women over the age of twelve and were ASA 1 or ASA 2. There were two cases of desaturation below 92%, which responded to oxygen and encouraging the patient to breathe. Two patients experienced epistaxis: one patient with learning difficulties placed his fingers in his nose which caused a resultant bleed, and the other had a spontaneous bleed a few minutes after the IN bolus was given.

Flumazenil use

Flumazenil was administered to three patients who had moderate to severe behavioural difficulties. The patients all had normal vital signs. Flumazenil was administered to these patients to improve disorientation rather than reverse any ill effects from over sedation. As discussed, this technique of conscious sedation is new to the department and the cohort of patients is very small.

Discussion

The technique involving the titration of intravenous midazolam has allowed many patients to access dental care, including those with special needs and needle phobias who have previously been unable to receive dental treatment with the IV technique. The intranasal technique could be beneficial to these patients. IN midazolam application is a basic technique provided that the practitioner can demonstrate competence in intranasal sedation.1 The technique of IN sedation is not as widely used as IV sedation, however, research has found it effective and safe; Manley et al.10 found that in 222 episodes of sedation, 128 (57.65%) accepted treatment.

Conclusion

The purpose of this paper was to demystify the use of IN midazolam as a technique in conscious sedation. This paper also outlines a practical protocol which other clinicians could follow in their own practices for administering IN midazolam. The Special Care Dentistry Unit at Dorset County Hospital is within a teaching hospital, and our sedation service is consultant anaesthetist led. At the time of writing in 2015, the technique had been in use within the department for a period of six months. The initial results have been very positive.

Acknowledgements

The authors would like to thank Grace Drysdale, the amazing staff at the Special Care Dentistry Unit at Dorset County Hospital, and give a special thank you to Dr David Craig for second chances.

Conflict of interest

No conflict.

Sources of Funding

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Can Clinical Hypnotherapy be used as an adjunct or an alternative to Conscious Sedation in Dentistry?

Munir Ravalia  BDS MFDS RCS Pg Cert Sed DCHyp
General Dental Practitioner
Medical Clinical Hypnotherapist
Wimbledon, UK

Introduction:
The Diagnostic and Statistical Manual of Mental Disorders’ defines “Specific Phobia” as being when “the individual experiences excessive and persistent fear of a specific object or situation, experiences feelings of anxiety, fear, or panic immediately upon encountering the feared object or situation, leading to significant distress or interference in the person’s day-to-day life.” Odontophobia is well recognised and encountered at differing levels by all dental clinicians.

The General Dental Council’s ‘First Five Years’ encourages the awareness ‘of the existence and a range of complimentary therapies’. Currently, many would define hypnotherapy like acupuncture to be a complimentary therapy, however, clinicians trained in these fields may argue otherwise!

The aetiology of dental phobia is multifactorial and may include: direct experiences (learning); modelling; helplessness and perceived lack of control. It can commonly arise from a process known as conditioning, a process of behaviour modification whereby a subject comes to associate a behaviour with a previously unrelated stimulus. The conditioning effect of a bad dental experience has been shown to be one of the most important; Ragnarsson, found that more phobic people than anxious ones attributed their fear to an adverse incident (90.5% vs. 65.8%). In children, conditioning may be only one of a number of factors implicated in the development of dental anxiety, though reports of traumatic experiences were significantly more frequent in anxious than non-anxious children in one study. Which dentist hasn’t experienced a child sitting in the surgery in pain, their parents warning them on the way into the surgery that if they don’t co-operate, the ‘nice’ dentist will stick a long needle in their mouth? Truly a recipe for disaster; the parent’s potential misconceptions or past experiences manifesting as potential fears, which whether well-founded or not, are passed like tracing paper straight to their child. The Chief Medical Officer noted the highest admittance to general anaesthesia in UK between 2014 and 2015 was for dental caries. Whether this was because of the extent of treatment required or the inability of the child/parents to cope in a general practice setting, is yet to be analysed.

Aims and Objectives:
The aim of this paper is to examine and analyse the use of hypnosis in relation to dental sedation. The object is to explore the following:
1. Causes of dental phobia and anxiety
2. What is conscious sedation, Cognitive Behavioural Therapy (CBT) and clinical hypnotherapy?
3. Indications for their use
4. Hypnotherapy uses in phobia, desensitisation techniques.
5. Hypnotherapy use as an adjunct to reduce sedative drug regimen
6. Reasons for its under-utilisation in clinical practice and stigmas attached to it
7. Recommendations

Methods:
This paper was informed by, a literature search using Pubmed; direct interviews with clinical hypnotherapists and finally, the Author’s personal reflections from working in this field.
Scale (MDAS), a short questionnaire that may be completed in a few minutes by the patient. It consists of five questions and gives a total summed score between 5 and 25 that is then translated by the dentist to a rank score of 1-4 which can be entered into the IOSN.8

<table>
<thead>
<tr>
<th>Indicator of Sedation Need (IOSN)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATRIX TO BE COMPLETED BY THE DENTIST</strong></td>
</tr>
<tr>
<td><strong>SEDATION NEED domain 1 + 2 + 3 scores</strong></td>
</tr>
<tr>
<td>Total Rank Score</td>
</tr>
<tr>
<td>3-4</td>
</tr>
<tr>
<td>5-6</td>
</tr>
<tr>
<td>7-9</td>
</tr>
<tr>
<td>10-12</td>
</tr>
</tbody>
</table>

This same scoring system could quite easily be adapted to produce an Indicator of Hypnosis Need. (IOHN). It could be adapted to include appropriate factors used to assess suitability for clinical hypnosis, such as past experience of the technique, awareness and bias to the technique as well as failed hypnosis in the past.

As such, hypnosis could be very useful for patients who are ASA III, enabling them to be treated safely in General Dental Practice, and not requiring to be referred to hospital.

**What is Conscious Sedation?**

The Poswillo Report in 19997 criticised the then existing definitions of sedation on the grounds that they failed to emphasise the essential basic element of hypnotic suggestion and reassurance, and emphasised central nervous system depression, rather than mood alteration. Its principal recommendation was that simple dental sedation be defined as “a carefully controlled technique in which a single intravenous drug or a combination of oxygen and nitrous oxide, is used to reinforce hypnotic suggestion and reassurance in a way which allows dental treatment to be performed with minimal physiological and psychological stress”.9

However, even today the standard definitions of conscious sedation are unchanged and do not take this into account.

Conscious sedation is presently 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.”10

Commonly used techniques for sedation include inhalation with Nitrous Oxide/Oxygen, and oral, intranasal, and intravenous techniques, with intravenous Midazolam being the single most commonly used sedative agent. Inhalation or relative analgesia, is underutilised in general dental practice but is a very safe and predictable technique.

**What is Clinical Hypnosis?**

Clinical hypnosis can be defined as a technique of deep relaxation, within which the individual becomes highly suggestible.8 It is quite often described as the medicine of imagination. The term “hypnosis” has been around since the early 1840’s, there are documented records of hypnosis going back 3000 years in Egypt and China. Ibn Sina (Avicenna), a respected 11th century Persian physician and psychologist, was the earliest to make a distinction between hypnosis and sleep. In his book, ‘The Book of Healing’, published in 1027,11 Avicenna referred to hypnosis in his Arabic text, as the ‘pleasant dreamy imagination’, stating that one could create conditions in another person so that they accept the reality of hypnosis.

There are two well defined and recognised types of hypnosis; stage hypnosis and clinical hypnosis. Stage Hypnosis is conducted for the purposes of entertainment and subjects are often pre-selected to be those of higher suggestibility, to ensure the desired outcome of entertainment, and those found not to be co-operating are quickly eased off stage. Clinical hypnosis is conducted with the full co-operation of the patient and such that the hypnotist makes suggestions designed to help the patient calculate specific internal processes (memories, feelings, images, etc.) that will lead to mutually agreed-upon outcomes.

How does clinical hypnotherapy work in a dental setting? Dental phobia is very common and even though informal hypnotic (suggestions of relaxation etc.) techniques are used by dentists on a daily basis for patients undergoing routine dental treatment, formal hypnotherapy does not enter most clinician’s minds. Specific phobias have been treated using psychological hypnotherapy12 but the treatments of choice have been systematic desensitisation with or without hypnosis.13

A study14 was carried out, in which interestingly, the authors talk of the term ‘Hynpo-sedation’. Their findings concluded that for hypno-sedation to be effective, it is necessary for the patient to be motivated, co-operative, and attentive to the suggestions of the hypnotist. Unco-operative patients with short attention spans are poor candidates for hypnotic techniques.

Hypnosis for sedation, especially for children, has been shown to reduce the amounts of propofol and lignocaine required, with accompanying reductions in pain, nausea, fatigue, discomfort and emotional upset.15

**Indications for Hypnotherapy and Conscious Sedation:**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Hypnotherapy</th>
<th>Conscious sedation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental anxiety and needle phobia</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pronounced gag reflex</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Complex surgical procedure</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Differences between Hypnotherapy and Conscious Sedation

<table>
<thead>
<tr>
<th>Table Note:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Glove analgesia</strong> = a Hypnotherapeutic technique taught to patients, which allows them to envisage that a hand has been rendered essentially numb, and they can then transfer this lack of sensation to other parts of the body.</td>
</tr>
<tr>
<td>It should be noted that the terms ‘Moderate Sedation’ and ‘Deep Sedation’, are descriptions of sedation that do not conform to the UK guidelines for ‘Conscious Sedation’.</td>
</tr>
<tr>
<td>Cognitive Behavioural Therapy is a well-known technique and is a psycho-social intervention. CBT is a talking therapy that can help a patient manage their problems by changing the way they think and behave. It focuses on the development of personal coping strategies that target solving current problems and changing unhelpful patterns in cognitions (e.g. thoughts, beliefs, and attitudes), behaviours, and emotional regulation.</td>
</tr>
<tr>
<td>Recent research on hypnotherapy is increasingly focused upon the integration of hypnotherapy and CBT. In 1995 Kirsch’s research team pooled data from 18 separate controlled studies to include 577 participants, and compared the efficacy of cognitive-behavioural hypnotherapy with CBT alone. They showed that for between 70-90% of clients, cognitive and behavioural therapies were more effective when integrated with hypnosis, i.e., that for the vast majority of clients cognitive-behavioural hypnotherapy is superior to CBT alone. &quot;We believe on the basis of our clinical experience that when behaviour therapy and hypnosis are used together, a synergistic effect results.&quot;</td>
</tr>
<tr>
<td>Stage 1 involves the identification of an anxiety-inducing stimulus hierarchy, Subjective Units of Distress Scale (SUDS). This is a scale of from 0 to 100 for measuring the subjective intensity of disturbance or distress currently experienced by an individual. Stage 2 is the learning of relaxation or coping techniques. Once the individual has been taught these skills, they must use them in stage 3 to react towards and overcome situations in the established hierarchy of fears. The goal of this process is for the individual to learn how to cope with, and overcome the fear in each step of the hierarchy.</td>
</tr>
<tr>
<td>Hypnoanalysis can be used to discover the root cause of the fear allowing the issue to be addressed. Hypnosis is used to train the unconscious mind and re-evaluate thinking patterns and behaviour.</td>
</tr>
<tr>
<td>In clinical hypnosis, the patient is guided by the hypnotist to suggestions for changes in subjective experience, alterations in perception, sensation, emotion, thought or behaviour.</td>
</tr>
<tr>
<td>In a study conducted in Hungary which examined 45 odontological patients, hypnotis proved to be a useful adjunct method to reduce anxiety for 84.4% of the patients.</td>
</tr>
<tr>
<td>In a prospective comparative clinical study, researchers evaluated the effectiveness of hypnosis using 45 highly anxious and non-anxious patients who had to undertake maxillofacial surgery. They were assessed based on the following objective parameters: EEG, ECG, heart rate, blood pressure, blood oxygen saturation and respiratory rate. The results both during and subsequent to the surgery showed that hypnosis helped patients significantly to reduce systolic blood pressure and respiration rate, and changes in the EEG were also registered. Moreover, the subjective level of relaxation increased at the same time as the neurophysiologic anxiety reactions (vital parameters) decreased. The authors concluded that hypnosis influenced both the psychological and the physiological reactions of dental anxiety during surgery and the results had long-term effects in future treatments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Differences between Hypnotherapy and Conscious Sedation</th>
<th>Hypnotherapy</th>
<th>Minimal Sedation</th>
<th>Moderate Sedation</th>
<th>Deep Sedation</th>
<th>General Anaesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of consciousness</strong></td>
<td>Light/medium/Deep trance like state. Responses to verbal commands.</td>
<td>Normal response to verbal commands - anxiolysis</td>
<td>Purposeful response to verbal commands - light touch</td>
<td>Purposeful response to repeated painful stimuli</td>
<td>Unconscious</td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td>Verbal</td>
<td>Verbal</td>
<td>Light touch</td>
<td>Painful stimuli</td>
<td>Nil</td>
</tr>
<tr>
<td><strong>Airway</strong></td>
<td>Maintained</td>
<td>Maintained</td>
<td>Maintained</td>
<td>Maintained/lost</td>
<td>Obstructed</td>
</tr>
<tr>
<td><strong>Ventilation</strong></td>
<td>Maintained</td>
<td>Maintained</td>
<td>Maintained</td>
<td>Maintained/lost</td>
<td>Inadequate</td>
</tr>
<tr>
<td><strong>Anaesthesia</strong></td>
<td>Gloves analgesia technique can be used to render no requirement for LA</td>
<td>Still required</td>
<td>Still required anaesthesia</td>
<td>Still required</td>
<td>Complete</td>
</tr>
</tbody>
</table>

**Table Note:**

The main hypnotherapeutic technique utilised is based on a process known as systematic desensitisation, a behavioural technique commonly used to treat anxiety disorders, fear and phobias. Systematic desensitisation uses the principle of reciprocal inhibition. It is commonly referred to as graduated exposure therapy and is a type of Pavlovian therapy developed by a South African psychiatrist, Joseph Wolpe. The process of systematic desensitisation occurs in three stages.
More recently, a further study noted that surgery is associated with significant anxiety and stress in a majority of patients. Most medications used to achieve anxiolysis and sedation are limited by their side effects. ‘Non-pharmacological hypnosis’ is defined as a subjective state, during which alterations of perception and memory can be elicited by suggestions. The results found were significantly relevant to those in clinical practice. Hypnosis successfully reduced anxiety from a range of 45 to 90 (median of 60) to a range of 1 to 20 (median of 10). When calculated and analysed as means, the mean decrease was 56 (95% CI: 51.81, 60.04) (p<0.001). Twelve of fifteen patients had their intravenous access established under hypno-analgesia with no memory of that event. Thirteen patients had successful prevention of nausea and vomiting without anti-emetics. Hypnosis also decreased the dose of induction agent required in all patients having general anaesthesia.

A further study noted that the main objectives of premedication in children are to facilitate the separation from the parents, to reduce pre-operative anxiety, to smooth the induction of anaesthesia and to lower the risk of post-operative behavioural disorders. Hypnosis enables a state of relaxation to be achieved but has never been evaluated as a premedication technique. The aim of this study was to evaluate the efficacy of hypnosis on anxiety and peri-operative behavioural disorders versus midazolam. The authors concluded that hypnosis seemed effective as premedication in children scheduled for surgery. It alleviated pre-operative anxiety, especially during induction of anaesthesia and reduced behavioural disorders during the first post-operative week.

When behavioural treatments have been compared to general anaesthesia, both produced a reduction in dental anxiety but more of the patients treated behaviourally were able to successfully complete dental treatment. 78% vs. 53% of the GA patients, which may be a difficulty, as behavioural management seemed to produce more anxiety reduction when compared to intravenous sedation, and further, that more patients maintained high levels of dental anxiety following IV sedation.

Interestingly, another paper found that midazolam requirements were significantly lower in the hypnosis group (P < .001) as compared with the intravenous sedation group: respectively, 0.04 +/- 0.002, 0.07 +/- 0.005, and 0.11 +/- 0.01 mg/kg/h. Greater patient satisfaction with the anaesthetic procedure and greater surgical comfort were also reported in the hypnosis group. They went on to conclude that successful hypnosis, as an adjunct sedation procedure to conscious IV sedation, provided better pain and anxiety relief than conventional IV sedation and allowed for a significant reduction in midazolam and alfentanil requirements.

### Hypnotherapy- Conscious Sedation procedure

<table>
<thead>
<tr>
<th>Stage</th>
<th>Hypnotherapy</th>
<th>Conscious sedation- single drug</th>
<th>General Anaesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre op</strong></td>
<td>No stimulants such as coffee, nicotine, mind altering drugs</td>
<td>+/-Oral premed/EMLA</td>
<td>+/-Premed/EMLA</td>
</tr>
</tbody>
</table>
| **Induction** | Techniques include  
1. Simple eye closure  
2. Rapid Eye defocusing  
3. Tactile Induction  
4. Eye fixation/Eye roll | Titrated Midazolam            | Induction agents         |
| **Deepeener** | Techniques include  
1. limb catalepsy  
2. 10-1 countdown  
3. Hand rotation  
4. Limb heaviness | Increased Titrated Dose to response | Increased drug usage- e.g. opiates/propofol |
| **Maintenance** | Continued suggestions                                                        | Titration- Midazolam          | IV/Inhalational        |
| **Recovery** | Awakening technique                                                         | Sedative stopped              | Reversal agents        |
| **Side Effects** | Very rare                                                                    | Amnesia                       | Nausea/vomiting        |

**Table Note:**

**Induction:** An hypnotic induction is the process undertaken by a hypnotist to establish the state or conditions required for therapy to occur. Various techniques can be utilised, but essentially the aim is to render the patient into a relaxed state, with full eye closure.

**Deepeener:** Once the patient has been induced into a hypnotic state, a deepener is used to render the patient in a much deeper state, to be able to listen to the positive suggestions of the therapist. Again multiple techniques can be utilised (only a few have been given as examples).

**Awakening:** At the end of the session, patients must be woken fully, so they are fully cognitively back in their normal state, similar to awakening someone who has been in a deep sleep, but in a very precise and controlled manner.
Author’s Reflections:

Clinical hypnotherapy is not mentioned in the Royal College of Surgeons’ clinical guidelines for non-pharmacological behaviour management, however, the author believes it is a crucial frontline behaviour management technique for patients.28,29

Sharon Waxkirsh, a specialist dental clinical hypnotherapist conducted self-hypnosis for her own wisdom tooth removal with control of post op blood flow. Ms Waxkirsh says “I hypnotised myself and it is so effective. It didn’t ever become painful, and I didn’t have any blood loss at all.”27

Ms Waxkirsh kindly related to me her experience and thoughts on this topic. Paediatric patients, she describes, often need parents to be involved. She told me of a case where a child took three days for the effects of general anaesthesia to wear off. This scared the father and he decided to seek Sharon’s help, “You have to play the game, put the child in a place where they feel in control”. She used the glove analgesia technique to create numbness in the child and his father by using a special word to trigger this numb feeling. When describing the subconscious mind, Waxkirsh states, “Techniques are one thing but dealing with what emerges is another”.

A highly respected and leading dentist in this field, Dr Mike Gow describes, “In one case, hypnosis was used instead of local anaesthetics in a sinus lift procedure and implant placement and, in another case, I demonstrated hypnosis being used instead of local anaesthetic for the extraction of two upper incisors with immediate implant placement.”30,31

The author’s personal experience highlights the use of such a technique successfully being able to treat several patients who had a severe phobia to dentistry or uncontrolled gag reflex. In one case a patient was told by a leading UK teaching hospital there was nothing that could be done for her due to her pronounced gag reflex. She was managed successfully with a combination technique - hypnotherapy combined with conscious sedation and then hypnotherapy alone.

Recommendations and Conclusion:

Clinical Hypnosis has been used successfully in the medical and dental fields to effectively manage anxiety and fear. Patients achieve lower scores on Dental Anxiety Scales post-operatively following hypnosis and also report decreased anxiety for follow up appointments. Hypnosis is monetarily inexpensive and has a very low risk of side effects. Hypnosis may very well be a safe alternative to conscious sedation and general anaesthesia.

There are well researched and evidence-based empirical studies supporting the benefits of hypnosis as an adjunct technique in dentistry. Ancedotal evidence by the authors who currently use this technique is also present. On the basis of available evidence, further research in these areas is justified.30

Dentists should be encouraged to explore further the use of formal hypnotic techniques. This would not only assist patients to cope better with treatment, but also reduce costly health care bills and the need for hospitalisation.

It is the Author’s opinion that clinical hypnosis is a reasonable alternative and adjunct to conscious sedation and can be utilised, as long as the patient is willing to accept it, as a conjunctive therapy. In answer to the question thus posed by this paper, Can Clinical Hypnotherapy be used as an Adjunct and or an Alternative to Conscious Sedation in Dentistry? Yes it can, by correctly trained clinicians and based, as with anything, on correct case selection.

Hypnosis could be a powerful tool at the disposal of the dental surgeon, but is rarely exploited. However, this does not rule out the need for conscious sedation and general anaesthesia in selected cases.

Sadly there is a lack of training in this field. There is a lack of appropriately trained dentists offering hypnosis, and this will affect both the patient’s awareness and access to clinical hypnosis.32,33 Courses are available but the minefield of organisations training in hypnotherapy becomes a little overwhelming. Those dentists who are trained in this field find it difficult to utilise hypnotherapy for NHS patients, as there is no funding for it, hence it becomes a management option only for those who can self finance it. A serious question to pose would be ‘should it be taught at sedation courses?’

Based on this review, there is an obvious need for further investigation and research, but it may well be time those dictating dental policy and dental professionals alike, started looking outside the conventional. Maybe so-called ‘alternative’ techniques might not be as alternative as they currently are, but become integrated into dental undergraduate training as a mainstay of dental behavioural management. From the information provided it can be said that hypnosis can be used as both an adjunct and main intervention for dental fear.

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Audit of written patient information for Conscious Sedation across a Community Dental Service

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Abstract

Aim:
Background: New sedation guidelines have included best practice recommendations relating to written information provided for conscious sedation that is provided to dental patients. The audit presented here compares the currently available patient information within one community dental service against standards derived from the new guidance, along with the availability and quality of the literature provided to patients.

Method: All patient information sheets, relating to dentist provided forms of conscious sedation from 10 sites of a community dental service, were collected. The collected sheets were then compared against pre-defined criteria, derived from national guidelines.

Results: There was insufficient available patient information in relation to patient options, age-appropriate information, material for the learning disabled, and separate information sheets for escorts currently available at any site. The quality of available information was variable, with areas for improvement including: out of hours contact details, subjective feelings of sedation, and descriptions of the dental procedures. Practical preparation of the patients, as well as risks and benefits, were well documented.

Conclusion: This audit highlights that the new guidance places new best practice standards on the written information that we provided to patients, and indicates areas of potential change that may need to be addressed.

Introduction

It is widely recognised that written patient information is a valuable adjunct to the consent and patient preparation process for elective procedures. This has been recognised in the consensus guidelines relating to conscious sedation in a dental setting by the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) recommending that;

“… the healthcare team makes available both verbal and written information of high quality in a form that is easily assimilated by patients, their parents or carers.”

It is also a recommendation of the new commissioning guidelines that content must be age and capacity appropriate also forming part of the SAAD sedation checklist. Furthermore, the IACSD documentation recognises the need for high quality care to involve audit and reflection, which is also echoed by the recently SDCEP guidance on the same topic.

The Harrogate and District Foundation Trust incorporates a large geographical area, and includes 10 sites in which sedation is carried out. Dentist led sedation is limited to basic techniques across all sites, with additional advanced techniques being anaesthetist led in the service, and as such excluded from this audit. Whilst it is recognised that the needs of services vary, the audit presented here may form a useful template for local audits on this topic.

Aims

• The availability of information for different patient groups seen within our service
• The quality of available the information that is provided compared against the standards laid out in the IACSD guidelines

Materials and Methods

The following patient user groups of our conscious sedation services were identified as: Adults, Younger children (6-12), Older children (12-16), Parents, Carers, Escorts and Learning-disabled adults – with intravenous sedation not being routinely offered to those under 16. Once identified this was further broken down into what patient information should be available to each group, with agreement from the sedation leads for the service, shown in Table 1. The following patient groups for inhalation sedation should have written information available: Adults, Parents of children younger than 16, Older Children, Younger children, Escorts/Caregivers and Easy Read. This should include separate age appropriate information, and separate sheets for instructions for escorts. Furthermore, information relating to intravenous sedation should be available for: Adults, Carers and Escorts. This should include easy read information for the learning disabled, and separate instructions for escorts.
Information was collected with a request to every clinic within the service providing sedation via e-mail to provide all information currently provided to any patient, or available to be provided in the clinics. This was then followed up by phone for non-responding clinics. The availability of patient literature at each clinic was recorded. Each information leaflet provided was then assessed for quality by a single auditor. All data were recorded and analysed in Microsoft Excel. They were assessed for quality against the recommendations for written patient information adapted from the IACSD guidance.1 These can be seen in Table 2, please note that not all standards are required for all types of written patient information.

Results

Response rate
All 10 sites carrying out inhalation sedation responded, with the 3 sites that were carrying out dentist led intravenous sedation also providing IVS related patient information.

Availability of information
All sites had appropriate written patient information relating to inhalation and intravenous sedation, if carried out on that site. Written information relating to options was sometimes present, but never as a separate information sheet. No site had separate age appropriate information to provide to children (older or younger) relating to conscious sedation, but was, in part, included in the

<table>
<thead>
<tr>
<th>Service User Group</th>
<th>Conscious sedation information type</th>
<th>Parent / Carer</th>
<th>Adult</th>
<th>Learning Disabled</th>
<th>Escort (if required)</th>
<th>Age specific information</th>
<th>Young Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation sedation</td>
<td>Sedation information</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Care Instructions</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Intravenous sedation</td>
<td>Sedation information</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Care Instructions</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 1 – Table showing user groups identified and the patient information required for each user group

Table 2 – Showing quality standards used in the audit

<table>
<thead>
<tr>
<th>Standard Required for:</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Information Sheets</td>
<td>Description of the sedation procedure that has been suggested and recommended as the most appropriate</td>
</tr>
<tr>
<td></td>
<td>Benefits</td>
</tr>
<tr>
<td></td>
<td>Risks</td>
</tr>
<tr>
<td></td>
<td>Alternatives</td>
</tr>
<tr>
<td></td>
<td>Subjective feelings during sedation</td>
</tr>
<tr>
<td></td>
<td>Subjective feelings after the sedation</td>
</tr>
<tr>
<td></td>
<td>Contact details of the care provider</td>
</tr>
<tr>
<td></td>
<td>Out-of-hours contact details for emergency advice and services</td>
</tr>
<tr>
<td>Adults and Young People</td>
<td>Instructions regarding the practical arrangements to be followed pre- and post-operatively</td>
</tr>
<tr>
<td></td>
<td>Separate information sheet describing the responsibilities of the escort for the patient to give the escort (I.V. only)</td>
</tr>
<tr>
<td>Children</td>
<td>Separate age appropriate information regarding the sedation procedure</td>
</tr>
<tr>
<td>Sheets provided to those with Parental/Caring responsibilities</td>
<td>Information about the preparation of the child/patient prior to the appointment</td>
</tr>
<tr>
<td></td>
<td>Post-operative instructions for the sedation provided</td>
</tr>
<tr>
<td></td>
<td>Description of the dental treatment performed</td>
</tr>
</tbody>
</table>
Table 3 – Summary of availability of recommended patient information

<table>
<thead>
<tr>
<th>User group</th>
<th>Written information type</th>
<th>Percentage availability across clinics that offer this sedation (Number of clinics available/Number of clinics offering)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent/Carer</td>
<td>Patient options (separate)</td>
<td>0% (0/10)</td>
</tr>
<tr>
<td></td>
<td>Inhalation Sedation</td>
<td>100% (10/10)</td>
</tr>
<tr>
<td></td>
<td>Intravenous sedation</td>
<td>100% (3/3)</td>
</tr>
<tr>
<td>Adult</td>
<td>Patient options (separate)</td>
<td>0% (0/10)</td>
</tr>
<tr>
<td></td>
<td>Inhalation sedation</td>
<td>100% (10/10)</td>
</tr>
<tr>
<td></td>
<td>Intravenous sedation</td>
<td>100% (3/3)</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>Easy Read Inhalation sedation</td>
<td>0% (0/10)</td>
</tr>
<tr>
<td></td>
<td>Easy Read Intravenous sedation</td>
<td>0% (0/3)</td>
</tr>
<tr>
<td>Separate Escort information (if required)</td>
<td>Inhalation sedation (included in parent/carer/adult information)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Intravenous sedation</td>
<td>67% (2/3)</td>
</tr>
<tr>
<td>Younger Child</td>
<td>Inhalation sedation age specific information</td>
<td>0% (0/10)</td>
</tr>
<tr>
<td>Older Child</td>
<td></td>
<td>0% (0/10)</td>
</tr>
</tbody>
</table>

Table 4 – Summary of quality of written patient information sheets that were available.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Percentage of sheets meeting standards</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the sedation procedure that has been suggested and recommended as the most appropriate</td>
<td>89.29%</td>
<td>Where discussed general anaesthetic only</td>
</tr>
<tr>
<td>Benefits</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>Risks</td>
<td>85.71%</td>
<td></td>
</tr>
<tr>
<td>Alternatives</td>
<td>17.86%</td>
<td></td>
</tr>
<tr>
<td>Subjective feelings during sedation</td>
<td>57.14%</td>
<td></td>
</tr>
<tr>
<td>Subjective feelings after the sedation</td>
<td>46.43%</td>
<td></td>
</tr>
<tr>
<td>Contact details of the care provider</td>
<td>78.57%</td>
<td>5 Information sheets were still using outdated phone numbers</td>
</tr>
<tr>
<td>Out-of-hours contact details for emergency advice and services</td>
<td>3.57%</td>
<td></td>
</tr>
<tr>
<td>Instructions regarding the practical arrangements to be followed pre- and post-operatively</td>
<td>100.00%</td>
<td>Available in intravenous sedation, but not for inhalation sedation – not necessarily a requirement.</td>
</tr>
<tr>
<td>Separate information sheet describing the responsibilities of the escort for the patient to give the escort</td>
<td>11.11%</td>
<td></td>
</tr>
<tr>
<td>Separate age appropriate information regarding the sedation procedure</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Information about the preparation of the child/patient prior to the appointment</td>
<td>81.25%</td>
<td></td>
</tr>
<tr>
<td>Post-operative instructions for the sedation provided</td>
<td>71.43%</td>
<td></td>
</tr>
<tr>
<td>Description of the dental treatment performed</td>
<td>28.57%</td>
<td>Only related to LA administration</td>
</tr>
</tbody>
</table>
information provided to parents available at all sites. No information was available in an easy read format for the learning disabled. Information for escorts was available at all sites, but only available as a separate information sheet at 2 out of 3 sites where intravenous sedation was carried out. These findings are summarised in Table 3.

Quality of information available
A summary of the quality of the information that was available can be seen in Table 4. Red amber green (RAG) rating, where Red where <50 percent, Amber between 50 percent to 99% compliant and Green where 100 percent compliant.

Discussion
Availability of Patient information
This audit highlighted a large variability in the availability of patient information, despite trust wide protocols. This has likely risen through good intentions; all versions were provided in paper format derived from the originals; the different versions in use could have potentially arisen through use of a master paper copy opposed to using the updated digital copy. Consistency would provide clarity for patients as well as staff.

Supplemental information sheets for both children and escorts were not available, except for at some intravenous sedation clinics. Whilst information is often given chairside, it remains a time pressured environment, which is not ideal for patients or carers to digest information, and often escorts are not present at the assessments. This should therefore be a priority to rectify.

Furthermore, it is incumbent on clinicians to provide written information that is capacity appropriate – this includes maximising the ability for someone to consent as per the mental capacity act. Written information in an appropriate format can be a valuable adjunct to communication to both the carer and the patient.

Quality of patient information
It is acknowledged that many of the omissions found in the information sheets will already form part of the clinical consultation, however, written information is recommended. Descriptions of the sedation experience are given as part of the written information provided, and whilst one individual’s experience of any form of sedation varies from another, a patient’s expectations should be managed in a reasonable manner. Providing written information is one way of carrying this out in both a measured, consistent and recorded way.

It is perhaps not surprising that when information sheets are written the benefits are emphasised over the risks – but in several cases, there were no mention of risks at all (such as sedation failure). Considering the Montgomery test level of consent, it is vital that all material risks that a reasonable patient would expect to know are included. It should be noted that risks and benefits were well presented on the current patient information in use.

The alternative forms of sedation (or other methods of anxiety control) are again probably being discussed as part of the clinical assessment, and are been offered by either availability or patient factors. There were 2 sites that had information sheets that briefly mentioned general anaesthetic as an alternative. However, with patient choice and informed consent being paramount, a written summary of all alternatives would be useful for the patient, carer or guardian.

The subjective feelings, both during and after sedation, are recommended to be included by the IACSD guidelines. This can be improved, and may reinforce some of the sedations effects by suggestion, as well as preparing the patient for their sedation journey.

Contact details for the clinic attended were presented in most cases, though the contact details on 5 information sheets were using out of date phone numbers. The details for which service to contact if there were any out of hours’ concerns were very poor; although signposting occurs on some answer phone messages, it is considered best practice that emergency contact numbers are detailed on the information we provide to patients, as this is likely their first port of call should a problem occur out of hours.

Pre-and post-sedation instructions for all available information sheets were excellent, and presented in a clear format and will be hopefully carried through to any new information leaflets developed.

Information provision to parents/carers regarding pre-and post op instructions is well presented across all information sheets. The guidelines recommend that a description of the dental treatment is provided, this would typically be individualised, and included on the written consent. Therefore, it could be reasonably be argued that treatment details should only be included in broad terms on information sheets.

Actions taken
- Revision of patient information relating to dentist conscious sedation service wide
- Creation of new “easy read” formats for sedation types used in the service, samples of which can be seen in Figure 1 developed in conjunction with learning disability team
- Creation of new age appropriate patient information – adapted from royal college guidelines
- Added to audit schedule for annual re-audit

![Figure 1 – Samples of new “Easy Read” versions of written patient information](image-url)
Conclusions

At the time of writing 2 years have passed since the publication of the IACSD guidance, which has been accepted as the standard UK wide with SDCEP publishing its report in early 2017. Both acknowledge the advantages of written patient information as part of the consent process. Patient literature is only a tool for obtaining consent, and should always be used in conjunction with a full assessment and discussions with patients. Comprehension of the information provided should always be checked with the pertinent person. This audit brings into focus and areas where written patient information may require changing to adhere to best practice standards.

References


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

For further details or to arrange an evaluation
Please contact fiona@saad.org.uk
A Cautionary Tale of the Use of Midazolam

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Abstract
Midazolam is a short-acting benzodiazepine which is anxiolytic, causes anterograde amnesia and has sedative properties and is therefore commonly used in conscious sedation to undertake dental procedures. Midazolam has a high safety margin with few severe adverse effects with appropriate usage. This paper is the first to describe two cases of injection-site reactions following intravenous delivery of Midazolam and aims to increase awareness amongst clinicians and nurses undertaking sedation.

Background
Common side-effects of Midazolam include drowsiness, confusion, euphoria as well as paradoxical reactions.1 Manufacturers have also stated the potential for anaphylactic and anaphylactoid reactions, a case of which has been reported in the medical literature.2 However, an additional resultant skin reaction has also been listed as an adverse effect of Midazolam in the British National Formulary, which has been termed an injection-site reaction.1 Injection-site reactions are rare and are defined as localised skin reactions which occur following intravenous delivery of a drug. Symptoms may include erythema, itchiness or tenderness. The following paper details two cases of injection-site reaction associated with intravenous Midazolam.

Case 1
A 27 year old fit and well female was referred to the Oral Surgery Department by her General Dental Practitioner for extraction of the lower left third molar, which was partially erupted and had been causing recurrent pain. On examination, the lower left third molar was partially erupted and horizontally impacted and she was listed for extraction under local anaesthesia with intravenous sedation.

Ten minutes after delivery of the Midazolam, she developed a rash initially at the cannula site which then spread superiorly to just above the antecubital fossa. The skin was not itchy and the patient’s observations were stable and there was no suggestion of an anaphylactic type reaction. There was no tenderness to palpation in the antecubital fossa or in the surrounding tissues and there was no evidence of extravasation. No further sedation was administered and within 15 minutes of intravenous administration of the Midazolam, the skin had fully recovered. The extraction was performed uneventfully. The patient and escort were informed and reassured. Having checked the British National Formulary, it was noted that this was an injection-site reaction secondary to Midazolam administration.

Follow-up
The patient was reviewed 2 weeks later and she confirmed no further skin reaction had arisen and she had remained asymptomatic.

Case 2
A 33 year old medically fit and well female was referred to the Oral Surgery Department for extraction of her lower left third molar due to recurrent pericoronitis. On examination, the lower left third molar was partially erupted and there was tenderness to palpation of the overlying operculum. The vertically impacted lower left third molar was scheduled to be extracted under local anaesthesia with intravenous sedation.

Five minutes after intravenous administration of the Midazolam, the same type of reaction as in Case 1 also occurred. Raised weals and erythema of the overlying skin above the antecubital fossa developed. There was no associated pruritus and again, observations were stable and there was no tenderness to palpation around the cannula site. As this was the second case in which this type of reaction had occurred, clinical photographs were taken. The reaction was transient following withholding of further titration with Midazolam. Following further careful administration of Midazolam, the skin reaction occurred again within 5 minutes and disappeared within 10 minutes (Figures 1a and 1b). Treatment was performed uneventfully and the patient and her escort were informed and reassured.

Figure 1 a) Transient skin reaction b) Resolution of skin reaction

Figure 1a)
Figure 1b)

Follow-up
The patient was reviewed 1 week later and she confirmed there had been no further rashes on her arms. Written consent was obtained to use the photographs for publication. At this stage, the tourniquet was also placed above the antecubital fossa and was left on for a time period equivalent to that required for venepuncture. The patient was monitored for 15 minutes thereafter. There was no skin reaction which confirmed the tourniquet could not be implicated as the cause. Therefore the changes in skin had occurred due to an injection-site reaction associated with Midazolam.

Conclusion
Cases of injection-site reactions related to Midazolam have not been reported in the literature or by the National Patient Safety Agency. Although these reactions are rare and are not concerning, any team undertaking sedation should always be vigilant when assessing whether a reaction is occurring due to a hypersensitivity reaction, potentially due to anaphylaxis or if it is the rarer injection-site reaction.

References
Cytotoxicity of Local Anaesthetics

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Abstract
The appropriate choice of local anaesthetic has a significant impact on patient management. The implementation of articaine in dental practice more than two decades ago vastly improved clinical care, particularly when involving more complex dental procedures such as oral or periodontal surgery. Clinicians would like to be supported by clear evidence regarding the indications and safety of local anaesthetics in dental patients. Some controversies associated with the use of articaine for inferior alveolar nerve block still exist, despite the robust data confirming the safety of its use, speculating a sub-inflammatoric local effect within soft tissues. Inflammatory responses play important role in the development of peri-operative failure, post-operative pain and complications associated with LA’s action. The crucial question arises whether some LA agents are superior to others, especially considering their biological interaction with the various cells composing the soft tissues, which are affected during regional local anaesthesia? What would be the optimal local anaesthetic to use in certain medical conditions, and when considering various clinical aspects of dental care? Robust future meta-analyses, based on both in vitro and in vivo studies, would produce unbiased and reliable data which could guide dental practitioners and help them to select the optimal LA for every individual case.

Our research team’s recent study evaluated, in vitro, the effect of common local anaesthetics: lidocaïne, articaine and mepivacaine on human fibroblasts which were exposed to different concentrations of each LA, ranging from 1.17 µg/ml to 150 µg/ml: a ‘golden standard’ in dentistry 2% lidocaïne with epinephrine 1:80,000, 4% articaine with epinephrine 1:100,000 (forte), 4% articaine with epinephrine 1:200,000 and 3% plain mepivacaine without vasoconstrictor agent. All investigated LAs did not induce significant cell death via the apoptosis/necrosis pathway, as revealed by using a flow cytometry technique (annexin V-FITC and propidium iodide). Mepivacaine at a concentration of 112.5 µg/ml slightly decreased cell viability. Within the limitations of our study (selected LAs concentrations) a concentration-dependent cytotoxic effect was not observed for any of the LAs evaluated; however, this result could be explained by the relatively low LA doses used in the experiments. The rather unexpected results showed that apparently articaine with adrenaline 1:100,000 diminished the percentage of apoptotic cells, revealing a slightly ‘protective’ action with potential ‘enhancement’ of cell viability. No significant differences were noticed between LAs in terms of reactive oxygen species (ROS) production, apart from articaine ‘forte’, which mildly stimulated an intracellular level of ROS production at the highest concentration. These results of our study are partially consistent with the findings demonstrated by Azuma and Ohura who stated that epinephrine may stimulate the production of superoxide anion and inhibit the production of hydrogen peroxide. The same results were obtained by them for lidocaïne with epinephrine. Mikawa et al. observed an inhibitory effect of lidocaïne and mepivacaine for the production of ROS by neutrophils.

Interestingly, up-regulation of pro-inflammatory cytokines interleukine 6 and interleukine 8 was observed only for mepivacaine in our experiments. On the contrary, for both articaine and lidocaïne an attenuation of both gene expressions was elucidated. These results are similar to those obtained by Gallos et al who confirmed that lidocaïne may reduce inflammatory markers, including cytokines and chemokines. Of interest, other studies have indicated that lidocaïne may selectively up-regulate pro-inflammatory proteins and down-regulate anti-inflammatory molecules. Taking into consideration in vivo studies, an intravenous infusion of lidocaïne significantly relieves post-operative pain and decreases immune alterations associated with surgery by reduction of production of IL-1ra and IL-6 cytokines. Generally, local anaesthetics are able to inhibit local inflammatory responses without major impact on host immunity, as shown by Cassuto et al who investigated in vitro that lidocaïne decreased TNF-α-induced surface expression of CD11b/CD18 on neutrophils. A pioneer in vitro neurotoxicity study carried out by Kasaba at al. using cultured neurons exposed to the different LAs: procaine, mepivacaine, ropivacaine, bupivacaine, lidocaïne, tetracaine, and dibucaine elucidated that lidocaïne was more toxic than the other tested LAs, and that mepivacaine had the least-cytotoxic effects on cone growth of neuron cells compared to the other local anaesthetics. Radwan et al. observed the morphological changes in growing neurons induced by lidocaïne and mepivacaine, for which the neurotoxic effect was significantly higher in comparison to the control values. On the other hand, the accumulated data related to the life science field may also indicate that local anaesthetics possess a range of potentially anti-inflammatory actions through their impact on the immune system. Additionally, in vitro experiments demonstrated that lidocaïne has a dose-dependent anti-proliferative effect on hepatocarcinoma cells. It has been proved that local anaesthetics may interfere with some levels of the ‘inflammatory cascade’ producing a ‘protective effect’ and this is a possible explanation of their action. The cellular mechanisms of action can be associated with the impact on the cell membrane proteins/lipids, altering cell metabolism and migration.

In this context, within the limitations of in vitro study, we elucidated that local anaesthetic agents are not cytotoxic to human fibroblasts. None of the LAs was found to be more toxic than others. Our results are in agreement with other reports stating that articaine does not have mutagenic potential up to the maximum tolerated dose level and that the local tolerance of articaine is very high. Interestingly, according to the newest study, among dental anaesthetics, articaine is the least neurotic, whilst mepivacaine, prilocaine and lidocaïne were identified as LAs with medium neurotoxicity. With regards to apoptotic induction and potency caused by different local anaesthetics, the cytotoxicity of articaine is lower compared to lidocaïne and mepivacaine.
Wardenhausen et al. observed a concentration-dependent cytotoxicity to non-neuronal T-lymphoma cells, including cell necrosis and apoptosis, for various investigated LAs, based on LC50 value (lethal concentration required to kill 50% of the exposed cells). These authors noticed the variability in the level of local anaesthetics’ toxicity, in the following decreasing order: tetracaine > bupivacaine > ropivacaine > prilocaine > procaine > lidocaine > articaine > mepivacaine. Interestingly, they also concluded that structural factors such as ester or amide linkage did not have any impact on the level of cytotoxicity.19

Results of the other non-clinical studies using mesenchymal stem cells, which play an essential role in healing following surgery, clearly revealed that lidocaine has the most noticeable concentration-related detrimental effects on stem cell viability.19 Similar results were obtained by the research team of Rahnama et al. who found that lidocaine could significantly decrease mesenchymal stem cell viability.20 Another team led by Dregalla et al. found that exposure of human mesenchymal stem cells to LAs has an impact on their viability and adhesion and that amide-type lidocaine may stimulate cell apoptosis in a time- and dose-dependent manner.21

The main clinical significance in dental practice, is the effect of local anaesthesia on post-operative healing in the case of surgical interventions, whilst their influence on systemic reactions depends upon the direct interaction of the LA with vital cellular components. Our preliminary research, which has been providing evidence of the non-cytotoxic activity of the common LAs towards fibroblasts, also has important clinical implications, confirming a minimal risk of post-operative local complications such as pain, neurological problems and trismus, confirming the safety of LAs. Our findings also support oral and maxillofacial surgeons by demonstrating a safe interaction between an LA agent and connective tissue cells – fibroblasts, with no major impacts on the wound healing process. Pre-clinical data indicate that articaine can be considered a safe local anaesthetic, and this finding has significant clinical relevance and practical implications, when selecting a local anaesthesia for dentistry. However, these cell culture experiments and non-clinical studies must be re-validated in the clinical/physiological environment due to the major fact that an LA’s pharmacokinetics in vivo conditions may not be fully replicated clinically. Advances in drug biotechnology appears to promise exciting results for new LA formulations in future. Cytotoxicity assays confirmed that the encapsulation of articaine (nanocapsules, nanovesicles) reduced its ‘standard’ toxicity when linked to the free LA molecules.22 It means that nano-carrier systems can be potentially used in practical applications in eg. medically compromised patients who have an increased risk of systemic LA-associated complications.

The conclusions from clinical studies show that articaine LA with adrenaline 1:200,000 is generally more strongly recommended for use with dental patients as it is considered safer than lidocaine with adrenaline 1:80,000 and articaine with higher concentration of adrenaline 1:100,000.23 The main advantage is that currently available cartridges containing articaine have a lower concentration of adrenaline compared to lidocaine, the onset of anaesthesia is more rapid due to better absorption/diffusion, and it is a safer option for patients with liver dysfunction due to plasma metabolism. Kambimalath et al. concluded that lidocaine with adrenaline 1:80,000 causes more alterations in the cardiovascular system of elderly patients with medical conditions.24 Due to the fact that the articaine molecule contains an ester group and therefore is efficiently hydrolysed by plasma esterases, its half-life elimination is 4-times shorter in comparison to lidocaine (approx 20 min vs. approx 90 min). This means additional articaine agent re-injection is much safer, because the first LA dose will be metabolised in the patient’s blood almost completely after 30 min.25 Additionally, a specific intra-linguimentary anaesthesia procedure (PDL) using articaine seems to have distinct advantages and is more effective in certain circumstances. The assessment of the interaction of lidocaine, articaine and mepivacaine with the central nervous system stimulant pentyl-enetetrazole using an animal model showed that LAs did not induce seizures, and that articaine is likely to be the safest ‘LA of choice’ for patients with epilepsy.27

In regards to hypothetical prolonged anaesthesia following IANB administration of articaine, conclusions drawn by authors in the most recent article from 201726 have confirmed that articaine does not have a higher (neuro)toxicity when compared with other amide anaesthetics. According to them, the local anaesthesia efficiency of articaine is not significantly different to other short-acting LAs like lidocaineand prilocaine and there is no conclusive evidence demonstrating above-average neurotoxicity. To summarise, no sound scientific evidence can be provided to support the statement that articaine is linked to an increased risk of local neurological complications (paraesthesia). Undoubtedly, it is essential to indicate a clear causative factor or range of factors responsible for LA-related complications, focusing on well-designed, controlled studies and analysing currently available data from both in vitro and in vivo studies.

References:


The SAAD Editorial Board would welcome receiving case reports of interest and original papers for publication in the SAAD Digest

Submission deadline 31st July 2018

Please refer to the guidelines for authors on page 89

Contact - fiona@saad.org.uk
A Synopsis of articles of interest from the last twelve months to inspire further reading

The Odyssey of Dental Anxiety: From Prehistory to the Present. A Narrative Review

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Abstract
Dental anxiety (DA) can be considered as a universal phenomenon with a high prevalence worldwide; DA and pain are also the main causes for emergencies in the dental setting, so their prevention is an essential part of patient safety and overall quality of care. DA and its consequences are closely related to the fight-or-flight reaction and it seems reasonable to argue that the odyssey of DA began way back in the distant past, and has since probably evolved in parallel with the development of fight-or-flight reactions, implicit memory and knowledge, and ultimately consciousness. Basic emotions are related to survival functions in an inseparable psychosomatic unity that enable an immediate response to critical situations rather than generating knowledge, which is why many anxious patients are unaware of the cause of their anxiety.

The wealth of data now available makes it definitively clear that the origin of DA is multidimensional and includes both endogenous and exogenous causes. Several psychological ailments such as low self-esteem, general fearfulness, conduct disorder, agoraphobia, simple phobia, alcohol dependence, or multiple mental disorders are more frequent in patients with high DA.

The exogenous factors include conditioned fear (yielded by previous bad experiences or information), fear of somatic intraoperative reactions and distrust of dental professionals; the latter, in turn, is usually caused by dentists’ and/or physicians’ inappropriate behaviour and traumatic dental treatments, leading to patient’s helplessness, threat of autonomy loss and violation. The fear these situations may induce throws us back to ancient times, when our ancestors had to face and react to dangers and predators on a daily basis.

Reviewer’s comments
This is a fascinating article examining the history of fear in all its aspects and relating it to the psychology, pathophysiology, assessment and management of dentophobia in the modern age. The authors mention that dental care was introduced as long ago as the Neolithic period (archeology has revealed that a 6500 year-old tooth had been restored with a beeswax ‘filling’) and argue that it is reasonable to assume that the odyssey of DA must also have originated at that time because of the ‘indissoluble marriage’ of dentistry with pain. They also outline the development of pharmacological techniques to manage the symptoms including the use of psychotrophic plants ‘which were capable of taking humans to realms of ethereal wonder.’ They also describe the Aleppo sponge used by Arab physicians to induce ‘sedation and a sort of inhalational anaesthesia.’

Delving even further back into the birth of anxiety, the authors examine the controversial ‘Sapient Paradox’ where there was an apparent great change in human consciousness, and arguably, in human emotions and anxieties, about 100,000 years ago. The paradox stems from the observation that our DNA was much the same across the age since that period, while the explosion of human culture only dates back from about 20,000 years ago. It is hard to explain this time lag on genetic grounds only.

From various sources of information, they state ‘Judging from the above-mentioned data, it seems reasonable to argue that forms of human anxiety—including DA—can be seen as a sort of odyssey begun in prehistory, when our ancestors were faced many times a day with danger, pain, stress, and the related fight-or-flight responses, as well as with diseases, toothache and some sort of dental treatments. Animals clearly know fear too, but human beings are often reluctant to admit that they belong to the animal kingdom. On the other hand, human anxiety also entails a much greater use of memory and imagination with respect to animals, enabling one to move backwards and forwards in time, a mind faculty related to the human’s well-developed default mode network.'
Further, they state a home truth in that the data shows the crucial role played by health professionals in the pathophysiology of DA, by leading to patients feeling unbearably helpless, being threatened with the loss of their autonomy, and violated, yielding avoidable suffering, pain, and opening the doors to medical emergencies. Thus, dentists and physicians look like the two-faced Janus, the Ancient Roman god of time in the past and future, in war and peace (the month of January is named after him): they may be gentle and protective experts providing safe and painless care, or turn into torturers capable of causing great suffering. Their inappropriate behaviour can exacerbate existing anxiety disorders or trigger a new form of anguish (anxiety, phobia, and PTSD) that may persist for life if not properly managed.

The focus of the article remains on appreciating the stressful scenario of dentistry which demands an appropriate management of anxiety, pain and the related physical reactions. In this regard, the patient centred approach is the ethical gold standard in modern dentistry in which pharmacological anxiolysis can also play a key role.

FA

Can we safely avoid fasting before abortions with low-dose procedural sedation? A retrospective cohort chart review of anaesthesia-related complications in 47,748 abortions

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Contraception 2013; 87: 51-54

Abstract

Background: Some licensing authorities require fasting before abortions under intravenous sedation to avoid aspiration of gastric contents. This study was conducted to estimate the incidence of anaesthesia-related complications in women undergoing abortions without pre-procedure fasting.

Study Design: This was a retrospective cohort chart review of patients having abortions with both fentanyl and midazolam at two urban freestanding abortion clinics with routine policy of advising women to eat a light meal before the procedure.

Results: There were no reports of anaesthesia-related complications in the 47,748 charts reviewed from 1998 to 2010. Applying Hanley’s formula for rare events that have not occurred, the upper 95% confidence interval for the true incidence of anaesthesia-related complications for women having abortion under low-dose procedural sedation without fasting, was estimated to be 0.00006%.

Conclusions: This large retrospective cohort chart review identified no complications related to low-dose procedural sedation in over 47,000 consecutive non-fasting patients having abortions through 18 weeks’ gestation. Eliminating the requirement to fast would decrease unnecessary stress and unpleasant symptoms without increase in the anaesthesia-related complications for women having abortions.

Reviewer’s Comments:

The need for fasting prior to dental treatment under conscious sedation is the subject of constant discussion and debate because although airway reflexes are assumed to be maintained, this does not consider the potential for inadvertent over-sedation and the loss of protective airway reflexes.

This review showed the benefits of minimising fasting include improved postoperative well-being and some clinical outcomes, such as reduced post-operative hospital stay, reduced dehydration and improved muscle strength and mass. In a study of dental surgery patients, 79% reported unpleasant symptoms from pre-procedure fasting. In a study of pregnant patients in labour, 27% of women considered restriction of food in labour “moderately” to “most” stressful; 57% found restriction of fluids to be “moderately” to “most” stressful.

Although the evidence from this study seems to be overwhelming that fasting need not be imposed on patients undergoing procedures under conscious sedation, it has to be taken into account that the cases were treated in a hospital setting where backup facilities would be readily available to support the sedationist in an unlikely aspiration event. In any case, working in the oral environment is completely different from abdominal surgery, it can be tricky if access is limited, or if the patient suffers from a gag reflex - and evoking a retching response is always a risk - even under sedation.

The reviewers highlight the stress caused to patients by imposing a fasting rule, especially the restriction of fluids and state that ‘minimal’ fasting i.e. having a light meal before the procedure is beneficial. Reducing the stress element is very relevant to the management of the dentophobic patient and therefore the dental practitioner may consider adjusting the fasting instructions on a case to case basis. The simple example may be permitting a patient to have a sip or more of water on a hot summer’s day or ensuring that a diet-controlled diabetic patient does have a light meal a couple of hours before the appointment.

Nevertheless, it is essential to keep in mind NICE guidelines which specify that ‘Clinicians who choose to sedate patients without fasting should be prepared to justify this choice.’

FA

Perception of simulation training in emergencies for dental sedation practitioners

Hadfield A, Thompson S, Hall J and Diaz-Navarro C.
Cardiff and Vale University Health Board, Cardiff University, UK
The Clinical Teacher 2017; 13: 1-5

Abstract

Background: Simulation education is an important part of health care education and training. There is growing evidence to support the usefulness of simulation, especially in training for infrequently
occuring situations, such as medical emergencies seen by dental practitioners. There are, however, few data on the longer-term effects of simulation, including usefulness, relevance, emotional effect and ability to affect changes to daily practice.

**Methods:** Dentists and dental nurses who had undergone simulation training in medical emergencies for dental sedation practitioners undertook a semi-structured interview about their perception of the simulation experience. They explored recollection of the experience and its emotional weight, perception of usefulness and relevance, specific learning outcomes and changes to practice prompted by the simulation session.

**Results:** Participants reported finding the simulation sessions worthwhile, realistic, challenging and almost universally emotionally positive. *In situ* simulation training was particularly well received, both in terms of realism, as well as identifying system flaws in emergency drugs and equipment. Participants reported gaining both increased clinical knowledge and human factors skills, which were reflected in subsequent changes to their practice.

**Discussion:** The results support the usefulness and applicability of simulation education to training in medical emergencies for dental sedation practitioners. In particular, specific benefits reported from *in situ* sessions and in human factors concepts, prompts a further review of the structure of teaching to maximise the benefit to participants.

**Reviewer’s comments**

The authors state that although there is no specific data quantifying incidents under dental sedation, up to 70% of UK dentists have encountered a medical emergency. However, less than 30% of newly qualified dentists feel ‘well’ or ‘fairly well’ prepared for an emergency situation. Training for emergencies is mandatory for all dental clinical staff and although these exercises do improve confidence immediately afterwards, there is little published research on how participants perceive the sessions at a later date. This, therefore, is an interesting study, albeit limited by the small number of participants, of the emotional and other long term effects of both simulation and *in situ* training in terms of perception, relevance and learning.

Nine out of 13 candidates perceived that their main learning outcome was increased clinical knowledge, yet the majority of changes to practice they described seemed to have resulted from an improvement in *non-technical* skills. Therefore, the study suggests that it may be more efficient to focus these sessions on human factor aspects in terms of boosting confidence and self-esteem and thereby facilitating better retention of the subject matter. Feedback was particularly positive for the *in situ* sessions, which seemed to be observed as more realistic than training in the simulation centre. This reinforces the requirement for regular in-house practice sessions where familiarity with one’s usual place of work assists team dynamics and identifies any weaknesses in the local emergency set-up and protocol.

In conclusion, this study suggests that simulation education in medical emergencies for dental sedation practitioners is worthwhile, relevant, and provides improvements in clinical knowledge and non-technical skills. It also identifies potential advantages of *in situ* simulation, which include realism, team training and systems testing. The authors acknowledge that further studies would be useful to fully assess the retention of knowledge from the sessions, and the impact of simulation learning experiences on everyday practice.

FA

**Pulmonary aspiration during procedural sedation: a comprehensive systematic review**


**Background:** Pulmonary aspiration is a rare but potentially life-threatening complication of sedation and general anaesthesia. It has been extensively studied in general anaesthesia but much less is known about aspiration during procedural sedation.

**Aim/Objectives:** This is the first systematic review of all published instances of aspiration during procedural sedation, detailing the circumstances and outcomes of these events.

**Methods:** A comprehensive, systematic review of PubMed, Web of Science, and the Cochrane Library from January 1985 to May 2016.

**Results:** 35 articles found describing one or more occurrences of pulmonary aspiration during procedural sedation.

- Gastrointestinal endoscopy procedures: 292 occurrences, with eight deaths.
- Non-endoscopy procedures: 34 occurrences, with a single death in a moribund patient, full recovery in 31, and unknown recovery status in two.
- Propofol was the most common sedative agent used in reports of aspiration.
- No occurrences of aspiration in non-fasted patients receiving sedation for non-endoscopy procedures.

**Conclusions:** The data suggests that aspiration during procedural sedation is rare, idiosyncratic, and typically benign. Very few occurrences of aspiration were identified in non-endoscopic procedural sedation, with most making a full recovery.

**Reviewer’s comments**

This is a comprehensive review of the literature that has identified very few occurrences of pulmonary aspiration during procedural sedation. Whilst the review format is not designed to quantify risk factors or prevalence of aspiration, the authors make several logical points of interest:

(i) The nature of gastrointestinal endoscopy procedures has an inherently greater risk of aspiration.
(ii) The finding that propofol was the most common sedative agent used in cases of aspiration reflects a target of ‘deep’ sedation, supporting the general assumption that this state has a higher aspiration risk than ‘moderate’ or ‘mild’ sedation.
(iii) There is no clear association between fasting (or lack of it) and the incidence of aspiration, particularly in non-endoscopy procedures.
(iv) Underlying co-morbidities were present in the majority of aspiration occurrences and are known to increase risk. However, many patients with similar conditions do not aspirate
during sedation, thus making underlying illness an unpredictable risk factor.

(v) The prevalence of aspiration in the literature for procedural sedation is lower than that reported with general anaesthesia; estimated to be one-third to one-half that of general anaesthesia

A review of this nature is clearly limited by publication bias and one must be mindful that the lack of published reports does not equate to lack of occurrence. Nevertheless, considering that procedural sedation is administered millions of times annually worldwide, judging from the published literature, the incidence of aspiration during procedural sedation is extremely rare.

Finally, it is noteworthy that none of the 326 published incidences of aspiration occurred during dental procedures, in keeping with the widely held view that procedural sedation is a very safe technique when used correctly in appropriately selected patients by appropriately trained personnel.

DM

Dental procedures, antibiotic prophylaxis, and endocarditis among people with prosthetic heart valves: nationwide population based cohort and a case crossover study


Background: Infective endocarditis is a rare but severe disease with high morbidity and mortality (40% at five years). The efficacy of antibiotic prophylaxis in patients with predisposing cardiac conditions undergoing invasive dental procedures is not clear; current data suggest that everyday life bacteremia (e.g. from tooth brushing, chewing) is more likely to be responsible for infective endocarditis than that caused by invasive dental procedures.

Aim/Objectives: To assess the relation between invasive dental procedures and infective endocarditis associated with oral streptococci in people with prosthetic heart valves.

Methods: This was a nationwide population study based on the French national health insurance administrative data and national hospital discharge database; included all adults who underwent insertion of prosthetic heart valves between July 2008 and July 2014.

Cohort Study: Assessed and compared the incidence of oral streptococcal infective endocarditis – with or without dental procedures; invasive or non-invasive procedures; with or without antibiotic prophylaxis.

Case crossover study: Looked at all cases of oral streptococcal infective endocarditis in patients with a prosthetic heart valve. Cases acted as their own controls when comparing exposure to invasive dental procedures during the three-month period preceding oral streptococcal infective endocarditis (case period) with three earlier control periods.

Results: Cohort of 138,876 people with prosthetic heart valves:
- 267 cases of oral streptococcal infective endocarditis during a median follow-up of 1.7 years (incidence rate 93.7 per 100,000 person years, 95% confidence interval 82.4 to 104.9).
- The overall rate of oral streptococcal infective endocarditis was 1.4 cases per 10,000 invasive dental procedures.
- In comparison to patients with no exposure to dental treatment, there was no statistically significant difference in the rate of infective endocarditis during the three months after an invasive dental procedure (relative rate 1.25, 95% confidence interval 0.82 to 1.82; P=0.26); nor after an invasive dental procedure without antibiotic prophylaxis (1.57, 0.90 to 2.53; P=0.08).
- The difference between invasive and non-invasive dental procedures was also not statistically significant.

The case crossover study included 648 cases of oral streptococcal infective endocarditis:
- Exposure to invasive dental procedures was more frequent during case periods than during matched control periods (5.1% v 3.2%; odds ratio 1.66, 95% confidence interval 1.05 to 2.63; P=0.03).
- There were no statistically significant differences in odds ratios whether or not patients received antibiotic prophylaxis (for both invasive and non-invasive dental procedures).

Conclusions: Only the case crossover study showed statistical significance associating invasive dental procedures and oral streptococcal infective endocarditis. However, both suggest that invasive dental procedures may contribute to the development of infective endocarditis in adults with prosthetic heart valves.

Reviewer’s comments
Patients with prosthetic heart valves are at higher risk for developing infective endocarditis and have historically received antibiotic prophylaxis during invasive dental procedures. However, there is a paucity of scientific evidence for both the association between dental procedures and oral streptococcal infective endocarditis, as well as the efficacy of antibiotic prophylaxis. This has led to the development of different guidelines over the past decade: (1) NICE recommends prophylaxis is not ‘routine’ required; (2) the European Society of Cardiology (ESC) and American Heart Association (AHA) continue to recommend antibiotic prophylaxis in patients at high risk of infective endocarditis (includes prosthetic heart valves) undergoing invasive dental procedures. In addition, there seems to be a growing trend towards an increased incidence of infective endocarditis following the guideline changes. It is no wonder that healthcare practitioners are now confused about the role of antibiotic prophylaxis, a possible reason why even within this study, only about half the patients having invasive dental procedures actually received antibiotic prophylaxis!

This is a well-conducted database study with a very large cohort of patients, essential when considering the low incidence of infective endocarditis.
- Neither the cohort nor case crossover studies demonstrated a statistically significant reduction in the rate of infective endocarditis with the use of antibiotic prophylaxis. However,
the authors do admit that the study was probably underpowered for this subgroup analysis.
- Only one of the two studies (the case crossover) showed statistical significance for an association between invasive dental procedures and oral streptococcal infective endocarditis. However, even then, the rate of invasive dental procedures during the three months preceding oral streptococcal infective endocarditis was low at only 5.1%. Whilst this shows an association between the two, the magnitude of this association remains uncertain.
- The incidence of oral streptococcal infective endocarditis in relation to everyday life bacteraemia (e.g. tooth brushing, chewing) was 94.6 per 100,000 person years (95% confidence interval 82.5 to 106.6) adding to the evidence that most cases of oral streptococcal infective endocarditis in patients with prosthetic heart valves are most likely related to this.

Although this study doesn't definitively associate invasive dental procedures with infective endocarditis, or demonstrate a benefit with antibiotic prophylaxis, it does add to the body of literature showing a trend in this direction. Until further evidence is available, I would personally recommend the use of antibiotic prophylaxis as per the ESC/AHA guidelines … at least until Brexit is complete!

DM

**A novel way to secure the laryngeal mask airway during oral surgery procedures.**


**Background:** The flexible/reinforced Laryngeal Mask Airway (LMA) is widely used to manage the airway during general anaesthesia for oral surgery. This is commonly secured in place by external tapes/ties or mouth gag, both of which can interfere with surgical access. Alternatively, the LMA is left unsecured so it can be moved by the surgeon, with the attendant risks of dislodgement.

**Aim/Objectives:** Design and pilot of a novel device – the LMA-PROP – a modified mouth prop that also allows the flexible LMA to be snapped in and secured, alleviating positioning concerns.

**Methods:** The LMA-PROP was custom-manufactured using silicone elastomer to fit LMA sizes 3 and 4. The device was piloted in a series of healthy patients (14 years and over) undergoing elective third molar extractions under general anaesthesia. The LMA-PROP is placed between the upper and lower molars, providing surgical exposure, and the flexible LMA is then snapped into a groove moulded on the lingual side of the LMA-PROP. If use of the LMA or LMA-PROP was unsatisfactory, it was removed and the patient was intubated.

**Results:** The LMA-PROP was evaluated in ten patients between the ages of 16 and 34 years. Several changes were made to the LMA-PROP during the course of the pilot to improve functionality. The LMA-PROP was unsuccessful in only 1 of the 10 patients who had a small oral cavity and required nasal intubation to facilitate surgical access. There were no serious airway complications and no complaints recorded during patient follow-up. Assessment of the device by both surgeon and anaesthetist was satisfactory.

**Conclusions & Reviewer’s comments**

This is a modification of the standard mouth prop that is routinely used in oral surgery procedures. It has the added advantage of being able to secure the LMA in place thus avoiding the not infrequent problem of the LMA moving mid-procedure due to surgical manipulation, which often then causes a failed or partially obstructed airway.

Each LMA-PROP cost US$170.00 to manufacture but could be reused up to 30 times following sterilisation. This equates to just under $6.00 per case – a nominal amount in isolation but would probably add up quite significantly, based on the number of oral surgery cases each centre does in a year.

DM

**Virtual Reality Exposure Therapy for the Treatment of Dental Phobia: A Controlled Feasibility Study**


**Published online:** 14th September 2017

**Abstract:**

**Background:** Virtual reality exposure therapy (VRET) has been used to treat a variety of fears and phobias.

**Aim:** To determine the feasibility (i.e. safety and efficacy) of using VRET to treat dental phobia.

**Method:** Safety was evaluated by determining any adverse events or symptom exacerbation. Efficacy of VRET was evaluated by comparing the reduction in dental anxiety scores (measured 16 times within a 14-week study period, and at 6-month follow-up), and its behavioural effects with that of an informational pamphlet (IP) on ten randomised patients with dental phobia using a controlled multiple baseline design. Participants’ heart rate response during VRET, and their experience post-VRET, were indexed.

**Results:** No personal adverse events or symptom exacerbation occurred. Visual analysis and post-hoc intention-to-treat analysis showed a significantly greater decrease in dental anxiety scores (higher PND (percentage of non-overlap data) scores of 100% and lower POD (percentage of overlap data) of 0%), Modified Dental Anxiety Scale, F (1,8) = 8.61, p = 0.019, and Dental Fear Scale, F (1,8) = 10.53, p = 0.012, and behavioural avoidance in the VRET compared with the IP group (d = 4.2 and -1.4, respectively). There was no increase in average heart rate during VRET. Of the nine treatment completers, six (four from the VRET group and two from the IP group) no longer had dental phobia at 6-month follow-up. Four of the five VRET participants, but none of the IP participants, scheduled a dental treatment appointment following the intervention.
Conclusion: VRET is a feasible alternative for patients with dental phobia.

In view of this reviewer’s current interest and research into the use of Virtual Reality (VR) in the treatment of dental phobia, this research article could not escape inclusion within the Digest’s Journal Scan.

For those less familiar with Cognitive Behavioural Therapy (CBT), it is important to highlight the vital role of graded exposure within the behavioural elements of CBT treatment for dental phobia. This article focuses upon applying the theory of graded exposure within a virtual environment – hence the term – Virtual Reality Exposure Therapy; or VRET. VRET has gained increasing attention in the treatment of anxiety disorders, including specific phobias – particularly for phobic objects or situations that may be difficult to expose oneself to in vivo (i.e. heights, flying, spiders etc.). It involves immersing an individual within a virtual (or simulated) world with the use of head mounted display (HMD) devices; and as Dr Bryan Kerr demonstrated in September’s SAAD Symposium, these VR technologies are light-years ahead from their initial launch in the 90s.

In this article, Kumar and the team demonstrate the encouraging use of VRET for dental phobia in a controlled feasibility study conducted in Malaysia, to explore safety and efficacy of the intervention. Participants with dental phobia (rated by a Modified Dental Anxiety Scale score >15) were randomly assigned to either receive a VRET intervention (using computer-simulated environments and computer generated avatars) or a control group who received an information pamphlet about dental anxiety only. The VRET videos included common dental scenarios from sitting passively in the dental chair, to oral examination and introduction to dental injections and drills – which were played to participants seated in a dental chair. Consistent with the principles of graded exposure, participants could not view the subsequent dental scenario until their state anxiety level had fallen to a manageable level (rated as 2/10 on the 1-10 Subjective Units of Distress scale (SUDs)).

While the results are preliminary and this was a small-scale study of 10 individuals, the authors observed encouraging results, which they suggest shows VRET to be both safe and acceptable to individuals. Additionally, it seems the use of VRET significantly reduced both state and trait dental anxiety, as well as reducing behavioural avoidance and increasing the likelihood of future arrangement of dental appointments. While participants rated moderate presence and realism (measures of quality of VR experience) from the VRET intervention, all but one reported experiencing nausea (or cyber sickness). No other adverse reactions were observed during VRET. This study therefore shows promise for the use of VRET as a mechanism to reduce dental anxiety, with further research to establish its efficacy, both in the short and long-term.

These are exciting times in the psychological treatment of dental phobia and we await the publication of the authors’ full randomised controlled trial (RCT) – as well as the current research underway in the UK by the current reviewer (outlined in the abstracts of the symposium – see page 55).

JH


Anthonappa RP, Ashley PF, Bonetti DL, Lombardo G, Riley P
Cochrane Database of Systematic Reviews 2017, Issue 6
Published online: 5th June 2017

Abstract:
This is a protocol for a Cochrane Review (Intervention). The objectives are as follows:

This review aims to assess the effectiveness of non-pharmacological interventions for reducing dental anxiety in children.

As the authors of this Cochrane protocol note, there have been very few published reviews evaluating the efficacy or effectiveness of non-pharmacological interventions for managing children’s dental anxiety – so this proposal offers an exciting opportunity to consider the current evidence-base.

The protocol outlines the background of the problem, defining phobia and dental fear and anxiety among children, as well as distinguishing dental behaviour management problems (DBMP), which may or may or not be associated with anxiety. The authors list an array of non-pharmacological interventions which have been used with children for anxiety management, from tell-show-do to Cognitive Behavioural Therapy (CBT). These techniques are grouped into four theoretical clusters, as suggested by an author of a prior review for anxiety management techniques in adults, which include: 1) communication skills, 2) behaviour-modification techniques, 3) CBT, and 4) physical restraints.

The review aims to assess the effectiveness of the interventions based on: 1) post-treatment anxiety differences between intervention and control groups; 2) with secondary outcomes exploring differences in behaviour, whether planned treatment was completed or not, and observations of adverse events. The review is planned to only include randomised control trials (RCTs) with parallel design, focusing on all children/adolescents up to 16-years-old. Varying levels of anxiety will be included, with or without the use of sedation methods; inclusion will also cover children receiving any dental treatment (from simple restorations, dental traumas and orthodontic treatment). Research involving children with medical conditions or syndrome will be excluded from the review.

While most clinicians develop their own practice-based sense of effective interventions that help reduce or manage dental anxiety in the children they treat, this Cochrane review offers the chance to add clarity to the types of interventions with a stronger evidence-base. It will also likely highlight intervention areas that warrant further exploration, as we continue to hone the techniques used, so to provide a full spectrum of anxiety-management interventions across the lifespan.

JH
The care and cure of dental phobia: the use of cognitive behavioural therapy to complement conscious sedation

Newton, T., & Gallagher, J.
Faculty of Dental Surgery. 8 (4): 160–163
Published online: 29 September 2017

How can CBT help rehabilitate patients who suffer from severe anxiety about dental treatment?

In a very recent opinion piece published, Professors Tim Newton and Jennifer Gallagher outline the case to include Cognitive Behavioural Therapy (CBT) within a framework of a comprehensive service for conscious sedation. The article nicely distinguishes the vital role of each form of intervention – in which the care provided from conscious sedation, can be followed by a cure of the underlying anxiety. Here lies the distinction – anxiety management followed by anxiety rehabilitation.

In the spirit of full transparency, it may already be known by some that I work with Professor Newton, within a service that are able to provide both aspects of intervention in the care pathway, for adults with dental phobia. That is, individuals referred to us are able to access both conscious sedation and CBT, for the long-term management of their phobia.

The opinion piece offers more information about CBT and the evidence-base of the approach; suggesting what a combined service might look like and what resources would be necessary to implement this.

JH

Development of a decision aid for children faced with the decision to undergo dental treatment with sedation or general anaesthesia


Reviewer’s evaluation, opinion and points of interest:

This article is, perhaps, the first study to develop a decision aid which actively involved children in any decision-making process relating to dental health care. The authors from Sheffield and Liverpool Schools of Dentistry set out to raise awareness of such little-known resources.

Whilst being a small study with only 58 participants made up of controls, children and parents, initial findings suggest that the decision aid could be helpful to patients and their parents faced with the decision to undergo dental treatment either with inhalation sedation, IV sedation or GA in terms of providing a more in-depth knowledge of the treatment options on offer. We now work in an era where clinicians inform what treatment modalities are available rather than dictate, but it is ultimately the patient or parents’ choice which they select, therefore, all developments to help guide them as to what may be the most suitable choice are welcomed.

Sadly, no statistically significant differences between the control and intervention groups were found in relation to reducing anxiety or decisional conflict. The authors propose that future studies should be focused on the introduction of the decision aid in primary care settings, using a controlled before/after design to help aid understanding of how the decision aid may impact upon measures of anxiety and decisional conflict and how these measures may alter over time.

RW

Comparison of single tooth anaesthesia by computer-controlled local anaesthetic delivery system (C-CLADS) with a supraperiosyeal traditional syringe injection in paediatric dentistry

Perugia C, Bartolino M, Docimo R
Eur J Paed Dent 2017; 18: 221-225

Reviewer’s evaluation, opinion and points of interest:

This study from researchers in Rome looked at comparing the efficacy of a computerised system for intraligamentary administration of local anaesthetic (C-CLADS) against traditional local infiltration delivery using a conventional syringe on primary molar teeth in patients aged between 5 and 13. Previous studies to date have mainly focused on comparisons between the 2 techniques in adults, the histological effects of high pressure intraligamental injections on the periodontal ligament, or on whether there is any effect on the underlying permanent tooth germ.

This study focused on the onset time and anaesthetic effect over time using a pulp tester, and the relative comfort perceived by the child whilst the injection was given. As well as the distress some children exhibit from ‘feeling numb’, trauma to the soft tissues is particularly common in children post injection. Hence it was particularly encouraging to see that no undesired collateral numbness to the lip occurred in the C-CLADS group, whereas in the conventional anaesthesia group 80% of the children reported discomfort due to the numbness. The patients expressed a marked preference for intraligamentary injection using C-CLADS, compared to buccal infiltrations or inferior dental nerve injection. In 88% of the children in the study disruptive behaviour was observed when using a traditional syringe compared to 0% with the C-CLADS.

This study gives further encouragement that pain free anaesthesia can be given with such techniques. As the authors are keen to point out, the significant reduction of pain-induced disruptive behaviour in children brings about lifelong benefits to them as adults when accepting dental treatment. I look forward to further larger studies with increased sample sizes.

RW
Anxiety management and sedation in dentistry; the next 60 years

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Abstract
Anxiety and pain management has evolved tremendously since the inception of SAAD. As this organisation celebrates its diamond jubilee now is a good time to reflect on what the next 60 years may hold?

This essay attempts to gaze into the future and discuss some of the factors which may influence how we practice over the next six decades. At a population level, we review how the change in demographics might influence our practise. At an organisational level we examine the changing culture of the NHS and the move towards specialisation and multi-disciplinary teams. Also, touching on some aspects of research and development in areas such as pharmacology, neurosciences, and psychology, and their impact on how we might care for our patients in the future.

Introduction
Historically, dentists have played a key role in the development of anaesthesia and its implementation. In the 1980s the use of general anaesthesia in dentistry was under the spotlight following a number of tragic deaths. In response to this, the Poswill Report (1990) was commissioned; the use of general anaesthesia and working practices were re-evaluated. The Conscious Decision (2000) document led to a cultural shift toward developing and integrating best practice in the delivery of sedation, and ultimately to the cessation of general anaesthetic provision in primary care. Over subsequent years there has been an increasing focus on improving patient safety, experience, and involvement in the delivery of anxiety management and sedation strategies; patient-centred care continues to be at the core of the dental journey, and this ethos looks set to continue well into the future.

Since the publication of the Conscious Decision (2000) report, sedation in dentistry has been used increasingly in preference to general anaesthesia. With the assistance of anxiety management and sedation techniques, dentists are able to provide a range of dental treatment including complex surgical procedures in primary and secondary care dental settings. Procedures such as implants, bone augmentation and sinus lifts would previously have necessitated a general anaesthetic but can now be undertaken routinely with the adjunctive use of sedation. This averts the need for admission to a ward, the provision of pre- and post-operative care, and thus streamlines the treatment process. Patients experience fewer adverse events associated with conscious sedation as opposed to general anaesthesia; they recover more rapidly and are discharged swiftly, allowing for increases in treatment provision and reduced waiting times for receipt of treatment.

The use of midazolam has a well-documented safety record and is the mainstay of dental sedation. Advanced sedation techniques including the use of fentanyl and propofol are being used by the dental team with increasing confidence and their formal integration into the sedation dentist’s armamentarium of tools for managing the anxious patient is being encouraged. At present, there is growing acceptance and research in support of psychological management techniques and complementary therapies that can reduce the need for pharmacological intervention. This paper will discuss the future of these techniques and attempt to crystal ball gaze into the next 60 years to describe the ways in which demographic changes such as the ageing and increasingly overweight population, NHS culture shifts focusing on patient safety, evidence-based practice and multi-disciplinary working, and rapidly advancing technological developments are likely to impact upon the provision of anxiety management and sedation.

Sedation practices over the next 60 years

Demographic shifts and implications for the provision of care
The population of the United Kingdom is rapidly changing. Overall we are increasing in size and age. Over the next 60 years consideration must be given to the ways in which these factors will impact upon the delivery of safe sedation. The Office for National statistics (2015) predicts that the population of those people over the age of 75 is likely to increase to 9.9 million by 2039 and for those over the age of 85 that figure is estimated to reach 3.6 million. In the year 2077, the elderly will make up a greater proportion of the population than at present. This population have grown up with a state funded healthcare system, have high dental aspirations and are likely to be on multiple medications for a range of chronic health conditions that previously would have been considered life-limiting. As this group come to constitute a greater proportion of the population, provision of sedation for the older
person is also likely to become more common. The knock-on effect of this demographic shift may mean that by 2077 more sedation treatments will be provided in secondary care environments or in primary care environments with the assistance of anaesthetists. Evidence-based midazolam administration protocols may be developed for the older patient to reduce the risk of over-sedation as far as reasonably practicable. Additionally, the dentist of the future will be responsible for the holistic assessment of the patient prior to undertaking sedation, this may include developing care plans that take into consideration the medical, functional, psychological and social needs of the patient and may involve, geriatricians, specialist nurses, community therapists, family members and general practitioners. Objective measures of frailty such as the Rockwood clinical frailty scale will become routinely used and important for those older people who may have very little wrong with them medically, but are at risk by their frailty.7

In addition to the aging population, obesity is a public health concern that almost certainly will impact on the practice of conscious sedation in dentistry in the next 60 years. Estimates have predicted that obesity is likely to affect 60% of men and 50% of women by 2050.8 For these patients a multidisciplinary medical and dental team may be necessary to facilitate dental treatment under sedation. Not only are obese patients more at risk of hypertension, cardiovascular disease, diabetes mellitus, sleep apnoea, and gastro-oesophageal reflux, all of which have potential implications for the provision of sedation, but also additional challenges may arise with airway management and cannulation.9 As the number of obese people attending dental practices increases, there may be an increase in the provision of inhalation sedation and non-pharmacological anxiety management strategies in an attempt to mitigate the risks of respiratory depression associated with midazolam.

National Health Service culture shift and implications for care

Patient safety

Patient safety is paramount in the NHS, this includes the avoidance of adverse events and the consistent recording of any untoward outcomes associated with treatment. Measures to improve safety that may arise or become more commonly used over the next 60 years include the routine incorporation of surgical safety checklists, such as those developed by the World Health Organisation, prior to undertaking any episode of sedation in primary or secondary care. Where possible, for medically complex or obese patients who are at an increased risk of adverse events during sedation, behavioural management techniques will be employed in the first instance and where sedation is unavoidable, there may be collaborative working with anaesthetists.

As the demographic shifts described above are realised, undergraduate and postgraduate students will be encouraged to become more familiar with the management of complications occurring in the dental surgery and during dental sedation. The use of simulation in teaching has become ever more sophisticated and is now frequently used in medicine. Simulation has been shown to increase performance in high-stakes situations and has shown promise in the simulation of routine dental techniques such as delivery of local anaesthesia.10

We are likely to see simulation incorporated into sedation teaching, students will be able to simulate the administration of a variety of sedative agents in varying concentrations or quantities in order to improve understanding of the physiological effects that sedative drugs have on the body to understand and learn how to manage adverse events, especially those which become critical over a short space of time such as over-sedation.

As a result of the Francis Report’s11 recommendations for duty of candour, a culture of transparency and accountability has become essential in the practice of medicine and dentistry, and is now a recommendation of the General Dental Council (2016).12 We are likely to see more candid and accurate reporting of adverse events and an increasing openness in the sharing of lessons learned as a result. Overall, the outcome of these changes over the next 60 years will be improved patient safety and experience.

Evidence-based clinical decision making

Over the coming 60 years there is likely to be a greater need to justify treatment decisions with high quality evidence, to provide clinicians with specific care pathways to determine which patients are likely to benefit from sedation or psychological therapies and for treatment indices that facilitate decision-making to become more commonplace. Cost effectiveness and sedation indices that provide a framework for objective assessment of treatment need have the potential to aid in decision making for dentists working within a public funded healthcare system. By 2077, validated measures of sedation-need are likely to be integrated into services and completed electronically prior to the patient’s first appointment. This will help to more accurately determine the patient pathway, thereby reducing time of the appointment, prevent wasted treatment sessions for those patients unlikely to benefit from psychological or relative analgesia methods, thus creating a more streamlined and replicable care pathway. Such indices may also be of benefit when commissioning dental services to give an overview of the sedation needs assessment of a population. Existing indices have suggested that approximately 5.1% of the population have a high need of conscious sedation.13

Multidisciplinary and team working

The management of patients with increasingly complex medical histories and the need to safely provide them with comprehensive dentistry is likely to lead to more integration between dentists and medical teams. For obese patients, airway management is considerably more challenging and may require the assistance of an appropriately trained anaesthetist during some sedation procedures. Additionally, for those high risk patients we are likely to see more multi-disciplinary team meetings with anaesthetists, dentists and psychologists taking place. Psychologists have been integrated into the dental team in some secondary care units where their role is to help in the management of chronic facial
pain, as sedation becomes more risky for specific cohorts, we are likely to see increasing reliance upon evidence-based behaviour management techniques and much more close working with psychiatrists, psychologists and general practitioners.15

Dental phobia can be severely debilitating, leading people to neglect their oral health, to experience unnecessary and avoidable pain and can affect self-esteem. Unlike other mental health problems, such as agoraphobia or post-traumatic stress disorder for example, the impact of dental phobia on quality-of-life is seldom considered. In the future, we can anticipate that the wider implications of dental phobia will be recognised by our medical colleagues and appropriate, tailored management plans will be developed to facilitate the routine provision of simple dental treatment for these patients.

With increasing specialisation comes the risk of increasing fragmentation of knowledge. The role of the specialist will increasingly rely on being able to access and synthesise knowledge, adapting it to the needs of their speciality. As Atul Gawande16 eloquently states, “the extreme complexity of medicine has become more than one individual can handle, but not more than teams of clinicians can handle”.

Team working is a key component to successful dental sedation practice. In recent years there has been an impetus to up-skill all members of the dental team, dental nurses are now able to undertake additional training to provide impressions, radiographs, fluoride varnish application and can develop advanced dental nursing skills for sedation. One of the outcomes of a systematic review exploring behaviour management strategies in dentistry, suggested that cognitive behavioural therapy (CBT) could be effectively provided by dental staff at various training levels, furthermore, this concept is supported by Porrit, Jones and Marshman17 who describe a dental nurse-led integrated care pathway that has been successful in reducing dental anxiety by providing low-level psychological interventions. Full utilisation of the dental team in the care pathway for the dentally anxious patient provides a cost effective way to assist patients in the management of their dental anxiety and is likely to be an area of growth over the next 60 years.

Improving patient experience

In the future the drive toward patient centred care will continue, putting the patient at the heart of the dental treatment plan, with patient choice and experience being the cornerstone of decision-making for elective anxiety management and sedation procedures. Positive experiences and associations are a key part of the dental journey for the management of anxiety. Evidence is emerging that the dental environment can be modified to reduce feelings of anxiety. Emergent evidence from randomised controlled trials suggests that small changes to the dental environment, such as the scent of lavender, can lead to statistically significant reductions in levels of anxiety as measured by the Modified dental Anxiety Scale (MDAS) and systematic reviews have suggested the benefits of music therapy for anxious adults.18,19 In 2077 we may see these evidence-based pre-emptive therapies employed to create a soothing environment for the anxious dental patient.

Technological advances and their implications for care

The integration of advancing technology in anxiety management and sedation is unavoidable; the potential for improved patient care and experience will no doubt be facilitated by a variety of technological advances. The technological boom will almost certainly impact on the way in which treatments are delivered, for example in the delivery of carefully titrated advanced sedation techniques, superior systems for monitoring patients and tools to improve the patient experience and environment.

Whilst technological advances infiltrate into the provision of sedation, the backdrop to the practice of dentistry will be changing simultaneously. As such, over the next sixty years we are likely to see a shift in the nature of dental treatment being provided under sedation or general anaesthesia. Sedation may be reserved for dental extractions and surgical procedures whilst needle-free local anaesthesia delivery systems and tooth restoration without conventional drills have the potential to reduce the distress associated with these procedures. Dental materials are likely to have improved handling, reduced moisture sensitivity and, as such, will be placed with greater ease in the dental phobic or patient with challenging behaviour. There has been a remarkable drop in the caries prevalence in England in recent years; primary coronal caries has fallen from 38 percent in 1998 to 23 percent in 2009.20 Multiple contributory factors including the normalisation of oral hygiene, the common use of fluoride containing dentifrices and the public health agenda to reduce sugar consumption look set to lead to a continued reduction in caries incidence.21 Additionally, genetically modified reduced cariogenicity Streptococcus Mutans may have a role to play in the future for the reduction of caries experience.

During the sedation procedure, more sensitive technology may become routine practice in the management of medically complex ASA III/IV patients. For example, capnography which graphically displays “the concentration of exhaled and inhaled carbon dioxide plotted against time” has been shown to be a method for the early detection of respiratory depression.22 Capnography is routinely used during general anaesthesia and in intubated patients. As the number of patients who are elderly or have multiple comorbidities increases, we may find that over the next 60 years the use of capnography becomes routine practice for dental sedation. Additionally, modalities such as pre-oxygenation of patients, especially those who are overweight can help to reduce the risk of respiratory depression during intravenous sedation and may become a mainstay of treatment for the at-risk patient.

As previously mentioned, closer working within multidisciplinary teams including dentists, anaesthetists, outreach teams and psychologists is anticipated in the future for patients with multiple complexities. These teams may be virtual. Telemedicine is already being used to monitor and treat patients in some branches of medicine which do not require the expert to be physically present, and a variant of this may be used in the management of dental patients where centrally located teams of specialists could provide expert opinions, treatment plans and clinical supervision remotely.23
Technology is not only beneficial in the monitoring of patients undergoing sedation, it can also be useful in non-pharmacological behavioural management. Sound-excluding earphones can be used in the dental surgery to block out distressing noises; these can be linked to microphones that enable the dentist to communicate with the patient. Over the next 60 years we may see virtual reality programmes developed that allow the patient to become immersed in a three-dimensional dental experience where they can safely become desensitised to the experience of attending the dentist; virtually inspecting instruments, operating dental hand-pieces and integrating this further through the use of avatars similar in appearance to themselves. Hypnotic principles are currently being pioneered through virtual reality head-sets, which focus the patient’s attention away from the procedure and onto alternatives experiences, creating states of focused attention, relaxation, and immersion into another reality.

**Developments in anxiety management strategies**

Following on from the current trends in the provision of dental care in the UK, the future of anxiety management and sedation is likely to continue to move toward a holistic, patient-centred and multidisciplinary approach. Anxiety management and sedation techniques will likely be guided by high quality evidence generated from rigorously controlled trials and synthesised evidence to support the efficacy and safety of these techniques in the hands of the dental team. Anxiety management strategies are likely to become multimodal, utilising methods which show ever increasing evidence in support of their effectiveness such as mindfulness meditation, cognitive behavioural therapy and hypnotherapy. In 2016, the National Institute of Health and Care Excellence made formal recommendations for the use of mindfulness based cognitive behavioural therapy in the management of depression, revealing the increasing acceptance of alternative therapeutic techniques within the medical sphere and with continued evidence in support of this, is likely to be an area that continues to increase over the next 60 years. A systematic review by Gordan et al., found that cognitive behavioural therapy (CBT) was successful in the reduction of dental anxiety, this success also extended to CBT undertaken in group sessions and showed some improvements after just one session. These techniques provide the patient with a way to develop their internal locus of control, thereby empowering them and providing them with coping strategies that can enable them to conquer their dental anxieties.

As behavioural management therapies become integrated into mainstream practice and gain further high quality evidence in support of their benefits and effectiveness, the under- and post-graduate curriculum will gradually morph to reflect these advances. Over the next 60 years we may see the development of structured behavioural management modules in the undergraduate curriculum educating young dentists to provide simple cognitive behavioural therapies, prescribe mindfulness regimes for patients to practice at home, and to deliver simple hypnotherapy-based relaxation techniques. The impact of such education may be a reduction in the number of dental phobia cases referred into community dental services or secondary care settings and an increased confidence in the use of non-pharmacological methods of anxiety reduction. Ultimately, developing behavioural management techniques in the undergraduate curriculum will reduce the reliance on sedation and encourage patients to overcome their dental anxieties.

We have described the increases expected in the medically complex older population, but at the other end of the age range, children with equally complex medical, and genetic conditions are thriving into adulthood thanks to advances in medicine and surgery. These patient groups require dental care consistent with that provided for the general population but due to their medical complexities may struggle to access, tolerate and comply with dental procedures. These challenges may mean that general anaesthesia is contra-indicated and therefore anxiety management may be crucial in facilitating access to care.

These changes in population demographic and our knowledge of anxiety management techniques creates an ethical imperative for the conscientious dental practitioner to provide a holistic approach to patient care and to move away from the perceptions of the mind body dichotomy. Psychological techniques will need to be integrated as adjuncts to pharmacological approaches. Pioneering researchers have explored the use of a combination of regional or local anaesthesia with sedation and hypnosis, utilising innovative management strategies drawn from multiple disciplines. Their research has shown promise for the cognitive modulation of dental pain and the combined benefits of conscious sedation in conjunction with hypnotic states to facilitate pain relief.

Current concepts in neuroplasticity are already exploring the potential for ‘rewiring’ the brain by changing neuron communications and networks. This in turn may have promise for the complete elimination of the patient’s stress and anxiety pathways. In the future, sedation may no longer be required as neurologists and psychiatrists begin to successfully remodel the brain of the dental phobia patient. Neuro-psycho-pharmacology may very well be the future for anxiety management.

By 2077, we are likely to see a move away from the medical model of treatment provision and a push toward empowering patients to take responsibility for their coping strategies and to develop their personal resilience alongside care provided by supportive practitioners.

**Advances in sedation techniques**

For many years midazolam sedation has been shown to be an effective agent in the management of the anxious or challenging patient. The route of administration has primarily been intravenous, but in recent years the use of intranasal midazolam administered using a Mucosal Atomisation Device has become increasingly popular for both children and adults. The use of such devices is likely to develop in the future with ever more sophisticated versions emerging. Patient-controlled sedation has been shown to have high levels of patient satisfaction, minimal cardiorespiratory complications and a good safety record. The aim of sedation is to maintain an optimum state where the patient is still able to respond to verbal commands and does not require
assistance to maintain their airway. Increasingly sensitive and responsive administration systems will help to improve the safety of both midazolam and multidrug advanced sedation techniques. Sedation methods are likely to be tailored to the specific needs and preferences of the patient, with advanced sedation becoming a more frequently used method in secondary care.

Advanced sedation techniques using continuous propofol infusion and combinations of midazolam and fentanyl have become increasingly popular for the management of those patients for whom midazolam may have been ineffective. Pioneering advanced sedation courses are being developed to up-skill dentists to safely provide these alternative techniques and over the next 60 years there are likely to be a greater number of dentists undertaking such courses.31

With an increasing move towards the use of anaesthetic and sedation-based procedures the nature of the operating theatre will change to accommodate the semi-conscious patient who may or may not experience post-operative amnesia, this may involve creating an environment conducive to both surgeon and patient. The lighting, the sounds, the nature of team operations and interactions need to create a harmonious atmosphere to support the patient.

Conclusions

Over the next 60 years we are likely to see anxiety management and sedation change dramatically. Gazing into the crystal ball reveals the benefits that technology can have to improve patient experience and also the safety of sedation through more rapidly responsive monitoring of at-risk (ASA III/IV) patients and more sensitive methods of sedation administration. There will be closer liaison between the dental team and medical specialties. Dentists will work closely with psychologists to deliver behaviour management techniques as an evidence-based way to mitigate the risk of sedation or general anaesthetic for medically complex patients and to reduce reliance upon pharmacological sedative interventions. As midazolam sedation continues to prove itself as a safe method for reducing dental anxiety and the acceptance of advanced sedation techniques delivered by the dental team increases, appropriately selected patients unsuitable for behavioural management intervention will be provided with optimum, evidence-based care pathways for the delivery of the most efficacious sedation strategy, ensuring that we’re ‘getting it right first time’.

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Anxiety Management and Sedation in Dentistry; the next 60 years?

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Abstract

Dental fear and anxiety (DFA), often recognised as one of the barriers to oral health, could impact a patient’s dental health and social life. Current approaches for severe DFA often require the use of conscious sedation, general anesthesia and psychological therapies. New technological advances and scientific discoveries in the near future have the potential to open up a diverse range of possible treatment options for DFA.

Recent advances in pharmacogenomics, robotic delivery technologies and nanotechnology hold promises for improving the safety and effectiveness of the current approaches. New approaches, such as decoded fMRI neurofeedback, computerised cognitive behavioural therapy and use of post-retrieval amnesic agents, are likely to bring new insights into treatments of DFA. The aetiology of DFA will be more effectively understood using more advanced neuro-imaging and molecular genetics technologies, allowing dentists to tailor a more “personalised” therapy for the patient. Overall, technological developments look set to yield positive developments in field of DFA and these research opportunities should be capitalised upon.

Dental anxiety, often recognised as one of the barriers to oral health care in scientific literature,1 has not only been known to result in poorer dental health due to the patient’s avoidance behaviour,2 but also to impact their social life by interfering with work and personal relationships.3 Dental fear and dental anxiety (DFA) are often referred as the state of apprehension which occurs prior to dental treatment and visits due to a perceived inability to predict and control upcoming situations.4 Dental phobia, though often reported separately, is actually a severe form of DFA and is characterised by active avoidance of dental care and out-of-proportion fear towards the actual danger posed by the dental situation.5 Statistics6 show that prevalence is high, with nearly half of the population reporting to have moderate to extreme levels of DFA.

Currently, the typical approach for patients with mild to moderate DFA is to create a calm and welcoming environment.7 Those with severe DFA or dental phobia may often require more intensive interventions, such as pharmacological strategies using conscious sedation and general anaesthesia(GA), and psychological therapies.8 Scientific and technological breakthroughs in the next 60 years could potentially improve the effectiveness and safety of current approaches, and yield new approaches in treating DFA.

Robotic delivery of anaesthesia and artificial intelligence

Robotic surgery is already a familiar concept in medical field in the 21st century; it is frequently reported to offer advantages such as lower post-operative pain9 and complication rates among patients.10 Despite the apparent benefits of robotic surgery, developments in robotic delivery have only just started in the field of anaesthesiology. The development of Artificial intelligence (AI), a branch of engineering that utilises computers to simulate intelligent behaviour with minimal human intervention, often goes hand in hand with that of robots.11

AI, installed with machine learning algorithms and knowledge management programmes, could be used to design computerised decision support systems for conscious sedation and GA and boost new discoveries in molecular medicine by identifying common patterns.12 These systems could enable health professionals to identify subjects with higher risk of developing certain symptoms, via integration of the patient’s medical history, genetic information and data from scientific research using computer algorithms,13 subsequently suggesting a range of pre-operative investigations and optimal treatment modalities “personalised” for the patient.14 These systems could also be used in post-operative care by providing reminders for administering prophylaxis for post-operative nausea and vomiting to high risk patients to improve patient comfort.15

Progress has also been made in robotic delivery of general anaesthesia and conscious sedation. For instance, McSleepy is the first pharmacological drug delivery system designed to monitor all three components of GA (hypnosis, analgesia and muscle relaxation) via automated closed-loop delivery systems, allowing automatic control of anaesthesia induction, maintenance and emergence.16,17 The system also includes in-built safety features and a touch screen with a user-friendly interface to permit bidirectional communication with the anaesthesiologist.18 Although clinical trials19,20 have been performed to demonstrate the feasibility of the device, research investigating the safety of the system is still lacking for clinical translation. SEDASYS, another semi-automated drug delivery system that administrates propofol calculated using patient’s physiological parameters,21 was shown to provide higher patient satisfaction and a more rapid recovery time when providing conscious sedation in gastrointestinal endoscopy and colonoscopy procedures.22,23 Having said that, the use of the device has never been investigated in a dental setting and several limitations concerning the safety of the device are still present, such as delayed oxygen delivery in situations of hypoventilation24.
Advancements in robotic technology in the future may potentially allow the development of a safer automated device that is capable of both recognising anaesthesia emergencies based on the patient’s clinical parameters and pre-operative risk assessments carried out using AI, and carrying out appropriate management towards these emergencies, therefore increasing the availability of conscious sedation and GA in primary dental settings. Robotic delivery has a potential role in increasing patient safety via reducing mistakes due to human error, as well as side effects by delivering an optimal dosage of sedative drugs.

**Pharmacogenomics**

Advancements in molecular technologies have led to an explosion of research in pharmacogenomics, a branch of science that investigates the effect of genetic variability on an individual’s response to drug therapy. This has allowed the identification of polymorphism in genes encoding drug metabolising enzymes, transporters and receptors as a predictive factor in an individual’s metabolic capacity towards the drug.

Pharmacogenomics could be used to select the right sedation drug for patients and several genotypes related have already been identified with the current technology available. For instance, a study by Khan et al. discovered genetic polymorphism in genes could have an impact in metabolism and clearance of propofol, resulting in variability in induction dose and time of loss of consciousness among patients. Another study by Nagele et al. found that patients who are homozygous for the genetic variant MTHFR 677C>T or 1298A>C are at a higher risk of developing hyper-homocysteinemia after the use of nitrous oxide as a sedative agent. Case reports suggest these patients could suffer from catastrophic neurologic outcomes, such as diffuse myelopathy or even death, if treatment wasn’t provided promptly. Genetics have also been shown to influence other commonly used sedatives, such as midazolam and diazepam. Pharmacogenomics can also be applied in local anaesthetic used in a clinical dental setting. Lidocaine, one of the most commonly used agents, was found to be less effective towards redheads due to mutations of the melanocortin 1 receptor.

Future developments in pharmacogenetics could allow testing to be conducted at chairside to provide patient-tailored drug selection and dosage individualisation, which could reduce any adverse side effects, increase effectiveness of the drug, or even prevent mortalities.

**Nanotechnology**

With the increasing incorporation of nanotechnology, a branch of engineering that manipulates matter by one atom or molecule to create structures with unique properties, into medicine, a new branch - nanodentistry is slowly emerging.

Development of nanorobots could reduce or even eliminate the need for dental drills and needles in treatment, which are the two most reported fears among patients. To induce anaesthesia without the use of needles, dentists could place a colloidal suspension containing millions of active analgesic dental nanorobots on the patient’s gingivae, which are all controlled by the dentist using a nanocomputer. Upon contact with the surface of the crown or mucosa, nanorobots could migrate into the pulp via gingival sulcus, lamina propria and dentinal tubules to shut down any sensitivity in the tooth and induce numbness. Likewise, restoration of sensation could also be achieved by ordering nanorobots to egress from the tooth. Nanorobotic dentifrices, delivered in the form of toothpaste or mouthwash, could be instructed using a nanocomputer to destroy any cariogenic pathogens and decayed tissue by metabolising trapped organic matter into harmless and odourless vapours, hence eliminating the use of drills when treating tooth decay.
Nanotechnology could also be applied to improve the drug delivery systems in sedation. Improved emulsion delivery systems in nano-lipospheres allow drugs to pass through the blood-brain barrier and directly transport sedative molecules to the target receptor, thus increasing bioavailability of drugs and reducing effects of toxicity to other healthy tissues.\textsuperscript{36,37} Preclinical trials with sedative agents with nanoparticles have so far been positive. For instance, a preclinical trial\textsuperscript{38} showed that intranasal delivery of nanoparticles loaded with midazolam improved drug entrapment, which may reduce the need for repeated administration and increase patient compliance with fewer side effects. Another preclinical trial\textsuperscript{39} discovered that intravenous delivery of propofol using hydroponically alginate nanoparticles may be able to overcome some of the drawbacks in the currently delivered lipid-based formulation, such as pain during injection and emulsion instability. With the technologies available now, most current studies are still in the preliminary stage. Although nanodentistry has a lot of potential in modifying anxiety management by eliminating the use of drills and needles, issues such as biocompatibility, technical issues of assembling molecular-scale parts and achieving public acceptance will need to be addressed before implementation into clinical practice.\textsuperscript{40}

**Understanding dental anxiety**

Advanced developments of functional neuroimaging techniques, such as functional magnetic resonance imaging (fMRI), allows the mapping of brain physiology by detecting changes in blood flow, metabolism and receptor-ligand binding.\textsuperscript{41} Application of these techniques has allowed us to understand the underlying psychopathological mechanism of mental illnesses, such as depression, OCD and even phobias.\textsuperscript{42} Recently, sex differences in neuroanatomy of dental phobic patients is demonstrated with the use of fMRI.\textsuperscript{43} While female patients show a greater activation of caudate nucleus, males exhibit enhanced dorsolateral prefrontal cortex (DLPFC) involvement. This indicates that females are more likely to avoid dental care when facing phobia and may benefit more with the use of distraction and hypnosis, whereas males are more likely to benefit from exposure therapy. Enhanced basal ganglia internal connectivity and reduced frontotriatal coupling were also identified in brains of phobic patients, which could be used as neuromarkers for diagnosis and monitoring of dental phobia during therapies.\textsuperscript{44} Genetics has always been believed to be not strongly related to dental phobia development,\textsuperscript{45} however, a recent study\textsuperscript{46} has demonstrated that dental fear may share heritability with fear of pain via a family-based cohort study. Despite advances in molecular genetic testing, the role genetics play in the development and maintenance of DFA is still unclear. Future developments in neuro-imaging, such as ultrahigh field strength MRI systems, new fMRI contrasts and diffusion tensor imaging,\textsuperscript{47} could give rise to the production of brain activation maps with higher spatial resolution and validity for interpretation,\textsuperscript{48} allowing us to understand the cognitive processing of the brain and the neuropsychology behind dental phobia in more detail.

Genomewide association studies, combined with new information obtained from neuroimaging and molecular genetic studies, can allow us to identify the biological processes involved with specific genes involved with dental phobia, e.g. heightened pain sensitivity, over-activation of anxiety pathway.\textsuperscript{49} With increased availability of these techniques and the emergence of personalised medicine, interpretations of a patient's MRI scan and genetic “fingerprint”, alongside with psychometric assessments, could be incorporated to tailor therapy for dental anxiety.

**Prevention of dental phobia and paediatric sedation**

With half of the population reporting onset of dental phobia in childhood,\textsuperscript{50} it’s crucial to take a shift towards its prevention. Current behaviour management techniques used for children with dental anxiety, such as relaxation and distraction, are mainly targeted to modify the child’s behaviour to make it easier to perform dental procedures.\textsuperscript{51} Meta-analysis\textsuperscript{52} also suggested there is a lack of studies investigating the effectiveness of different approaches towards preventing dental anxiety in children. While promoting a warm and welcoming child-friendly environment and avoidance of negative experiences may be useful in preventing dental phobia, there’s little evidence supporting these approaches and longitudinal studies exploring the predictors of phobia development would be crucial in designing effective interventions.\textsuperscript{53}

Children with behavioural management problems, severe dental anxiety and in need of complicated treatments are often indicated as needing conscious sedation.\textsuperscript{54} In recent years, medications used in sedation and anaesthesia have been suggested to cause damage to the developing brain.\textsuperscript{55} Moreover, bias from other confounding factors are often present in these studies\textsuperscript{56} and adverse neurological outcomes could be difficult to recognise.\textsuperscript{57} With advances in neuroscience and improved study designs, long-term effects and safety of paediatric anaesthesia could then be confirmed. A Cochrane review\textsuperscript{58} published recently also highlighted the lack of quality research in the efficacy of sedative agents used in paediatric dentistry, with weak evidence supporting the current use of oral midazolam and nitrous oxide. In addition, only one new sedative, dexmedetomidine, was introduced in the past decade, showing that researches in new methods of delivery and new sedative drugs are certainly lacking.\textsuperscript{59} New drugs, such as remimizadolam\textsuperscript{60} and derivatives of etomide\textsuperscript{61}, are currently undergoing clinical investigations and could potentially offer benefits in the future. With improvements in safety of delivery equipment, paediatric sedation could become slowly more available in dental practice rather than hospital settings alone.\textsuperscript{62}

**Virtual Reality technology**

Advances in virtual reality (VR) technology in the last decade have opened many research opportunities into the treatment of mental health, of which virtual reality exposure therapy (VRET) is developed in treating specific phobias. The therapy allows patients to confront their fears by immersing them in a virtual environment that integrates real-life computer graphics, body tracking devices, visual displays and sensory input devices.\textsuperscript{63} Despite success of the therapy being reported in treatment of phobias of flying and
spiders,\textsuperscript{24} it is not well explored as an approach to treat dental phobia. To treat dental phobia in VRET, patients will experience virtual reality scenarios, such as receiving a basic oral examination and injection set in a simulated dental clinic in first person view.\textsuperscript{19} VR technology is also applicable in treating patients with mild to moderate dental anxiety, for instance, the use of virtual reality distraction system showing relaxing nature worlds was found to help patients in reducing anxiety and pain during dental procedures.\textsuperscript{46}

**Fig. 2**: A dentally anxious patient using VR distraction
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0091276

Future developments in VR technology could allow the contribution of multimodal stimuli (visual, auditory, tactile and olfactory) in VRET, giving patients a sense of actual presence in the virtual world.\textsuperscript{19} With an increase in portability and a decrease in equipment cost in the future, VRET could be made available in home-use as well as private practice, allowing patients who are too anxious to undergo real-life exposure therapy to face their fears. VRET also gives the possibility of generating gradual assignments with increasing intensity, allowing patients to face their fears at their own pace.\textsuperscript{42} Other than VRET, VR can also be augmented to provide other psychological interventions, such as hypnosis and biofeedback, thus increasing availability of these interventions in a clinical setting.\textsuperscript{42} Investigations about the neurobiological mechanisms underlying the analgesic effects of VR are currently ongoing, which will be critical in developing age and developmentally appropriate clinical interventions for pain management as an alternative to pharmacologic analgesia.\textsuperscript{42}

**Decoded fMRI neurofeedback (DefNef)**

DefNef is a recently developed technique that combines the use of real life functional (rfMRI) and online feedback system. As the subject is being evoked by the presentation of a stimulus, certain brain activity patterns are identified using rtfMRI and these patterns will be compared to the ideal pattern. These patterns will then be repeatedly induced without explicit presentation of the stimulus during neural reinforcement sessions, while the patients will receive feedback on how close their current brain activity patterns are to the desired healthy pattern, thus slowly inducing a change in behaviour as the patient learns to induce the ideal neural pattern.\textsuperscript{22} Success of this technique has been reported in various treatments, such as chronic pain control\textsuperscript{46} and depression\textsuperscript{46} and smoking addiction\textsuperscript{46}, thus prompting a recent study by Koizumi et al.\textsuperscript{22} in exploring the possibility of applying this technique in treatments of phobia. Using the concept of counter-conditioning, when neural activation patterns that represent a conditioned fear-specific stimulus shows up on the patients’ rtf MRI scans, the patients will be rewarded while remaining unaware of the intention of the procedure, thus slowly dampening patient’s fear towards the stimulus. Without an explicit presentation of the stimulus, dental phobic patients may find it easier to accept this intervention than exposure therapy.

Future developments of this technique will coincide of that of neuroimaging techniques, with clearer physiological signals to facilitate better neurofeedback performance.\textsuperscript{26} Fundamental issues, such as the long-term effectiveness of the intervention and identification of suitable candidates, will need to be addressed before clinical translation.

**Computerised CBT**

Cognitive behaviour therapy (CBT), a brief psychological therapy combining behaviour modification techniques and cognitive restructuring procedures,\textsuperscript{4} is proven to be successful in treating DFA.\textsuperscript{4} However, CBT services are often only available for treatments of depression and general anxiety issues.\textsuperscript{7} A study by Tellez et al.\textsuperscript{4} demonstrated the successful use of computerised CBT in reducing patients’ DFA. The intervention, based on a psychoeducation module, educates the patients on the nature of DFA and the advantages of overcoming their phobia. The intervention also includes exposure exercises and motivation enhancements to encourage attendance in future dental appointments.

Although further trials addressing the effectiveness of the intervention are needed, computerised CBT, without needing one-to-one interventions with a clinician trained in psychotherapy, will have a potential role in increasing accessibility of CBT to dental phobic patients.

**Use of a post-retrieval amnesic agent**

A study by Soeter and Kindt\textsuperscript{21} recently addressed the feasibility of using post-retrieval amnesic agent in one session therapy in treating phobias. In the study, participants with spider phobia were given a single oral dose of propranolol, a medication that disrupts reconsolidation of fear memories, after exposing the participants to a tarantula for 2 minutes. Results have been promising and change in fear behaviour was still observed even after a year.

At present, studies\textsuperscript{22} investigating the effectiveness of this intervention on dental phobia are ongoing. Future research carried
Conclusion
Management of dental anxiety patients could be challenging and potentially problematic for the dental team. Yet, with accelerating technological advances and explosion of scientific discoveries, a more diverse range of cost-effective options could be made available in the future to dentally anxious patients to overcome their fears.

Application of pharmacogenomics and robotic delivery look likely to increase the safety and availability of conscious sedation and GA. Aetiology of DFA will be more effectively understood with the development of neuroimaging and molecular genetics technologies, allowing dentists to yield a far more diverse and "personalised" therapy for the patient. Overall, technological developments look set to yield positive developments in the field of DFA. These opportunities should be capitalised upon, with research focusing on the relative benefits of each technique.

References
Anxiety Management and Sedation in Dentistry; the next 60 years?

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Abstract
The aim of managing dental anxiety is to work towards eradicating the fear of the dentist, enabling the provision and maintenance of oral health. In order to understand the extent of the impact of oral health on overall health, a greater infiltration in the medical profession is needed in the future. Current practice in dentistry has favoured the use of a single-drug method of midazolam administration, however, despite its excellent properties compared with previously used agents, it is not always the ideal drug for intravenous sedation. The increase in the size of the elderly population and prevalence of bariatric patients has seen changes in clinical practice. The next 60 years of dentistry will surely see the development of increasingly effective sedation agents, such as remizolam. It will be interesting to see if this new member of the benzodiazepine family will find a place in dentistry. Good quality evidenced-based research will need to be conducted to establish any potential in dentistry, in comparison with the safety and efficiency of midazolam, of any new drug with anxious dental patients. Other future changes in clinical practice will be reliant on sustainability plans, with the possible increase in provision of community hubs.

Introduction
Anxiety management is an important aspect to consider when providing dental treatment. Looking back at the development of dental management methods for anxiety, fear and phobia gives an appreciation of the many techniques currently available to the dental team.

These techniques can be broadly split into two categories; pharmacological and non-pharmacological. Using pharmacological modalities can provide more comfortable treatment and reduce the likelihood of patient avoidance and encourage regular attendance.\(^1\) The use of local anaesthesia proved to be an immense development in dentistry and has changed patients’ perspectives of dental procedures to a great extent.\(^2\)

Conscious sedation is another pharmacological adjunct which is an important fundamental aspect of the modern practice of dentistry and is considered by many to be an integral element in controlling pain and anxiety when delivering dental care.\(^3\) It should be remembered that although sedation is a proven technique for dealing with dental phobia, it should not be used as an alternative to effective local anaesthesia or good behavioural management.\(^4\)

Pharmacological
Prior to the development of local anaesthesia, patients had to endure any pain without complaint and accept the inevitable; often prior self-medication with alcohol was the only way of coping with operative dental care.\(^1\) More treatment options are now available to patients due to developments in modern dentistry and the development of safe and reliable local anaesthesia, successful administration of which remains the most important skill for the practitioner.\(^5\) Effective anaesthesia and pain control can be all that is needed to manage anxiety depending on the severity.\(^6\) It is widely recognised that the fear of dental injections remain a clinical problem and is a common trigger of dental anxiety. For this reason alternatives to conventional methods of administering local anaesthetics are actively sought.\(^7,8\) Topical anaesthetic agents and the development of computer-controlled anaesthetic delivery systems, such as the Wand®, have helped minimise pain and discomfort whilst delivering local anaesthesia.\(^9\) Innovative techniques are being developed, with one study examining a nasal spray to induce anaesthesia of anterior maxillary teeth and measuring its efficacy, safety and tolerability in patients.\(^10\) Newer improved devices include the syringe micro vibrator (SMV) designed to provide a practical way to relieve injection pain.\(^11\) These are promising advancements in pain and anxiety management, and devices like these could potentially be the future of everyday clinical practice.

Despite these advances, routine dental treatment is not always tolerated using local anaesthetics alone and some surgical interventions render local anaesthesia insufficient. Conscious sedation can provide an adjunct to local anaesthesia and so appropriate patients need not fear surgical procedures in the future.\(^12,13\) Both conscious sedation and general anaesthesia are two pharmacological intervention techniques available.\(^14\)

Conscious Sedation
Pharmacological methods to manage anxiety have been developed over the years with dentists often at the forefront of anaesthesia research, many of the world’s first anaesthetics were given in a dental setting.\(^15,16\) It is this ongoing research and development that has seen a historical shift from using one sedative agent to another, with each showing advantages over its predecessor. Further developments in the drugs and techniques used for dental conscious sedation have formulated the practice seen today. Nowadays sedation techniques are classified as either basic or advanced.\(^1\) The basic techniques of conscious sedation have been found to be safe and effective for the management of
anxiety in adult dental patients requiring sedation to allow them to undergo dental treatment. These include inhalation sedation with nitrous oxide, oral or transmucosal benzodiazepine sedation and intravenous sedation with a titrated dose of midazolam. Following its first use in 1983, midazolam still remains recognised as the drug of choice for intravenous sedation in anxious patients. Advanced conscious sedation techniques are far less widely used, and more complex to administer than the basic techniques, but for patients with high levels of anxiety the standard techniques of sedation are not always appropriate or successful. Midazolam can be used along with other agents, such as an opioid, propofol and/or ketamine, to obtain better sedative effects. Propofol is a sedative-hypnotic agent that was introduced in 1977. It has minimal side effects and rapid recovery, but unlike midazolam it has no antagonist. In general, midazolam is used to produce sedation, and propofol to induce general anaesthesia, but propofol can be used as an intravenous sedative agent in adults. However, when used at appropriate doses, both agents may achieve either clinical endpoint thus requiring specific training in their administration. The pain caused by propofol on injection can contraindicate the very reason, to remEDIATE pain, that its use is hoping to achieve. Studies have been conducted using patient-controlled sedation with good results. A lack of control during dental treatment can provoke a patient’s fear and returning the control to the patient can help to decrease anxiety. It was found that propofol had favourable properties for patient-controlled sedation, and provided a safe and acceptable intra-operative analgesia for phobic dental patients.

Every drug has its drawbacks in clinical practice despite having been established in anaesthesia due to its properties of delivering relatively safe and effective outcomes. Currently, there is no clinically available hypnotic agent that possesses all of the desired properties required in such a drug. Both midazolam and propofol possess significant advantages for sedation over hypnosis, however, their limitations present the incentive to continue to search for new innovative anaesthetic agents. Many are un convinced that a single drug will ever be found that could meet all the pharmacological and safety requirements. Driving the development of new sedative and anaesthetic drugs has been the change in demands of clinical practice over the last decade. Both the practice of anaesthesia and the dental profession have seen an increasingly older population with a greater number of comorbidities. The elderly show increased sensitivity to anaesthetic medications and often have exaggerated effects due to their decreased rates of metabolism and excretion, which can prolong the effects of the agent and postpone recovery. The dramatic prevalence of obesity has also demanded a change in clinical services, with a global surge in the prevalence of bariatric patients. The Society for Obesity and Bariatric Anaesthesia’s (SOBA) guidelines state that obese patients are not suitable for single operator-sedation procedures, as with sleep-disordered breathing, they are likely to have airway obstruction with even minimal sedation. This could have implications for the larger patient having conscious sedation for dental treatment in the future, thus requiring a second practitioner. A reason for this is sleep-disordered breathing, which describes the spectrum of conditions ranging from obstructive sleep apnoea (OSA) through to obesity hypoventilation syndrome (OHS). The risks of complications are much lower if identified and treated pre-operatively with continuous positive airway pressure (CPAP). This has prompted the development of new devices one of which is the Optiflow® which provides pre-oxygenation via a nasal cannula to extend the apnoea time of patients with difficult airways, and is currently being trialled in general anaesthesia. This practice could be transferable to dental conscious sedation, but research is required to validate this.

Obese individuals have an increased risk of cardiovascular disease, diabetes and pulmonary disease. These physiological changes are likely to result in altered drug pharmacokinetics. This has lead the focus of modern research in anaesthesia on soft drug development (self-metabolising, organ-independent drugs) and Current developments in anaesthesia are primarily focused on the targeted modification of structures of existing compounds in order to improve their pharmacodynamic and pharmacokinetic properties, specifically against the two most commonly used agents, midazolam and propofol. It is against these two agents that any newly developed ones will be assessed. An innovative member of the benzodiazepine group of drugs, remifentanil (CNS 7056), is currently being investigated in clinical trials. The structure of remifentanil was modified to produce a drug that is independently metabolised and not dependant on organ metabolism. It combines the properties of two unique drugs, midazolam and remifentanil. Remifentanil acts on GABA receptors like midazolam and its metabolism occurs in the blood, thus it is organ-independent like remifentanil, a desirable trait for the increasing number of medically compromised patients. Similar to currently used midazolam, remifentanil has the ability to be reversed with the antagonist flumazenil. This makes it highly desirable when given by non-anaesthetists not highly trained in airway management which adds to its safety were an overdose to lead to significant respiratory depression.

After the introduction of midazolam, attempts were made to identify short-acting benzodiazepines, but these showed no significant advantages over midazolam. So why is remifentanil different? Based on the existing data, remifentanil does appear to have potential advantages over midazolam. The time to recover from sedation is shorter and more consistent with remifentanil compared to midazolam. It shows great promise as a sedative agent for outpatient sedation where fast and predictable onset of action and rapid recovery is highly desirable. However, the standard titration techniques of intravenous midazolam sedation are approved and have excellent safety records when it is administered according to guidelines and its use is not contraindicated. Short-acting drugs require an infusion method due to increased potency. Acceptance within the dental profession is largely determined by convenience of administration; sedation by bolus injections is preferred over infusion pump methods. In addition, the definition of conscious sedation must be kept in mind, which refers to ‘a margin of safety wide enough to render loss of consciousness unlikely’.

Another point worth considering is the management of failed sedation appointments. Robb demonstrated how the logical use of advanced sedation techniques allowed patients, who were unmanageable with the basic sedation techniques, to receive

SAAD ESSAY PRIZE WINNER
dental treatment under sedation rather than having to resort to general anaesthesia. It is highly likely the future will continue to see an increase in these advanced techniques to avoid the risks of general anaesthesia and ultimately maintain cost-effectiveness. Another advanced technique is the use of sevoflurane, studied as an alternative to nitrous oxide, particularly due to its minimal impact on the environment.1

With the potential increase in use of advanced techniques, additional respiratory monitoring of bariatric patients may be required during sedation, for their safety. Current guidelines are unable to recommend the routine use of capnography because of the lack of evidence based dental-specific research.7 This void has prompted researchers to look at the use and validity of implementing capnography monitoring alongside pulse oximetry.26 Nevertheless, if advanced sedation techniques become more widely employed and practised, as polypharmacy sedation is more risky, it is essential the patient’s respiratory function be monitored closely.27 Will the future of sedation see sampled exhaled gas or transcutaneous capnography as the gold standard of intra-operative monitoring?5,26 If warranted by new research, future changes in practice will undoubtedly result in changes to existing guidelines. It is essential for the whole dental team to keep up to date with the latest guidelines, to ensure patient safety.

Non-pharmacological

Given the complexity of treating bariatric patients and an increasingly elderly population, it is highly likely there will be an increase in use of alternative non-pharmacological modalities. These anxiety management techniques are simple to perform,22 ranging from good communication and establishing rapport, to the use of systematic desensitisation and hypnosis.27 Assessment of the patient is paramount to identify the causes of anxiety, and to establish the patient’s expectations of treatment. Deciding what techniques are required depends on the level of the anxiety and is ultimately adapted to the patient’s individual needs.23,24 The art of hypnosis has great therapeutic benefits in dentistry, ranging from simple relaxation of the anxious patient, to complete analgesia for surgery, with no after effects and no drugs required.23,24 A powerful tool yet poorly understood, hypnosis can provide effective ‘sedation’, whilst leaving the patient in full control.29

Thom et al.41 compared psychological behavioural and cognitive behavioural approaches to managing dental phobia, seeing greater changes with the long-term management of anxiety, as opposed to a one session administration of pharmacological agents. Annual follow-ups of these patients revealed reduced levels of dental anxiety and a greater frequency of visiting a dentist.21 This may be due to the amnesic effects of some pharmacological agents.2 It is necessary to escalate the justification and the increasing relevance of psychology and behavioural sciences to dental training and clinical practice.24 Hill et al.42 found both undergraduates and postgraduates would be interested in further training if financial support was available, the key is to increase confidence with additional behavioural management skills.29

Alternative methods for anxiety management may include the use of the olfactory system and the effects of aromatherapy, particularly lavender and orange scents, and to investigate their impact on anxiety, mood, alertness and calmness in dental patients.44,45 It has been shown that odours are capable of altering emotional states and have proved helpful in reducing anxiety in dental patients.46 Another alternative method is acupuncture which is a generally safe and non-toxic supplement to conventional treatment46 and produces negligible adverse reactions.46 Clinical trials have shown that ear acupuncture is as effective as intranasal midazolam in reducing dental anxiety and the gag reflex.27

An additional, widely acknowledged cause of anxiety is the fear of the dental drill.1 Modern developments such as air abrasion and lasers may increasingly be used in conjunction with, or replace, traditional methods.30-32 These developments, although not currently implemented in everyday practice, are important giving the hope to eradicate the use of the dental drill and to change perceptions of dentistry by removing this major contributing factor to anxiety.

Sustainability

It is important, when looking at the future, to be aware of proposals concerning the sustainability of the National Health Service. These will undoubtedly impact the delivery of dental care, despite practitioner preference for advanced techniques for paediatric patients to be delivered in a secondary care setting.23 There is a growing need for sustainability and transformation planning of special care dentistry.23 As hospitals are becoming overwhelmed, there needs to be greater primary care access and provision for anxious patients. It will be necessary to increase accessibility of alternative treatments in practice and community centres.27 As part of an integrated care pathway (ICP), low-level psychological intervention delivered by dental nurses showed significant reduction in dental anxiety.27 Care pathways are also discussed in the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) standards.4

Conclusion

As well as remimazolam, other compounds have been synthesised due to changes in clinical practice. This has given rise to anaesthesia research in the pursuit of more suited agents.22 Unpinning evidence-based practice of new agents is needed and should be dental specific, to ensure patient safety is paramount.

Klass et al.24 highlights the importance of managing oral health in relation to other conditions. It is important the dental team encourage regular attendance; if oral health impacts on chronic diseases, providing effective anxiety management techniques for the attendance of the dental phobic patient to be possible.

References:
SAAD Diamond Jubilee Symposium 2017
A Strong Foundation for a Bright Future
Saturday 23 September 2017
The Royal Society of Medicine, London, UK

SAAD celebrated its 60th anniversary, or Diamond Jubilee in 2017 and to mark the occasion, this year’s symposium was the best attended yet! Francis Collier, SAAD’s current President made his entrance in a truly celebratory fashion by being played in by a Scottish piper, and then gave a wonderful welcome address to all delegates.

The first presentation of the day was a joint address by current SAAD trustee (and former President) Chris Holden and Honorary Life member of SAAD, Ian Brett. They delivered a very detailed account of how SAAD was instrumental throughout the last 60 years in promoting and improving anaesthesia and later sedation in dentistry in the U.K. Their presentation was also given a very human face by the addition of a collage of pictures over the years of the people that made and shaped the society, some of whom are sadly no longer with us.

The next speaker was Prof. Vince Bissell who chaired the committee from the Scottish Dental Clinical Effectiveness Programme (SDCEP) reviewing the current guidelines on sedation in the U.K. He explained how the SDCEP functions and how they come to formulate guidance for any specific area in dentistry. As can be expected the guidelines are comprehensive but broadly consistent with those published by the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) in 2015. He welcomed any feedback on the new guidance via the SDCEP website.

Next followed a very entertaining and informative presentation by Brid Hendron, a qualified dentist and communication coach. Her expertise lies in working with and treating anxious and dental phobic patients through understanding the psychological processes that underpin these patients’ behaviour and thought processes. By listening to her explain these processes step by step, she helped attendees better understand some of their nervous patients, as well as how to deal with them more effectively.

Following on from this topic we heard of a very practical approach to treating dental phobic patients through the use of Cognitive Behaviour Therapy aided by the use of Virtual Reality. This was a joint presentation by Jennifer Hare, a registered Health Psychologist and her colleague at Guy’s and St Thomas’ NHS Trust, Bryan Kerr, a Consultant in Special Care Dentistry. They explained how they were making use of Virtual Reality scenarios in a dental setting to improve the outcomes for nervous patients receiving Cognitive Behaviour Therapy. They also kindly offered to demonstrate the Virtual Reality during the lunch break to those who were interested.

This rounded up the morning session, but before breaking for lunch, as well as the SAAD Annual General Meeting, the following Prizes were awarded by SAAD’s President Francis Collier:
- Dental Care Professional Essay Prize: Kimberley Illing
- Dental Student Essay Prize: Yui Yin Ko
- Drummond Jackson Essay Prize: Janine Doughty and Amar Kaul

The President’s Award for the best poster presentation was awarded to Ruixiang Yee from Singapore for “Intramuscular ketamine sedation in managing paediatric oro-dental trauma.” Francis also presented a gift from SAAD to Will Botha who was stepping down as a SAAD Trustee.

After a lovely lunch, the afternoon session kicked off with a joint presentation of some interesting case studies by Dan Bateman, Will Botha and Nicole Sturzenbaum. These three speakers each gave an account of cases they have dealt with, ranging from Daniel’s look back over the last ten years and how he has changed and evolved his own operator-sedationist practices; to Will’s case of a five year old boy who developed severe post-sedation agitation and how to identify risk factors and manage this phenomenon; finally to Nicole’s chronic of a deeply traumatised patient with complex dental needs over many years and chosing the best way of treating her using different forms of sedation and behavioural management.

The next speaker was Dr. Michael Zybutz who gave a very personal account of a ‘surgeon’s’ or operator’s perspective of conscious sedation for dental and oral surgical procedures. Michael went on to share some practical tips he has gained through his extensive experience working with many different sedationists over many years in practice.

The last speaker of the day was Mick Allen who gave a very interesting talk about what the future might hold for sedation and dentistry, judging by how much it has changed over the last few decades. He suggested that changes might come in many different forms ranging from new drugs to different ways of working and mixing clinical skills, to technological advances such as making use of Nanobots to treat disease! However, even though these changes might one day become reality, as human beings, we will always need a human touch!

At the end of a thoroughly enjoyable and interesting day, Francis Collier thanked everyone for attending our Diamond Jubilee Symposium and invited everyone back for next year’s symposium on 22nd September 2018 to be held again at the Royal Society of Medicine in London.
SAAD: A History of the last sixty years

Christopher Holden & Ian Brett
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Ian is an Honorary Life member of SAAD, now retired from practice.

Christopher is a GDP with a background postgraduate service training post in general anaesthesia and oral surgery. His practice is devoted to care of the anxious and frightened patient. As a continuing elected member of SAAD Council and Board (including a term as president) since 1984 he has seen the development and achievements of modern SAAD. He is the longest ever serving Board member of SAAD. UK and worldwide postgraduate teaching, and experience as an expert at the GDC, GMC, tribunals and courts in a number of jurisdictions has enabled Christopher to bring the needs and challenges of sedation practice to help SAAD guide our members as contemporaneous standards develop. As a member of the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) Christopher is actively involved in furthering future standard setting and training in dental sedation. He is a past president of IFDAS (International Federation of Dental Anesthesiology Societies) and he is currently the elected European Representative on the executive.

SAAD has evolved over the last sixty years from a small study group to a mature, sophisticated specialist society. An anecdotal look at a picture album of our development may list our achievements and time line but would miss the true essence of SAAD. Our membership is, and always has been, an eclectic mix of dental and medical practitioners, the educationally gifted, the politically powerful and curiously interesting individuals.

Driven by a shared desire to improve the patient journey, SAAD has filled a niche both educationally and politically. Knowing that change for the better requires leadership entwined with democracy, discussions in Council and the Board have occasionally been robust but always respectful and forward looking. We have worked with our medical colleagues, the educational authorities, the medical and dental indemnity organisations and the medical and dental regulators with increasing knowledge and acceptance all furthering our members needs.

Knowing our past, leads to an understanding of the role SAAD has taken in developing standards of patient care whilst being open to change and promoting education beyond the basic training available in the first decades. We have taken leadership internationally with considerable impact. It is the talent of our membership that has been SAAD’s success so far. A diverse group of individuals whose stories are sometimes strange and not infrequently viewed as quizzical but who have co-operated together in the pursuit of abolishing pain to conquer fear.

This presentation describes our past and illustrates that SAAD’s success has been born of challenging the status quo, led by individual members and the will of the Board. SAAD has much to celebrate and we look forward to the coming decades of clinical changes steered by a proactive membership whose individuality and drive must reflect the talents of those who have shaped our past.

Not only has SAAD been a national leader in education in pain and anxiety control but the development of the Society changed the face of UK dentistry. From the embryonic stages of a study club, through design of the first dental chairs for supine dentistry and team working, SAAD has been instrumental in the modernisation of dentistry. It has not been an easy path with periods of professional clashes with anaesthetic colleagues; high court litigation; and a maturing into a leading educational society.

In the 21st Century, SAAD has flourished co-operating with the dental faculties and medical Royal Colleges to agree training pathways for sedation. SAAD has provided representation or individuals with expertise on every major guidance document in the training and provision of dental pain and anxiety control in the last generation.

The society has developed with increasing confidence, capability and co-operation providing guidance together with professional practical training that has the respect of dentists both in the UK and worldwide.

Our past can teach us lessons about how to thrive in an increasingly evidence-focused provision of dental services. Our future is dependent on challenging the status quo, being innovative in patient care, and pushing for change in a medical and dental world where doing nothing for change is the easy option but not the option that delivers improvement for our patients.
MILESTONES IN THE HISTORY OF SAAD:

1955 Study Club founded by Stanley Drummond Jackson (D-J)
1957 Society founded. Trust deed drawn up by Lord Chancellor
1957 First Course, Meetings and News sheet
1957 Intermittent Brietal (Methohexitone) technique taught
1957 Interest in mortality and morbidity began
1960 Jorgensen Loma Linda technique promulgated
1961-1965 Development of the first supine electrically driven dental chair (Syncromat)
1967 10% of all UK dentists had attended a SAAD course
1968 Intravenous Valium taught
1969 Libel Case: High Court
1970 Expansion of ultralight techniques
1975 Death of D-J. Re-organisation of the society
1979 SAAD 79 -2nd International Congress on Modern Pain Control London
1980 Inhalational sedation as RA expanded teaching
1980's Proliferation of benzodiazepine and opioid techniques
1981 Inter Faculty Working Party on Training in Dental Anaesthesia
1984 Evaluation Scheme for GA /sedation starts
1984 Start of Update and Lifesaver Courses
1986 First guidance document: Monitoring
1987 National Course in Conscious Sedation for Dentistry
1990 General Anaesthesia, Sedation and Resuscitation in Dentistry (Poswillio)
1993 1st Annual Symposium of the modern era
1996 Lifesaver II presented in Australia
2000 Standards in Conscious Sedation for Dentistry-SAAD
2003 SAAD hosts IFDAS 2003 Edinburgh
2003 A Conscious Decision
2003 Conscious Sedation in The Provision of Dental Care
2006 Conscious Sedation in Dentistry: Dental Clinical Guidance
2007 Standards for Conscious Sedation in Dentistry: Alternative Techniques
2009 Evaluation Scheme for Sedation implements national standards
2013 Framework for Commissioning Sedation Guidance
2013 Academy of Medical Royal Colleges: Standards and Guidance
2015 Standards for Sedation in the Provision of Dental Care (IACSD)
2016 SAAD Assessed Sedationist and SAAD Assessed Sedation Nurse Schemes
2017 Conscious Sedation in Dentistry (SDCEP)

SDCEP Conscious Sedation in Dentistry: Updating the Guidance

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Vince Bissell graduated from the University of Leeds in 1985. He completed his specialist training in Restorative Dentistry in Edinburgh and, following a brief stint in the Middle East, he was appointed Senior Lecturer and Honorary Consultant in Restorative Dentistry at the University of Glasgow. In 2011 he was appointed to a Chair in Restorative Dentistry and Dental Education at Glasgow. He is currently Chair of the General Dental Council’s Overseas Registration Examination Advisory Group and recently chaired the SDCEP Guidance Development Group revising the Conscious Sedation guidance.

The role of the Scottish Dental Clinical Effectiveness Programme (SDCEP) is to produce clinical guidance on priority topics to promote high quality clinical care. SDCEP first published guidance on conscious sedation in 2006 and a full review and revision of the guidance was due in 2016/17. In 2015 the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) published “Standards for conscious sedation in the provision of dental care.” This document, whilst clearly focussed on patient safety and high-quality sedation practice, raised significant concerns for some sectors of the profession. It was considered that there was some confusion surrounding a number of the recommendations. Consequently, in 2016 the Chief Dental Officers of the four UK nations asked SDCEP to bring forward its review of conscious sedation guidance and, in doing so, to address the concerns raised by the IACSD report.

SDCEP uses a robust methodology, now accredited by NICE, to produce guidance. The process begins with establishing the scope for the guidance, through structured interviews with practitioners and patients. Using feedback from these interviews, the scope is defined through the development of a number of clinical questions that the Guidance Development Group (GDG) will consider. The SDCEP team then gather evidence to inform the discussion by conducting a comprehensive and systematic search of online databases. The
GDG was made up of members drawn from a variety of dental professional roles, and also included patients. The GDG considered the evidence in relation to each clinical question, along with expert opinion, the balance of risks and benefits, patient and practitioner perspectives etc., prior to making recommendations and producing a draft document. The draft guidance was then subject to a four-week consultation. There were 65 consultation responses, some from individuals, and some from organisations. All responses were considered and the guidance amended accordingly.

The updated guidance was published in 2017 and contains recommendations that are broadly consistent with those in the IACSD report. It is presented as key recommendations followed by further explanation and advice; a number of tools to aid implementation are also included. The report attempts to clarify requirements in relation to a number of issues, for example, the timing of assessment for sedation and its relation to consent, the need for fasting, and the inclusion of specialist expertise to insure effective treatment planning. There are also clear recommendations on training and an endorsement of the training curricula specified by IACSD.

SDCEP welcomes feedback on the new guidance, which can be provided via its website, http://www.sdcep.org.uk/published-guidance/

“Be not afraid...”; Understanding nervous patients.

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Brid Hendron is a qualified dentist and communication coach. Her clinical interests have always been shaped by an interest in working with nervous patients to eliminate dental related anxiety and reintegrate them into mainstream care. Brid is a qualified NLP trainer and is qualified in hypnosis. She also provides customised training for healthcare professionals and their teams to optimise performance and eliminate stress. She presents extensively on these subjects at seminars across the UK. Brid also enjoys roles as Postgraduate Dental Dean and as Regional lead for Community & Hospital dental services and Dental Public Health in Northern Ireland.

Dental professionals frequently encounter patients with dental anxiety in their day to day delivery of care. The anxiety experienced can vary greatly both in magnitude and in its ability to impact on access to care and subsequent oral health choices. Clinicians understandably find it challenging to understand how a patient can retain a negative perception despite the high standard of compassionate care they make sure they provide. This is one of the great challenges of working with nervous patients.

The effect of perception and the subjective experience of reality can be outlined using the Neuro Linguistic Programming (NLP) communication model. This presents a working explanation of what we observe in clinical practice. It can be used to highlight that how we think affects how we feel which in turn impacts on our behaviour including our interactions and communication with others. Therefore negative thoughts (such as those predominant in a nervous patient’s mind during treatment) are not only visible in the outward physical presentation but are frequently revealed through compromised behaviour and poor communication both in speaking and listening. This explains why nervous patients tend to “forget” or more accurately fail to pick up and retain information provided. It also accounts for the observation that nervous patients can find it difficult to articulate their thoughts and deliver a comprehensive history. The model also explains how a previous negative experience can completely short circuit a patient’s ability to engage with the present and this can result in negative behaviour even in a currently positive and supportive environment. This helps us understand why some nervous patients can seem difficult and confrontational at the outset of care, and yet as their anxiety dissipates they become much more amenable and flexible. An understanding of the mindset of a nervous patient using this simple model can greatly empower us as clinicians to remain patient and supportive. Simple tools such as repeating important information voluntarily, offering choices and retaining an agreeable disposition can go a long way to improving the dental care experience for nervous patients.

Cognitive Behaviour Therapy (CBT) and Virtual Reality for Dental Phobia: The Past, The Present and The Future

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Jen is a registered Health Psychologist based within the Dental Health Psychology Service at Guy’s and St Thomas’ NHS Trust, in the department of Sedation & Special Care Dentistry. Jen’s primary role is to lead and develop the NHS-based service; providing psychological interventions (including Cognitive Behaviour Therapy) to patients with dental anxiety. She has worked across a range of physical health psychology services within the NHS and has held roles in both community and hospital-based dental services. Jen became a member of the SAAD teaching faculty in June 2014, providing a psychological perspective in the National Course in Conscious Sedation for Dentistry and now maintains a role on the Editorial Board for SAAD Digest. Jen also provides teaching to postgraduate dentists and dental professionals in her role with KCL.

Bryan was inspired by his undergraduate teaching in Sedation at Glasgow Dental Hospital and won the SAAD student essay prize. He then went on to pursue a career focused on the delivery and teaching of conscious sedation techniques. He completed an MSc in Sedation and Special Care Dentistry at King’s College London (KCL) and is now a Consultant at Guy’s Hospital, London. He provides training in conscious sedation to undergraduate and postgraduate dentists at KCL. Bryan is the current Honorary Secretary for DSTG and is a member of the SAAD teaching faculty. In view of both their interests, Jen and Bryan have teamed-up to explore the utility of Virtual Reality (VR) within the treatment of dental phobia using Cognitive Behavioural Therapy (CBT). Their talk at the Symposium aimed to support the day’s programme (“A strong foundation for a bright future”), by providing an outline of CBT’s past, present and future in the management of dental phobia.

The presentation began by providing an overview of the current role and use of CBT in managing dental phobia, followed by a brief exploration of where we are now in implementing CBT – highlighting the challenges faced – leading to the role of VR in providing a possible solution to these challenges. They presented the very recent findings from Kumar Gujjara and his team in Malaysia, which have shown how VRET provides evidence for the application of VR in the treatment of dental phobia (for further details, please refer to the journal scan on page 33 of this issue). The presentation ended with a summary of their own research proposal, designed to explore the use and efficacy of VR exposure therapy (or VRET) within the treatment of dental phobia.

This will be the first research project conducted by the Guy’s based team into the role and utility of VRET for dental phobia, for which a modest pump-priming research grant was provided by SAAD to support the study. A second research proposal following the feasibility study (further outlined below) will employ a blinded and randomised control trial (RCT), comparing traditionally delivered CBT (with standard exposure resources, i.e. photos, 2D videos) with VR-enhanced CBT (with incorporated VRET), to identify the efficacy of VR to enhance CBT, for the treatment of specific dental phobia.

Their presentation concluded before lunch, during which time Bryan and Jen provided an opportunity for the Symposium attendees to trial the VR equipment and videos – immersing themselves into the virtual world of dental treatment. Interestingly nearly all attendees chose to view the local anaesthetic video, and provided some helpful feedback and comments.

The research abstract of their proposed study is outlined below:

A feasibility study to explore the use of immersive 360-degree video in graded exposure within a Cognitive Behaviour Therapy (CBT) approach for dental phobia

Dental phobia is estimated to affect 11% of the UK population. The recommended treatment for specific dental phobia is Cognitive Behaviour Therapy (CBT), advocated by the National Institute for Health & Clinical Excellence. Exposure-based therapy in CBT can utilise many approaches and resources, including imaginal exposure (i.e. imagining the object/situation), as well as photographs, sounds, videos and the objects/situations in real life. Recent innovations in technology have witnessed the provision of exposure therapy utilising a virtual environment for anxiety and specific phobias; known as ‘virtual reality exposure therapy’ (VRET), individuals can become fully immersed within simulated environments, created by 360-degree videos, viewed through specially designed head mounted display devices (HMD). The last decade has seen encouraging research findings in the use of VRET for a number of phobias and anxieties, however, there has been no research into the use of virtual environment exposure for dental phobia, until a very recent study protocol to trial its use among dental phobics in Malaysia was published. This paper was unknown to the researchers as they were designing their own video-software to create a virtual exposure programme for UK dental patients, and the results of this randomised control trial (RCT) study have yet to be published. While preliminary findings are encouraging, this research was conducted using computer-simulated virtual dental environments, as opposed to in-real-life videos using 360-degree video software. Therefore, the primary aim of the current proposal is to pilot a feasibility study among dental patients in the UK. Employing a questionnaire design, individuals successfully treated with traditional CBT will be asked to view 360-degree videos created of the dental setting and provide feedback, to ascertain: acceptability, immersion,
ease of use, level of nausea and whether the use of VRET for dental phobia would be considered of benefit within traditional CBT treatment.

References

Advanced Sedation
A case study demonstrating Post-sedation Agitation in a child.

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Daniel qualified from The London Hospital Medical College in 1997. Since 2001 he has worked in a large referral based practice where he has treated approximately 25,000 patients under IV conscious sedation. The majority of these cases have been in conjunction with a sedationist, however, in the last 5 years he has been an operator/sedationist. Daniel was part of a trio of speakers who each discussed cases.

Daniel's presentation was a light-hearted look back at three cases from the past 15 years. Just as technology has changed, we as dentists have changed in our techniques. The first two cases highlighted how his technique has evolved from increased dosages of midazolam to lower levels with more patient management and distraction techniques. Both cases had the same end result successfully providing treatment and involving sedation, but with significantly reduced dosages.

The third case was a more recent case involving sedation and poor patient co-operation, moving towards a successful conclusion of a complicated and stressful case which was ultimately completed without sedation, just adequate local anaesthesia.

Will Botha is a medical practitioner and has been working as a full time sedationist since 2005, treating both adult and paediatric patients in private dental practices as well as sedation for other medical and surgical procedures. He completed a post-graduate diploma in sedation and pain control at the University of the Western Cape under Prof James Roelofse.

With a special interest in paediatric sedation, Dr Botha joined the sedation team at the Toothbeary Dental Practice in Richmond at the start of 2011, treating children from age 2yrs and older, using advanced, multidrug sedation techniques for patients requiring complex treatment or with complex needs.

This case study showed the development of post-sedation agitation in a 3 year-old boy undergoing sedation for dental treatment. The patient presented on the day of treatment with an active upper airways infection (URTI), but at the same time suffering with significant pain from dental decay in two areas.

It was decided to proceed with intra-venous sedation in order to treat the problem areas only, due to the current URTI, and then to arrange a follow-up visit to complete the other treatment still required.

The patient was sedated with a combination of Midazolam, Ketamine and Propofol over 40min and the proposed treatment was completed successfully. During his treatment he was fairly active and conditions were challenging.

During recovery, the patient developed post-sedation agitation which seem to last longer than usual. Two weeks later the
patient’s mother reported that he was very unsettled after leaving the clinic following his sedation session and that he was also suffering with nightmares at night, which she felt was related to his sedation, even though he had no memory of the treatment itself.

The parents were counseled regarding the likelihood of him developing post-sedation agitation if he had sedation again, but they decided the need for his dental treatment outweighed the risk.

During the subsequent treatment under sedation, conditions were much better and the patient recovered without any problem.

A discussion followed identifying risk factors for development of post-sedation agitation:

1. Younger age
2. Pre-operative anxiety
3. History of behavioural problems
4. URTI
5. Post-operative pain
6. Deep sedation
7. Physical restraint during treatment
8. Certain drugs used in anaesthesia

Recommendations in approaching this problem were suggested including identifying potential patients prone to this, as well as counselling these patients and parents about the problem. Other measures include ensuring adequate pain relief to patients post-operatively and avoiding over-sedation.

Regional Anaesthesia with Nitrous Oxide

Different sedation techniques and their limitations: A case study of a needle phobic patient over a period of 8 years

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Nicole holds a Dentistry degree (Wuerzburg, Germany), a Postgraduate Certificate in Paediatric Dentistry and a doctorate (Dr med dent) in Paediatric Dentistry (University of Jena, Germany). Nicole worked in paediatric dental practices for 7 years before relocating to London to establish, in 2008, Toothbeary an innovative award-winning children’s only dental practice. Nicole is on the Reader Panel of the BDJ Team, has published in several national and international journals and regularly features as an expert regarding children’s dental health matters in television, radio and newspapers.

Nicole presented a case study of a severely traumatised and needle phobic girl named Victoria, who she treated over an 8 year period with different sedation and behaviour management techniques. Victoria was traumatised by a negative experience in hospital at the age of 5 and over the next 10 years she was unable to cope with dental treatment at her local dentist despite an urgent need for fillings on her 6 year molars. Victoria was 16 when she first visited Toothbeary. Following her initial consultation and an OPG it became apparent that additional treatment was needed due to a displaced UR3. Different treatment approaches and options were discussed and agreed, namely to start with IV sedation for the filling therapy and then to prepare Victoria for her orthodontic treatment and surgical exposure of UR3. However, Victoria couldn’t cope with IV sedation, even with a pre-treatment with Midazolam. It was therefore decided that behaviour management therapy was required to help Victoria overcome her needle phobia before any further treatment attempts could be made. Victoria was referred to Tim Newton’s team at Guy’s and over a 6 month time-frame she learned how to apply breathing and relaxation techniques to deal with challenging treatment situations. Following this, Nicole was able to treat Victoria with Nitrous Oxide for fillings, she also accepted treatment with IV Sedation for the surgical exposure of her UR3 and received treatment with incognito to align the UR3. Over the following eight years Nicole applied diverse sedation and behaviour management techniques to build up Victoria’s confidence and overcome her fear, which ultimately led her to have treatment with local anaesthesia alone.

However, when subsequently transferred to a general practitioner, Victoria initially was only able to accept treatment with Nitrous Oxide when Nicole applied the local anaesthesia, and it took one year before she tolerated treatment with local anaesthesia alone.

Nicole discussed the approach of high frequency appointments and reflected on the challenges of high-end dentistry within this patient group, but concluded that the long-term benefit, in particular the improved self-esteem and enhanced quality of life for the patient, more than compensated for the overall effort.
One Periodontist’s View on Conscious Sedation

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Michael Zybutz is a specialist Periodontist and Diplomate of the American Board of Periodontology. Dr. Zybutz obtained his Masters Degree at the University of Washington and his BDS at the University of the Witwatersrand. He is a fully accredited member of the American Academy of Cosmetic Dentistry, a past president of the Alpha Omega Dental Fraternity in the UK and a member of the American Academy of Periodontology and the Academy of Osseointegration. He is currently the President of The American Dental Society of London. His interest is in immediate dental implant therapy. His team utilise sedation routinely for procedures such as the ‘All on Four’ technique and zygomatic implant placement. Having worked with many different sedationists he is in an excellent position to evaluate the effectiveness of various approaches and techniques.

As with any treatment, sedation has a number of advantages and disadvantages. Minimising the barriers to treatment while maximising the advantages make conscious sedation a worthwhile procedure for the dental surgeon. Observed barriers to Treatment and observed ways to minimise these follow.

Additional Coordination Issues and Increased Set-Up Time

The sedationist should arrive in good time with sufficient margin to fully set up equipment and discuss the case(s) prior to the scheduled surgery start time. Sedationist and surgeon should discuss the case(s) prior to the start.

Adverse Intra-operative Experience (Induction; Maintenance; Recovery/post op)

Effective local anaesthesia is vital during conscious sedation. The sedation should facilitate local anaesthesia by providing pain control during the initial local anaesthesia injections. Utilisation of low dose Ketamine and/or a low dose of Opiate is extremely helpful.

During maintenance, effective intra-operative experience appears to be consistently smoothest in patients treated with Midazolam as well as a Propofol utilising a Propofol pump and low dose Ketamine infusion. Very often a lightly sedated patient utilising these drugs is more co-operative than a heavily sedated patient.

Post-op nausea should be avoided at all costs. For this reason avoidance of, or at least utilisation of low dose Opiates is something to consider.

Analgesia is greatly facilitated by use of IV Paracetamol (Perfalgin) administered in the last 30 minutes of the procedure.

‘Tomorrow and tomorrow and tomorrow...’ A Personal view of the future of Conscious Sedation.

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Mick’s interest in Conscious Sedation started as a Year 4 student at UCH. Since then he has developed services in Conscious Sedation in South Wales, establishing the only NHS GDS Conscious Sedation referral practice in Wales in 2007. He has taught Sedation and Special Care Dentistry to 20 year’s of Undergraduate and Postgraduate students. With a career change to become a Consultant in Special Care Dentistry for Aneurin Bevan University Health Board CDS he worked with his practice team to establish the U.K.’s first NHS GDS Employee-Owned Enterprise with all staff becoming shareholders. In his spare time he enjoys fly-fishing on his beloved River Usk, Beekeeping and cycling. He is the living embodiment of the MAMIL!

The aim of the presentation was to reflect upon how conscious sedation has changed since the mid-1980s up to the
present day, and to consider short, medium and long term potential developments.

In the career span of the presenter, conscious sedation had moved forward from a completely unregulated situation where patient experiences and sedation education were not what we would expect today. For example, techniques employed included the administration of intermittent methohexitone from a glass syringe which was sterilised and re-used; having used diazemuls to sedate patients during liquid helium cryotherapy to treat trigeminal neuralgia they were then recovered as a group in a room on hospital trolleys, and in some dental schools the ‘see one, do one, teach one’ approach to sedation education was the common approach. The development of undergraduate education; training by organisations such as SAAD and the publication of IACSD Standards have moved things forward considerably since those days.

Short term developments in drugs, such as remimazolam, and pro-drugs such as fospropofol were described and the possibility of their use in the near future considered. The technological advances in intra-oral scanning and the potential use of 3-D printing will allow for less invasive techniques for some patients, and could reduce the need for sedation, for instance in those patients with pronounced gag reflexes.

In the medium term, the potential to increase the use of skill-mix was suggested. The use of therapists and hygienists in providing inhalation sedation is a step forward, but anaesthetic practice in some parts of the world is seeing fewer anaesthetists involved in routine cases. The potential is there to consider training therapists in the use of IV sedation.

In the longer term, the development of nano technology and its potential for use in dentistry was explored. Nanobots are in development for drug delivery, and could be used to provide more targeted local analgesia, and delivery of a sedative agent to the CNS. The nanobots could be activated or de-activated remotely to raise or lower the level of sedation, and when completed, be completely de-activated and excreted. Dentifrobots might be used to clean and repair teeth, negating the need for invasive and destructive dental treatment.

Above all, humans are social creatures and despite the rise of technology we will always need people to ‘hold our hands’ even in the high-tech future!

Letters to the Editorial Board of the SAAD Digest

We welcome letters concerning any subject related to Conscious Sedation, Anxiety Control, General Anaesthesia or Analgesia in dentistry.

Subject to editorial control, these will be published on the SAAD website at www.saad.org.uk/digest-newsletters/letters along with any replies.
Poster Presentation Abstracts

Intramuscular ketamine sedation used in managing paediatric oro-dental trauma in an Emergency Department

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Introduction: Ketamine sedation is useful for management of paediatric emergencies. However, there is limited evidence documenting its safety specifically in management of oro-dental trauma. This study is the first of its kind in an Asian population.

Methodology: Ethics approval was obtained. The existing database of all paediatric procedural sedations performed at the KK Women’s and Children’s Hospital Emergency Department from January 2014 to December 2016 was screened. Cases where intramuscular ketamine sedation was administered for dentists’ treatment of oro-dental trauma were identified. The clinical notes were reviewed to determine:
(a) type/number of sedation-related adverse events
(b) patient demographics
(c) dental diagnoses and type of dental procedures performed

Results: Over three years, 167 intramuscular ketamine sedations were administered for treatment of oro-dental trauma. Patient median age was 3.6 years (range=1.1-12). There were 19 adverse events reported (11.4%) (n=19); the most common being emesis (9.0%, n=15) followed by transient desaturation (1.8%, n=3) and hypersalivation (0.6%, n=1). One case had two types of adverse events. The most common dental diagnosis was primary tooth laceration injuries (49.1%, n=82). The most common dental treatment was primary teeth extractions (70.7%, n=118).

Conclusion: Intramuscular ketamine sedation administered by trained Emergency Department personnel is safe and effective in managing paediatric oro-dental trauma.

Patient Related Outcomes and Experience Measures (PROMS/PREMS) relating to Oral Surgical procedures under IV sedation: A summary of a local project and a suggested move towards a standardised questionnaire.

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Abstract: Conscious IV sedation (IVS) is a useful adjunct for many patients undergoing oral surgical or dental procedures. The clinical team should strive to improve the quality, safety and satisfaction of the service provided for patients. Evidence of this is becoming increasingly important in the commissioning of NHS services.

We studied the Patient Reported Experience and Outcomes (PREMS/PROMS) of the Oral Surgery outpatient IVS service at the Royal Devon and Exeter Hospital (RD&E). The questionnaire included criteria from two national commissioning documents. 100 questionnaires were sent by post with pre-paid return envelopes. All patients underwent dental extraction(s) and were over 18 years of age. 43 questionnaires were returned and results analysed.

Patient satisfaction was generally very high, on a Likert scale from 5 (excellent) to 1 (very poor), 90% answered excellent while 98% answered 4 or higher. 95% of patients would definitely, and 5% would possibly, recommend the service to a friend or family member. 7% of patients needed to seek advice or assistance post-procedure and 5% required additional surgery. The widespread use of standardised PROMS/PREMS criteria would help evaluate and compare IVS services consistently across providers. SAAD or other organisation(s) could consider developing such a questionnaire.
The pre-operative conscious sedation assessment is imperative for the safe treatment of dentally anxious patients, ensuring the most effective treatment modality is chosen.

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Aim: To evaluate parameters of the pre-operative consultation and their effect on treatment outcomes for patients at Barts Health Trust.

Method: Pre-operative baseline measurements, peri-operative observations and post-operative outcomes were assessed retrospectively.

Results: 200 patients; male (36%) and female (64%) with a mean BMI of 28.86kg/m² were included. Mean midazolam dosages were higher in patients with a higher BMI (p=0.053). There was no noted difference in first attempt cannulation success, with varying BMI groups; no association between BMI and Ellis Grade and no significant occurrence in desaturation below 90%. Hypertensive readings (>140/90mmHg) in 26.8% and referral to GMP in 1.5% of patients (BP>179/110mmHg). Highly anxious patients (MDAS 19+) were more likely to have treatment under IVS than IHS (p=0.02) although this had no effect on Ellis Scores.

Conclusion: Pre-operative assessments are useful in deciding suitability for sedation and modality. Individual readings such a BMI should be considered with further assessments prior to sedation provision and should not be a deterrent for outpatient IVS when high.

Ehlers Danlos Syndrome and Hypermobility Spectrum Disorders – Can we control the pain?

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Introduction: Ehlers Danlos Syndrome (EDS) is a group of hereditary connective tissue disorders, characterised by joint hypermobility, skin hyperflexibility and tissue fragility. Hypermobility Spectrum Disorders (HSD) have similar presenting features as hypermobile type EDS (hEDS). The efficacy of local anaesthesia (LA) may be reduced in both conditions. Alternative techniques to enable pain and anxiety control for dental treatment may be required for this group of patients. The management of patients with EDS or HSD with resistance to LA will be presented.

Case reports: This report will focus on a total of seven patients with EDS or HSD who had their dental treatment completed either under conscious sedation or general anaesthesia (GA) at University College London Hospitals. Three patients underwent conscious sedation (intravenous) and the other four had GA. All of them reported previous resistance to LA.

All patients had other co-morbidities and those undergoing GA required a multidisciplinary team approach and special arrangements. The dental treatments were completed successfully.

Conclusion: Adequate pain and anxiety control can be achieved with conscious sedation or GA in patients with EDS or HSD who present with resistance to LA. A multidisciplinary team approach may be required to enable safe delivery of treatment.

A Retrospective Evaluation of Conscious Sedation Methods used within a Community Dental Service

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Aims: To evaluate the conscious sedation methods used within a community dental setting in patients with learning disabilities (LD).

Introduction: Patients with LD still face many inequalities when accessing health care. Challenging behaviour, co-morbidities and the ability to give consent can make treating these patients challenging. Unfortunately, a high proportion of these patients therefore undergo treatment under general anaesthetic (GA).

Method: Data was collected from day lists and records in patients with learning disabilities seen by the Community Dental Service in Hackney between the periods of June 2012 to July 2013.

Results: 134 patients with LD required treatment under sedation. 76 patients received intravenous sedation (IVS) with midazolam, 30 received intranasal (IN) midazolam and IVS, 9 received oral sedation (OS) with midazolam and IVS, 6 patients
received INS, OS and IVS at the same appointment. 12 patients received inhalation sedation (IHS) and 1 patient received oral midazolam only. 16 patients had previously undergone dental treatment under general anaesthetic.

**Conclusion:** Historically, patients with LD at Barts Health underwent dental treatment under GA. However, the development of a sedation service which offers novel techniques has successfully enabled patients to receive comprehensive dental treatment and as a result, reduced the need for a GA.

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**The benefits of sedation for the diagnosis of head and neck abnormalities**

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**Introduction:** Intravenous sedation in dentistry is an invaluable tool in the care of patients with special care needs, who are otherwise unable to co-operate for a thorough examination. This poster presents four cases where examination, only possible under IVS, highlighted important head and neck findings that led to patients being referred and managed appropriately for the conditions discovered.

**Case Description:**
Case 1: a 51 year old patient with Down’s Syndrome was found to have bilateral mandibular fractures.
Case 2: discovery of a healed ramus fracture on a 36 year old patient with severe learning disability.
Case 3: medicine related osteonecrosis of the jaw in a 70 year old lady with severe dementia.
Case 4: 40 year old patient with Sturge-Weber syndrome and severe learning disability requiring investigation of oral involvement prior to tooth extraction.

**Discussion:** The benefits of IV sedation are such that a quick assessment and diagnosis of incidental findings can be made in patients who are unable to co-operate with an assessment of the head and neck region. These case studies highlight the potential misdiagnosis of vulnerable patients with head and neck abnormalities had intravenous sedation not been provided.

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**Action research in the development of undergraduate education in Local Anaesthesia**

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**Objective:** E-learning platforms that utilise effective pedagogy have the capacity to enhance student learning and outcome. King’s College London Dental Institute (KCLDI) has developed an innovative training programme to introduce undergraduate dental students to Local Anaesthesia (LA) by blending online and clinical education using a virtual learning environment (VLE) platform.

The aim of the study is to demonstrate the use of action research methodology to develop an introduction symposium on LA and to demonstrate the ability of the VLE as a tool to gather and analyse feedback data to aid development.

**Methods:** 160 2nd year undergraduate dentistry students at KCLDI were instructed to view an online narrated presentation as well as given links to an online repository of multimedia learning resources. Students were then invited to attend small group workshops facilitated by academic and clinical staff on anatomy, anaesthetic techniques, equipment and complications and dosing. At the end of the course students were instructed to complete an online feedback questionnaire. Quantitative and qualitative data were collected and analysed via KEATS (King’s E-Learning and Teaching Service) platform which is a Moodle operated VLE.

**Results:** The narrated presentation had 346 views. 77 (48%) feedback forms were submitted. (90%) feel familiar with the equipment and the procedures for LA. (88%) feel skills and models were useful to simulate LA. (88%) feel more knowledgeable about the subject. (30%) feel confident and ready to start practicing local anaesthesia.

**Conclusion:** VLEs can be used to support clinical courses by building on prior learning, accommodating different learning styles & allowing students to re-enforce learning as needed. Feedback provided a useful insight into the students’ perceptions as well as opportunities for improvements. Action research is a valid methodology for systematically and empirically attempting to develop undergraduate education in Local anaesthesia.
An audit on the IV Sedation Pre-Assessment Forms within the Paediatric Department of the Eastman Dental Hospital

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Background and Aim: Standards for Conscious Sedation in the Provision of Dental Care (2015) state that the patient assessments for conscious sedation must be based on a full healthcare check and psychological assessment and take account of management needs. The aim of this audit was to investigate accuracy in completion of pre-assessment forms against expected standards (90%).

Methodology: 49 clinical records of patients who underwent IV sedation from January 2017 to June 2017 were obtained. Pre-assessments are completed by a range of clinicians with final approval by the consultant (for trainees) within the Paediatric Department at the Eastman Dental Hospital. 29 aspects in the pre-assessment form were evaluated.

Results: 35% of pre-assessment forms were fully completed; 22/29 questions (76%) had a percentage of completion above the standard.

Conclusions Compliance with the pre-assessment form completion was below the expected standards (90%). Poor compliance was due to different reasons, such as blood pressure machine unavailability, lack of clinician signature and presence of outdated forms.

Recommendations ensure equipment availability; correct forms availability; regular staff training; 2nd cycle after 1 year.


A Two-cycle Clinical Audit of Compliance of Conscious Sedation Practice in Norfolk & Norwich University Hospital OMFS unit with New National Guidelines

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Aims and Objectives: To determine whether Norfolk and Norwich University Hospital OMFS unit is meeting standards of best practice for conscious sedation in oral surgical procedures with intravenous Midazolam.

Methods: Patients who had oral surgery procedures under conscious sedation with IV Midazolam in the outpatient department between January and March 2017 were prospectively recruited after a new sedation monitoring form was implemented in December 2016 following the first audit. Data was collected from patient records by independent auditors.

Results: Recommendations from the first cycle audit have led to improvement in standards in all 3 domains (pre-, peri- and post-operative care). Out of the 21 identified criteria from the national guidelines, 12 had met 100% compliance.

Discussion & Conclusion: There is still room for improvement to meet the gold standard, especially in peri-operative care and monitoring, which calls for further training and review of the sedation monitoring form. It would be good to follow up with a re-audit of a bigger sample size.

These results and trainee comments will be used to improve and standardise trainee experience and learning. These competencies should be assessed and observed throughout the year to ensure trainees are progressing as expected.

A pilot study of dental foundation trainees. Are we meeting curriculum requirements in dental sedation training?

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The 2016 UK Dental Core Training Curriculum includes speciality specific competencies relating to dental sedation. The Oral Surgery competencies include: understanding anxiety management; being able to carry out sedation and being able to insert an intravenous cannula. Those competencies are added to under the speciality of Sedation and Special Care with the addition of an awareness of the current sedation guidelines and protocols.

It was noted in the Oral Surgery department at Guy’s Hospital that dental foundation trainees reported and demonstrated differing levels of skill and awareness of the above-mentioned competencies at the end of their DF2 year.

Method: A pilot study was conducted using a retrospective questionnaire at the start and end of the year. Trainees rated their personal perceived competency in a variety of skills, including those mentioned in the curriculum. Results showed that following their DF2 year, despite an increase in confidence, none of the trainees rated their confidence at 100% for the skills we would like them to have gained as part of training in dental sedation.

Discussion & Conclusion: There is still room for improvement to meet the gold standard, especially in peri-operative care and monitoring, which calls for further training and review of the sedation monitoring form. It would be good to follow up with a re-audit of a bigger sample size.

These results and trainee comments will be used to improve and standardise trainee experience and learning. These competencies should be assessed and observed throughout the year to ensure trainees are progressing as expected.
After some work experience at a local MaxFax dept, (and despite fainting whilst watching a fraenotomy), I decided a career in dentistry was for me. So, after venturing across the border from my hometown in South Wales, I took up a place at Birmingham Dental School, qualifying in 1997.

During my VT year I was fortunate to have a great trainer who was a real enthusiast for using Inhalation Sedation for nervous patients and who was keen for me to develop this skill. Full of enthusiasm, I attended my first SAAD course in 1997 and haven’t looked back since.

Treating nervous and anxious adults and children is something that I have always enjoyed and found extremely rewarding, and I felt early on that I’d found my niche in dentistry.

After VT, I continued working in Birmingham, both in practice and in hospital before moving to Cheltenham with my husband in 2000. Moving to an area with very few NHS practices I didn’t quite feel ready to move into the private sector, so started working within the Community Dental Service where I stayed for seven years. I particularly enjoyed doing the paediatric and special needs GA sessions and treating anxious patients using Sedation. During this time, I also found an enthusiasm for teaching, and became involved in teaching on the local NEBDN course.

Wanting to further my skills in conscious sedation, I enrolled on a Pain and Anxiety management course at Bristol University, and following this decided a new challenge was needed. So in 2007 I was very lucky to start working in a fantastic private sedation practice, where I continue to practise, and where we provide Inhalation Sedation and Intravenous Sedation to our own anxious patients as well as to referral patients from around the county and region. As sedation lead in the practice, I am responsible, among other things, for all our sedation policies and protocols, sedation update training and for mentoring staff during their supervised clinical practice.

In 2013 I completed an MSc in Conscious Sedation at Cardiff University, and during my time there I was invited to become a Clinical Lecturer and taught on the MSc and Diploma course for several years.

I have always enjoyed teaching sedation and am passionate about passing on this valuable and essential skill to others. It was a real privilege to be asked to join the SAAD teaching Faculty in 2016, which has been great fun to be a member of, and which I am thoroughly enjoying.

In the first part of 2017, I was invited to be part of the steering group for the document, ‘Commissioning Dental Services: Standards for Conscious Sedation in Primary Care’, a potentially significant milestone in the provision of sedation within primary care.

Towards the end of 2017 I will be embarking on a new challenge as Paediatric Lead back within the CDS, aiming to help further develop their paediatric as well as adult sedation services, but will also continue working part-time in the practice.

Since attending my first SAAD course 20 years ago, I have gained significant experience in providing sedation, primarily within a primary care setting, and as a Trustee, I look forward to being able to use my experience and enthusiasm to help further and develop SAAD’s essential role within primary care.

Outside of work, we are kept busy with two very active children, Jacob (15) and Milly (12) but when I have time, I love cooking and entertaining, trying to keep fit, playing the occasional game of netball, drinking prosecco at book club and doing the odd triathlon (well, one so far!). I also love nothing more than filling the car with all the surf boards, heading to the coast, and catching some waves (although not particularly well as my children will attest!!).
Manni Deol
BDS, MJDF, PGCMedEd, PGDipConSed.
New SAAD Trustee and Assistant Honorary Secretary

From the age of 12 I wanted to be a dentist. I was born and brought up in West London and was fortunate enough to attend UMDS (Guy’s Hospital) for my BDS (1997). From the start, the area of Dentistry that inspired me the most was the management of anxious dental patients. A certain sedation demonstrator at Guy’s had told me to “just get on with it……” and the rest was history.

I did my vocational training in Deptford, London, in a practice that used to provide GAs. My trainer encouraged me to treat anxious patients under IV Sedation. When I moved north, to Coventry I again found myself in a practice that used to provide GAs and had a reputation for dealing with anxious patients. I was fortunate enough to continue providing treatment under sedation.

Over the next 10 or so years with the help of my husband we set up NHS and private practices and I developed my sedation practice. Postgraduate learning and development has always been important to me and as such I embarked and completed the MJDF from the RCS England. Having attended the SAAD course a few times and being a SAAD member I felt I wanted to expand my knowledge base further in the field. In 2014 I went back to Guy’s and embarked on the Diploma in Sedation. Having achieved the qualification I continued to be part of the team at Guy’s working one day a week in the Department of Sedation and Special Care Dentistry, teaching undergraduates and treating patients. As a general dental practitioner this was and still is a unique opportunity to learn more about Special Care and Sedation.

Alongside this I have been fortunate to have been a Vocational Trainer for over 10 years in the West Midlands Deanery. During this time I achieved the Postgraduate Certificate in Education for Health Professionals from University of Birmingham. Being a VT-trainer has always been a privilege and in parallel to that I have been a Mentor for the West Midlands Post-Graduate Deanery Coaching and Mentoring scheme. More recently, I have been lecturing on sedation and providing practical training sessions to Diploma students, sedation practitioners and Foundation Dentists.

Being an NHS practitioner as well, I have been an elected committee member for Coventry Local Dental Committee since 2006, which has been an honour and a rewarding way to represent my colleagues. This has kept me continuously involved with NHS department managers for many the years, most recently interacting with the NHS Area Team and contributing to the MCN of Sedation and Special Care.

Aside my passion for Dentistry, I am busy bringing up three children and fit in hobbies of spin-cycling, gym, cooking, gardening and travelling. This summer I have just returned from a rural region of Nepal, where I did two weeks of volunteering in a Dental Hospital. This was an amazing experience and one I hope to revisit.
I am a GDP and hospital Specialty Dentist who graduated from the University of Birmingham in 2010. In 2012 I worked as a foundation trainee in the Community setting gaining experience in Special Care, Oral Surgery and Paediatric dentistry with a strong emphasis on practical conscious sedation training. I completed my SAAD certificate in conscious sedation the following year and have been a member of SAAD ever since. I gained my MJDF membership in 2012. I continued to gain experience of practising conscious sedation in various OMFS and restorative training posts across the North West. In 2013 I was appointed to the role of a Speciality Dentist at Manchester Dental Hospital, leading a service for the management of anxious patients within the Restorative Department. Working full-time and independently in this post helped me to gain significant experience and develop my skills over a relatively short period of time. I have also recently been awarded an MSc in Fixed and Removable Prosthodontics with the University of Manchester.

In 2015 I started a service delivering sedation services to private practices within the North West with the aim to improve access. We are steadily expanding and now regularly provide sedation services to over 15 dental practices in and around the Manchester area. I have been invited to lecture for several surgical implant courses, advocating the use of conscious sedation as an adjunct to complex surgical treatment. I was honoured to be invited to speak at the last SAAD symposium in 2016 - ‘Sedation is alive and well in General Dental Practice’, sharing my journey of setting up my own sedation service.

I am dedicated to improving pain and anxiety control within Dentistry. Above all I am committed to help expand and develop conscious sedation services both within the NHS and the private sector. I currently work in several established private practices in the North West as a GDP and sedationist. I am also part-time at Manchester Dental Hospital working in both the Oral Surgery and Restorative departments treating anxious adults under conscious sedation and supervising other practitioners to achieve competency in intravenous sedation.

Shilpa Shah
BDS MJDF RCS (Edin) MSc (Fixed & Remov Pros)
New SAAD Trustee
I grew up in Hampshire on the south coast. Being the product of science teacher parents, a career in something requiring science A-levels beckoned and dentistry soon caught my eye.

Dental School at King’s followed, where I was fortunate to train under a wealth of talented pre-clinical as well as clinical teachers. My biochemistry tutor, Professor Nunn was a particular inspiration who focused my scientific mind on how neurotoxins work. I then spent a glorious year completing an intercalated BSc with the awe-inspiring dental anatomist Barry Berkovitz, doing electromicroscopy hunting for elusive nerve endings in periodontal ligaments, in a basement in Kensington.

Clinical studies called me back to Denmark Hill where I was taught by dedicated professionals such as the anaesthetist Jose Ponte and the restorative dentist Steve Dunne. Junior house officer positions followed, and I was somewhat relieved to discover I really enjoyed dentistry. I honed my IV sedation skills whilst taking out wisdom teeth in Oral Surgery that first year. I recall one of my first sedation patients asking me afterwards if my nurse and I really had been topless for the procedure! But it was the department of Paediatric dentistry where I found I was most at home. Under the excellent discipleship of Petra Smith, Kate Barnard and Registrar Meera Ahluwalia, my love of inhalation sedation and all things paed was born.

Following VT in Bermondsey, a stint with the masterful Rob McGeogh in Tower Hamlets CDS developed my sedation skills further. I fell on my feet when senior house jobs, a Masters in Clinical Dentistry and registrar positions in Paediatric Dentistry at the Royal London Hospital soon followed. I was so fortunate to be trained by Professor Wong, whose constant zest for new techniques and materials kept me ahead of the game, and Janice Fearn who never ceases to be an inspiration and developed my research interests in enamel defects and molar incisor hypomineralisation.

I was appointed a Consultant in Paediatric Dentistry at the Royal London Hospital in 2007 where I have been Clinical Lead since 2013. It is a very busy unit receiving over 5000 referrals a year, and I head the Children’s Sedation and Comprehensive dental care and surgical GA services. We are currently training 6 registrars, 2 DCTs and 3 clinical Fellows.

Since 2011 I have been an examiner for the Royal College of Surgeons’ Membership in Paediatric Dentistry exams and currently sit on the exam board. I am also an Honorary Senior Lecturer at Queen Mary, University of London, teaching on the Masters in Clinical Dentistry postgraduate programme and am the internal examiner for the Hygiene Therapy School. Since 2015 I have been the external examiner for the University of Dundee Therapy School.

Recently, I was somewhat bemused to discover my 4 times great-grandfather Dr PH Van der Weyde was one of the first advocates for the use of nitrous oxide in dentistry back in1864. He is quoted saying in the New York Times, “When we look at the hundreds of cases directly killed by ether or chloroform on the operating chair or table, the comparative value of nitrous oxide must be apparent.”

I am married with 3 children who keep me busy. In rare moments of spare time I play percussion and am trying (and failing) to learn to play the drum kit!
I graduated from the University of Leeds medical school in 1998. Following a thoroughly gruelling yet enjoyable year of pre-registration house officer posts in Leeds and York, I made my way down to London to begin postgraduate training in anaesthesia. I completed specialist registrar anaesthetic training on the North Central Thames – University College London & Royal Free Hospitals rotation. This included sub-specialty training at several prestigious London hospitals including: The Royal Marsden Hospital, The Royal Brompton Hospital and The Evelina Children’s Hospital. Upon completion, I was delighted to be appointed to a Consultant anaesthetist post in paediatric and cardiac anaesthesia at Guy’s & St Thomas’ hospitals, where I have been ever since 2007.

My clinical interests have since evolved to include anaesthesia and sedation for dental surgery in both children and adults, with a particular interest in adults who have special needs. I have the pleasure of working with one of SAAD’s past Presidents (Dr Carole Boyle) and our weekly special care dental GA list is not infrequently the most enjoyable and at times the most challenging part of my work!

Aside from clinical work, my other main interest is training and education. I am Clinical Adviser to undergraduate medical students at King’s College London School of Medicine, as well as College Tutor and Training Lead for over 50 postgraduate anaesthesia trainees at Guy’s & St Thomas’ hospitals. I was lucky to have been taught by some amazing and truly inspiring Consultants during my training and it’s a major passion of mine to try and do the same for future generations.

I am honoured to have been invited to join the Editorial Board of SAAD. Anaesthesia and Dentistry have a strong historical association and I feel very privileged to represent my specialty on the Board and continue to maintain the strong links between our specialties.

Outside of the world of anaesthesia, there was a time when I had a passion for travel to far and exotic lands. Having become a father last year, I am now very much a family man revelling in the joy and precious moments of life with my now 8-month-old son.
Cognitive Behavioural Therapy (CBT) for dental phobia: services and training options for dental professionals

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Abstract
This article will explore the use of psychological approaches (specifically Cognitive Behavioural Therapy, CBT) for the management of people with dental phobia. While dental anxiety is common, it should be considered as a continuum, becoming a phobia when it meets the criteria outlined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). Specifically this means the phobia has a significant impact on an individual’s wellbeing in areas of physiological, psychological or social functioning; with marked avoidance and experience of significant distress associated with encounters related to the dental setting. Recognised as one of the most common specific phobias, dental phobia is estimated to affect 11% of the UK population. Consequently, increasing interest and attention on the application of CBT for dental phobia and the use of psychological approaches informed by the principles of CBT (i.e. Cognitive Behavioural-techniques) for dental anxiety management, has led to an increase in the demand for both services and trained professionals within the dental care setting. To this end, it is important to note the distinction between CBT and CB-techniques; for individuals with mild-to-moderate dental anxiety, a range of psychological approaches may be employed, some of which draw on the principles of CBT (i.e. CB-techniques) but do not necessarily constitute formalised CBT for the treatment of phobia. This article aims to briefly outline the role of CBT within dental phobia care pathways, outline existing services which provide CBT approaches within the UK and identify the possible training options available to dental care professionals interested in the approach. The authors wish to note that the UK services and training options outlined in this article, were those known to them at the time of writing – there may be others we are not aware of.

Introduction
The use of Cognitive Behavioural Therapy (CBT) for the long-term management of dental phobia has been well documented* and has a strong evidence-base for both its efficacy (i.e. how well CBT interventions treat dental phobia)** and its effectiveness (i.e. how well these CBT interventions work in “real-world” clinical settings). In a very recent publication in the Royal College of Surgeons (England) Faculty Dental Journal, the complementary use of CBT within a conscious sedation care pathway has been endorsed, in which conscious sedation is deemed to provide an excellent approach to deliver dental care to the anxious individual, with CBT providing the long-term cure of the anxiety itself. Such rehabilitative benefits of CBT within the sedation care pathway were demonstrated in a case report published in the Digest last year, and further the rationale for services to develop sustainable care pathways to both care for and cure dental phobia.

What is CBT?
For those unfamiliar with the approach, CBT is a psychological talking therapy which combines two traditional theoretical approaches of behaviour therapy and cognitive therapy, that help an individual learn new strategies to solve problems related to their thoughts and behaviour. CBT is used to treat a broad range of psychological problems including depression and anxiety disorders, including dental phobia, with both general and disorder-specific treatment methods.

To draw a distinction from other psychological therapies, the focus of CBT is on the here and now; rather than the original cause or past experiences and is a brief time-limited approach. The aim of therapy is to help an individual make sense of their problems by breaking them down into manageable steps, and to identify the connections between thoughts, behaviours, emotions and physical sensations – so to demonstrate the impact of our thinking on how we feel (both emotionally and physically). However, CBT moves beyond insight of the problem and seeks to change unhelpful strategies with action-based methods, towards specific and concrete goals; this occurs both in-session and within agreed homework tasks, where the learning is applied in natural situations and is a crucial determinant of the success of therapy.

CBT for specific dental phobia primarily centres on exposure-based behavioural intervention alongside cognitive strategies; whereby an individual is exposed to their feared object/situation. Typically this occurs in a graded fashion (i.e. “graded exposure”) in order to acclimatise to each anxiety provoking situation and learn that their catastrophic predictions are unlikely to occur.

CBT requires close collaboration between the individual and the practitioner, so that the therapeutic relationship fosters independence for the patient to help themselves and apply their learnt strategies in the future management of the problem – therefore offering a form of long-term management or “cure” if you will.
**What CBT services for dental phobia are currently available?**

In 2008, the Improving Access to Psychological Therapies (IAPT) programme was launched across the UK to provide evidence-based treatments for adults with anxiety and depression, of which specific phobias are included. Currently over 900,000 people access their local IAPT services each year, with plans for further service expansion in the next 5 years. Across the country, individuals can be referred by the general practitioner for assessment and treatment; with some localities offering self-referral and referral by health-care professionals (HCP). CBT is the primary therapy provided and if deemed suitable for treatment, sessions with a CBT therapist or psychologist would typically involve working in a non-dental setting. Collaboration between the patient and their local general dental practitioner (GDP) or dental service would be beneficial in this instance, to allow the necessary behavioural aspects of intervention. IAPT services would provide a local option for CBT intervention where specialised dental phobia services do not exist: details of local IAPT services are available on NHS Choices.

The established and specialised dental phobia services providing CBT within the UK typically adopt one of two models: psychologist-led services and dental nurse-led services (usually with psychologist or CBT Therapist input and supervision). That is, these services are embedded within special dental care services, which typically offer the full care pathway from conscious sedation to CBT, and additionally enable the graded exposure elements of therapy to be easily delivered.

Currently there is the Dental Health Psychology Service (developed and delivered by the authors) at Guy’s & St Thomas’ NHS Foundation Trust (GSTT) and King’s College London Dental Institute (KCLDI) in London, which has been established since 2008. In Sheffield, a team of dental-nurses have been trained and supervised to provide low-level psychological interventions to work with anxious patients, as part of the nurse-led dental anxiety management service (NDAMS) within the Sheffield Salaried Primary Care Dental service. Both services have published service evaluations demonstrating the effectiveness of CBT-based interventions within this setting. However other CBT-based intervention pathways have been recently established within other UK special care dental services, in the following localities: Birmingham, Isle of Man, Port Talbot, Wolverhampton, Stoke on Trent, Lancaster and Edinburgh. This demonstrates the growing demand for access to CBT-based interventions for the long-term management of dental phobia.

**What options are there to provide CBT for dental phobia and what training is available?**

Based on our experience, for the management of individuals with dental phobia, CBT could be provided in one of two ways:

1) By employing fully trained CBT Therapists (or equivalent) within dental services, who can apply their skills and approach to the dental situation

2) By devising a highly structured CBT protocol specifically for dental phobia, and training non-CBT Therapists in how to deliver the therapeutic interventions

Individuals who are employed in the second group would only be trained to use CBT for dental phobia and would not therefore be eligible to be called CBT Therapists. However they would be delivering an intensive course of management for dental phobia following CBT principles.

With either approach, the provision of CBT or CB-techniques for dental phobia requires new roles or personnel training; along with the facilities to provide the approach and planned care pathways for the management of psychological comorbidity or complex cases. Given the similarity in service outcomes, such services could be either psychologist/CBT-therapist-delivered or dental nurse-delivered; provided there was access to psychologists/CBT-therapists for supervision and complex case management. Dental hygienists/therapists and dentists may also be well suited or interested in training, though the cost of service provision may be a consideration in planning suitable personnel.

To become a fully accredited CBT therapist in the UK requires undertaking an accredited level 2 course (or a level 1 course with additional hours of supervised therapy) in order to meet the minimum training standards outlined by the British Association of Behavioural and Cognitive Psychotherapies (BABCP). Within IAPT, there are specific opportunities to train as psychological wellbeing practitioners (PWPs) or high intensity therapists – these would require full-time employment and training within the IAPT training programmes.

Introductory courses in CBT are available, though there are very few specialising in specific phobia alone; those advertised by the BABCP or BPS (British Psychological Society) would be a useful place to start but caution should be exercised before seeking training from an unrecognised teaching body.

Local training from existing services may also be an option, where CB-techniques can be applied in the dental setting. Indeed, following the development of a training manual for CBT in dental phobia, created by psychologists and dental clinicians at KCLDI and GSTT, online and face-to-face training courses are available: see “Cognitive Behavioural Techniques for the Management of Adults with Dental Fear” provided by KCL (https://alumni.kcl.ac.uk/dental-e-learning-course). The online learning course runs twice yearly, providing an introduction to the principles of CBT for the treatment of dental phobia. As part of the course, participants receive a copy of the training manual, along with course materials and interactive forums for learning. Course teaching is provided by both academic staff and clinicians currently delivering the CBT service at GSTT.

The authors are also aware that other teaching courses in dental anxiety management within the UK may also provide some training on Cognitive Behavioural principles, that can be applied for mild-moderate dental anxiety; including the “Post Graduate Certificate in Clinical Conscious Sedation and Anxiety Management” provided by the University of Bristol. SAAD itself also provide the “National Course in Conscious Sedation for Dentistry”, which now includes a 40-minute lecture on psychological approaches. However, these courses are designed to support training in sedation rather than a stand-alone CBT-based approach.
Conclusions

There is no question that CBT provides an effective approach to rehabilitating patients with dental phobia. However, current availability of services providing CBT for dental phobia within the UK are limited. There are two broad options for increasing access to CBT for patients: 1) liaison with local psychological services (i.e., IAPT) or 2) development of specialised services within the dental setting. The latter has an existing evidence-base of successful services currently in operation, and there are two options for staffing to achieve this. Currently KCL provide training and support for the development of CBT services through a variety of training resources and courses, with other more generalised courses on the CBT principles for mild-moderate anxiety management.

References


** NHS Choices link: https://www.nhs.uk/Service-Search/Psychological%20therapies%20%28IAPT%29/LocationSearch/10008

RA LOAN

Inhalational Sedation and Scavenging System

Available for a six-month loan to SAAD members who have recently attended a SAAD course

Opportunity to purchase the system after the loan period

Details of the scheme at www.saad.org.uk or email fiona@saad.org.uk
SAAD Shows the way for ‘New Starters’ in Dental Sedation

“Education is not the learning of facts, but the training of the mind to think” Albert Einstein

Since the publication of the IACSD Standards for Conscious Sedation in the Provision of Dental Care (2015) the expectations around training courses in dental sedation have increased dramatically and this is significant for both course providers and potential delegates. As a profession we have a duty of care to provide appropriate pain and anxiety control for our patients and it is imperative that those practising conscious sedation are able to deliver this in a safe and predictable way. Sedation practitioners are required to have a good understanding of the techniques used and to be able to apply their knowledge for each patient and in all clinical situations thereby ensuring a successful outcome.

The newly formed Sedation Training Accreditation Committee (STAC) is responsible for accrediting all independent courses intending to train ‘New Starters’ in dental sedation, including sedationists and dental nurses. Courses need to demonstrate they fulfil the requirements described in the IACSD education syllabuses and that students will obtain the necessary knowledge, skills and experience to prepare them for independent sedation practice. These changes have necessitated course providers to reflect on their own courses and develop and improve them to meet the new standard.

As a premier education provider in dental sedation, the Society for the Advancement of Anaesthesia in Dentistry (SAAD) has responded to this challenge and new demands, by developing and gaining accreditation for two new courses; the SAAD Assessed Sedationist scheme (SAS) and the SAAD Assessed Sedation Nurse scheme (SASN). These two courses are in addition to the existing accredited course in inhalation sedation for Dental Hygienists and Dental Therapists, the SAAD Assessed Sedation Therapists (SAST) scheme. The SAS, SAST and SASN scheme are structured to deliver a detailed two-day programme of didactic training followed by supervised clinical experience, thereby fulfilling the requirements detailed in the IACSD Standards’ Syllabus 1: Basic conscious sedation techniques for children, young people and adults, and Syllabus 5: Dental nurses: Assisting during conscious sedation, respectively.

These courses build upon the success and popularity of the existing SAAD National Course for Dental and Medical Practitioners and the Dental Nurse Course, but offer a great opportunity to combine these with a well-structured and thorough clinical experience module for ‘New Starters’. Course participants identify a suitable clinical supervisor in advance of the course who will be approved by the SAAD Training Board after providing details of their sedation experience, qualifications and current practice. This provides delegates with the flexibility to work with a clinical supervisor either within their own practice environment or locally, thus facilitating easier access to the clinical experience. This proximity to the clinical supervisor promotes not only a positive and constructive working relationship during the formal process of supervision and assessment, but also an increased likelihood of continued mentorship, support and peer review.

SAAD Assessed Sedationist (SAS) scheme

‘New Starters’ interested in joining the SAS scheme need to register at the time of booking onto the National Course. A clinical supervisor should then be identified by the applicant and approved by SAAD in advance of attending the course. On the second day of the National Course, delegates will undergo a written assessment using the Single Best Answer format. The clinical experience module consists of a series of Direct Observation of Procedural Skills (DOPS) totalling 20 Intravenous sedation (IV) and/or 10 Inhalation sedation (IHS) cases. In addition practitioners are required to complete a logbook of experience and undertake a practice evaluation checklist using the SAAD Safe Practice Scheme document. All documentation must be submitted for approval by SAAD within 12 months of the date of the National Course.

SAAD Assessed Sedation Therapist (SAST) scheme

Dental Hygienists and Therapists registered for the SAST scheme submit the details of their clinical supervisor for approval by SAAD at the time of registration. They then attend the two-day SAAD National Course, for the knowledge and skills training. On the second day of the course there is a written (Single Best Answer format) and a practical assessment. The clinical experience module is completed in the same manner as the SAS scheme for 10 IHS cases, with the documents being submitted within 12 months of attending the SAAD National Course.

SAAD Assessed Sedation Nurse (SASN) scheme

Dental Nurses wishing to join the SASN scheme need to register their interest either before attending the Dental Nurse Course or within the first four weeks after the course. A suitable clinical supervisor needs to be identified and approved by SAAD as with the SAS scheme. The clinical experience module is completed in exactly the same manner as the SAS scheme with the requisite number of DOPS and a clinical experience logbook. Dental Nurses are required to compile a practice profile detailing a description of the clinical setting. As with the SAS scheme, course participants have 12 months to complete the required documentation and once this is received and approved, individuals will be invited to attend for their final assessment including written and practical elements. These assessments are scheduled on the Saturday morning of each SAAD National Course course held in London.

November 2016 saw the first cohorts enter the SAS and SASN schemes and two further cohorts have begun their journeys in March and June of this year. Thus far a total of eight sedationists and two dental nurses have successfully completed the schemes, thereby fulfilling the requirements to be able to practise independently. The SAAD Training Board is very enthusiastic and positive about the impact of these new schemes and feels confident that the robust, well rounded and thorough training pathway will equip new sedationists and dental nurses with the required knowledge, skills and experience to be able to practise dental sedation safely, effectively and so provide a positive outcome for their patients.

If you have any questions or would like some more information about the SAS or SASN schemes please visit www.saad.org.uk or email Fiona at fiona@saad.org.uk

Paul Howlett
SAAD Training Board
REGISTER (BEFORE ATTENDING THE SAAD NATIONAL COURSE)
The deadline for registering for the SAS scheme is the Friday before the weekend of the SAAD National Course.
- eg for the SAAD National course taking place on the 16th & 17th June 2018, the SAS scheme registration deadline is 8th June 2018

INFORMATION REQUIRED
When registering you will need to be able to provide the following information…
- Date you will attend the SAAD National Course
- Intended sedation technique(s)
- Age group of patients (adults, children or both)
- Name of proposed clinical supervisor(s)
- GDC / GMC No. of proposed clinical supervisor(s)
- Qualifications of proposed clinical supervisor(s)
- Sedation experience of proposed clinical supervisor(s)
- Sedation services offered by proposed clinical supervisor(s) including approx. no. of sedation cases per month.
- Address of the practice(s) where the clinical supervision will take place
- A brief description of sedation facilities

APPROVAL
The information about the nominated clinical supervisor(s) and the sedation facility where the supervised clinical practice will take place is submitted for approval to the SAAD Training Board.

SAAD NATIONAL COURSE
Attend the SAAD National Course for the knowledge and skills training.

WRITTEN ASSESSMENT
This is a Single Best Answer paper on the Sunday of the National Course weekend.

ASSESSMENT RESULTS
The week after the National Course the results of the assessment are emailed along with the link to the SAS scheme webpage.

SAS SCHEME WEBPAGE
From this page is will be possible to download all of the documents required to complete the supervised clinical practice.
- DOPS forms
- Practice profile
- Also available is guidance on setting up the SAAD Document Repository (SDR)

SUPERVISED CLINICAL PRACTICE
20 IVS and/or 10 IHS cases should be documented and signed by the approved clinical supervisor.

ACCESS THE SAAD DOCUMENT REPOSITORY (SDR)
This enables SAS scheme documents to be uploaded, via a secure section of the SAAD website, and submitted for approval.
- All documents must be submitted within twelve months of attending the SAAD National Course.
- eg if attending the SAAD National Course on 16th & 17th June 2018 all documents must be submitted by 17th June 2019.

APPROVAL AND CERTIFICATION
Successful practitioners will receive a SAAD certificate confirming ‘SAAD Assessed Sedationist’ status which will enable you to practise independently.

REGISTER (BEFORE OR AFTER THE SAAD NATIONAL COURSE)
The deadline for registering for the SASN scheme is four weeks after the weekend of the SAAD National Course.
- eg for the SAAD National course taking place on the 16th & 17th June 2018, the SASN scheme registration deadline is 14th July 2018.

INFORMATION REQUIRED
When registering you will need to be able to provide the following information…
- Date you attended the SAAD National Course
- Intended sedation technique(s)
- Age group of patients (adults, children or both)
- Name of proposed clinical supervisor(s)
- GDC / GMC No. of proposed clinical supervisor(s)
- Qualifications of proposed clinical supervisor(s)
- Sedation experience of proposed clinical supervisor(s)
- Sedation services offered by proposed clinical supervisor(s) including approx. no. of sedation cases per month.
- Address of the practice(s) where the clinical supervision will take place
- A brief description of sedation facilities

APPROVAL
The information about the nominated clinical supervisor(s) and the sedation facility where the supervised clinical practice will take place is submitted for approval to the SAAD Training Board.

SAAD NATIONAL COURSE
Attend the SAAD National Course for the knowledge and skills training.

ASSESSMENT RESULTS
The week after the National Course the results of the assessment are emailed along with the link to the SASN scheme webpage.

SASN SCHEME WEBPAGE
From this page is will be possible to download all of the documents required to complete the supervised clinical practice.
- DOPS forms
- Logbook
- Practice Self-Evaluation Checklist
- Also available is guidance on setting up the SAAD Document Repository (SDR)

SUPERVISED CLINICAL PRACTICE
20 IVS and/or 10 IHS cases should be documented and signed by the approved clinical supervisor.

ACCESS THE SAAD DOCUMENT REPOSITORY (SDR)
This enables SASN scheme documents to be uploaded, via a secure section of the SAAD website, and submitted for approval.

SUBMIT DOCUMENTS FOR APPROVAL
All documents should be submitted to be approved within twelve months of attending the SAAD National Course.
- eg. If attending the SAAD National Course on 16th & 17th June 2018 the final opportunity to submit documents is 4th May 2019.

WRITTEN AND PRACTICAL ASSESSMENT
After the submitted documents have been approved, return to the SAAD National Course venue to sit the single best answer paper and the practical assessment on one of the SAAD weekends within twelve months of attending the SAAD National Course.
- eg. If attending the SAAD National Course on 16th & 17th June 2018 the final opportunity to attend for assessment is 15th June 2019

ASSESSMENT RESULTS
Candidates will receive their results approximately a week after the assessment.

APPROVAL AND CERTIFICATION
Successful practitioners will receive a SAAD certificate confirming ‘SAAD Assessed Sedationist Nurse’ status which will enable you to assist with the provision of dental sedation as the second suitable trained person.

REGISTER (BEFORE ATTENDING THE SAAD NATIONAL COURSE)
The deadline for registering for the SAST scheme is a month before the course dates.
- eg the deadline for the course commencing on 3rd & 4th November 2018 is Friday 5th October 2018

INFORMATION REQUIRED
When registering you will need to be able to provide the following information…
- Age group of patients (adults, children or both)
- Name of proposed clinical supervisor(s)
- GDC / GMC No. of proposed clinical supervisor(s)
- Qualifications of proposed clinical supervisor(s)
- Sedation experience of proposed clinical supervisor(s)
- Sedation services offered by proposed clinical supervisor(s) including approx. no. of sedation cases per month.
- Address of the practice(s) where the clinical supervision will take place
- A brief description of sedation facilities

APPROVAL
The information about the nominated clinical supervisor(s) and the sedation facility where the supervised clinical practice will take place is submitted for approval to the SAAD Training Board.

SAAD NATIONAL COURSE
Attend the SAAD National Course for the knowledge and skills training.

ASSESSMENT RESULTS
The week after the National Course the results of the assessment are emailed along with the link to the SAST scheme webpage.

SAST SCHEME WEBPAGE
From this page is will be possible to download all of the documents required to complete the supervised clinical practice.
- DOPS form
- Logbook
- Practice Self-Evaluation Checklist
- Also available is guidance on setting up the SAAD Document Repository (SDR)

SUPERVISED CLINICAL PRACTICE
10 IHS cases should be documented and signed by the approved clinical supervisor. For at least five of these cases you should have provided both the sedation and the treatment.

ACCESS THE SAAD DOCUMENT REPOSITORY (SDR)
This enables SAST scheme documents to be uploaded, via a secure section of the SAAD website, and submitted for approval. All documents must be submitted within twelve months of attending the SAAD National Course.
- eg if attending the SAAD National Course on 3rd & 4th November 2018 all documents must be submitted by 3rd November 2019.

APPROVAL AND CERTIFICATION
Successful practitioners will receive a SAAD certificate confirming ‘SAAD Assessed Sedation Therapist’ status which will enable you to practice independently.
The following is a selection of the more commonly asked questions I have received as secretary over the last year:

**Q.** I am the practice manager of a dental practice and was previously a sedation trained dental nurse, although I am no longer on the General Dental Council (GDC) register. Can I still occasionally act as a sedation nurse?

**A.** Unless you are on a recognised supervised training programme, to carry out any clinical procedure or assist in a surgery environment, you are required to be registered with an appropriate professional body. Registration with the GDC is required before you can become indemnified.

The GDC states that “To assist with any dental procedure you have to be appropriately indemnified. To be indemnified you need to be registered with the GDC so unfortunately if you are no longer on the GDC register, you will not be able to assist clinically in any capacity. To be registered with the GDC you have to work within the Scope of Practice guidance, which outlines the duties that each member of the dental team is able to carry out on registration [https://www.gdc-uk.org/professionals/standards/st-scope-ofpractice]. Section 38 of the Dentists’ Act, states that it is a criminal offence for a person who is not a registered dentist or a registered dental care professional to practise dentistry.”

**Q:** As a Dental Therapist can I provide inhalational sedation to a patient without a dentist being on the premises?

**A:** Yes, Dental Therapists or Dental Hygienists can provide dental sedation without a dentist being on the premises as long as they are supported by an appropriately sedation trained and experienced individual (second appropriate person) such as a sedation trained dental nurse.

This question forms part of the Standards for Conscious Sedation FAQs developed following the publication of the IACSD standards and can be found by following the link below. [https://www.rcseng.ac.uk/dental-faculties/fds/publications-guidelines/standards-for-conscious-sedation-in-the-provision-of-dental-care-and-accreditation/faq/](https://www.rcseng.ac.uk/dental-faculties/fds/publications-guidelines/standards-for-conscious-sedation-in-the-provision-of-dental-care-and-accreditation/faq/)

**Q:** How do I provide an in-house sedation training course in my own sedation practice for new staff?

**A:** For those staff completely new to sedation, the IACSD standards training pathway should be followed. To train individuals in a conscious sedation technique that allows them to practise independently, you need to apply for course approval via an external verification process. This is provided by the Sedation Training Accreditation Committee (STAC) and application forms are available from the Royal College of Surgeons website. In line with the training pathways outlined in the IACSD standards, courses must also include supervised clinical practice. [https://www.rcseng.ac.uk/-/media/files/rcs/fds/publications/standards-for-conscious-sedation-and-accreditation/stac-course-accreditation-form-june-2017.doc?la=en](https://www.rcseng.ac.uk/-/media/files/rcs/fds/publications/standards-for-conscious-sedation-and-accreditation/stac-course-accreditation-form-june-2017.doc?la=en)

Continuing professional development in sedation or sedation update courses offering only knowledge and skills training, do not need STAC approval. University, dental school or postgraduate deanship courses are also exempt from the STAC approval process.

**Q:** Do I have to cannulate a patient having oral sedation or premedication to manage their dental anxiety?

**A:** Firstly, a distinction should be made between oral premedication and oral sedation. Oral premedication for dental procedures is usually a low dose Benzodiazepine, taken by the patient before attending the surgery or the night before the appointment. No additional monitoring is needed for oral premedication and there is no requirement for additional sedation skills such as cannulation.

Oral sedation, usually a higher dose Benzodiazepine, is given to the patient when they arrive at the dental surgery by an appropriately sedation trained dental team member. In order to administer oral sedation for dental procedures, sedation training in the form of knowledge, skills training and supervised practice are mandatory. Appropriate monitoring equipment is required and the patient should be cannulated as soon as practicable following the oral sedation.

**Q:** How do I dispose of Midazolam safely?

**A:** Midazolam should be rendered irretrievable before disposal. This means that the remaining Midazolam in the syringe / ampoule should be squirteed onto cotton wool / gauze (or similar) before being placed into the sharps bin, or a commercial controlled drugs kit used. The kits contain granules which denature and congeal drugs rendering them harmless and unfit for inappropriate use. You may find this document helpful: [https://www.sps.nhs.uk/wp-content/uploads/2016/06/NW-QA178.4-Controlled-drugs-for-dentists-.pdf](https://www.sps.nhs.uk/wp-content/uploads/2016/06/NW-QA178.4-Controlled-drugs-for-dentists-.pdf)

**Q:** Do I need to open a new ampoule of Midazolam for every patient?

**A:** The Association of Anaesthetists of Great Britain and Ireland (AAGBI) published a safety guideline in October 2008, ‘Infection Control in Anaesthesia’. Under the heading of ‘Preventing Contamination of Drugs’ it states that ‘A syringe must not be used for multiple patients even if the needle is changed. Before use, prepared syringes and needles should be stored in a clean container and syringes capped to avoid contamination…... Single use ampoules should be discarded after the required amount of drug is drawn up and not re-used for subsequent patients.’ (AAGBI 2008: 6)
Electronic Record Keeping in Sedation

Kellie Downie BDS MFDS RCPs (Glas) DipConSed
SAAD Trustee & Assistant Honorary Treasurer
Kellie.downie@saad.org.uk

Contemporary and accurate record keeping is becoming more challenging and demanding of dentists’ clinical time. Failure to keep good records not only depreciates patient care but also puts the clinician at risk of regulatory or civil proceedings which may be difficult to defend.

It is often the case that in a busy clinical environment, clinicians may wish to be able to make records as quickly and conveniently as possible, however, it is of vital importance that the accuracy, completeness and integrity of the records are maintained. It is vital that a robust assessment record is followed by a clear operative and peri-operative record followed by a proper discharge record.

There is now more regulation of record keeping in dentistry both from the GDC and CQC.

The GDC clearly defines a professional obligation to accurately record the dental treatment that is provided to patients. This is outlined by the GDC in Standards for the Dental Team; Standard 4.1.

“You must make and keep contemporaneous, complete and accurate patient records”

The CQC has its own regulation relating to record keeping which is relevant to the dental field -

Regulation 20 of the Health and Social Care Act 2008 (Regulated Activities) Regulations 2014 (No 2936) states that:

1. The registered person must ensure that service users are protected against the risks of unsafe or inappropriate care and treatment arising from a lack of proper information about them by means of the maintenance of:
   1. an accurate record in respect of each service user which shall include appropriate information and documents in relation to the care and treatment provided to each service user; and
   2. such other records as are appropriate in relation to

2. The registered person must ensure that the records referred to in paragraph (1) (which may be in paper or electronic form) are:
   1. kept securely and can be located promptly when required;
   2. retained for an appropriate period of time; and
   3. securely destroyed when it is appropriate to do so.

Many specialist dental software systems allow for template proformas to be developed in order to act as an aide-memoire ensuring basic information is recorded to which free hand notes can be added. Its now well recognised that template style records should be used with caution. Pre populated fields create a risk of inaccurate and meaningless records and should be avoided. Equally, cut and paste preformed text templates carry the risk of being used as a process rather than a genuinely reflective note.

Each individual field should be considered and completed to accurately reflect the appointment and treatment provided. It is then generally well accepted that templates can be compiled and completed as a basic record which then can be developed and added to in order to fully reflect the appointment that took place.

To provide a basic template for clinicians to utilise as a guide for recording sedation services, a focus group of members of the SAAD Board of Trustees met and deliberated information that should be considered and recorded for appointments relevant to sedation services in dentistry and based on the current national standards for sedation assessment, inhalation sedation and intravenous sedation. It was determined what essential information should be recorded at each appointment and how this could be presented. This was developed on three software systems R4, Software of Excellence and Systems for Dentists.

Screen shots prepared for each system are available now on the SAAD website, through the members section, to allow clinicians to develop their own templates relevant to their practice and to inspire ideas to improve ease of record keeping. Templates for Software of Excellence are available to be directly integrated. The other software can be developed individually with software systems to allow clinicians to edit, develop and utilise in their own practices.

Electronic Records
SAAD recognises that sedation records can be adequately kept in narrative form either in manually written records or text input on computer software. Keeping robust notes of the sedation assessment, clinical procedure and discharge of the patient can be assisted by the use of properly prepared custom screens recording relevant data.

The following are exemplars that have been developed by an expert working group that can be used in some commercially available dental software. These may be developed further to meet your facilities individual needs. The content of these is considered to be guidance towards good practice.

If the exemplars are modified then care should be taken to avoid pre filled data fields or those that default to a specific answer. There should be a tendency towards the need for a positive action to complete a drop down box choice or radio button choice so that data can be considered valid and individual specific.

Instructions for use of the SAAD electronic records below are a guide. SAAD does not offer technical support for downloads.

Software of Excellence: Exact
Download the files below to your computer. (Right click on the file name and select ‘download linked file’)

Each custom screen (file) is imported individually.
In Exact enter the Configure tab in the taskbar.
Choose Custom Screens.
Click Import on the lower right of the screen.
Find the file click Open.

<table>
<thead>
<tr>
<th>Sedation Assessment:</th>
<th>Sedation Assessment SOE-1.CSV</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Sedation Treatment:</td>
<td>IV Sedation Treatment SOE-1.CSV</td>
</tr>
<tr>
<td>Inhalation Sedation:</td>
<td>Inhalation Sedation SOE-1.CSV</td>
</tr>
<tr>
<td>Recovery and Discharge:</td>
<td>Sedation Recovery and Discharge SOE-1.CSV</td>
</tr>
</tbody>
</table>

Systems for Dentists
Download the files below to your computer. (Right click on the file name and select ‘download linked file’)
Please contact your software provider for software support to upload these files to your system.

<table>
<thead>
<tr>
<th>Sedation Assessment:</th>
<th>Sedation Assessment SFD-1.xml</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Sedation Treatment:</td>
<td>Intravenous Sedation Treatment SFD-1.xml</td>
</tr>
<tr>
<td>Inhalation Sedation:</td>
<td>Inhalation Sedation Treatment SFD-1.xml</td>
</tr>
<tr>
<td>Recovery and Discharge:</td>
<td>Sedation Recovery and Discharge SFD-1.xml</td>
</tr>
</tbody>
</table>

Kodak R4
Download the templates below to adapt for your own systems.

<table>
<thead>
<tr>
<th>Sedation Assessment:</th>
<th>Sedation Assessment R4 Word Template</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Sedation Treatment:</td>
<td>IV Sedation Treatment R4 Word Template</td>
</tr>
<tr>
<td>Inhalation Sedation:</td>
<td>IS Sedation Treatment R4 Word Template</td>
</tr>
</tbody>
</table>
Symposium
and AGM

Saturday 22 September 2018

The Royal Society of Medicine,
1 Wimpole Street, London W1G 0AE

Details will be posted at
www.saad.org.uk
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 enquiries, payments, cancellations and deferrals, hygienist & therapist course logbooks
01302 846 149  fiona@saad.org.uk
Toni Richman (Course Administrator) Course weekend logistics
07583 039 309 (text)  toni@saad.org.uk

Details for the SAAD Assessed Sedationist and SAAD Assessed Sedation Nurse scheme are on pages 79 & 80
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 only available for ‘New Starters’ registered for the SAAD National course.

The total fee for enrolment on the SAS scheme is £1000. (includes the National Course fee of £700)

Further details are available at https://www.saad.org.uk/index.php/sas-scheme

Enquiries to 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 £400.

Then enrol for the second stage, SAAD Assessed Sedation Nurse scheme, via the SAAD website (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 £870.

Any questions?
Further details are available at https://www.saad.org.uk/index.php/sasn-scheme

If you have any questions please contact fiona@saad.org.uk in the first instance.
ESSAY PRIZES

DRUMMOND-JACKSON ESSAY PRIZE

£500
DCPs
£300
DENTAL STUDENTS
£300

For essays on any subject related to Conscious Sedation, Anxiety Control, General Anaesthesia or Analgesia in dentistry.

The winners of the SAAD Essay Prize receive a complimentary registration for the SAAD Symposium in order to be presented with their award certificate and cheque. In addition to this the prize-winning essays are considered for publication in the SAAD Digest.

• 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.
• Essays must be written in accordance to SAAD’s Guidelines for Authors available from the SAAD website and on page 89 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
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.

Examples of electronic patient record templates are available to SAAD members from the SAAD website. Please see page 75 for details.

For patient information leaflets, 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 or 01302 846 149
• 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 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
  • Electronic template samples (see page 75 for details)
Dental Sedation Immediate Life Support Course
From ResusPlus Training

Whichever pharmacological methods of conscious sedation you provide to your patients, recognition of inadvertent oversedation with appropriate reversal techniques and urgent management and rescue of a compromised airway or reduced respiratory drive is paramount for patient safety.

The 2015 Report of the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) “Standards for Conscious Sedation in the Provision of Dental Care” states that:

“The term ‘rescue’ derives from anaesthetic practice and means the ability to respond appropriately to . . . inadvertent over-sedation . . . practitioners must be able to perform Immediate Life Support/Paediatric Immediate Life Support, depending on the patient’s age, and that they must be able to recognise and manage sedation-related complications (including over-sedation, respiratory depression/apnoea, unconscious patient, airway obstruction, vomiting, idiosyncratic responses, delayed recovery, failure of conscious sedation). Deployable airway competencies (including basic airway manoeuvres, the use of airway adjuncts and the ability to administer positive pressure ventilation) are mandatory. Alternative courses with equivalent content which are adapted to the needs of dental practice are acceptable: these might also include the management of common sedation, medical and dental emergencies.”

ResusPlus Training are based in the South Midlands and are medical emergency training specialists for health professionals. ResusPlus Training provide a dental focused 7-hour adult immediate life support and paediatric immediate life support course (ILS and PILS) in one day which meet the above IACSD conditions and more and with plenty of hands-on practice. Courses take place on a regular basis and can also take place at your own venue. For in-house courses please contact ResusPlus Training with your individual practice requirements.

Dental Sedation Immediate Life Support Course: The course day starts with the adult component for a minimum of 5 hours, then explores the changes required to assess, rescue and perform BLS on a child. This Paediatric component takes 1.5 to 2 hours and can provide invaluable theoretical and practical information for both adult and paediatric teams.

The course includes specific CPD learning outcomes regarding:

- **Airway management** including positive pressure ventilation with bag valve mask and pocket mask and use of nasopharyngeal and oropharyngeal airway. It will also include i-gel insertion both during respiratory depression and in cardiac arrest.
- **ABCDE approach** to the management of common sedation and dental medical emergencies such as CNS depression, anaphylaxis, chest pain, asthma, seizure, hypoglycaemia and choking.
- **Emergency dental drugs** with hands-on practice for the above conditions.
- **BLS and defibrillation** refresher practice for all.
- **Cardiac arrest scenarios** – a team approach.
- **Team roles and responsibilities** – leadership, communication, planning.

**Who is the course for?** The course is principally for conscious sedation-trained dentists, nurses, hygienists and therapists but can also be attended by any dental professionals looking to take their life support skills to a higher level.

**Delivered by:** To ensure you receive the most beneficial training experience and ongoing quality assurance, courses are taught using a high ratio of instructors to students and only by Resuscitation Council (UK) clinical instructors and dental medical emergency specialists.

**Assessment:** Is subject to quality assurance. Assessment is continuous and includes the ABCDE approach, i-gel and other practical airway management skills for both inadvertent over-sedation and cardiac arrest scenarios.

**Certificates:** For successful candidates, certificates provide 7 verifiable and quality assured, eCPD points and as per GDC 2018 guidelines.

For contact information please refer to the advertisement on page 85.
Dental Sedation Immediate Life Support Course
From ResusPlus Training

This one day, quality assured CPD course for the conscious sedation dental team includes:

- **Airway management including positive pressure ventilation, nasopharyngeal, oropharyngeal airway and Intersurgical i-gel® (pictured)**

- **Recognition and management of over sedation, anaphylaxis, chest pain, asthma, seizure, hypoglycaemia and choking**

- **Emergency dental drugs: when, how, why**

- **BLS and defibrillation for adult and child**

- **Cardiac arrest scenarios**

- **Team roles and responsibilities**

All courses are delivered and assessed by Resuscitation Council (UK) clinical instructors and dental medical emergency specialists.

Successful candidates receive 7 quality assured and verifiable eCPD points as per GDC 2018 guidelines. Course complies with IACSD conscious sedation standards 2015.

To book or for more information please contact ResusPlus Training
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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-oriented (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. 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,
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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.

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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.

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Articles reporting clinical research must include a statement indicating that appropriate Ethical Committee approval has been granted.

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SAAD Digest 2017
Online CPD
Answers to the Questions

What's new in…capnography

1. In the UK, the term conscious sedation includes:
   a. Minimal sedation
   b. Deep sedation
   c. Moderate sedation
   d. General anaesthesia

   Answers: a and c

2. For ASA 1 & 2 dental patients requiring conscious sedation, capnography monitoring is required in:
   a. Canada
   b. United States of America
   c. United Kingdom
   d. Australia

   Answers: a, b and d

3. In previous studies where patients were breathing room air during their sedations and not routinely receiving supplemental oxygen, the addition of capnography:
   a. Decreased the requirement for supplemental oxygen
   b. Did not decrease the rate of oxygen desaturation
   c. Increased the rate of oxygen desaturation
   d. Decreased the heart rate

   Answer: b

4. Capnography measures:
   a. End tidal carbon dioxide
   b. Peripheral oxygen saturation
   c. Litres / minute of oxygen
   d. AVPU score

   Answer: a

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

1. With regards to BIS monitors, which of the following statements is FALSE:
   Bis monitors:
   a. monitor depression of the cerebral cortex
   b. monitor electrical activity
   c. use electroencephalography
   d. rank activity on a scale from 0 to 1000

   Answer: d

2. In the described TCI-BIS sedation technique, the target concentration in the brain:
   a. is measured by means of chemical analysis
   b. is set at 80-90 ng/ml
   c. is calculated with the BIS machine
   d. is initially set to 2 mg

   Answer: b

3. In the described TCI-BIS sedation technique, the initial target concentration in the brain is set to:
   a. 0.75 mg/ml
   b. 2 mg
   c. 75 ng/L
   d. 30 ng/ml

   Answer: d

4. The described TCI-BIS sedation technique:
   a. enabled minimal sedation for prolonged treatment without having to change the target concentration
   b. prevented the cardiovascular response to midazolam
   c. enabled minimal sedation by a single operator/sedationist within safe physiological limits for long treatments up to 3 hours
   d. prevents oversedation during induction of minimal sedation

   Answer: c

A review of the use of flumazenil for the reversal of midazolam conscious sedation in dentistry.

1. In an emergency situation, where the reversal of midazolam is required, what is the standard dose of flumazenil that should initially be administered intravenously as a slow bolus?
   a. 0.2 mg
   b. 0.5 mg
   c. 1 mg
   d. 2 mg

   Answer: b

2. What is the approximate elimination half-life of flumazenil?
   a. 20 minutes
   b. 30 minutes
   c. 60 minutes
   d. 120 minutes

   Answer: c

3. Following the Rapid Response Report (2008), which concentration of midazolam should be used in all clinical areas (except general anaesthesia or intensive care)?
   a. 0.5 mg / 1 ml
   b. 1 mg / 1 ml
   c. 2 mg / 1 ml
   d. 5 mg / 1 ml

   Answer: b
4. Which of the following is NOT an indication for reversal of midazolam induced conscious sedation in dentistry?
   a. Over sedation
   b. Patient with mobility issues
   c. Patient with learning difficulties
   d. Allergy to benzodiazepines
   Answer: d

5. In which of the following groups of patients should caution be used if reversal with flumazenil is required?
   a. Patients with asthma requiring fluticasone inhaler use
   b. Patients with type 1 diabetes on subcutaneous insulin
   c. Patients with epilepsy taking clonazepam
   d. Patients with pernicious anaemia receiving 3 monthly vitamin B12 injections
   Answer: c

The decisional needs of young patients faced with the decision to undergo dental treatment with sedation or GA

1. The most frequently cited model of shared decision-making in healthcare suggests the second stage of the process relates to:
   a. Deciding on which treatment to implement
   b. Information exchange
   c. Deliberation
   d. Evaluating the patient’s decision
   Answer: c

2. A recent systematic review suggested that benefits of decision aids for healthcare decisions include:
   a. Reduced decisional conflict
   b. Improved knowledge
   c. Reduced length of consultations
   d. Improved adherence to healthcare decisions
   Answers: a and b

3. Themes that were identified as influencing the decision to undergo dental treatment with sedation or GA included:
   a. Time
   b. Method of administration
   c. Cost
   d. Treatment type
   Answers: a, b and d

4. According to Lagana and colleagues, what percentage of pre-anaesthesia consultations with paediatric patients failed to include discussion of the related risks of the procedure?
   a. 5%
   b. 20%
   c. 30%
   d. 50%
   Answer: c

Sedation for Patients who Lack Capacity

1. When assessing capacity, which of the following statements are true?
   a. a person can be deemed to lack mental capacity based on their age, appearance or behaviour
   b. dental anxiety and phobia is irrelevant
   c. the clinician should have reasonable belief that the person lacks capacity at the time the decision needs to be made
   d. a clinician should determine if a person's understanding will be better at a different time in the day
   e. appropriate communication measures should be taken for patients with literacy and dyslexia difficulties
   Answers: c, d and e

2. A Lasting Power of Attorney (LPA) is:
   a. the next of kin who can make decisions on behalf of the person
   b. a legal document made by the patient appointing one or more persons to undertake decision making when the person lacks mental capacity
   c. a person appointed by the court of protection to safeguard the patient’s best interest
   d. sought when the person lacking capacity has no other representatives other than paid carers
   e. all of the above
   Answer: b

3. When undertaking a Best Interest assessment, the clinician should:
   a. consider if there are any valid and applicable advance decisions to refuse treatment
   b. seek advice from others relevant to the decision making
   c. take into consideration the patient’s personal values, beliefs, past and present wishes and feelings
   d. seek advocacy if there are disagreements between carers and health professionals.
   e. all of the above
   Answer: e

4. The decision-maker should:
   a. clearly record the outcome on a Consent Form 2.
   b. discuss any form of clinical holding required at the best interest assessment stage
   c. act to provide treatment in the least restrictive manner
   d. should only suggest treatment option according to the clinicians preferred choice of technique and not of the patient’s needs
   e. not need to review previous best interest decisions
   Answers: b and c
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