SAAD

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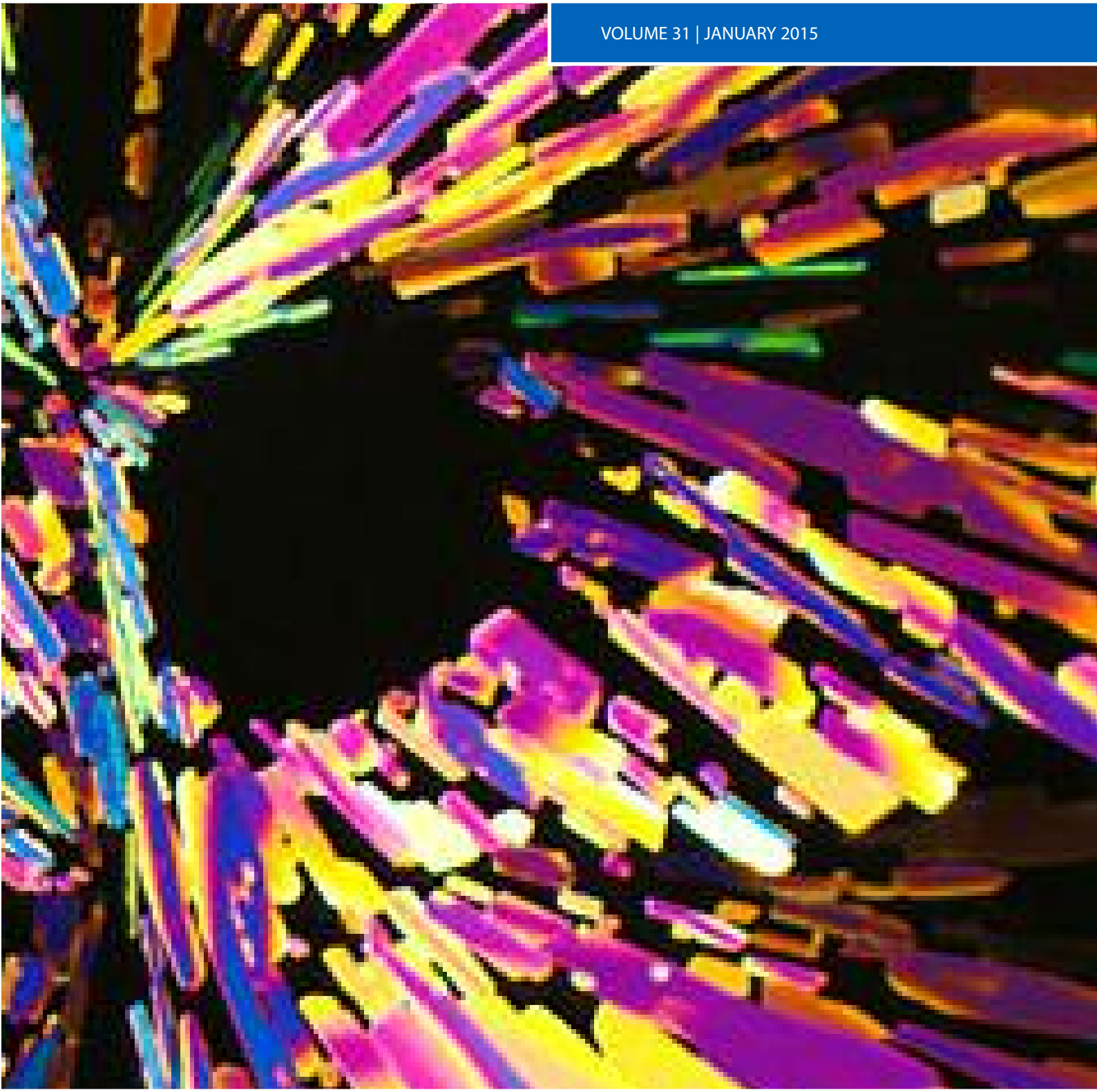

What's New in Post Op Analgesia

Hungry for Nothing?

Audit of IV Failure

Elective Report - Peru

STORY BEHIND THE COVER

ASPIRIN

Acetyl salicylic acid (Aspirin), was first manufactured by the French chemist Charles Frédéric Gerhardt in 1853 but he had no desire to market it and abandoned his discovery.

The story actually begins long before this with the natural plant drug Salicin. Hippocrates, c460-377 BCE describes the use of a powder made from the bark and leaves of the white willow tree which he found helped heal headaches, pain and fever. Its use is also recorded in Roman literature.

Culpeper, the English botanist and apothecary, in his *Complete Herbal* 1653, mentions that willow is good for redness, but this is hidden in a list of other cures, plus the claim that if the bark is boiled with white wine then you can drink as much as you like and remain sober, probably more due to the boiling than the Willow which would just have made the wine bitter. In the *Complete Herbal*, fever was cooled by placing branches of willow in the bedchamber of the sick person.

The first real account of the use of Salicin is found in a letter from Edward Stone to the Earl of Macclesfield, then President of the Royal Society, and published in 1763. He describes the bitter taste of willow and wondered if it had similar properties to the Peruvian Bark (quinine). Stone was a believer in the doctrine of signatures, where the cause of the disease offers a clue to its treatment, hence willow growing in damp areas should help cure agues and fevers. He describes drying and powdering the bark then giving forty grains every four hours to fifty patients over a period of five years. In most cases the patients were cured and even in longstanding quarternary ague the symptoms were remarkably reduced. Later extraction rates from the bark would indicate the patients were receiving about 60mg salicylic acid, four hourly.

Aspirin was first marketed by Bayer in 1899, the UK patent being granted in 1900. The traditional story is that the father of Felix Hoffmann, a research chemist at Bayer, asked him to find an anti rheumatic which had fewer side effects than sodium salicylate. Hoffmann found Gerhardt's paper and produced acetylsalicylic acid in August 1897, which he then persuaded Bayer to market.

It now seems the story is very different. Heinrich Dreser, Head of Bayer's lab was testing aspirin in 1897 but set it aside until 1898 even though it was noted to be better than sodium salicylate. Arthur Eichengrün called for clinical studies to be instigated but was overruled by Dreser as Head of Department because he felt it had cardiac side effects. Eichengrün prepared a batch of Aspirin and tested it on himself, then on colleagues, and finally by medical and dental friends, on their patients. In all cases the drug worked well with few side effects. Eichengrün presented the results to Bayer but again Dreser objected. Carl Duisburg Head of Research, ordered Dreser's results to be checked and it is probably here that Hoffmann enters the story preparing the Aspirin for Duisburg's tests. The story of Aspirin was not published until 1936. Eichengrün was probably written out of the discovery because he was a Jew. He subsequently invented acetylcellulose for which he was not given credit in Nazi Germany. His part in the discovery is found in a letter to Bayer dated 1947.

As part of the treaty of Versailles 1919, Bayer lost the trademark for Aspirin and Heroin throughout Europe and America. Aspirin is, however, still a Bayer trade mark in some countries.

Aspirin is now a WHO *core drug*.

Bill Hamlin

Further reading:

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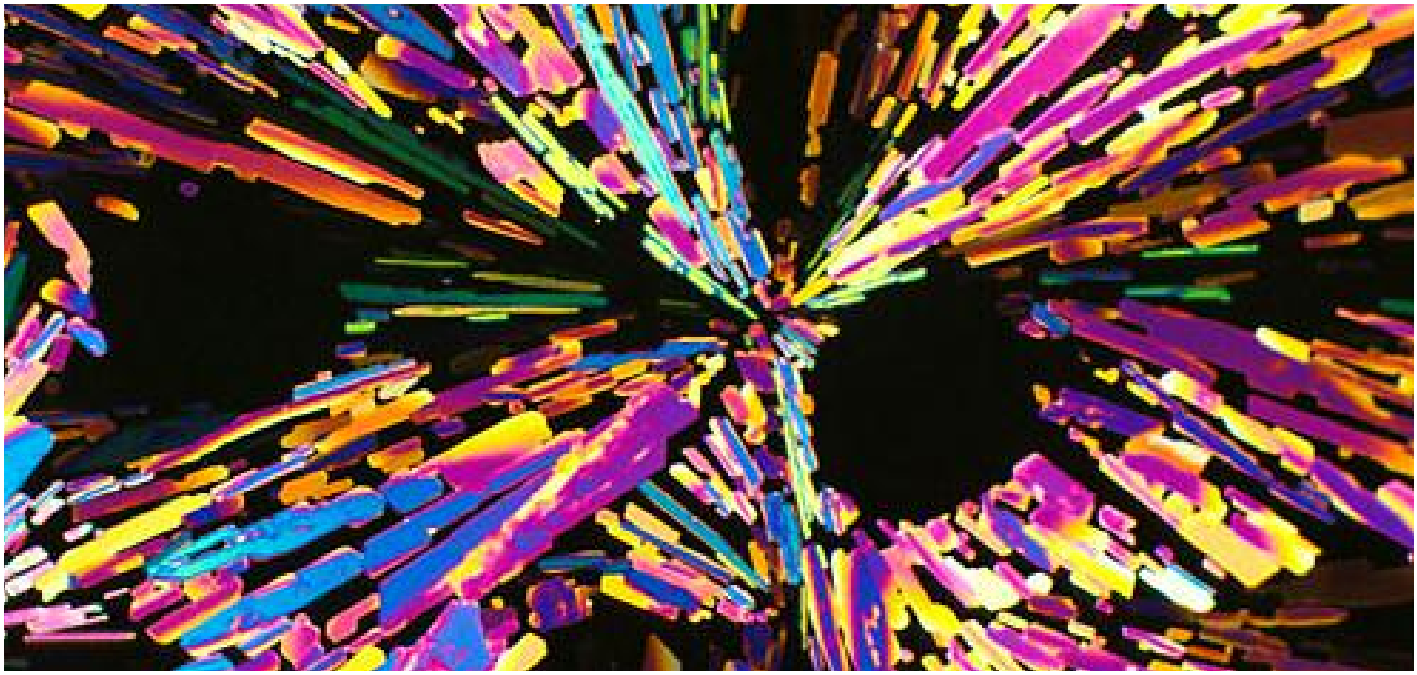
2. The Discovery of Aspirin, a reappraisal. Sneader W. BMJ 2000; 321: 1591



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The cover photograph is scanning electro-micrograph of aspirin. It is reproduced with the kind permission of the National High Magnetic Field Laboratory, Florida State University.

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EDITORIAL

I hope that you will enjoy reading volume 31 of SAAD Digest. This is the 10th volume of the revamped Digest that has been produced.

We have made some alterations to the format this year. SAAD Editorial Board and Board of Trustees decided that we would move to having two newsletters per year, and so much of the Society news has been moved from Digest to the Autumn Newsletter. Amongst the other advantages, it means that there is less delay in getting news, such as the report of the Annual Symposium to members. We have, however, retained the abstracts of the presentations within Digest so that they are part of the scientific publication.

There have been a number of changes to the Editorial Board this year. Paul Averley has left us, having been one of the original members of the Board. Paul made a great contribution to the Digest both in terms of his work on the Editorial Board, reviewing and commenting on submissions, and also authoring a number of publications for Digest. Unfortunately Paul's clinical practice has taken him in a different direction, and as he is no longer heavily involved in sedation, Paul felt it would be better to stand down. Sadie Hughes, who joined us in 2013 has been elected to the post of Assistant Secretary with the aim of following Francis as Honorary Secretary after next year's Annual General Meeting, when Francis becomes President of SAAD. She felt that carrying out the two roles together would result in a greater time commitment than she is able to give to SAAD.

I would like to record my thanks to both Paul and Sadie for the work that they have put into Digest and the newsletters, during their time on the Editorial Board. Sadie will be continuing within the SAAD fold and I look forward to working with her on the Board of Trustees. I join all of the Editorial Board in wishing Paul well with the new direction of his practice. We do miss him on the Editorial Board.

We have been joined by two new members on the Editorial Board. Jennifer Hare is a Health Psychologist, who is based at Guy's Hospital. I am delighted to welcome her to the Board. Jen brings a wealth of experience from the field of psychology and thus can contribute in areas that complement the experience of the other members. We are also going to expand the Journal Scan section of Digest to include articles of interest from the psychology literature.

Fareed Ahmed works in General Dental Practice. He is based in the very practice where Peter Hunter worked when SAAD was first founded. Fareed has been involved in other publications in the past, and it is valuable to have a GDP input to our deliberations, given that so many of our members are based in the primary care sector. Both Fareed and Jen have made contributions to this issue of Digest.

The other main item worthy of note in the Digest is that, at the time of writing this editorial, the Intercollegiate Advisory Committee for Sedation in Dentistry (IACSD) has produced the final draft of its report. This draft has been sent for consultation to all the stakeholders, and the Trustees of SAAD had the opportunity to make comment.

The IACSD met on the 12th November to consider the responses to the consultation. Final changes were discussed and the document is being sent for formatting to the printers. The next version the members of the IACSD will see will be the galley proofs. I do not yet know the date of publication, but as soon as it is available, it will be published on the website, and a link to the report will be included. SAAD has made a huge contribution to the report. Three Trustees (David Craig, Chris Holden and I) have attended the majority of the meetings – there has not been a single meeting where at least one of us wasn't present. SAAD has been involved in the production of the Syllabi that are included in the report. The syllabus for hygienists and therapists administering inhalation sedation was produced as the basis for the SAAD Hygienists and Therapists Course. The adult advanced and the paediatric advanced techniques syllabi are taken (with minor modification) from the work of the Independent Expert Group on Training and Standards for Sedation in Dentistry (IEGTSSD), as are the recommendations for CPD. The work of the IEGTSSD was funded by SAAD. Had the SAAD Trustees not been as vocal at the meetings and as involved between meetings as they were, the final IACSD report would have been significantly less user-friendly to those involved in the provision of sedation for dentistry.

The recommendation that those providing conscious sedation for dentistry must undertake a minimum of 12 hours verifiable sedation related CPD has been accepted by the IACSD. The SAAD Digest last year was able to award 2½ hours CPD via its online verifiable CPD. Completing this every year will give the 12 hours required by the guidance. Attendance at the annual symposia and using online CPD will allow everyone to find enough verifiable CPD to fulfil their needs. Excellent value for your subscription!

Nigel Robb

What's new in... The Management of Post-operative Pain in Dentistry

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Abstract

Post-operative pain is a common occurrence within dentistry. The causative factors are not solely dependent on the procedure but a part is also played by the patient's ability to self-cope as well as their level of anxiety. This article discusses the effectiveness of analgesia available for prescription by general dental practitioners based on systematic reviews in the literature, with particular reference to third molar removal. In addition, other methods that can help reduce pain in the post-operative period are addressed, including the types of local anaesthetic used for the procedure and psychological aspects of patient care. The main aim is to update and aid dentists' decision making processes in choosing ways to lessen the pain experienced by patients following dental procedures.

The management of post-operative pain in dentistry

Within dentistry pain is unfortunately a common occurrence. With particular reference to surgery, pain results from surgical trauma and the release of pain mediators.[1] The effects of pain can influence whether a patient wishes to undergo a procedure, affect the patient's perception of the operator and even cause the onset of anxiety or fear. An increased perception of pain has been reported in patients that undergo treatment who were already dentally anxious.[2] By reducing or eliminating the painful aspects of treatment, patients become more at ease and compliant to see the procedure through. Post-operatively, having left the clinical environment, patients want to return to 'normality' and rely on either prescribed or over the counter medications. With a variety of drugs available to control pain, the clinician can feel overwhelmed when deciding which to prescribe or advise.

This article aims to discuss and review post-operative pain management to update and aid the decision making process so that practitioners can feel confident about the ideal medications to be given to help to reduce pain following dental procedures.

What is pain?

The International Association for the Study of Pain have defined pain as:

'An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.'[3]

Depending upon the stimulus, the response may be acute (protective) or chronic (destructive).[4] Although usually perceived with a negative response, the primary need for the sensation of pain is to aid survival by warning the body of present and potential harm.[5]

Tissue damage caused by surgery, including dental procedures, elicits a nociceptive response. Nerve fibres conduct information regarding the nature of the trauma to the brain. Once a threshold is reached, pain is the outcome. It is important to note that nociception and pain are not co-dependent and one can occur without the other.[5]

Dental pain is unique. This is due to a combination of the innervation of the teeth and jaws as well as the clinical setting.[6] Following dental procedures, including restoration of a tooth by the removal of caries, root canal treatment, or even tooth removal, a degree of tissue damage will have occurred. If not anaesthetised, treatment would usually be almost impossible. An interesting element in this is the psychological ability of a patient to increase their pain threshold by 'zoning-out' and having treatment without anaesthetic, commonly seen in those who wish to avoid the dental needle. This highlights how the response to pain varies and depends not only on the stimulus but also the individual.[6]

As is common knowledge, a pain free treatment does not predict a pain free recovery. Several authors have highlighted inadequacies in post-operative pain management, despite there being an array of available analgesics.[7] This has been suggested as a leading cause of increased post-discharge attendance at Accident and Emergency departments and re-admission into hospital.[8,9]

Methods used to measure pain

To understand the effect of interventions on pain, it is first necessary to identify the original extent of pain that the patient is experiencing. This measurement can be captured through the use of questionnaires, for example the McGill Pain Questionnaire or the Child Dental Pain Questionnaire.[10,11] In addition, pain intensity scales are more commonly used including the use of the Visual Analogue Scale (VAS), Verbal Rating Scale (VRS) or the Numerical Rating Scale (NRS), which rely on anchor points to describe the pain.[12,13]

Medications for post-operative pain available to prescribe

The British National Formulary (BNF) currently has the following medications available for dental practitioners to prescribe on FP10D forms, as potential oral analgesics:[14]

- Aspirin Tablets, Dispersible
- Diclofenac Sodium Tablets, Gastro-resistant, BP
- Dihydrocodeine Tablets, BP, 30mg
- Ibuprofen Oral Suspension, BP, sugar-free
- Ibuprofen Tablets, BP
- Paracetamol Oral Suspension, BP
- Paracetamol Tablets, BP
- Paracetamol Tablets, Soluble, BP

'Surgery provides an ideal setting for examining the relationship between individual variables and pain. Surgery is a high stress situation which evokes intense emotional reactions, involves considerable physical danger, and is quite painful.''[15]

Within dentistry, the same principle can be applied to third molar surgery. The surgical removal of third molar teeth is one of the most commonly performed minor oral surgical procedures. There have been several studies on the effects of analgesia on post-operative pain following third molar removal, reviewed by the Cochrane Group. As these reviews are of the best available evidence, the authors have provided a summary using the Cochrane library, for the effectiveness of analgesics that are available in the BNF Dental Formulary.

Paracetamol

Weil et al[16] conducted a Cochrane Systematic Review to measure the efficacy of the use of Paracetamol verses placebo for management of acute pain as a single post-operative dose following surgical third molar removal. Based on pain relief scales for doses of Paracetamol, for 11 studies with doses varying between 500-650mg versus placebo at 4 hours, the Number Needed to Treat (NNT) was 4 (95% CI 3 to 5), and for doses of 1000mg Paracetamol versus placebo the NNT was 3 (95% CI 3 to 4). The studies included were randomised, parallel group, placebo controlled, double blind trials. The review concluded that Paracetamol was statistically significant at reducing post-operative pain following wisdom tooth removal. Pain relief scales confirmed the 1000mg dose was more effective than lower doses without an increase in any dose related adverse events.[16]

Ibuprofen

A review carried out by Derry et al[17] provided evidence on the effectiveness of Ibuprofen as a single oral dose for acute post-operative pain in adults. The review identified a total of 72 studies of which 57 were based on post-operative pain following third molar removal. For Ibuprofen 400mg, the proportion of participants with ≥50% pain relief over 4-6 hours based on 49 studies with 5428 participants was 55% pain relief for Ibuprofen versus 12% pain relief for the placebo group. For Ibuprofen 200mg the proportion of participants with ≥50% over 4-6 hours based on 18 studies with 2470 participants was 47% pain relief for Ibuprofen versus 10% for the placebo group. The NNT were 2.3 and 2.7 for the 400mg and 200mg Ibuprofen doses, respectively. Derry et al[17] also found from the studies they reviewed, that at the same dose of Ibuprofen, patients taking a soluble preparation were less likely to require rescue medication within 6 hours of their first dose.

Studies were also included in which higher doses of Ibuprofen (600-800mg) were prescribed where the NNT was reduced to 1.7, the NNT figures for the 600-800mg doses though were based on only 2 studies compared with 57 and 49 studies available for the 200mg and 400mg doses. A more recent review by Bailey et al[18] reported comparing Ibuprofen 400mg versus Paracetamol 1000mg, and found Ibuprofen 400mg was more effective.

Codeine

A systematic review by Derry et al[19] found that single dose Codeine 60mg provided relatively poor post-operative analgesia after dental procedures. When comparing the number of subjects that had ≥ 50% pain relief at 4-6 hours post-operatively, only 14% of subjects taking the Codeine 60mg achieved this figure compared with 9% placebo, based on 15 studies with 1146 participants. The authors suggested that Codeine alone should not be used as a first line analgesic for post-operative dental pain. However, if Codeine is to be used they suggest use combined with Paracetamol improves effectiveness.

Dihydrocodeine

Moore et al[20] identified 4 studies with a total of 359 participants, 3 of which compared the effectiveness of Dihydrocodeine 30mg to a placebo, and one study the effectiveness of Dihydrocodeine compared with an active intervention of 400mg of Ibuprofen. Only one of these studies was based on the third molar extraction model. However, previous studies have shown that third molar removal is a good predictor of the effectiveness of post-operative analgesia for other surgical procedures.[21] The studies concluded that 30mg of Dihydrocodeine was insufficient to provide effective post-operative pain relief. The NNT for ≥ 50% pain relief at 4-6 hours post-operatively was 8.1 for 30mg Dihydrocodeine. There were also a greater number of adverse effects reported in the participants taking dihydrocodeine, including confusion, vomiting, headache, dizziness, nausea and drowsiness.

Diclofenac Sodium

Derry et al[22] also reviewed the use of single dose oral Diclofenac for acute post-operative pain in adults, comparing 15 studies involving a total of 1512 participants.

For Diclofenac 50mg, the proportion of participants with ≥50% pain relief over 4-6 hours based on 9 studies with 1119 participants was 56% for Diclofenac versus 19% for the placebo group.

For Diclofenac 100mg, the proportion of participants with ≥50% pain relief over 4-6 hours based on 4 studies with 413 participants was 66% for Diclofenac versus 10% for the placebo group. The respective NNT were 2.7 and 1.8 for the 50mg, and 100mg, Diclofenac doses. Based on the NNT figures Diclofenac 50mg is superior to paracetamol 1000g if given alone as a single dose post-operatively.

Seymour et al[23] studied the effects of intravenous Diclofenac versus placebo on pain relief following surgical removal of third molars and found the Diclofenac cohort had significantly less post-operative pain over a 4 hour observational period when compared to the placebo ($P<0.001$). This study was based on intravenously administered Diclofenac, however, the results are similar to findings from the Derry et al[22] group.

Combined Therapies

Paracetamol + Codeine

The combination of Codeine and Paracetamol has been investigated and shown to have a superior analgesic effect when compared to Paracetamol alone. Data from a systematic review by Toms et al[24] identified 3 studies with 217 participants that showed when comparing doses of Paracetamol 1000mg + 60mg Codeine versus Paracetamol 1000mg, the proportion of participants with ≥50% pain relief over 4 to 6 hours was 68% for Paracetamol with Codeine and 48% for the Paracetamol only group. Two of these studies were based on post-operative pain after extraction of third molar teeth and one was based on a general surgery model.[25]

The NNT for preparations of 800-1000mg Paracetamol and Codeine 60mg is 2.2. This makes the combined efficacy of Paracetamol and Codeine comparable to Ibuprofen 400mg or Diclofenac 100mg.[24]

It is worth noting that Paracetamol 1000mg and Codeine 60mg is not available in the Dental Formulary for dentists to provide via an FP10D prescription in England. However, the preparation is commonly prescribed as two tablets of Co-codamol 30/500mg, which is available to Hospital dental practitioners.

Paracetamol and Ibuprofen

In 2013 Derry et al[26] reviewed the effectiveness of Paracetamol combined with Ibuprofen. Three studies were identified, all based on surgical removal of third molars.

For Ibuprofen 200mg/Paracetamol 500mg the proportion of participants with ≥50% pain relief over 4-6 hours, based on 3 studies with 508 participants, was 69% versus 19% for the placebo group.

For Ibuprofen 400mg/Paracetamol 1000mg the proportion of participants with ≥50% pain relief over 4-6 hours, based on 3 studies with 543 participants, was 73% versus 7% for the placebo group. The respective NNT were 1.6 and 1.5 for the lower and high doses, respectively.

The review also concludes that Ibuprofen in combination with Paracetamol provides superior analgesic effect compared to their individual administration. Other studies have also concluded similarly for example, Merry et al[27] found that Maxigesic (Acetamophen 500mg and Ibuprofen 150mg) tablets provide superior pain relief when compared with Paracetamol or Ibuprofen alone.

Comparison of analgesics available for General Dental Practitioners to prescribe

Table 1 compiles data from a series of systematic reviews from the Cochrane library. There is also the addition of NNT figures from the review by Toms et al[24] and the recent review article by Derry et al[26] which include the respective NNT figures for combination therapies for comparison purposes. Since all the systematic reviews had a single review group and their primary outcome assessment was the number of participants that had 50% pain relief over 4-6 hours, it is possible to quantify the effectiveness of different analgesics including those with combination preparations, so they can be compared. Table 1 lists the analgesics that are available to be prescribed from the BNF Dental Prescribers List (with the exception of Paracetamol + Codeine) and should act as a guide when considering effective analgesia for patients for expected acute post-operative pain; in this instance third molar removal.

Table 1: NNT for post-operative analgesia following third molar removal.[28]

Analgesic regime	NNT (95% CI)
Ibuprofen 400mg/ Paracetamol 1000mg[26]	1.5
Ibuprofen 200mg/ Paracetamol 500mg[26]	1.6
Ibuprofen 600-800mg[17]	1.7*
Diclofenac 100mg[22]	1.8
Paracetamol 800-1000mg/ Codeine 60mg[24]	2.2**
Ibuprofen 400mg[17]	2.3
Diclofenac 25mg[22]	2.5
Diclofenac 50mg[22]	2.7
Ibuprofen 200mg[17]	2.7
Paracetamol 975-1000mg[16]	3.2
Paracetamol 500mg[16]	3.8

* This dose was reviewed in 3 articles but only 1 involved a dental model
**These NNT figures for the 600-800mg dose were based on 2 studies only

Other factors to help reduce post-operative pain

Local Anaesthetic

There are a number of local anaesthetic solutions available for use by the dental surgeon including Lignocaine, Prilocaine, Mepivacaine and Articaine.[29] The value of an array of anaesthetics allows for their use in differing treatment scenarios and patient factors, such as medical history. Long acting local anaesthetics have some value following procedures that can be expected to cause significant post-operative pain.[30] Caution needs to be exercised when administering local anaesthetics in such a manner to children as although beneficial in reducing post-operative pain, anaesthetic effects can result in self mutilation by lip and/or cheek biting or scratching.[31] A survey conducted by Corbett et al[29] identified Lignocaine with adrenaline solution as the most commonly used local anaesthetic in the UK in healthy patients. Although considered the gold standard [1,32] for dental anaesthesia, its duration is approximately 90 minutes.[33] However, following lower third molar removal, Articaine provided greater post-operative anaesthesia than Mepivacaine and Lignocaine,[34] as well as providing greater anaesthetic success for routine dental procedures in the first molar region, compared to Lignocaine.[35] Articaine is available as a local anaesthetic in 2% and 4% solution with a concentration of adrenaline of 1:200,000 or 1:100,000. Hintze et al[36] carried out a double blind randomised trial and concluded that the lower concentration of 2% did not affect the onset of action, effect or tolerability when compared to the 4% solution. The study did find a statistically significant difference in the soft tissue anaesthesia between the 2 concentrations. The mean duration of anaesthesia was 174 minutes for the 4% solution, with the 2% solution shorter by 29 minutes. On this basis, post-operative pain management could be considered more effective when using a 4% Articaine solution with adrenaline.

Bupivacaine is also a longer acting agent in comparison to Lignocaine and Articaine, due to its increased binding to proteins and solubility in lipids.[1] This aids rapid and profound anaesthesia, ideal for treatments such as endodontic therapy, tooth extraction and oral surgery in which pulpal anaesthesia in excess of 90 minutes is required.[1] The post-operative analgesia is also similar to that of Articaine.[34] However, Bupivacaine has been shown to accumulate in the sodium channel and is, therefore, thought to be less safe in patients taking medications which depress cardiac function, for example, beta-blockers, calcium channel blockers and cardiac glycosides.[1]

Psychological and other factors

Pain is a phenomenon that encompasses many different factors. In light of this its treatment requires a multifactorial approach. One suggested technique is to ensure adequate behavioural preparation of the patient prior to treatment by the provision of pre-operative information. Studies have suggested that groups of patients who received information regarding pain and post-operative recovery experienced less pain and required less analgesia. Conversely though, in some cases providing information regarding pain has been shown to sensitise patients to experience more pain.[37] However, although discussion of what is to come may sometimes cause distress, patients have generally reported that information on the treatment of post-operative pain was one of the most appreciated, and preferred to have details provided in advance.[38]

Anxiety is an emotion that is present in all patients at some level but there is a range of difference in how patients are able to utilise their self-coping styles.[39] With anxiety causing possible cognitive and behavioural changes[40], it is not surprising that studies have shown higher anxiety levels to be associated with greater perceived pain post-operatively.[39,41,42] Conversely, lower levels of anxiety can leave a patient underprepared for the post-operative painful response and should, therefore, not be taken for granted.[40] Dentists should identify the anxious patient pre-operatively and organise an individually tailored approach for their treatment, either using iatrosedation, conscious sedation or general anaesthesia. It is sensible to use their measured anxiety level as a guide for their relative post-operative pain response.

In addition to post-operative recommendations of medications, such as analgesia or anti-inflammatories, the application of cold is also recommended. Methods to achieve this include the use of ice packs, gel packs and more recently, mechanical methods that allow the continuous application of cold via face masks. Reducing the temperature of traumatised tissues helps to reduce the threshold for activation of nociceptors and, therefore, the conduction velocity of pain nerve signals.[43] In addition, cell metabolism is reduced, slowing the biochemical reactions associated with pain and inflammation and promoting vasoconstriction.[44,45] However, there is only limited research in dentistry to consolidate the use of cryotherapy.

Conclusion

Many determinants affect post-operative pain including procedure, environment and patient factors.[41] Treatment can be complex and should begin at the initial consultation. Once complete and if left untreated, postoperative pain can result in the development of chronic postoperative pain syndromes.[40]

Some preliminary studies have shown that dexamethasone, administered submucosally adjacent to the operative site or intra muscularly, can reduce post-operative pain[46]. On-going research in to the effects of cold therapy with continuous cold application appears to show promising reductions in pain levels[47]. Good pre-operative planning is essential and whilst atraumatic technique is the standard, flapless surgery may reduce pain[48] as long as the surgical result is not compromised. Whilst there is debate on the benefits of pre-emptive analgesia[9], taking steps to reduce post-operative inflammation and infection seem logical.

The bulk of this review relates to the presently available range of analgesia in dentistry and aims to give guidance on best performance as revealed by clinical research based, where available, on the third molar model. Much of these data were obtained from motivated patients in clinical trial conditions where compliance is likely to have been higher than that seen in clinical practice[49]. Taking the degree of external validity into account, along with relevant medical co-morbidities and interactions, we hope to have highlighted the optimal drugs and dosages for pain control, as presently recommended.

Our review has highlighted that combination therapies of Ibuprofen 400mg and Paracetamol 1000mg are the optimum doses for post-operative pain control, both of which are readily available as 'over the counter' medications. If pain is severe, then the addition of Codeine (dihydrocodeine for dental prescriptions) may be warranted. Ibuprofen may be contraindicated for patients for whom NSAIDs are inappropriate. We also suggest non systemic methods of pain control that can be used independently, or as an adjunct, in post-operative pain management.

Patient education, and compliance with the prescribed dose regimen is an ongoing challenge[50] and this needs even more care at the initial post-sedation phase so as to involve both patient and escort.

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Hungry for Nothing: Should Dental Patients Fast Prior to Conscious Sedation?

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Abstract

Objective: This research explores the attitudes of medical professionals towards fasting patients prior to the use of conscious sedation.

Materials and methods: Questionnaires were completed by a total of 113 dentists, anaesthetists and dental nurses in order to identify current practices and opinions concerning the employment of pre-operative fasting in the context of conscious sedation in dentistry.

Results: Seventy-eight (69%) respondents did not recommend fasting, compared with 35 (31%) who did. Those who did not recommend fasting were able to state significantly more adverse effects (P<0.01) of fasting when compared to the 35 (31%) who advocated fasting. Significantly more anaesthetists (80%) than dentists (14%) advised fasting patients (P<0.001). Thirty-two of 39 (82%) respondents mentioned the risk of aspiration to be the main reason for recommending that patients be fasted.

Conclusion: Medical professionals in dentistry provide a wide range of conflicting views on the employment of fasting prior to conscious sedation reflecting the lack of homogeneity in literature surrounding this topic.

Introduction

One area of patient care in which conscious sedation is playing an ever-increasing role is in the field of dentistry. For many people, visiting the dentist is a daunting prospect and in an attempt to make dental care more patient-centred, conscious sedation has been adopted as an effective method of alleviating anxiety. This said, sedation is not without its risks; one of the most feared being pulmonary aspiration leading to potentially devastating consequences such as aspiration pneumonitis or pneumonia.[1,2] For this reason many dental hospitals up and down the country employ the procedure of fasting prior to conscious sedation.

Although fasting patients may seem logical, there are two major caveats: firstly, fasting comes with disadvantages of its own such as discomfort, headaches, and irritability which may undermine some of the anxiolytic properties that sedative agents confer;[3] secondly, fasting has only been established as significantly beneficial at greater levels of sedation, where airway intervention is often required and spontaneous ventilation is frequently inadequate (Table 1).[4] Such a reduced state of consciousness should not occur in conscious sedation, which the General Dental Council[5] stipulates should '[ensure] the patient will respond to command throughout the period of sedation' and 'render unintended loss of consciousness unlikely.'

Table 1 – The continuum of depth of sedation[4]

	Level of Sedation			
	Minimal sedation anxiolysis	Moderate sedation/ analgesia *("conscious sedation")*	Deep sedation/ analgesia	General anaesthesia
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate

In an attempt to advance the debate on whether or not to fast patients pre-procedure, this paper identifies current practices and opinions of dentists, dental nurses and anaesthetists working with conscious sedation and compares those responses with current literature.

Literature Review

Current literature suggests that there is little evidence to support the practice of fasting patients prior to conscious sedation.[3] An initial literature search was undertaken to explore the incidence of aspiration during conscious sedation with intravenous (IV) midazolam; the most common type of conscious sedation used in dental procedures.[3] As no results were found, the search was broadened to encompass all of conscious sedation but the lack of evidence that aspiration occurs during such procedures appears to nullify concerns about its risk.

A case report by Cheung et al[6] is the first and only published incident that could be found concerning aspiration pneumonitis after procedural sedation and analgesia (conscious sedation). They reported a 65 year-old woman presenting to Accident and Emergency with a left ankle fracture. She vomited and aspirated which was attributed to a multitude of aspiration risk factors including: two rounds of sedation (using IV fentanyl and propofol), prior ingestion of alcohol, emergency intervention, and being in the extreme of age.[6,7] Others include deep sedation, a higher American

Society of Anaesthesiologists (ASA) classification (III-IV), and gastro-oesophageal reflux disease. All this indicates that the occurrence of aspiration pneumonitis following conscious sedation is extremely rare, especially during elective procedures such as those for which conscious sedation is used in dentistry.

In contrast to conscious sedation, aspiration pneumonitis is a well-recognised peri-operative complication of general anaesthesia.[1,3] Green and Kraus[7] outlined a list of factors suggesting that the relative risk of aspiration with conscious sedation is significantly lower than with general anaesthesia. Despite this, many current guidelines on fasting, such as a report[8] published by the ASA committee make little distinction between the two degrees of sedation. Even though the report[8] suggested there was insufficient published clinical evidence to provide a clear relationship between fasting from clear fluids or light meals and the risk of aspiration or emesis, it recommended the following:

'It is appropriate to fast from intake of clear liquids at least 2 hours before (and from intake of a light meal at least 6 hours before) procedures requiring general anaesthesia, regional anaesthesia or sedation.'

Due to a lack of evidence, expert consensus given by anaesthetists and dentists formed the basis of such recommendations, which have not changed since the previous ASA report 12 years earlier.[9] The ASA's report is not unique in this respect. The Poswillo report[10] states that patients should fast from clear fluids and solid foods for at least 4 hours, whereas the Scottish Dental Clinical Effectiveness Programme[11] encourages that fasting should not be recommended for conscious sedation unless specifically indicated. This latter view is echoed by guidelines released by the Academy of Medical Royal Colleges (AoMRC),[12] which acknowledges the controversial nature of this topic and how some committees within dentistry consider routine fasting as unnecessary.[13] The AoMRC[12] ultimately states the decision to fast should be tailored to the patient, specifically weighing up their individual risk of aspiration.

With such a variety of guidelines and protocols, it is important to investigate how medical professionals on the front line actually practice, and what the basis for said practice is.

Objective

The objective of this study was to explore the current practice and opinions of anaesthetists, dentists and specialist nurses concerning fasting prior to conscious sedation particularly when using the sedative midazolam given intravenously. This would allow for an interesting comparison with the current evidence base in the literature.

Materials and methods

Questionnaires were distributed to willing participants who had to be dentists (n=81), anaesthetists (n=20) or specialist nurses (n=12) practising conscious sedation in the dental setting. This was done at a dental conference yielding a sample size of 113 respondents. Much of the data was quantitative in nature and analysed in Microsoft Excel. Statistical analysis was performed using Chi-square as the data was either categorical in nature (e.g. do you advise fasting: yes or no?) or could be grouped into categories (e.g. the number of adverse side-effects mentioned: 0-1 or 2-4).

A review of the literature was done contemporaneously in order to evaluate the evidence base behind certain practices. Although questions and responses were designed in such a way as to be generally applicable to conscious sedation as a whole, the sedating agent midazolam was mentioned specifically due to its wide use within this study cohort.

Results and discussion

Current practice

According to profession, 81 (72%) respondents were dentists, 20 (18%) were anaesthetists and 12 (10%) were specialist dental nurses. Their answers to the question 1 - *'do you advise fasting prior to conscious sedation?'* - are shown in Table 2. These results demonstrated that there was an extremely significant difference ($P<0.001$) between the percentage of anaesthetists (80%) who advised fasting compared with the percentage of dentists who did so (14%) based on Chi-square analysis. A reason for this could be that anaesthetists, who are more used to general anaesthesia (GA) protocols and may be more aware of the uncommon yet significant danger of aspiration or adverse events under GA than dentists, are thus more cautious in their practice. Despite the fact that GA protocols on fasting have been arbitrarily extrapolated to sedation protocols in some instances,[8,9] this in itself may be enough to explain why anaesthetists are more likely than dentists to fast a patient prior to conscious sedation.

Table 2 – Is fasting advised prior to conscious sedation?

Respondent:	Total Number	Yes to fasting	No to fasting
Dentists	81	11 (14%)	70 (86%)
Anaesthetists	20	16 (80%)	4 (20%)
Dental Nurses	12	8 (67%)	4 (33%)
Total	113	35	78

Understanding of the term fasting

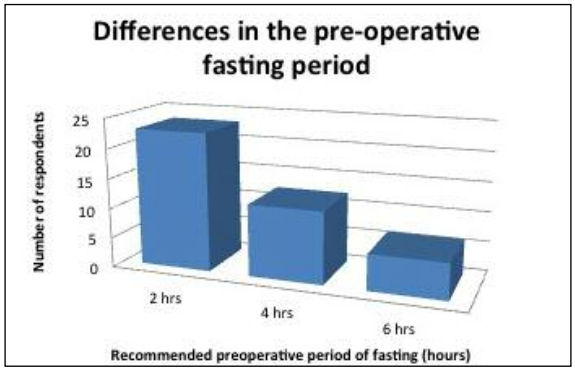
Results showed that respondents had a good understanding of the term fasting, measured against the following definition given by the ASA.[8] 'a prescribed period of time before a procedure when patients are not allowed the oral intake of liquids or solids.' An understanding was demonstrated by those who answered 'yes' to question 1 and then went on to explain their fasting regimen, whether it be from fluids or solids for any period of time.

Although 35 (31%) out of the 113 respondents stated that they fast patients prior to sedation, there were 41 (36%) respondents who answered the second question which asked: *'how many hours do you advise patients to fast prior to IV sedation?'* This indicates that 6 respondents were perhaps less well acquainted with the definition of fasting as they answered 'no' in response to whether they recommend fasting, yet surprisingly went on to describe their fasting regimen. One plausible explanation could be due to a lack of clarity concerning what constitutes 'fasting'. It is worth noting that members of all three groups of professionals (3 dentists, 2 anaesthetists and 1 dental nurse) exhibited this lack of understanding and that all these 6 respondents recommended a fasting regimen consisting of a light meal 2 hours before sedation. Ordinarily, it is unlikely that not eating or drinking for 2 hours would be equated to fasting, and so perhaps for this reason these 6 respondents did not regard it as such.

Duration of pre-operative fasting

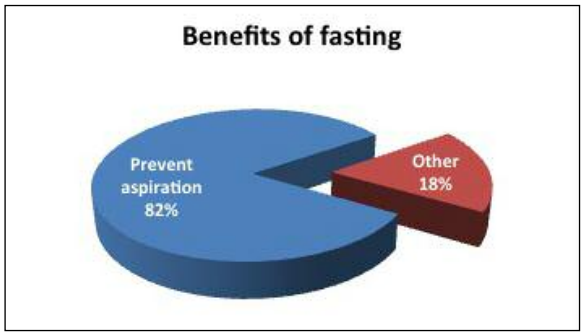
As the literature[8-11] suggests, there is a clear difference in opinion concerning from what a patient should fast such as fluids or solids, and for how long, if at all. This lack of uniformity in the pre-operative fasting time was echoed by results showing that 23 (56%), 12 (29%), and 6 (15%) respondents gave answers of 2, 4, and 6 hours respectively (Figure 1). This variation is likely to be due to a lack of national guidelines for pre-operative fasting periods and an emphasis on adherence to local policies that vary from one hospital to the next. Hospital guidelines and protocols are known to be beneficial by providing consistency for those patients who may undergo several procedures requiring sedation, and by mitigating the opportunity for mistakes made by medical staff; especially in environments where conscious sedation and general anaesthesia are used in parallel.[3,14]

Figure 1 - A bar chart showing the recommended hours of fasting prior to conscious sedation.



Only those who answered 'yes' to whether they recommend fasting were prompted to answer the third question, which generated 39 responses (Figure 2). This question asked *'how do you think patients benefit from fasting?'* Two out of the 39 respondents failed to mention a benefit and remarked that they were 'just following protocol,' putting their own personal opinions to one side when it came to preparing patients for treatment. This may indicate that at least among some medical professionals, protocols can foster obedience that often prevents mistakes from happening in health care. It can also be assumed that such protocols, much like the ASA[8,9] and Poswillo reports,[10] are likely to be based on the lowest form of clinical evidence: expert opinion. As such there is an argument that they can only have a transient existence in the modern era of evidence-based practice.

Figure 2 - A pie chart showing the perceived benefits of fasting prior to conscious sedation. The respondents labelled as 'other' (n=7) cited the following benefits: prevent vomiting (n=2), prevent nausea (n=1), prevent regurgitation (n=1), prevent airway problems (n=1) and 2 respondents mentioned that they were just following protocol.



Views on the disadvantages of fasting

One-hundred-and-ninety-three disadvantages were given by the 113 respondents in answer to question 5 concerning the adverse effects of fasting (Figure 3). There was a significant association ($P<0.01$) between medical professionals that do or do not fast their patients and the number of adverse effects they cite, with those who fast patients mentioning notably fewer side effects than those who do not (Table 3).

Figure 3 - A bar chart showing the perceived disadvantages of fasting according to respondents.

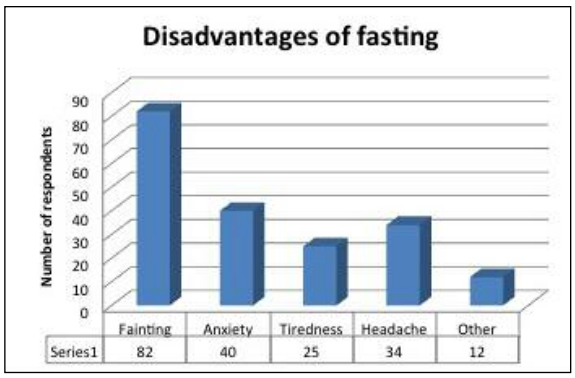


Table 3 – Chi-square grid demonstrating the number of adverse effects of fasting cited between those who recommend fasting and those who do not. Categories '0-1' and '2-4' were formed based on data distribution. Figures in brackets represent the expected computed values (to 1 decimal place) and figures to the left of these in the same cell represent the observed values.

	Number of Adverse Effects		
Recommendation	**0-1**	**2-4**	**Total**
Fast	24 (17.7)	11 (17.3)	35
Do not fast	33 (39.3)	45 (38.7)	78
Total	57	56	113
P value	0.00982		
Alpha level	0.01		

One could postulate that those who recommend fasting may be biased and so may prefer to overlook or under-represent detrimental effects in order to justify their practice. In a risk-averse profession, it is often encouraged to err on the side of caution, which is perhaps why some participants in this study recommend their patients to fast even though current literature is too scarce to support or refute its role in reducing the risk of aspiration. All other variables held constant there is no reason to challenge this conservative approach, yet when it becomes clear that fasting could detrimentally affect the patient, one must seriously reconsider the reasons behind their practices. Thus, the potential advantages and disadvantages of fasting must be taken into consideration when protocols are drawn up.

Moreover, it is logical to assume that those who recommend fasting have a reason for doing so. Of the 41 clinicians who advise their patients to fast, only 39 gave such a reason (Figure 2). Quite unsurprisingly, 82% (32/39) cited the mitigation of aspiration risk during conscious sedation to be the major benefit of fasting; a belief with little validity as shown through the work of Bell et al.[15] They conducted a prospective observational cohort study in which the incidence of adverse respiratory events and vomiting were recorded in 282 patients who did not fast prior to emergency procedural sedation and 118 patients who did. One patient from each cohort vomited but none aspirated in either group. They concluded that propofol was therefore a safe agent to use in the emergency setting when the fasted status of patients cannot always be determined. Furthermore, Thorpe and Benger[16] conducted an extensive literature review on pre-procedural fasting prior to conscious sedation in the Emergency Department setting and discovered that no evidence exists to support its employment. Thus, although the majority of those who recommend fasting before conscious sedation believe mitigation of aspiration to be a justifiable rationale, it is clear that little evidence exists to support such an assertion.

Conclusions and further work

The current study has shown that the practices and opinions of medical professionals are very heterogeneous in the field of conscious sedation using IV midazolam. It has unearthed a number of findings that warrant further action and investigation.

Firstly, this paper indicates that anaesthetists are more likely to recommend fasting before conscious sedation than are dentists. One theory for this is that anaesthetists are more likely to have witnessed aspiration due to airway manipulation than many dentists have done and so they may prefer to apply the same caution to sedation as they do to GA. By emphasising the disparity in incidence of aspiration between these depths of sedation, views may begin to change amongst anaesthetists in this matter.

Secondly, although respondents who advise fasting mentioned significantly fewer adverse effects in fasting, this may have not been due to a conscious omission of adverse effects, but may in fact be due to a lack of education regarding the detriment of fasting. Thus, educating medical professionals on this topic may arm them to make a better-informed choice as to whether or not to fast patients. It is also advisable that the advantages and disadvantages of fasting be carefully considered when guidelines, whether local or national, are formulated.

Lastly, an important area of further research that needs to be explored, concerns determining the risk of peri-operative aspiration during conscious sedation. This study found that most of those who recommend fasting believe the major benefit to be the prevention of aspiration during conscious sedation, which is an assumption with scarce scientific grounding to date. There should be a greater push for professional organisations such as the ASA to conduct large, high quality, randomised controlled trials to answer this question. Studies such as the one by Bell et al[15] need to have a much greater sample size as papers indicate that even the incidence of aspiration during general anaesthesia is incredibly low and highly variable[2]. There is an argument, however, that in order to help policy makers acquire a holistic view of the advantages and disadvantages of fasting, the incidence of complications other than aspiration should be profiled.

It seems that in the absence of empirical evidence, it is clinical experience that has been called upon to form current guidelines on the employment of fasting prior to conscious sedation. The large variation in practices and opinions of medical professionals as shown in this study is a clear manifestation that at the moment we really do not know whether patients should be fasted prior to conscious sedation or not. Seeking a definitive answer to this question is by no means unattainable, but it requires an epic endeavour that must be pursued.

Ethical approval

Ethical approval was not required.

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An Audit into the Reasons why Treatment was not Completed as Planned under Intravenous Sedation in an Adult Oral Surgery Department, and the Cost Implications

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Abstract

This audit aimed to identify the prevalence of, and reasons for failed intravenous conscious sedation in an adult oral surgery department, to develop recommendations to reduce such failures and to identify any cost implications. Data were collected prospectively for three months for all intravenous sedation appointments in the Oral Surgery department. Data were collected for 109 sedation appointments of which 83 were successful (76%). The failure rate (24%) was higher than the acceptable departmental failure rate (10%), and included reasons for failure that should have been avoided by a thorough patient assessment prior to treatment. Of the 26 failures, the most common reasons for failure were: cancellation: 8 patients (30.8%), failure to attend: 6 patients (23.1%), excessively late arrival of patient: 4 patients (15.4%) and failure to cannulate: 3 patients (11.6%).

When sedation was unsuccessful, 13 of the 26 patients (50%) had their treatment successfully completed under local anaesthesia alone, 10 patients (38%) were rebooked for sedation and 3 patients (12%) were rebooked for a general anaesthetic.

Identifying and correcting the reasons for failure can result in vast savings in appointment time, clinical resources and cost. That 13 patients subsequently had their treatment completed under local anaesthesia alone opens the debate on how rigorous the patient assessment and allocation of sedation appointments was, and the potential to achieve savings.

Introduction

Intravenous conscious sedation (IVS) is a method of sedation in which one or more intravenously administered drugs are used to depress the central nervous system but where the patient's protective reflexes remain intact, and verbal contact is maintained.[1] The drugs and techniques used to provide conscious sedation should carry a margin of safety wide enough to render loss of consciousness unlikely.[1] It has been a longstanding view both of the General Dental Council and the Royal College of Anaesthetists that IVS is a safe alternative to general anaesthesia for dental procedures.[2,3] Following the publication of 'A Conscious Decision' in 2000, the use of general anaesthesia in primary dental care ceased.[4] Since then much guidance and many recommendations for the use of conscious sedation have been published to help ensure that it is used safely and correctly.[1,5-9]

IVS is commonly used in oral surgery to enable treatment to be carried out that would not be possible with local anaesthesia alone. This, therefore, avoids the need for a general anaesthetic and its associated risks. IVS is frequently used for patients who have dental anxiety, needle phobia, strong gag reflexes or medical conditions where an increased state of anxiety is undesirable, for example those with high blood pressure or asthma.[10]

IVS can be carried out using midazolam alone or using combinations of drugs.[10] Within our department, IVS is always carried out using midazolam alone.

The Oral Surgery department at the Eastman Dental Hospital offers 14 IVS appointments a week, with between three and five staff members allocated to each appointment. IVS appointments are 45 minutes long, compared to 30 minute local anaesthetic appointments. Overall, IVS appointments require more clinical time and resources than local anaesthetic appointments and have a longer waiting list. Failed IVS appointments result in much wasted clinical time, resources and money.

At least one week prior to a patient having treatment undertaken under IVS, they attend for an assessment appointment, where a thorough assessment is made of their medical details, and the treatment required. At this appointment, their treatment plan is formed and the decision is made whether the patient will have their care under local anaesthesia alone, IVS or with a general anaesthetic. If a patient is to have their treatment under IVS the following additional information is required at the assessment, to ensure IVS is safe and to try to prevent its failure:

- Blood pressure
- Heart rate
- Venous access assessment
- Availability of suitable escorts

Clinic data highlighted that failure of IVS was largely due to the following factors:

- Patients' failure to attend
- Lack of escorts
- Inappropriate escorts e.g. children
- Medical reasons e.g. changes in drugs or medical conditions
- Operators' inability to establish venous access
- Complex or lengthy procedures which were not suitable to be carried out under IVS
- Inappropriate response to midazolam.

The reasons for failed IVS had not previously been thoroughly investigated, so this project was designed to investigate the reasons for failed IVS further and to develop recommendations which could help to reduce the failure level in the future.

Aims and Objectives

This audit was designed to identify the reasons for failed IVS and arrive at recommendations which could help to reduce the number of failures, increase clinic efficiency and thus reduce the waiting times and overall costs.

Standards

At present there are no national standards for the failure rate of IVS, or on what factors are considered to be acceptable reasons for failure of IVS. The Oral Surgery Department therefore uses departmental standards to assess its failure rates and to develop acceptable reasons for failure.

The following standards were used and were expected to be screened out at the patient assessment appointment:

- A failed IVS appointment was defined as one where it was impossible to complete the intended procedure under intravenous sedation
- The overall target for failed IVS appointments was expected to be no greater than 10%
- There should not be any failures due to:
  - Medical reasons
  - Failed venous access
  - Planning to provide over complex procedures

Failures due to the following should be minimised and not exceed the target of 10% overall failure rate:

- Patient non attendance
- Patient cancellation
- Lack of escort
- Inappropriate escort
- Inappropriate sedation response

Method

A prospective audit was carried out over a 3 month period from October 2012 to January 2013. All IVS appointments within the department were included in the audit. All the patients were over the age of 18 years, ASA I or II, and required dental extractions. There was no limit to the number of teeth to be extracted or the difficulty of the extractions, however, other oral surgery procedures were excluded from the study e.g. biopsies, and apicectomies. All patients were sedated using intravenous midazolam which was titrated until the operator assessed the patients as being adequately sedated for the procedure.

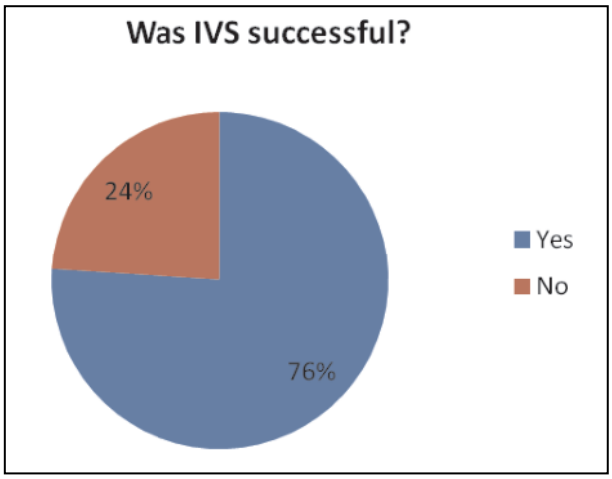
Data was collected after every IVS appointment and the following were recorded:

- Was treatment successfully completed under IVS?
- If treatment was not successfully completed, what was the reason for failure?
- In cases of failure, what action was taken?

Results

Over the three month period data were collected for 109 IVS appointments. IVS was successful for 83 patients (76%) and failed for 26 patients (24%) (Figure 1).

Figure 1: Success rate of IVS



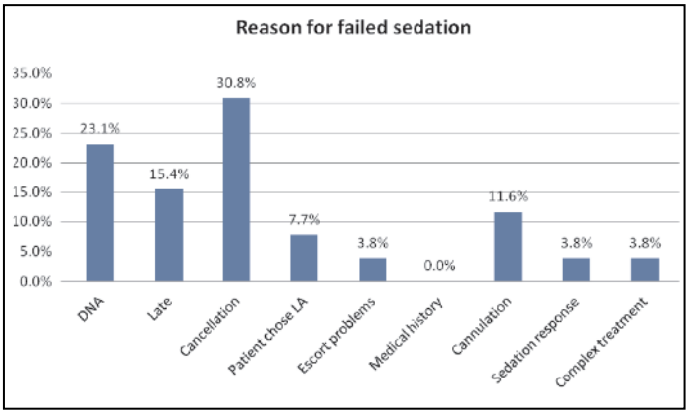
Failed IVS was due to a variety of reasons. Of the 26 failures, the most common reason which occurred for 8 (30.8%) patients, was patient cancellation on the day of the appointment. The second most common reason for failure was the patient failing to attend, which happened for 6 appointments (23.1%). This was closely followed by 4 patients (15.4%) arriving too late for their IVS appointment.

Factors relating to the procedure itself also accounted for failures. The inability to cannulate occurred in 3 patients (11.6%). Failures due the patient having an inappropriate response to the sedation were found to be much lower (1 patient, 4%) and for the procedure being too complex to be carried out under IVS, (this was a case of a deeply impacted lower wisdom tooth -1 patient, 4%).

On the day of treatment, 2 patients (7.7%) changed their mind and declined IVS, choosing to have their treatment completed under local anaesthetic alone. In both of these cases the treatment was completed successfully.

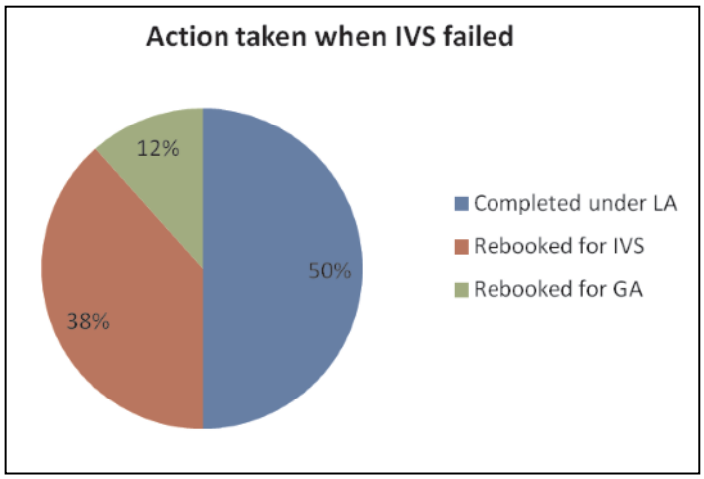
The full results for the reasons for failed IVS are shown in Figure 2.

Figure 2: Reasons for failure of IVS (N=26)



When IVS failed the most common course of action was for the treatment to be completed under local anaesthesia alone at the same appointment, which happened in 50% of the failed IVS cases. 38% of the failed IVS patients were rebooked for another IVS appointment and 12% were rebooked for a general anaesthetic (Figure 3).

Figure 3: Action taken when IVS failed



Discussion

These results show that the department had a failure rate of 24% which did not meet our target of 10%. There is little published literature on the failure rate of IVS in oral surgery with which to compare our study, however, the limited published studies have found lower failure rates of between 1% and 1.6%.[11,12] The studies often look at oral and maxillofacial procedures and include procedures such as tumour removal, and often examine the use of combinations of sedative drugs such as midazolam and fentanyl, or midazolam, fentanyl and methohexitone.[11,12] These studies are, therefore, not directly comparable to our study in reporting a different patient population and using different sedation methods.

Overall, our audit did not meet the departmental standards for failed IVS. The department sets a standard of having no failures due to patient medical complications, venous access and the difficulty/complexity of the treatment to be provided. This is because the thorough patient assessment appointment is designed specifically to identify any of these areas of concern so that it can be addressed before the treatment appointment. Alternatively, in some cases it may mean that a patient is actually unsuitable for IVS. Our audit did not have any failures due to patient medical complications, however, 11.6% of the failures seen were due to inability to achieve venous access, and 3.8% were due to the treatment planned being too complex to be performed under IVS. These are both areas which should have been highlighted and addressed at the patient assessment appointment, to prevent the subsequent failed IVS and highlights the need to ensure that a thorough assessment is completed for every patient, and that the advice of more experienced clinicians should be sought at this stage if required.

The most common reasons for failure were patient cancellation (30.8%), failure to attend (23.1%) and lateness (15.4%). These common reasons accounted for 69.3% of the failed IVS appointments and thus heavily contribute to the areas where improvements can be made.

At the assessment appointment, patients are given all of the relevant information about attending their IVS appointment, such as coming accompanied by an appropriate escort and arriving on time. This information is provided both verbally and by means of a leaflet, to try to minimise failures due to these reasons. The department also telephones patients the day before their appointment to remind them of the appointment and to confirm their intended attendance.

It is unlikely that a 0% failure rate can be achieved, when many factors are controlled by the patient, however, our failure rate was found to be much higher than our target highlighting the need for improvements.

7.7% of IVS not being completed as planned, was due to patients choosing to have their treatment completed under local anaesthesia alone. IVS was not attempted in these cases. At all assessment appointments the options of local anaesthesia, IVS, and general anaesthesia are discussed with patients. A patient changing their mind on the day of the appointment is unforeseeable, and only occurred in a minority of cases.

In cases where IVS was unsuccessful, 50% of patients had their treatment successfully completed under local anaesthesia alone, 38% were rebooked for IVS and 12% were rebooked for a general anaesthetic. The 50% whose treatment was completed under local anaesthesia could not have IVS due to their arriving too late, an inability to cannulate or having unsuitable escorts. The patients who chose to not attempt IVS and have their treatment completed under local anaesthesia were also included in this group. All of these patients chose to have their treatment completed under local anaesthesia alone on the same day, for their own convenience. They received appropriate behaviour management for their treatment and were happy to accept local anaesthesia. This brings into question how rigorous our assessment appointments were and further highlights the need for a very thorough patient assessment to fully ensure that IVS really is indicated and appropriate.

IVS requires more clinic time and resources than treatment under local anaesthesia making it a scarcer and more expensive resource. It is important to not waste this resource and to try to ensure that all IVS appointments are successful, hence saving clinical time, departmental money as well as reducing waiting times. Within the department IVS appointments are approximately £150 more expensive for the department to provide than local anaesthetic appointments. The failed IVS appointments over the three month period of this audit therefore cost our department almost £4000 more than if this clinic time had been utilised for treatment under local anaesthetic. This extrapolates to approximately £16000 annually and highlights the need for the optimal utilisation of sedation resources to prevent the unnecessary wastage of time, clinic resources and money.

This audit could be further enhanced in future by collecting data on the treatment patients underwent, to determine if this also influenced the success or failure of IVS. It would be useful in future to analyse data from other departments to compare failure rates across departments and for different modes of care.

Recommendations for improvement

Following this audit, the results were presented at an interdepartmental audit meeting. The following recommendations were made to try to reduce the failure rate of IVS. Telephone reminders to patients would in future include verbally confirming that the patient had an escort, and reminding them to arrive on time for their appointment. To prevent failure due to difficult venous access, in cases where venous access was questionable, a

senior member of staff is now required to check the venous access and to document the suitability of the patient for IVS in the medical notes at the assessment stage. If a procedure is considered possibly too complex this is also now required to be assessed by a senior member of staff and the decision documented in the notes.

It was reinforced to all staff that a full and complete discussion of the options of local anaesthesia alone, IVS and general anaesthesia, was always to be carried out at the assessment appointment as well as to enquire about any previous sedation experience. This should minimise the risk of failure for such preventable reasons or because the patient chose on the day of the appointment not to have IVS.

A re-audit is planned in one year to assess the effect of these recommendations, and to further help reduce failed IVS appointments.

Conclusion

This audit examined the failure rate of IVS in an adult Oral Surgery department and highlights some key areas that can be targeted to minimise failure. There is currently little published literature on the failure rate of IVS which makes this audit an interesting addition to the existing literature.

We highlight the need for a thorough and rigorous assessment appointment for all patients prior to IVS, to enable sedation to be employed optimally and to help minimise failures. Identifying the reasons for failure can result in vast savings of both clinical resource, and finances. Interestingly, half those patients whose IVS failed, had their treatment successfully completed under local anaesthesia opening a debate on how rigorous should be patient assessment and allocation of sedation appointments.

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An Experimental Elective Report Examining and Comparing Current Levels of Dental Anxiety and Disease in Child Populations in Peru and the UK.

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Editor's note: This paper is an elective report undertaken whilst the author was a final year undergraduate student at The University of Dundee. SAAD Digest is always very happy to encourage such submissions and looks forward to receiving further similar papers in the future.

Abstract

Introduction: Dental anxiety is an important factor in influencing patients' decisions to access treatment. It is crucial dental care professionals understand its causative factors in order to prevent and manage it, particularly as dentally anxious patients often have poor oral health. This report is of an elective study that tried to ascertain whether children with signs of dental neglect suffered greater dental anxiety, as existing research suggests that anxiety can stem from previous experiences.

Method: 100 children in both the United Kingdom and Peru were examined for signs of dental neglect using the PUFA (Pulpal exposures, Ulcers, Fistulas & Abscesses) system, and their anxiety levels surveyed with the Modified Child Dental Anxiety Scale. A Spearman's rank analysis was performed.

Results: Both groups showed similar disease levels, but Peruvian children were significantly less anxious. The r values (United Kingdom r=-0.020 Peru r=-0.0099) were less than r_c=0.165 at a significance level of P=0.05, showing that increased dental neglect does not make children more anxious.

Discussion: It appears that having a neglected dentition as a child does not make you more anxious, but the resultant invasive treatment procedures likely to have been experienced as a child may have a role. Ultimately, cultural background and attitude to dental care are suggested as being more important in determining the dental anxiety levels of children.

Introduction

Dental caries is one of the most prevalent diseases affecting children in the world[1-4], though outcomes vary between countries. Access to treatment, diet, oral hygiene, deprivation, perceived treatment need and anxiety affect dental disease levels.[2-7] A sixth of the world's population suffer some degree of dental anxiety, studies suggest approximately 50-80% develop this anxiety in their childhood.[8-11] Anxiety can be exogenous or endogenous, childhood onset is usually exogenous, conditioned from negative experiences or vicariously from family members and can lead patients to avoid treatment.[8,12-17] Caries is a modifiable disease process, treating caries arrests its progression, eliminating pain and sepsis; untreated, caries progresses through enamel and dentine into the pulp. Consequently, the bacterial reservoir devitalises teeth and presents as fistulas and abscess.[1,3] One measure of dental neglect is the to assess the consequences of untreated caries using the PUFA index.[18] This elective study examined and compared two contrasting populations with regard to untreated dental disease and anxiety.

Deprivation increases the prevalence of dental neglect, consequently populations in countries with greater poverty levels demonstrate higher levels of untreated caries.[4,7] In 2009, Delgado-Angulo et al.[19] completed a cross-sectional study of poverty and caries among 12 year olds, across 11 deprived areas in Lima, Peru. They found poverty resulted in 2.25 times more caries in 12 year olds (83.3% of children in poverty had caries).[19] Dental care is less accessible to deprived Peruvians, and this combined with a highly cariogenic diet and limited knowledge of oral hygiene has resulted in more dental neglect.[20] The Peruvian children examined reside in remote villages on the Amazon's Maranon tributary, with limited access to dentists (3-4 times a year in a surgery aboard a Vine Trust medical ship). PUFA data has been collected for the past 2 years in these villages on several tributaries including the Maranon by Mason et al.[21] in conjunction with the Vine Trust, for 6 and 12 year olds. Raw data suggests a 79.2% prevalence of untreated caries in deciduous teeth among 6 year olds in 2011, which fell to 70.1% in 2012.[21] However, untreated caries in permanent teeth (7.1% in 12 year olds in 2011) had risen to 20% in 2012. Dental settings though typically equipped as in the UK, are alien environments to children and adults alike in rural Peru, due to infrequent attendance.[20] We may infer that despite high levels of dental neglect, there could be fewer opportunities of anxiety conditioning; however, children may be more anxious as they are less accustomed to dental surgeries.

While there is greater access to treatment, oral hygiene and health education in the UK, diets remain cariogenic.[3,6] In 2008 and 2012, the British Association for the Study of Community Dentistry (BASCD) conducted dental health surveys for children; these showed dentine caries prevalences of 33% in permanent teeth and 27.9% in deciduous teeth, respectively.[22-23] Dental anxiety is common in the UK and stated to affect a third of the population.[12,17] It is complex, with significant effects on patients both in accessing care and in the treatment modalities required.[12,17,26] UK children are aware of dental settings from a young age, therefore dental attendance may be normalised. However, parents transferring

dental fears to their children vicariously is common; evidence suggests that adult dental anxiety can result in avoidance and can cause anxious parents to avoid bringing their children, further propagating anxiety.[8,11,17] Avoidant behaviour was often correlated with increased treatment need; patients tended to seek treatment when caries had progressed to cause significant pain, often resulting in extraction under general anaesthetic (GA) for children.[15,17,24]

The UK population examined within this report are patients of Queensway Dental Clinic (QDC) in Teesside, which has provided advanced sedation care for anxious children for 15 years. This service has accepted over 8000 child and adult referrals from Teesside and County Durham and was established to reduce dependency on GA, as the region had 9 times the national average of dental GA.[16] 450 dentists referred children to QDC for sedation using relative analgesia (RA), or advanced sedation (provided by a dental sedation trained Consultant Anaesthetist) using a combination of RA and intravenous midazolam[25]. Both techniques are supported by several studies.[16-17,25] Caries in Northeast children is approximately 5% higher than the UK national average in 12 year olds, and a staggering 14% higher in 5 year olds (41.5% of Middlesbrough children have evidence of caries).[22-23,26] Not only is caries more prevalent, there is greater variation within the population, with an almost fourfold increase between the most and the least affluent areas.[27]

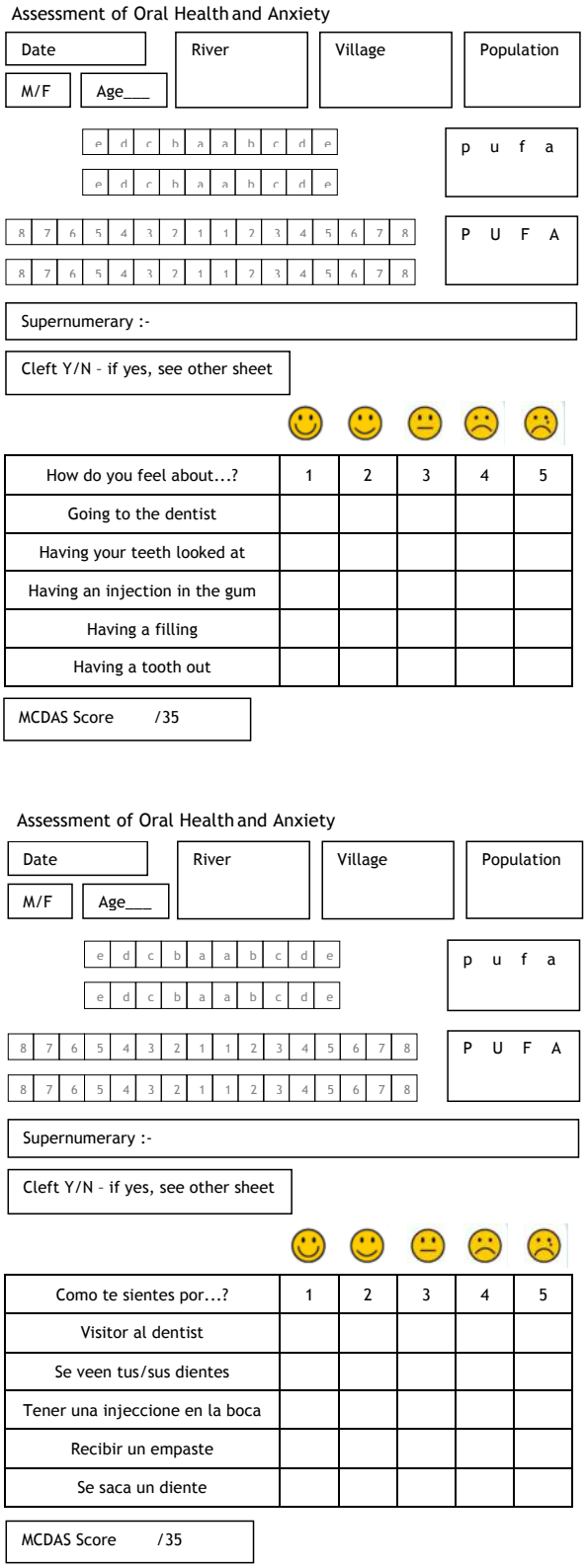
In 2003 Nuttall et al.[24] found dentally anxious children more likely to have active caries compared to their non-anxious counterparts; subsequent studies support this.[14-15,17,24] This report explored the suggestion that anxious UK children are more likely to have neglected dentitions, although this is not necessarily true for Peru (no clear data pertaining to child anxiety could be found). Culturally these populations are very different and provide an interesting comparison. This report looked for any correlation between dental neglect and anxiety in Peruvian children, to establish whether one drives the other. Essentially, is more dental disease a driving factor for fear of the dentist and would targeting dental neglect with further preventive schemes reduce anxiety? It was hypothesised that strong cultural and educational influences are involved in anxiety development, as some people with extreme dental neglect have little to no fear of the dentist.[3]

Methodology

The PUFA Index was used to measure dental neglect, and the modified child dental anxiety scale (MCDAS) was used to measure anxiety. Patients were numbered to anonymise data. Age, gender and location were recorded, in addition to PUFA & MCDAS to allow comparison within and between groups.

The PUFA Index is a system for measuring dental neglect, and has a strong evidence base.[18] It is a hierarchical score recording the single worst feature present on each tooth, from pulpal exposures through ulcers and fistulas, with abscess the most severe. For example, a tooth with a pulpal exposure and an abscess only has the abscess recorded.[18] During the patient examination, if a feature was present a chart was marked with the corresponding letter. Scores for the permanent and deciduous dentition were totalled up to give an individual total by feature, and an overall combined total for the deciduous and permanent dentition (figure 1)

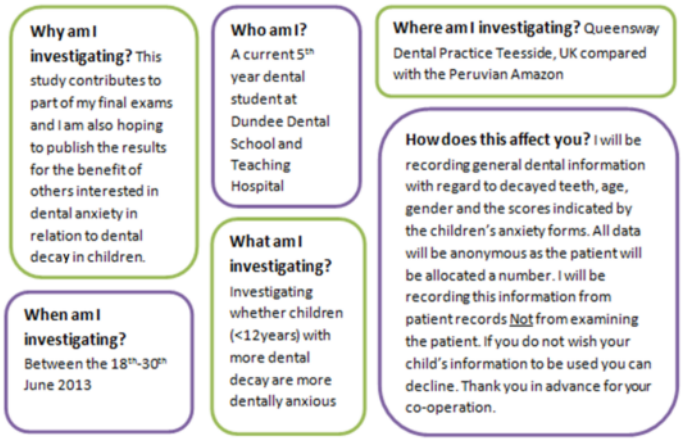
Figure 1 – Data Collection Sheets English & Spanish



The MCDAS developed by Wong et al.[28] was used, with corresponding smiley faces, for scores 1-5 making it universally understood; this format has an established evidence base.[28-30] Questions were translated into Latin American Spanish to be culturally accessible to the Peruvian population; good results have

been reported in Hispanic people using Spanish MCDAS.[31] The survey was completed verbally in Peru with the aid of translators, removing the barrier of literacy levels. Patients answered by pointing to the most appropriate smiley face. Questions relating to scale and polish, sedation and GA were removed from the MCDAS questionnaire as they were not applicable to the Peruvian population. Hence total MCDAS scores were measured out of 25, like the Modified Dental Anxiety Scale (MDAS) rather than 40, so as for MDAS a cut-off of 19 was used to denote the lower threshold of dental phobia.[32] Patients were examined and interviewed at assessment appointments in the UK, and by visiting schools in the Peruvian villages, eliminating bias created by assessing only patients seeking treatment as these are likely to be more anxious than usual, and to regard themselves as higher treatment need.

Figure 2 – Patient Information Sheet



QDC submitted details of the Project to the local Ethics Committee and as no changes to current clinical practice were required, further approval was not necessary. Information sheets were given to patients' parents explaining how the data would be used, and allowing them to exempt their children from participation (figure 2). A pilot of the data collection method with 16 patients, was completed over 2 days at QDC, 3 months before the elective, to test its efficacy. A sample size of 100 children under 12 years old per nation was chosen to provide more significant representation. Results at this stage already suggested UK childrens' anxiety was out of proportion to their level of dental neglect.

Results

Initial observations of the raw data suggested little difference in dental neglect levels between the UK and Peru, with average PUFA scores for Teesside children 1.05 affected teeth, not dissimilar to the score of 1.68 recorded amongst children from Amazonian villages. A similar proportion of children (52% and 63% in Teesside and the Amazon respectively) showed signs of untreated dental disease, equating to a disease burden of 2.02 affected teeth in Teesside children, and 2.67 in the same population in the Amazon. However, anxiety levels showed significant differences. Almost a third of Teesside children presented with dental phobia, compared with only 5% of Amazonian children; whilst a staggering 75% of Amazonian children reported little or no anxiety, compared with only 6% in Teesside.

Converting raw data to relative frequencies (Tables 1 & 2) highlights the distribution of dental neglect and anxiety for both countries. The spread of PUFA data is comparable, the vast majority of children affected having no more than 3-4 affected teeth, and fewer than 10% in both nations having more than 5 (a quarter of a deciduous dentition). However, the results indicate that whilst neglect levels are comparable, UK children are significantly more anxious. Dentally anxious children are a minority in Peru, with most of those reporting some level of anxiety, evenly distributed between mid-range MCDAS scores (below phobia cut off). In the UK, other than 6 children reporting almost no anxiety, approximately a third were in each anxiety band, including dental phobia, equating to nearly two thirds of children demonstrating moderate to high anxiety.

Table 1 – Relative Frequencies of PUFA Scores

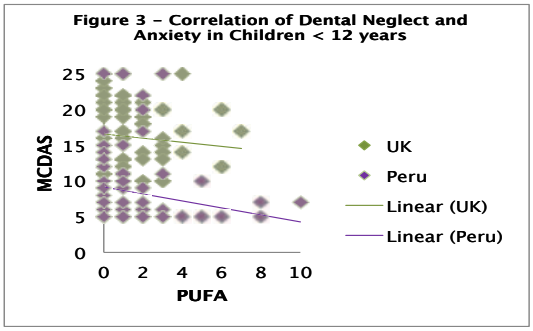
PUFA	UK %	Peru %
0	48	37
1-2	38	40
3-4	11	13
5-6	2	7
7+	1	3

Table 2 - Relative Frequencies of MCDAS Scores

MCDAS	UK %	Peru %
5-9	6	73
10-14	31	12
15-19	33	10
20+	30	5

The Spearman Rank Correlation test was used to assess the strength of correlation between dental neglect and anxiety. Both r values (UK r=-0.020, Peru r=-0.0099) were less than r_c=0.165 at a significance level of P=0.05. These findings confirm the null hypothesis, that increased neglect does not make a child more anxious.[33] This is highlighted by the scatter of data in Figure 3, showing a greater density of UK data at higher MCDAS scores, and the majority of Peruvian data centred around scores of 5-10. Regression lines suggest anxiety actually falls as neglect rises, but this finding is not statistically significant and the raw data does not support this. However, the pattern of regression lines is significant, as they illustrate UK anxiety levels are on average consistently higher than those of Peruvian children.

Figure 3 - Correlation of Dental Neglect and Anxiety in Children <12 years



Results show that of those UK children showing signs of dental neglect, more than a third gave MCDAS scores indicative of phobic levels (MCDAS > 19; which was the cut-off selected by the author) but almost a quarter of those without signs of neglect also scored in this range (Tables 3 & 4). In contrast, Peruvian children giving MCDAS scores in the phobic range, account for only 6.3% and 2.7% of the groups with and without signs of neglect respectively, further highlighting that UK children are consistently more anxious than Peruvian children, irrespective of the level of neglect of their dentition. However, although not statistically significant, there is an indication that more of the anxious patients fall into the neglected dentition category for both nations.

Table 3 – Percentage of Children with Signs of Dental Neglect & Percentage of these with Extreme Dental Anxiety

	PUFA > 0 (%)	MCDAS > 19 (%)
UK	52	36.5
Peru	63	6.3

Table 4 – Percentage of Children with No Sign of Dental Neglect & Percentage of these with Extreme Dental Anxiety

	PUFA = 0 (%)	MCDAS > 19 (%)
UK	48	23
Peru	37	2.7

Discussion

The findings of this study raise many interesting points, not least that little difference is observed between the UK and Peruvian dental neglect levels; there are likely many reasons why. In general, greater levels of neglect are found in less wealthy parts of the world because healthcare and education standards are lower there.[4,7,19] Accordingly, it is unsurprising that two thirds of Peruvian children studied showed signs of neglect. It is more shocking that any parts of the UK show comparable levels of dental disease to Peru; the only difference being a greater number of affected teeth i.e. upwards of 5. In 2009, Delgado-Angelo et al.[19] found an average DMFT of 3.93 in affected children, not dissimilar to the PUFA score of 2.67 affected teeth recorded here, because PUFA is a score of the worst affected teeth, not just of the presence of caries like DMFT.[19] We may also hypothesise that children from rural Peru may have less cariogenic diets than those from deprived urban areas e.g. Lima. The Amazon Hope has improved dental education in rural areas, which may be another factor in the variation in disease levels (83% children from Lima but only 63% in Amazonian children) between regions.[19] Comparison of this PUFA data to that collected for the same Amazon region in previous years by Mason et al.[21] does show that although dental neglect is rife, disease levels have fallen by 17% in 2 years. It seems that socio-economic status does not appear to have too strong an effect on dental neglect levels.

Teesside is a less wealthy area of the UK, where disease levels are generally higher, the National Childrens' Oral Health Surveys show the Northeast consistently above the National average for dental disease.[22-23,27] It is well known that people from low socioeconomic status populations have lower health aspirations.[4-5,7] In the UK, this has lead to a history of increased dental intervention for these patients, compared to the amount those in Peru may experience, which may distress young children. Perhaps it is one reason why Teesside children are more anxious than their Peruvian counterparts, who are unlikely to have undergone as much dental intervention.[20] Lack of dental care in rural Peru means people are grateful for any treatment, they are culturally more accepting and less anxious.[20] Essentially, dental anxiety in UK children may stem from interventions required to manage dental neglect, hence raising awareness in order to reduce neglect could also have a positive impact on dental anxiety in children.

Another avenue for exploration is the role GA might play in Teesside childrens' dental anxiety. Teesside has a large burden of dental disease and often manages this with GA.[27] However, the issue still stands as to why these children are more anxious. This report indicates that the reason cannot be purely due to dental neglect, or else Peruvian children would be equally as anxious, and this was not found to be the case. Evidence shows the significant morbidities of GA can cause children treated under it distress, thus increasing anxiety.[34-36] Teesside has a history of a large number of dental GAs, particularly over the last 20 years, because disease levels are above average. Although use of GA has reduced since publication of the Poswillo Report, Teesside still treats 0.8% of patients under GA, compared to the national average 0.5%.[16,37] There are multiple inter-related factors for dental anxiety and Teesside's history of managing anxious patients may skew the figures compared with the rest of the UK.[16] Some children treated under GA in the last 20 years are now parents themselves and may have passed on their anxiety vicariously to their children.[13,15,36] Anxiety may also develop intrinsically for children still undergoing GA, which increased from 0.6% to 0.8% from 2012-2013 but is much lower than it was 20 years ago.[36-37] This is a worrying trend, as evidence shows conscious sedation is a successful alternative to GA with regard to morbidity; it manages rather than masks anxiety and with high anxiety levels prevalent in Teesside, it seems prudent to promote sedation use further.[17,25,38]

In conclusion, dental neglect is fundamentally observed worldwide but there is a great divide between dental anxiety levels of children from different countries. This suggests significant cultural differences in patients' attitudes to dentistry and highlights the influence of cultural norms and education on treatment. No correlation between dental neglect and anxiety was found outside the UK, indicating that presence of disease is related to, but not necessarily a driver for, dental anxiety despite previous studies suggesting to the contrary.[12-13] Dental anxiety appears to be a complex entity and although not directly linked, is more prevalent in those who have undergone invasive treatment for the consequences of dental neglect.[37] Countries with limited access to care but greater treatment need are more accepting of dentistry and patients there are less anxious. The inferences suggest that irrespective of disease level, where there is little access to dentists and oral health education, children are less anxious. Further investigation is required to fully appreciate dental anxiety's complexity in contrasting populations.

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

Bill Hamlin

Sadie Hughes

Effect of Oral-Transmucosal Midazolam Sedation on Anxiety Levels of 3-4 Year Old Children During a Class II Restorative Procedure

Kapur A, Chawla HS, Gauba K, Goyal A, Bhardwaj N
Contemporary Clinical Dentistry 2014;5:334-339

Aim: A double-blind randomised control trial was conducted to assess the effect of oral-transmucosal midazolam sedation on changes in anxiety levels of preco-operative children during a Class II amalgam restorative procedure.

Methodology: A sample of 40 healthy, ASA I, children aged 3-4 years having at least one carious primary mandibular molar requiring a Class II amalgam restoration with no previous dental history were randomly divided into experimental and control groups comprising of 20 children each. The children in the experimental group (Group I) received 0.5 mg/kg body weight of midazolam mixed in strawberry syrup and those in the control group (Group II) received the same syrup mixed in saline but without the addition of midazolam, 15 min prior to the restorative procedure. Routine non-pharmacological behaviour management techniques were used in both groups. The anxiety levels were recorded using Venham's anxiety scale at the start and end of each procedural step.

Results: There was a significant ($P < 0.001$) reduction in the anxiety levels of children in the experimental group on entry into the operatory compared with the control group. Introduction of each fear evoking stimuli showed a somewhat similar increase in anxiety levels in the two groups. In spite of a similar trend, the anxiety levels remained much lower in Group I than in Group II.

Conclusion: Midazolam in conjunction with behaviour management is more helpful in relaxing the child initially than behaviour management alone, thus increasing the chances of successful and easy accomplishment of further treatment steps.

Reviewer's comments: An interesting article carried out on a young age group. The oral midazolam group showed less baseline anxiety than the control group and significantly less anxiety on entering the dental surgery and whilst receiving local anaesthetic via an inferior block injection. Behaviour management techniques were also used with the children in both groups. The authors conclude that the children were more receptive to treatment after oral midazolam with only two failures out of 20 children in this group compared to a failure of 13 out of 20 children in the behaviour management only group. Physical restraint was used as part of the behaviour management on two occasions in the midazolam group and seven occasions in the non-midazolam group, with two children in the latter group physically restrained in order to get them into the surgery for treatment. This is a discernible difference, however, with reference to preventing long term dental anxiety, developing good attendance patterns and dental confidence, this type of restraint would not be condoned. There are few midazolam only studies on paediatric dental patients and it is encouraging to see that there were no adverse reactions to the midazolam with the exception of two cases of mild hiccups. Also no paradoxical reactions were seen and with good behaviour management, midazolam can be a successful adjunct for paedodontic treatment.

Sadie Hughes

Intravenous Midazolam Dose Ranges in Older Patients Sedated for Oral Surgery - Preliminary Retrospective Cohort Study

Chauhan M, Carter E, Rood P
Br Dent J. 2014 Mar; 216(5):E12. doi: 10.1038/sj.bdj.2014.197

Aim: The aim of this study was to investigate differences in the titrated midazolam doses in older patients undergoing oral surgery procedures under intravenous sedation.

Method: The records of 50 patients aged 40-92 years who had undergone oral surgery procedures under intravenous sedation at King's College Hospital between May 2008 and February 2009 were selected at random in each of the age groups: 40, 50, 60, 70 or 80+. Results: The mean dose for patients over the age of 70 (2.8 mg) was 50% less than the mean dose for those under the age of 70 (5.7 mg).

Conclusions: Our study found a correlation between the age of the patient and the dose of midazolam required for sedation before oral surgery procedures, with, on average, older patients requiring less midazolam. A range of doses are required in any age group, but the range decreases as age increases.

Reviewer's comments: With the increase in the ageing population in the UK, increased retention of teeth into old age and additional co-morbidities in this group, this article reminds us of the physiological differences that result with increasing age, and the importance of slow titration when administering intravenous sedation to this group. The authors make reference to an 'acceptable pause' after the initial increment with some literature citing waiting up to 4 minutes before the second increment. It also highlights the increased risk of critical events with Flumazenil use in these patients. An interesting observation relates to the range of doses required in the different age categories, which decreased with increasing age leading the authors to speculate whether guidance could be postulated for intravenous Midazolam use in the various age groups. Further study is planned.

Sadie Hughes

5th National Audit Project (NAP5) on Accidental Awareness During General Anaesthesia: Patient Experiences, Human Factors, Sedation, Consent, and Medicolegal Issues.

Cook T M, Andrade J, Bogod D G et al.
Br J Anaesth 2014; 113: 560-574

The fifth national audit project, NAP 5, of the Royal College of Anaesthetists, and the Association of Anaesthetists of Great Britain and Ireland was into accidental awareness during general anaesthesia (AAGA). A striking finding was that 75% of experiences were for less than 5 min yet 51% of those aware experienced distress and 41% suffered longer term adverse effects. The incidence of 'accidental awareness' during sedation estimated at 1:15,000 was similar to that during general anaesthesia, 1:19,000. The project raises significant issues about information giving and consent for both sedation and general anaesthesia. The authors propose a novel approach to describing sedation from the patients perspective. Methods and results for NAP 5 are found in other papers.[1-2]

Anaesthetic drugs can directly abolish memory, studies show post sedation recall may be prevented by doses low enough to permit conversation and voluntary responses, sedation. Isolated forearm experiments under general anaesthesia show response to complex commands without later recall. In AAGA awareness memories may be classified as follows.

Explicit memory: that whose content can be articulated. Meaningful or well organised material is easier to recall.

Trauma memory: a type of explicit memory where the trauma is relived rather than recalled. These memories remain vivid and high in sensory detail.

Implicit memory: memory revealed experimentally.

False memory: occurs when false data is included in the reconstructive process.

Source memory: where a patient who has experienced AAGI may recall events but is unable to place them temporally.

AAGA may lead to post traumatic stress disorder with an aggregated rate of approximately 15%, it may also be responsible for clinical depression or complex phobias. An important element causing these is the perceived threat to life the patient feels. AAGA is not always immediately reported, it may not be recognised, reports show reporting occurs commonly 7-14 days after the event with some occurences only being revealed by questioning.

Patients may interpret experiences during conscious sedation as AAGA. In the American Society of Anaesthetists (ASA) registry, ⅓ of reported cases had not received general anaesthesia, of these 75% were distressed, 25-40% reported flashbacks and nightmares, anxiety, depression. and chronic fear.

The Association of Medical Royal Colleges (AoMRC) report is safety-oriented with an assumption that patients and doctors know what sedation is. It does not address the issues of consent and explanation looking at outcomes from the sedationist's point of view, but from the patient's perspective where the distinction between sedation and anaesthesia is ambiguous.

NAP5 received 32 reports of AAGA after sedation. Extrapolation would give an annual figure of anaesthetist controlled sedation as approximately 310,000, giving an AAGA incidence of 1:15,500 which is close to the reported incidence for GA of 1:19,000. All but one sedation event occurred during maintenance and none at induction. ⅔ involved experiences of auditory or tactile sensations, with ⅓ reporting pain. 15 patients reported distress and of these 46% developed moderate or severe long term psychological sequelae.

Miscommunication or lack of managed expectations was judged the main contributory cause in all but 6 reports. In many cases patients reported that caregivers had specifically used the words 'asleep' or 'light anaesthesia' which they interpreted as being unconscious. In 4 cases the patient was explicitly informed they would not be unconscious and even signed a form of consent, yet still made a report of perceived AAGA.

Failure to provide patients undergoing sedation with sufficient information to understand the nature of sedation can lead to reports of AAGA. These are associated with levels of distress and longterm sequelae. Prevention depends on clear communication verbally with written support, this should emphasise that the patient is likely to be conscious and may have recall and that the intention is to reduce anxiety and not to produce general anaesthesia. It is important the patient appreciates this. Miscommunication was the main contributory or causal factor in 88% of AAGA reported while sedated. The patient discussion should include a description of the intended level of sedation proposed according to AoMRC guidelines, and the level of recall likely to be experienced.

Reviewer's comments:
Once again the need for good communication and comprehensive consent for sedation is reinforced.

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Bill Hamlin

Iatrosedation: A Holistic Tool in the Armamentarium of Anxiety Control

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Abstract

Identifying the causes of dental anxiety by taking a history and carrying out investigations for patients attending for any type of dental procedure, can be time consuming. Common causative factors of dental anxiety can be previous adverse dental experiences, age, temperament or socioeconomic factors. These factors can lead to patients falling into a cycle of dental avoidance and greater treatment need with attendance for symptomatic relief only. Treatment using pharmacological methods such as conscious sedation or general anaesthesia can help overcome these obstacles, however, although a successful treatment outcome may result, how is the patient to gain trust and overcome their anxiety or fear, if they do not learn from the experience?

In 1967 Nathan Friedman described a method he termed 'Iatrosedation' consisting of two components, the interview and the clinical encounter. His method relies on the communication skills and behaviour of the practitioner to identify the causes of anxiety or fear and then to provide a bespoke approach to help overcome them.

The result can be that the patient not only has successful treatment, but also learns and gains confidence from their experience, as well as gains increased faith in their practitioner.

Introduction

It can be difficult to know where to begin when treating the anxious patient. Building rapport with a patient whilst carrying out a thorough history and identifying the cause of their anxiety can be time consuming. Pawlicki[1] reported that patients can require as much as 20% more time at appointments than less anxious patients. With busy appointment lists and constrained appointment times, it can be tempting to refer the anxious patient for treatment using pharmacological methods such as conscious sedation or general anaesthesia. Although using drugs to help facilitate treatment is a well recognised technique, this rarely cures the patient of their underlying anxiety.

Anxiety

Anxiety and fear have been described as synonymous terms since they are very much related. Armfield et al,[2] stated this, and referred to *anxiety* as 'an emotional state which precedes an encounter with a feared object or situation....., *fear* refers to the actual or activated response to the object or situation.'

A number of common contributing factors to dental anxiety have been identified, gender (women report higher levels of fear), previous dental experiences, age, temperament, socioeconomic factors and educational levels.[3] However the anxiety manifests, there is a direct correlation with dental avoidance, poorer oral health and service use.[3,4] Severe dental anxiety in the UK affects approximately 10-20% of the adult population[3] and can result in individuals placing themselves in a vicious cycle of dental fear and avoidance.[4] Armfield[4] describes that a cycle exists whereby anxiety and fear inevitably lead to a higher treatment need and a tendency for patients to attend a dentist for symptomatic relief, rather than for routine dental care.

Easing anxiety

The dental professional has access to a number of methods to help reduce a patient's anxiety so that treatment can be completed. Pharmacological interventions using inhalation, intravenous, oral and transmucosal sedation are commonly known, and collectively termed as pharmacosedation.[1,5] However, with such quick acting, easily available and effective pharmacological interventions, an overuse of these agents can occur.[1,6]

Pawlick[1,6] suggested the overutilisation of pharmacological interventions had three primary causes:

1. 'A lack of education in behavioural sciences' in dental curricula, resulting in the dental professional having 'inadequate knowledge or confidence to implement behavioural or psychological techniques of patient management'.

2. 'A perception that behavioural or psychological techniques are not cost effective'. This theory is supported by Brahm et al,[7] who states that treating patients with dental fear is associated with poor revenues and little appreciation by the employer.

3. 'The limited interpretation of pain to the somatic dimension'. Anxiety and fear have cognitive, affective, and somatic elements.[1] When anxiety is reduced, the perception of pain is also lowered. The use of pharmacological intervention can therefore be used to reduce anxiety and to help with patient management, rather than with the pain itself.[1]

Although the outcome of the dental procedure may be successful, pharmacosedation does not eliminate anxiety or fear; it reduces it so that treatment can be carried out and as a result patients may come to feel that they can only tolerate dental treatment if they are sedated[5,8] Therefore, the use of pharmacological techniques should be considered secondarily, as an adjunct to treatment, and not to replace an effective dentist-patient relationship.[9]

Iatrosedation

The fundamental basis for reducing dental anxiety is for the dental practitioner to establish a successful therapeutic relationship with the patient, based on mutual trust and respect.[9] This is established through the 'behaviour' of the dentist. This was originally described by Friedman[5] as 'iatrosedation', 'formulated from a combination of iatra (pertaining to the doctor) with sedation (act of making calm)'. Friedman[5] describes how a doctor's behaviour (verbal and non verbal communication) can calm the anxious patient. Should this method of calming not be sufficient, then pharmacosedation should be used as an adjunct. Friedman[5] describes two components of iatrosedation; the iatrosedative interview and the iatrosedative clinical encounter.

The Iatrosedative Interview

The initial consultation with a patient can be the pivotal point in recognising and treating anxiety. The consultation can establish a bond that can both reduce anxiety and increase confidence and trust, providing security for the procedure that is to follow.[6] The iatrosedative process will also allow the patient to re-learn from an experience they originally thought of as fearful.[5] It is important to note that telling a patient to relax can be annoying for them. It is clear that this is what is needed, however, the patient simply does not know how to relax, and being told to do this repeatedly, only serves as an irritant.[1]

Several instruments are described in the literature, to aid in the assessment of dental anxiety. For example, the Dental Anxiety Scale, Modified Dental Anxiety Scale (MDAS) or the Index of Dental Anxiety and Fear (IDAF-4C).[1,4,10] Whether anxiety is shown through verbal or non-verbal behaviour, the professional should respond by initiating an iatrogenic interview. This can help to identify the causative factors of anxiety and suggest solutions to the problem.[5] During the interview the professional must be an effective listener and 'hear' what the patient is saying.[5] Friedman[5] describes how 'one may listen but not actually hear.' Cues that are subtle and less obvious than the buzz words 'pain, drill or needle' may go unheard, so it is important for the professional to listen carefully and develop his or her 'third ear'.[5]

Once the causes of anxiety have been established, the professional should acknowledge them and explore the problem further in order to start the process of altering the patient's perception. Liddell et al,[11] reported that 'dentally anxious patients regarded a dentist's understanding and acceptance of patients' needs and concerns as more important than their technical competence'.[2,11] In addition, the act of asking dentally anxious patients to report their levels of dental fear before treatment, has been suggested as effective in reducing their level of anxiety.[2,12] Exploring the causes of anxiety can help to identify specific fears and their intensity. Identification will aid the professional in eliminating or reducing the fear level, as without this knowledge it is impossible to alter behaviour.[5] Identification of the specific factors of anxiety will also allow the professional to offer a solution to the problem.[5] It is at this moment that the role changes from collecting information to giving information. Friedman[5] states that the dentist can now provide information to the patient on the specifics of their anxiety and from where it was learned or originated. This will then allow for the cause to be unlearned. In this way the professional can state their 'commitment to how they will behave and what effects this behaviour will have on the patient's ability to relearn'.[5]

Essential elements of the iatrosedative interview are not solely to discover the causes of anxiety and attempt to resolve them, but to establish a two-way interaction that is genuinely caring. This will include a supportive chairside manner, encompassing a soothing tone of voice, demonstrating empathy, not standing over the patient but sitting at their level and using simple non-verbal gestures like smiling.[2,13] In addition to facial expressions, bodily expressions provide information about the action of an individual, in this case the dentist, and can therefore be perceived as a more direct threat.[14] Hence, the professional should keep their movements relaxed and not be over active.[5]

The Iatrosedative Clinical Encounter

The second component of iatrosedation is the clinical encounter. Once the causative factors of anxiety have been identified at the initial consultation, patients should feel more at ease and attend for subsequent treatment in a more relaxed state of mind than would have otherwise been the case.[9] However, this is the first clinical encounter since the interview and has been described by Friedman[5] as the 'firing-line'. Both the patient and professional will be experiencing what the patient may feel anxious about. Body language is still extremely important, so how delicately the clinician uses their instruments can convey the patient something of how they are about to be treated.[5] Prior to any action, the patient can be prepared to overcome their anxiety. This can be achieved by informing the patient of what to expect, for example pain, pressure, vibrations, etc.[2,5] A similar approach can be seen in paediatric dental treatment with the 'tell, show, do' technique.[2,13] Once treatment is underway, having regular rest breaks can help the patient to remain in a relaxed state. Armfield and Heaton[2] suggest rest breaks and signalling as ways to provide control for patients, which can also be used in the iatrosedative clinical encounter. Pre-planning or initiating rest breaks during treatment can help to prevent patients from building their anxiety to such levels that they cannot tolerate the procedure any longer. Breaks can therefore provide patients with a sense of predictability and control over their treatment.[2]

Signalling allows a patient to show when they feel they may need a break or if they are experiencing any problems. Having a means to communicate will help to build trust between the patient and dentist and will also provide them with another form of control over their treatment.[2] It is important to emphasise that even if near to the end of a procedure, the clinician should stop if signalled, as to continue could break the trust barrier and go beyond the patient's tolerance of their anxiety, detrimental to future treatments.[2]

There will always be some patients who are categorised as extremely anxious.[1,6] For these individuals iatrosedation techniques may not be sufficient to reduce their anxiety to a level which will allow treatment to be performed. Such situations may require the addition of pharmacological techniques such as oral, intravenous or inhalation sedation. However, it is important to remember that such methods may not remove the cause of anxiety. Pawlicki[1,6] suggests that in this instance a patient may need to be referred to a clinical psychologist. This can be an alternative way to help to identify and relearn the causes of anxiety, as well as being away from the clinical scenario (dental surgery) that initiated anxiety.

Conclusion

The power of iatrosedation in reducing anxiety and allowing a patient to relearn their dental experience is not only a method of success for overall treatment outcomes. Reduction in dental anxiety will also result in less avoidance and delay in dental visits, in turn improving the oral health and quality of life of patients, by breaking the vicious cycle of dental fear.[3,4] There is always the need for the dentist to remain flexible and tailor management for anxious patients according to their individual backgrounds and concerns.[1] Having been pioneered by Friedman,[5] clinicians have taken the iatrosedation concept and further enhanced it with the use of audiovisual equipment. In this way hearing and visual senses are stimulated, distracting from the sights and sounds of the dental practice.[15]

Anxiety management is complex, however, this article highlights methods reported in the literature to help build rapport and confidence in dentally anxious patients. It also identifies the possible need for a multidisciplinary approach that could be used to help patients overcome their dental fears.

Simply achieving a treatment outcome is not necessarily a success, but reducing a patient's anxiety in a way they can remember and have learned, is a duty of care that should be taken on by all clinicians. This can not only build on the patient-dentist relationship but also provide clinicians with an increased sense of achievement and satisfaction.

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Dental Anxiety - How Would You Manage It?

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Abstract

Dental anxiety is well documented within dental literature, and is a condition with which dentists and dental care professionals alike will be familiar. Its consequences may extend beyond dental implications alone, but can also have the potential to affect a patient's quality of life. It is important that as a dental profession we are aware of the methods which can be used to manage various forms of dental anxiety, and to refer to specialist services as appropriate.

This paper focusses on detailing both the evidence-based behavioural and pharmacological strategies that may be employed for both dentally anxious adults and children.

Introduction

Dental anxiety is a common condition that is publicised heavily in the dental field. It can present as a significant barrier for patients to access the dental care they require.[1]

It is defined as 'a fear related response that originates in or is expressed in a dental setting'.[2] Statistics show that approximately 15% of the population in the Western developed world avoid dental care due to dental anxiety.[3] In addition, about 20% of sufferers present with another mental health condition, such as generalised anxiety disorder, depression and agoraphobia.[4]

Consequences

Dental anxiety can have an impact on not only patients' oral health but also on their general wellbeing and quality of life. It is reported to lead to sleep disturbances as well as to have an effect on patients' personal and work life.[5] Patients may avoid smiling or exposing their teeth, leading to a feeling of self-consciousness. Anxious parents may not be able to take their children to the dentist's and may even pass on their dental anxiety to them. From a dental professional's viewpoint, it can affect both the onset and the patient's response to dental treatment. Delay in visiting a dentist may mean that more conservative forms of treatment are no longer suitable for the situation. This could further potentiate a patient's anxiety.[6]

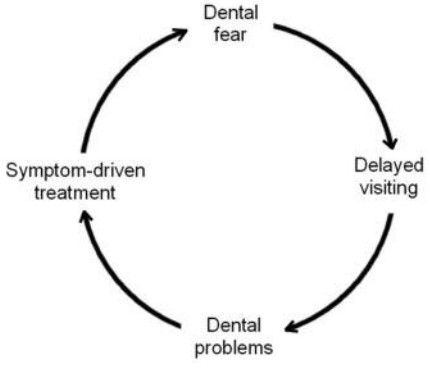

Figure 1- Model of the vicious cycle of dental fear[7]
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Aetiology

It has been suggested that dental anxiety can be divided into two categories of aetiology:

1. Exogenous dental anxiety - resulting from a traumatic past experience in the dental setting
2. Endogenous dental anxiety - in association with other anxiety disorders, like generalised anxiety disorder.[8]

It has been described to be multifactorial in aetiology, and negative past experiences appear to be the main reason why anxious patients find it hard to tolerate the dental environment.[9-10] Fears might relate to the sound of the dental drill, the perceived pain associated with local anaesthetic needles or even the thought of the dentist themselves. Likewise, the smells linked to the dental environment may also trigger a fear related response, such as the smell of Kalzinol. One study mentions that patients reporting a traumatic painful experience at the dentist were approximately 14 times more likely to present with some kind of dental anxiety.[11]

Assessing dental anxiety

There are numerous scales, questionnaires and surveys that can be used to assess dental anxiety. Examples include the Dental Anxiety Scale, The Dental Belief Survey and the Dental Fear Survey. A well-known method is the Modified Dental Anxiety Scale (MDAS) that is used to evaluate the extent of a patient's dental anxiety and is an effective measure both on children and adults. The MDAS targets all individuals as opposed to extreme cases only.[12]

Figure 2[13] Modified Dental Anxiety Scale

Can you tell us how anxious you get, if at all, with each dental visit?
PLEASE INDICATE BY INSERTING 'X' IN THE APPROPRIATE BOX

1. If you went to your Dentist for TREATMENT TOMORROW, how would you feel?					
	Not Anxious ☐	Slightly Anxious ☐	Fairly Anxious ☐	Very Anxious ☐	Extremely Anxious ☐
2. If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?					
	Not Anxious ☐	Slightly Anxious ☐	Fairly Anxious ☐	Very Anxious ☐	Extremely Anxious ☐
3. If you were about to have a TOOTH DRILLED, how would you feel?					
	Not Anxious ☐	Slightly Anxious ☐	Fairly Anxious ☐	Very Anxious ☐	Extremely Anxious ☐
4. If you were about to have your TEETH SCALED AND POLISHED, how would you feel?					
	Not Anxious ☐	Slightly Anxious ☐	Fairly Anxious ☐	Very Anxious ☐	Extremely Anxious ☐
5. If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?					
	Not Anxious ☐	Slightly Anxious ☐	Fairly Anxious ☐	Very Anxious ☐	Extremely Anxious ☐

Instructions for scoring (remove this section below before copying for use with patients)

The Modified Dental Anxiety Scale. Each item scored as follows:

Not anxious	=	1
Slightly anxious	=	2
Fairly anxious	=	3
Very anxious	=	4
Extremely anxious	=	5

Total score is a sum of all five items, range 5 to 25: Cut off is 19 or above which indicates a highly dentally anxious patient, possibly dentally phobic.

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Other more scientific methods include studying the patient's heart rate, galvanic skin response or muscle tension. This assesses the physiological response towards anxiety.

Clinical management of dental anxiety

Newton et al[12] divides anxiety into three sub-groups based on severity: low, moderate and high. According to this, tailored management strategies are considered.

Figure 3[12]

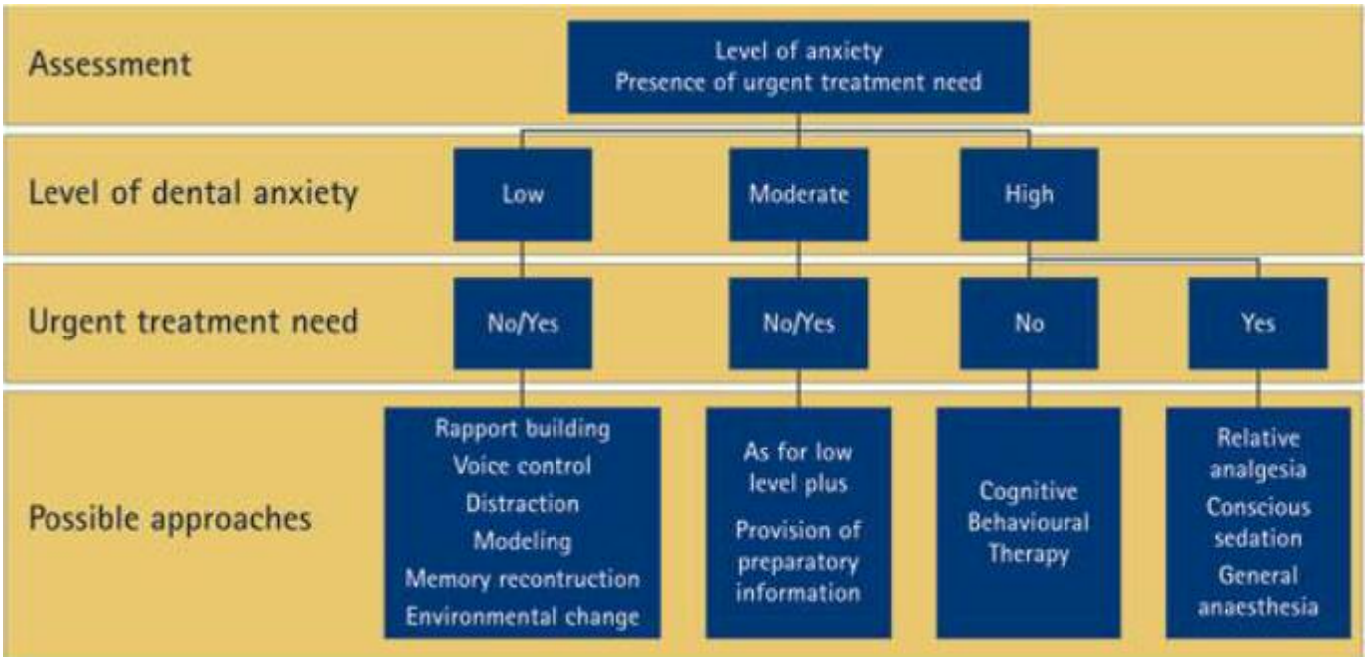
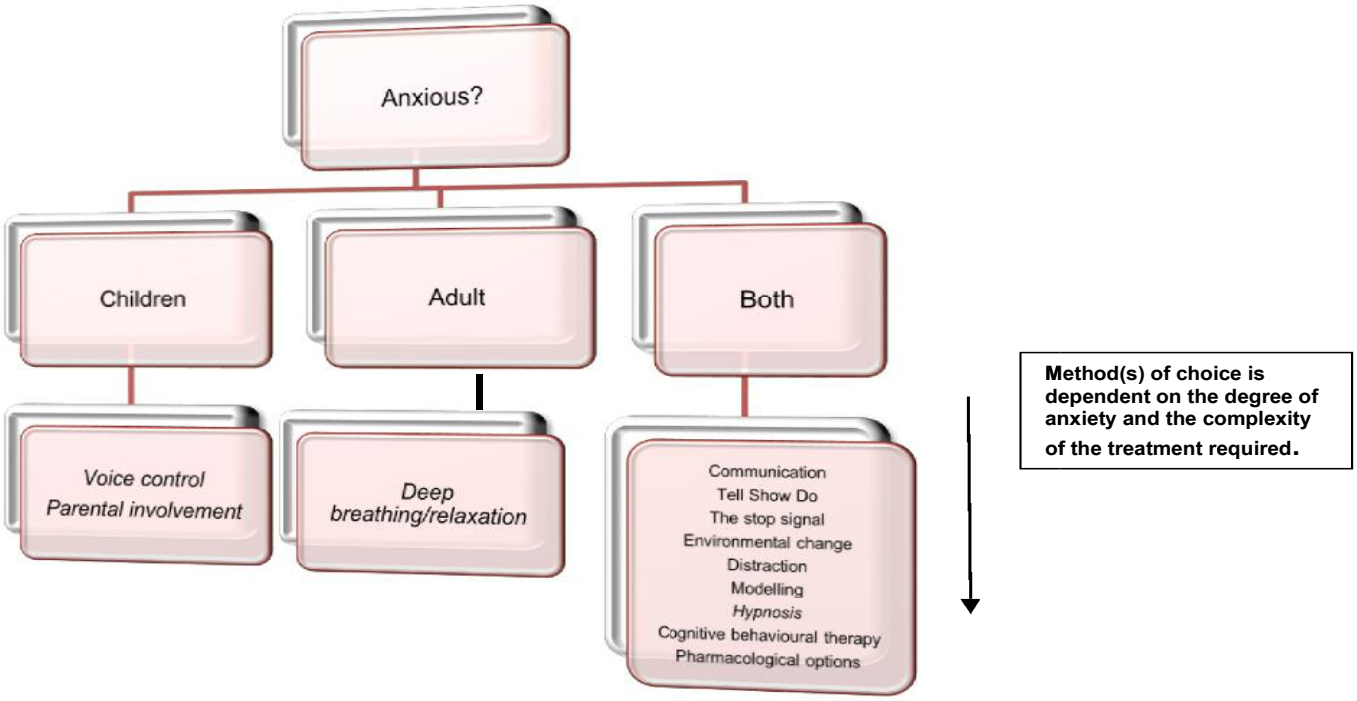


Figure 4 is an adapted version of Figure 3

Figure 4



Children

If adult dental anxiety does stem from childhood fears, concentrating on preventing this adverse response in children is a necessary step to the provision of their future dental care without fear.[14] It may be a detriment to their oral health and may make seeking a dentist more psychologically difficult if not managed early on in life.

Voice control

Evidence shows that children's behaviour, which may be as a result of being anxious, can be effectively managed by the tone of voice of the dentist.[15] A loud voice resulted in better conduct throughout the dental treatment compared to dentists who spoke at a normal volume; whether this lead to a reduction of anxiety is not known. Likewise, it was found that a dentist with an assertive and firm manner can aid in reducing a child's anxiety. The author concluded that the adoption of a more direct approach by the clinician had a positive long-term effect on their anxious behaviour during treatment.[16]

Parental involvement

In paediatric dentistry the vast majority of patients attend with their parents, and research has been carried out to determine whether parental anxiety has any effect on the anxiety levels of their child. Numerous studies have looked into the association and found a strong link.[17-21] Kain et al found that during anaesthesia induction, children did benefit from their parents' presence only if they (parents) had low levels of anxiety themselves.[22]
Folayan et al proposed that the anxiety levels of the parent may first need to be assessed and managed to avoid any knock-on effects on the child.[23]

Adults

It is the author's opinion that the following methods are more effective when used with adults than children due to increased compliance and cooperation.

Deep breathing/relaxation

Relaxation has been found over the years to successfully reduce stress and anxiety levels in clinical and non-clinical settings.[24-27] In dentistry, this technique may be a simple cost-effective approach to reducing a patient's anxiety levels. Lahmann et al found that when compared to music distraction, brief relaxation was more effective at reducing anxiety.[28]

Figure 5

State anxiety (STAI–S*†) at initial and final evaluation.

GROUP	MEAN ± SD‡ INITIAL STAI-S SCORE	MEAN ± SD FINAL STAI-S SCORE	MEAN ± SD DIFFERENCE BETWEEN STAI-S SCORES	STANDARDIZED EFFECT SIZE (COHEN'S d)	*P* VALUE		
					Difference in Before-and-After BR STAI-S Scores Versus Difference in Before-and-After C STAI-S Scores	Difference in Before-and-After MD STAI-S Scores Versus Difference in Before- and-After C STAI-S Scores	Difference in Before-and-After BR STAI-S Scores Versus Difference in Before-and-After MD STAI-S Scores
BR§ (n = 29)	42.4 ± 10.4	29.4 ± 6.3	13.0 ± 9.5	1.25	< .001	.028	< .001
MD¶ (n = 28)	41.3 ± 9.6	36.8 ± 9.8	4.4 ± 4.6	0.46			
C# (n = 30)	41.9 ± 11.5	40.5 ± 11.2	1.4 ± 4.4	0.12			

* STAI-S: State-Trait Anxiety Inventory–State.
† Source: Spielberger and Gorsuch.[31]
‡ SD: Standard deviation.
§ BR: Brief relaxation.
¶ MD: Music distraction.
# C: Control.

Edmund Jacobson, a physician, developed in 1938 a method known as 'progressive relaxation'. This procedure relates to the theory that anxiety can lead to physical tension, which in turn can increase a patient's perception of the anxiety stimulus. This vicious cycle can be controlled by means of tensing specific muscles for a period of 5-7 s followed by 20 s of relaxation. Thompson et al concluded that patients who were tense were more likely to suffer from mental or physical discomfort than those who were relaxed.[29]

Suitable for children and adults

Communication

Effective communication between the dentist and the patient is critical in managing anxiety.[30-32] Friedman et al 's 1983 research concluded that a dentist's behaviour, attitude and communicative stance were all related to making patients calm. They coined this behavioural approach 'the iatrosedative technique'.[33]

Other studies have found that patients who were kept informed throughout treatment reported less anxiety when compared to other methods such as visual distraction.[34] In addition, in children, anxiety was reduced by avoiding clinical terms or words e.g. using a wand instead of local anaesthetic.[35]

Another form of effective communication is the Tell-Show-Do Method. Research in Nigeria found that when used alongside a combination of other psychological behavioural techniques such as distraction; mean dental anxiety levels were reduced from 15.23 before treatment to 13.40 afterwards.[36]

Modelling

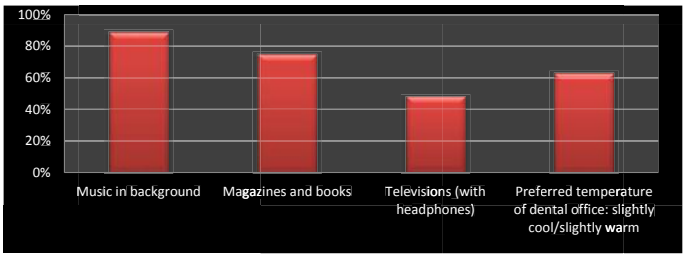
This is where an anxious patient observes another individual (actor or parent) attend a dental appointment and has treatment performed. Newton et al mentions that for modelling to be successful the actor should be of similar age, gender and anxiety level to the patient observing them.[12] In adults, studies have shown video modelling can have a positive effect on a patient's anxiety levels and strengthens their skill of coping in a clinical setting.[37-39] Whilst in children, modelling may be more effective as they might not be aware that the patients are actors in the first place. Farhat-McHayleh et al compared this method to the Tell-Show-Do approach and found that the children's heart rates were lower than for the latter method. Interestingly this was only the case if their mother was used as the model.[40]

Environmental change

Fox and Newton found that exposing children to positive dental

images resulted in the anticipatory anxiety being less than if the children were shown neutral photographs.[41] Newton et al also observed that the smell of lavender can reduce this initial anxiety with regards to treatment.[12] Research into features of the dental setting which were desirable by anxious patients concluded that 63% preferred a dental practice with a pleasant cool temperature, while 89% wished for music playing in the background and 75% requested reading material such as magazines to be kept in the dental practice.[42]

Figure 6: Strategies perceived as helpful by anxious respondents



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Distraction

Distraction detaches the patient from the dental setting.[12] Studies have found that the more the patient is distracted, the greater the reduction in the anxiety which they experience.[43-45] Interestingly research suggests that video distraction is more beneficial at reducing anxiety than audio distraction, and that focusing on a fish tank lead to less anxiety than looking at a music poster.[45] This could possibly relate to the greater utilisation of the senses. For video distraction, both visual and audio components are used which may have a greater distracting potential than audio alone. In addition, animate objects may distract a patient more than inanimate objects.

Hypnosis

There is a school of thought that hypnosis may not be as effective when compared to the other non-pharmacological methods available and may have limited use these days.[46] A similar study looked at the long-term effect hypnosis has on patients with extreme forms of dental anxiety. The results revealed that after a three year period, 54.5% of hypnotherapy patients went to their dentist for regular maintenance whereas 65.5% of the patients who had systemic desensitisation attended.[47] It suggests from this study alone that hypnotherapy may have a positive effect at reducing anxiety yet there are other methods available which can produce more successful outcomes.

Alternative therapies that could also be applied in conjunction with other behavioural management techniques might be acupuncture, homeopathy and biofeedback.

Acclimatisation and systematic desensitisation

Acclimatisation refers to the sequential introduction of the dental environment to anxious patients. It may involve simply showing the patient what the equipment looks like e.g. a local anaesthetic syringe with the cover on, and practising placing it in their mouth. Repeated exposure of an anxiety provoking stimulus in a controlled environment has been found to be effective.[48] Systematic desensitisation is a follow on from the above technique as it exposes a patient to a hierarchy of feared situations in order to condition them to reduce the anxiety experienced.[49] The rate of success following systematic desensitisation is variable and has been linked to one's existing psychological state of mind.[50]

Cognitive behavioural therapy

Its use in managing psychological conditions such as depression is a popular option in hospital care and research shows that it can be very effective.[51-54] Numerous studies have also found that CBT is also successful at reducing dental anxiety[55-58] and that its effects may be sustained on the long-term.[59] Despite evidence to suggest its efficacy, there is currently an availability barrier for its practise in managing dental anxiety in the UK.[11] However, continued developments into computer aided CBT may resolve this issue and provide a greater opportunity for its use in dentistry.[60]

Pharmacological methods

Milder forms of dental anxiety may be adequately controlled by behavioural management methods as mentioned above. However, this may not be sufficient for those suffering from more severe forms of dental anxiety such as odontophobia. Therefore the option of conscious sedation or general anaesthesia (depending on the clinical situation) may need to be considered.

This encompasses the following three pharmacological methods:

1) Inhalation sedation/ relative analgesia

Consisting of a mixture of nitrous oxide and oxygen, its main effect is to produce a state of anxiolysis and thus increasing a patient's

Figure 7- Pre-and post-operative MDAS scores[62]

Patient groups	Mean pre-op MDAS	Standard deviation	Mean post-op MDAS	Standard deviation	Difference between pre- and post-op MDAS scores	p value
IHS MDAS 11-25 moderate-severe anxiety (n = 60)	16.48	4.03	12.80	4.38	3.68	0.000
IHS MDAS 5-10 mild anxiety (n = 43)	7.44	1.75	7.37	2.16	0.07	0.392
LA (n = 35)	7.20	2.83	6.97	2.55	0.23	0.227

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compliance and co-operation for dental treatment.[61] Hierons et al concluded that inhalation sedation used on adults undergoing extractions was more beneficial if they were moderately to severely anxious. The difference between pre and post operative MDAS scores was found to be statistically significant for this cohort (3.68) when compared to those with mild anxiety (0.07).[62]

In comparison, Hosey et al stated that it remains to be the preferred method of choice for mild to moderately anxious paediatric dental patients. Great emphasis was placed on the fact that inhalation sedation should not be used in isolation but rather in conjunction with effective behavioural management techniques[63]. Wilson described this combined management approach as 'psycho-pharmacological sedation'.[61]

2) Intravenous sedation

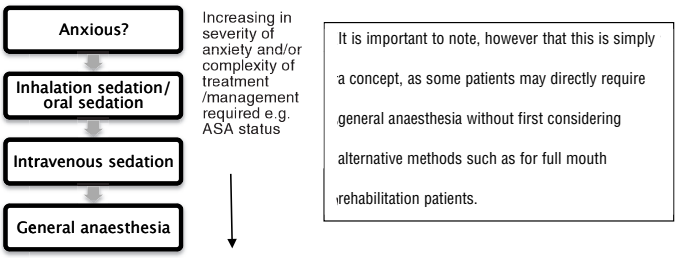
In adults, this form of conscious sedation has been found to be very effective at managing dental anxiety.[64-66]
Midazolam is the main benzodiazepine administered intravenously. Its action is to potentiate the effect of the chemical inhibitory neurotransmitter GABA and thus can lead to the following clinical effects:

- Conscious sedation
- Anxiolysis
- Muscle relaxation

The Standing Dental Advisory Committee stated in its 2003 guidelines that midazolam used intravenously was a standard technique for dental patients over the age of 12 years old and should only be administered by dentists who are adequately trained and competent to do so[67]. In paediatric dentistry, Wilson et al 2013 commented that it might be suitable in only a minority of patients, particularly if inhalation sedation has been unsuccessful[61]. Furthermore, there have been only a few studies concluding its efficacy in the routine dental management of anxious children.

3) Oral sedation and oral premedication

Oral forms of benzodiazepines (Midazolam, Diazepam or Temazepam) can be used either as an oral sedative agent or as an oral premedicament. Oral sedation is in itself a non invasive form of conscious sedation but acts as an adjunct to obtaining intravenous (IV) access. This may be the case for needle phobic patients who would not be able to tolerate the IV procedure. Its main disadvantage is its variable onset that is dependent on its absorption. Consequently, its unpredictable nature means that a patient could potentially become over or under sedated as its effects vary from individual to individual.[63] In addition, Donaldson et al mentions that oral sedation is very much limited to those patients who are mild to moderately anxious. The author further discusses the idea that 'levels of sedation progress as a continuum'.[68] This could be illustrated like so:



Oral premedication can be given the day before the dental appointment to reduce the associated anxiety. It does not have the sedative properties of oral sedation but is simply an anxiolytic agent.

General anaesthesia

It has been widely documented that general anaesthesia is effective on very anxious patients or pre-cooperative children who require complex and extensive treatment.[12, 61, 63] However, studies have found that patients' anxiety of the dental environment is not eliminated and that their avoidance of attending the dentist in the future is sustained.[69-70] Arch et al concluded that children and parents who chose general anaesthesia compared to inhalation sedation had greater psychological distress.[71] Another study compared the psychological approach to the pharmacological approach in managing dental anxiety. The results obtained were that a greater percentage of patients treated by the behavioural method were able to complete the necessary treatment compared to those treated by GA (78% to 53% respectively).[72]

Conclusion

Despite acting as a barrier to dental care, dental anxiety can be managed. There are numerous options that are available to anxious patients, facilitating the provision of dental services.

It is also important to bear in mind that with the advent of 'Painless Dentistry' within the last decade, new products are constantly being developed which aim to reduce both the pain and the anxiety associated with dental treatment. Examples include 'The Wand', 'Nucalm' and 'The Dental Button'.

Lastly, this essay mainly focuses on exogenous dental anxiety control yet it is significant also to mention patients with endogenous dental anxiety and the role dentists play in their management. Thus a clinician must be aware that it may be a manifestation of an underlying psychotic condition, which could warrant a referral to a specialist clinic or psychologist.[55]

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How Pain is Controlled in Endodontic Therapy

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Abstract

Endodontic therapy is often of concern to patients, frequently due either to the expectation, or experience of pain. Managing this pain before, throughout and after a procedure is not only beneficial to a patient but reflects upon their dentist. To achieve effective pain relief different methods of pain control, including a pharmacological plan and the use of anaesthetics, must be individually tailored for each patient alongside an appropriate diagnosis and treatment plan.

This is Going to Hurt Just a Bit

One thing I like less than most things is sitting in a dentist chair with my mouth wide open,
And that I will never have to do it again is a hope that I am against hope hopin'.
Because some tortures are physical and some are mental,but the one that is both is dental.

Introduction

It has been over half a century since the American poet Ogden Nash offered his satire on attitudes to the dental profession and yet today's dental practitioners still continue to be so challenged. The terms *pain* and *root canal* are often thought of as one by the public[1] and clinicians frequently have to deal with this misguided preconception. Managing pain is an integral part of the field of endodontics, often considered a sign of clinical excellence; it requires a thorough understanding the physiology of pain and the mechanisms by which drugs and therapies offer relief.

Dental pain may arise before, during or after endodontic therapy and the methods for management of this pain are different in each case. This paper aims to explain the mechanisms responsible for pain and then to address its management in relation to the stages of treatment.

Pain

From Where Does Pain Arise?

Pain can be defined as 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage.'[2] The perception of pain is subjective, varying greatly between patients and their individual backgrounds.[3]

The nociceptors responsible for dental pain are the Aβ and Aδ nerve fibres which transmit sharp stabbing pain, and the Cδ nerve fibres which transmit slow dull pain. The principal fibres concerned with inflammatory pain from the dental pulp and periradicular tissues are thought to be the unmyelinated C fibres. This is attributed to the C fibres comprising 70-90% of the innervation to the pulp, along with their responsiveness to inflammatory mediators, and the dull ache commonly that accompanies pulpitis is associated with the C fibres.[1]

Fig.1 is a diagram explaining two mechanisms, the hydrodynamic theory and inflammation, which are responsible for the stimulation of these nociceptive nerve fibres in both the dental pulp and the periradicular tissues.

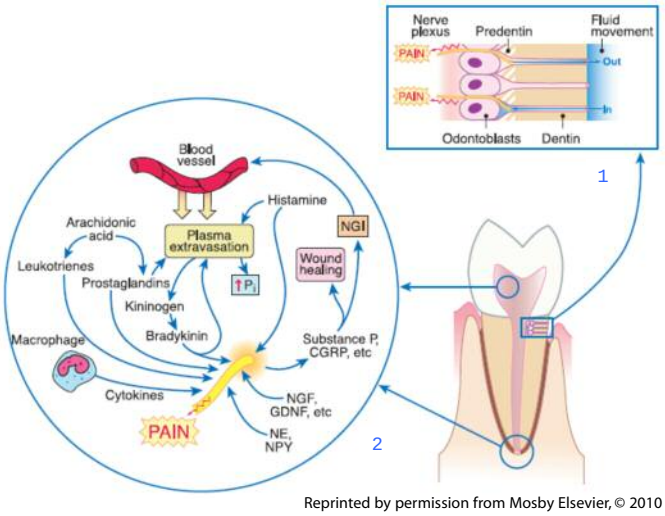

Fig.1. The mechanisms responsible for dental pain

1. *Acute dentinal pain: According to the hydrodynamic theory, stimuli that cause fluid movement in exposed dentinal tubules result in the stimulation of nociceptive nerve fibres.*
2. *Pain with inflammation: Inflammation is associated with the synthesis or release of mediators, including prostaglandins, bradykinin, substance P, and histamine. The interrelationships of these inflammatory mediators form a positive feedback loop, allowing inflammation to persist far beyond cessation of the dental procedure.*

From Hargreaves K. M.[6]

Pain Management

A sensible and effective approach to the management of endodontic pain is first to diagnose the cause of pain, and then to offer definitive treatment with the use of drugs and other therapies as appropriate.

Diagnosis

When presenting with pain, a patient's symptoms often do not correlate to any histological findings.[7,8] Despite this challenge, it is essential that before the management of pain can begin, an accurate diagnosis is made. A patient who presents with pain from a tooth may be suffering from one or more of a range of problems such as periapical disease, pain of non odontogenic origin, a fractured tooth, referred pain, dentine hypersensitivity, irreversible pulpitis, reversible pulpitis or even an abscess. The treatment of each of these diagnoses is different and hence effective pain management and treatment hinges upon correct diagnoses.

Definitive Treatment

It is worth noting that frequently dental treatment itself can be used to manage pain. In instances where an abscess has formed, incision and drainage may be indicated, or the removal of an

irreversibly inflamed pulp may reduce pain by reducing concentrations of mediators and lowering tissue pressure.[9] Therefore, an accurate diagnosis and effective treatment can be used before other therapies are needed.

Drugs

Pre Treatment

The management of pain, particularly during the initial phases of endodontic treatment, is fundamental so as to put the patient at ease, not only in that stage but also for the remainder of their treatment. It allows the patient to gain confidence in the dentist, and the dentist to proceed with their clinical care.

Non-narcotic Analgesics

A major class of drugs that can be of use before treatment begins are the non-narcotic analgesics; they include both the non-steroidal anti-inflammatory drugs (NSAIDs) and paracetamol.

Before treatment begins, the administration of an NSAID has been shown to produce a significant benefit for the patient in the reduction of post treatment pain.[10] The rationale behind this approach is to reduce the input from peripheral nociceptors whilst also acting upon the CNS.[11] Even those who cannot take NSAIDS have been shown to benefit from pre treatment administration of paracetamol.[12]

There is very limited evidence against this approach[13] and when combined with other therapies to be discussed later, it would seem this is a valuable step for placing the patient at ease.

Despite the availability of a wide range of NSAIDs (See Table 1) there are unfortunately few comprehensive studies comparing the efficacy and safety of each one when used for endodontic pain. Therefore, only subjective recommendations can be made.

Table 1. A summary of Selected Non-narcotic Analgesics. Adapted from Hargreaves[1]

Analgesic	Dose Range (mg)	Daily Maximum Dose (mg)
Paracetamol	325-1000	4000
Aspirin	325-1000	4000
Diclofenac Potassium	50-100	150-200
Ibuprofen	200-800	2400
Naproxen	250-500	1500
Ketoprofen	25-75	300
Fenoprofen	200	1200

Ibuprofen is the most commonly used of these drugs, due to its efficacy and well documented safety[14] even though Ketoprofen may be more a powerful analgesic.[15] Therefore it is advised that patients should be pre-treated 30 minutes before the procedure with either an NSAID (e.g. ibuprofen 400 mg) or with paracetamol 1000 mg.

The first systematic review comparing NSAIDs and their use in endodontics to reduce post endodontic pain concluded that both pre- and post- treatment with NSAIDs provides effective pain relief.[16] However, clinicians should be aware of limitations and drug interactions when considering the use of NSAIDs for managing endodontic pain.[17]

During Treatment

Local Anaesthesia

It is important to achieve profound anaesthesia prior to commencing treatment and it is also vital to ensure that this is of adequate duration. However, achieving a sufficient level of anaesthesia in teeth with an inflamed pulp is often a challenge. Several theories try to explain this difficulty, it is thought infection lowers the pH, which prevents the anaesthetic from penetrating the nerve membrane as the anaesthetic molecule does not dissociate, remaining in its ionised form.[18] Other theories suggest that inflammation alters resting potentials, leading to the inability of local anaesthetics to prevent impulse transmission[19,20] ,or simply that patients who are nervous have a lowered pain threshold.[20] For these reasons, supplementary techniques and therapies are often advised to be used alongside local anaesthesia.

A valuable pharmacological approach for pain management is the use of long-acting local anaesthetics. Bupivacaine has consistently been shown to eliminate pain during endodontic therapy and to reduce both post treatment pain and the need for analgesics after treatment.[21,22] Case selection is important with such anaesthetics as some patients may not like the long lasting numbness and children must take care after an ID nerve block to not unintentionally injure or chew their lips, cheeks or tongue.

Supplemental Intra-osseous Injection

Intra-osseous injections placed distal to the target tooth are useful as they allow direct access to cancellous bone and overcome the difficulty of getting the anaesthetic agent to penetrate the cortical plate. The Stabident system, used on posterior teeth within the mandible has high success rates of 89%.[23] The X-Tip system offers similarly high success rates of 82%.[24] The use of articaine as opposed to lidocaine in these instances also achieves comparable success results of 86%.[25]

Intrapulpal Injection

If pain continues to persist when the pulp is entered, intrapulpal injections may be considered as a last option. These work by raising the pressure within the pulp to an extent that the nerves depolarise once and then remain unresponsive. The main disadvantage is the potential pain during administration of the injection.[26] However, the technique can be highly successful (94%) when the syringe needle fits tightly into the access cavity leading to the pulp meaning the injection can be given under backpressure as opposed to when passively depositing the solution.[26]

Corticosteroids

The use of corticosteroids to prevent postoperative pain has been increasingly investigated in the last 25 years.[27] During shaping of a canal system, the periradicular tissues may become unintentionally irritated by bacterial products, irrigants, bacteria or necrotic tissue. These can cause the release of inflammatory mediators, increased vascular permeability and tissue pressure, leading to stimulation of pain fibres.[28] Corticosteroids aim to prevent this pathway from occurring.

Intracanal

One method of steroid administration is Intracanal. A study indicated that the use of dexamethasone solution in such a manner reduces pain at 24 hours, but not in the days after this.[29] A further study showed the use of a steroid solution reduced post operative pain when the pulp was vital, but offered no relief when the pulp was necrotic.[30] Additional studies did not show significant differences or effectiveness in pain reduction with the use of Ledermix™ (Blackwell), calcium hydroxide or formocresol.[31] although a study did provide evidence that Ledermix could reduce post treatment pain when compared to use of calcium hydroxide, or no dressing at all.[32] Despite mixed reviews, it can be concluded that whilst other pain control methods may be more effective, intracanal use of steroids can reduce post treatment pain in the short term and when the pulp is vital.

Systemic

Intramuscular injections of dexamethasone have been shown in several studies to reduce pain at 4-8 hours post treatment but for no longer.[33, 34] Oral administration of dexamethasone achieved similar results, with 8-24 hours being the maximum times post treatment for which pain was controlled.[35] The most compelling evidence for the use of systemic corticosteroids was shown following an intra osseous injection of methylprednisolone, which provided significant pain reduction for seven days in teeth with irreversible pulpitis.[36]

Despite this, the overall efficacy and safety of these drugs means they are rarely used and that other methods of pain control should always be used before corticosteroids are considered.

Post Treatment

Control of pain following treatment is a crucial aspect of endodontic therapy that must be carefully managed. Post endodontic pain is usually most severe during the first 12 hours[37] and as shown by a Cochrane systematic review, is more common after single visit treatments.[38] However, its prevalence appears to vary greatly, especially between the stages of treatment. Ince et al.[39] showed that 70% of 306 patients reported pain following canal preparation, whilst Ng et al.[40] found 40% of 415 patients reported pain following canal obturation. Yet an even more recent systematic review by Nixdorf et al.[41] revealed post treatment pain to occur in only 5.3% of cases, even lower than the 10% previously reported by Fox et al.[42] The differences revealed in these reports may be partly attributed to the differing skill of the dentists, patient selection and the actions taken after treatment was complete. Despite the variations found in occurrence of post treatment pain, it can still be successfully managed using the correct therapies.

Opioid Analgesics

Opioids are a group of analgesics that can be used for the relief of post treatment pain, commonly in combination with ibuprofen or paracetamol (See Table 2). Opioids both inhibit signals from the trigeminal nucleus to higher centres in the brain, and act on peripheral opioid receptors in the dental pulp.[42] It is also worth noting that when morphine is administered as an intraligamentary injection it has been shown to notably reduce endodontic pain.[44, 45]

Table 2. A summary of selected opioid analgesics. Adapted from Troullos et al.[46]

Analgesic	Oral Dose (mg) to be taken up to four times a day
Codeine	60
Dihydrocodeine	60
Hydrocodone	10
Tramadol	50

Clinicians should, however, be aware that the side effects such as nausea, drowsiness and dizziness of opioids do limit their practical use.

Flexible Plan

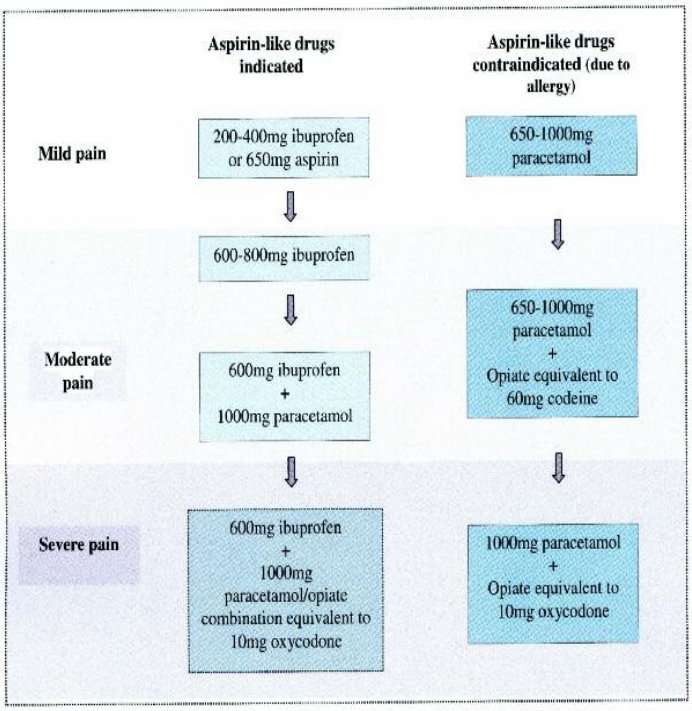

Fig.2 - A flexible analgesic plan. Adapted from Hargreaves[1]

To minimise post treatment pain and side effects, a so-called flexible plan for the administration of drugs can be used according to the level of pain experienced, with each dose to be taken four times a day until pain subsides (Fig.2). The hope is that a patient can receive sufficient pain relief by use of timed NSAIDS, administered as per the particular drug's instructions, with, if needed, the addition of paracetamol or a paracetamol-opioid combination.

Several studies have indicated that ibuprofen combined with paracetamol or a paracetamol-opioid combination is significantly more effective than ibuprofen alone (See Fig.3).[47, 48]

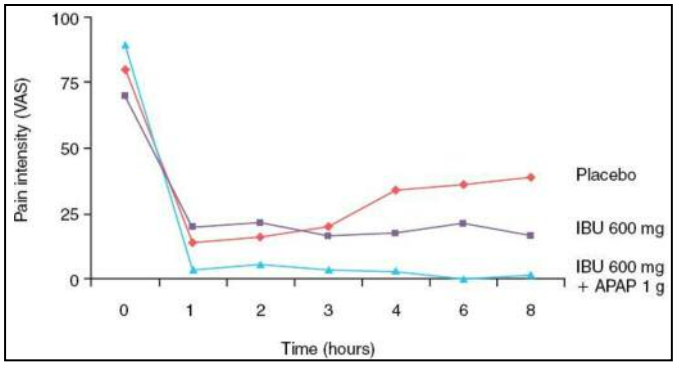

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Fig. 3 Comparison of pain intensity (Visual Analog Scale) after administration of ibuprofen 600mg with paracetamol 1g (APAP) or ibuprofen alone or to placebo treatment in post-endodontic pain patients. From Menhinick et al.[48]

As is apparent from Fig 3, a combination approach achieves minimal pain intensity not only initially, but also consistently for the entire duration of the drugs' effects when compared to ibuprofen alone making this method of pain control following treatment both highly effective and simple to put in place.

Antibiotics

Antibiotics are indicated to manage infections of endodontic origin, when there are systemic signs of infection, or swelling is present. In such cases they are effective in reducing bacterial counts and in relieving patient pain. However, the prophylactic administration of antibiotics as a means to reduce post treatment pain is controversial for well-known reasons both of bacterial resistance and patient sensitisation.[49] A recent Cochrane systematic review concluded that antibiotics offer no pain relief where irreversible pulpitis is concerned.[50] Furthermore, two randomised, prospective, clinical studies have shown that the prophylactic use of antibiotics offers no reduction in post treatment pain or flare-ups.[51,52]

Further techniques

Sedation

Inhalational or intravenous sedation are both viable options for reducing patient anxiety and placing the patient more at ease. Whilst sedation does not directly reduce pain, it has been shown that high levels of anxiety reduce pain tolerance.[53] Therefore, since sedation reduces patient anxiety, pain tolerance also increases and the patient is able to undergo endodontic treatment in a more comfortable manner.

Hypnotherapy

Deep breathing combined with muscle relaxation is an effective way of reducing anxiety and stress in patients.[54,55] Practising this method has been shown quickly and effectively to help the patient enter a relaxed state.[56]

Guided imagery is another technique that can be used to relax an anxious patient.[57] Focussing on a place that is comfortable and safe to the patient will help to manage pain during procedures,[58,59] especially when combined with relaxation techniques.[60] Recent research has reinforced findings that these techniques can be used to manage pain and anxiety in the dental environment.[61]

Acupuncture

Evidence from two systematic reviews would suggest that acupuncture is effective in managing pain both during and after dental procedures.[62,63] However, further research is required on this topic to define the optimal technique and to draw comparisons with other methods of pain control, but this alternative treatment may be one to consider in the future.

Conclusion

The management of pain during endodontic therapy is a demanding but critical area of dentistry. Understanding the responsible neurophysiology, in addition to the possible variation in diagnoses, is vital in establishing the correct approach to alleviate pain. An effective method for the successful management of endodontic pain involves tailoring methods of pain control for each individual patient, and the use of appropriate therapies at each stage throughout their treatment.

Pre-treatment administration of NSAIDS, followed by effective local anaesthetics or long acting anaesthetics, and a flexible pharmacological plan that includes opioids is a basic structure for dental practitioners to use. Alternative methods can easily be integrated into this framework, as should careful clinical techniques and effective communication between patient and dentist.

As a final word, we should remember what Ogden Nash said, *'some tortures are physical and some are mental, but the one that is both is dental.'* An empathetic approach, ensuring the patient is at ease and is reassured before the management of the physiological pain itself begins, is essential to a dental practitioner's success in endodontics.

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SAAD Symposium 2014
Drugs: the Good, the Bad and the Ugly

Saturday 13 September
Royal Society of Medicine, London, UK

This year's Symposium received very positive feedback from its biggest ever audience, due in no small part to the expert knowledge and clinical relevance of all the day's speakers. Each talk sparked healthy debate through the Q&A sessions and provided food for thought during the refreshment breaks. Further technical knowledge and support was kindly made available by the event's sponsors, Cestradent McKesson Ltd, DPS - Dental Practice Systems and RA Medical Services Ltd.

Carole Boyle, SAAD President, welcomed the participants, introduced the day's programme and later presented awards to the SAAD prizewinners: Pankaj Taneja (Drummond Jackson Essay prize), Maya Karnad (Dental Student Essay prize) and Rebecca Young (NEBDN Examination highest score prize). These competitions were, as usual, highly competitive and reassure us of the quality of those entering into the specialty.

David Wilkinson set the scene, highlighting the specialty's great progression across the years, before Scott Russell discussed the medical and pharmacological issues we battle with. He helped guide us through best practice, prioritising safety.

Joe Hulin, our SAAD sponsored PhD student, gave us a preview of his Patient Decision Aids research (more to follow), and Bob Baker eloquently presented an experienced and patient-centric approach to the dental management of those with Alcohol and Substance Use Disorders.

After an excellent lunch, Dan Silverstone gave an illuminating perspective on street drugs, while Enrico Facco then gave the audience an eye-opening demonstration of the power of hypnosis.

As expected, Nigel Robb and Christopher Holden gave clear robust presentations on the present political climate, recent developments and showed their passion for the continued development, progression and protection of dental sedation. The day was rounded off with the SAAD AGM.

We look forward to 3rd October 2015 at the same venue, The Royal Society of Medicine, London, where we are sure next year's Symposium will be as successful as this one certainly was.

SAAD Annual Symposium Abstracts

The History of Conscious Sedation

Dr David J Wilkinson MBBS FRCA Hon FCARCSI
Emeritus Consultant Anaesthetist,
Boyle Department of Anaesthesia,
St Bartholomew's Hospital, Barts Healthcare, London
President, WFSA

Conscious sedation is an induced state of sedation characterised by minimally depressed consciousness such that the patient is able to continuously and independently maintain a patent airway, retain protective reflexes, and remain responsive to verbal commands and physical stimulation. Probably the first to create it was Humphrey Davy; working around 1798 with nitrous oxide, he observed how the inhalation of the gas made him light-headed and analgesic.

Both ether and chloroform can create a sedated analgesic state when first inhaled, and it is only when more drug is applied that the patient will become fully anaesthetised. With the advent of intravenous anaesthesia at the beginning of the 20th Century, initially with ether, and then drugs like chloral hydrate, a great deal of experimentation took place.

Sedation really became practical with the introduction of barbiturates and synthetic opiates like pethidine. The Jorgensen technique of 1945 used pentobarbitone, pethidine and scopolamine. This was supplanted by incremental methohexitone which was often augmented with local anaesthesia.

With the introduction of benzodiazepines, a proliferation of sedation techniques developed, often augmented with opioid agonist antagonists or pure agonists. Almost every anaesthesia induction agent has been tried in combination with every analgesic to create conscious sedation.

Sedating Patients on Multiple Prescribed Drugs: Problems and Interactions

Dr Scott H Russell MB BS FRCA
Consultant Anaesthetist, Queen Elizabeth Hospital, Birmingham.

Many patients undergoing sedation for dentistry are on multiple drug therapies for medical conditions but as long as the sedative agent is titrated to effect, this should not be a problem. In most cases, their drugs should be taken at the normal dose, and at the normal time.

The metabolism of midazolam is reduced by some agents which compete with cytochrome P450 for metabolism, specifically protease inhibitors and reverse transcriptase inhibitors, but also diltiazem, erythromycin and clarithromycin. Its plasma level is also increased by atorvastatin, which decreases its elimination. The initial dose of midazolam will be unaffected, but subsequent dose requirements may be reduced. Its metabolism is increased by enzyme inducing agents, specifically rifampicin and phenytoin. Doses of midazolam may need to be increased if patients are taking these drugs.

Propofol is free of specific drug interactions. If fentanyl is used as an adjunct, one should be beware of hypertensive reactions with the monoamine oxidase inhibitors, but evidence suggests that the MAOI reaction, although present with the structurally related drug pethidine, does not occur to any significant degree with fentanyl. Prudence might suggest, however, that the drug should be avoided if possible.

If protocols require diabetic patients to miss a meal, their doses of diabetic medication will need to be reduced. Oral hypoglycaemic agents should be omitted (except for meglitimide, which should be given if the patient is eating breakfast but missing lunch). Once-daily insulin should be reduced by 30%, and other insulin regimens adjusted appropriately.

Evidence would suggest that if patients are on anticoagulation, the risk of stopping the drug is greater than the risk of continuing it, and local measures should be used to control bleeding post extraction.

Development of a Decision Aid for Paediatric Dental Sedation

Joe Hulin MSc BSc (Hons)
SAAD sponsored PhD student
School of Clinical Dentistry, University of Sheffield, UK

Background: Patient decision aids (PDAs) are resources that provide information about healthcare decisions and encourage patients to recognise and communicate their personal values attached to the options available.

Aim: To develop a PDA for young people faced with the choice to have dental treatment with either inhalation sedation, intravenous sedation or general anaesthesia (GA).

Methods: Accounts of dental treatment with sedation or GA were obtained in interviews with patients (n=12) and

parents/guardians (n=13) from the Charles Clifford Dental Hospital and the Liverpool University Dental Hospital. Themes identified as important in the decision making process were used to inform the content of a pilot PDA. A focus group including experts in paediatric dental sedation and further interviews with patients (n=3) and family members (n=3) were conducted to determine the acceptability of the PDA.

Results: Initial feedback suggests the amount of information given in the PDA was appropriate and the presentation of information was balanced.

Conclusion: A PDA has been developed to help young people make informed choices about having dental treatment with either sedation or GA. Research is now being conducted to determine the impact of the PDA on decisional conflict, knowledge, anxiety, attendance and compliance with treatment.

Drug and Alcohol Misuse and its Effects on Dental Treatment and Dental Sedation

Dr Robert Baker BDS MFDS RCPS Glas MSND RCS Edin MSc Bristol
OSCAR Dental, Whitchurch Hospital, Park Road, Whitchurch, Cardiff, CF14 7XB

Alcohol Use Disorder (AUD) and Substance Use Disorders (SUDs) are defined differently in the USA and the UK. In the UK, AUD affects 5-10 % (15% USA), a higher proportion in men and the peak incidence is in adolescence and early 20s.

The prognosis is poor; almost 50% are dead by the age of 60. This is due to co-morbid mental & behavioural disorders such as tobacco use, physical complications such as cardiomyopathy, hypertension, hepatitis, and pancreatitis. Other causes of death include suicide and accidents.

AUD and SUD are chronic relapsing medical disorders which are treatable when efficacious medicines are added to enhance the effects of psychosocial treatment.

There is a higher rate of tooth decay in these patients due to personal neglect and acid dissolution of enamel & dentine.

The management of patients with AUD or SUD takes place in many differing environments. Patients may be seen in General Dental Practice, Community Dental Practice, secondary care or as in-patients in Hospital. Their lifestyle makes routine dental care difficult with a high FTA rate.

Their management will vary according to their alcohol usage. Patients with AUD who are currently drinking will often attend in pain, requesting immediate extractions.

Patients undertaking detoxification require immediate pain relief to permit medical therapy to be successful, whilst those undergoing rehabilitation will benefit from extraction of all those teeth which cannot be restored with simple plastic restorations and the provision of acrylic dentures to provide cosmetic confidence post-rehabilitation.

Complex care is not advised due to chronic relapsing nature of the disorders.

What you Always Wanted to Know about Street Drugs

Dr Dan Silverstone BSc PhD
London Metropolitan University
166-220 Holloway Road, London N7 8DB

The key split between the 'recreational' and 'problematic' use of 'street drugs' remains. There are continuing controversies over the use and regulation of cannabis and the classification of 'street' drugs in the UK is still being debated. There are trends in illegal drug use in the UK and these will

present health issues for practitioners. Current threats are new synthetic drugs and the enduring issues with poly drug use and drug purity.

Hypnosis for Sedation Resistant Patients

Prof. Enrico Facco MD
Cattedra di Anestesia Gen.e Spec. Odontostomatologica
Dip. di Neuroscienze - Università di Padova
via Giustiniani 2
35128 PADOVA, Italy

Dental fear is a universal phenomenon justifying the increasing relevance of psychology and the behavioural sciences in dental training and clinical practice. Despite pharmacological sedation being generally effective, several patients may not benefit from it, such as in case of:

a) severe dental phobia depending on a post-traumatic stress disorder, patient distrust and/or fear of losing control
b) paradoxical reactions to benzodiazepines
c) severe gag reflex
d) intolerance due to multiple chemical sensitivity

Some patients, unsatisfied with previous sedation, may also prefer non-pharmacological sedation; on the other hand, proper communication, including iatrosedation and/or hypnotic communication, allows for a marked decrease of the required doses of sedatives. Very uncommon cases, not tolerant to local anaesthetics, may also benefit from hypnosis and if they are able to reach hypnotic analgesia, a drug-free surgery may be performed.
The unique advantages of hypnosis are:

a) capability of providing effective sedation whilst maintaining the patient's collaboration
b) by teaching self-hypnosis, the patients may learn to face the intervention by themselves
c) treating anxiety and phobia allows for patients' recovery from dental anxiety and phobia as well as from gag reflex

Current Sedation Politics and How it will Affect Future Sedation Practice - IACSD

Dr Nigel D Robb TD PhD BDS FDSRCSEd FDS(Rest Dent) FDSRCPS FHEA
Reader/Honorary Consultant in Restorative Dentistry, School of Oral and Dental Sciences, University of Bristol

The Intercollegiate Advisory Committee for Conscious Sedation in Dentistry (IACSD) has met three times since the last SAAD Symposium. The author is SAAD's representative, but David Craig (representing DSTG) and Chris Holden (as a GDP) also attend.

The latest draft report was circulated in August 2014 and comments returned to the committee. There have been significant successes. Notably:

1. A single dose of fentanyl followed by a titrated dose of midazolam is still recognised as being an operator/sedationist technique
2. Continuous propofol infusions can be administered by suitably trained dentists
3. ECG monitoring is not routinely required for conscious sedation for dentistry
4. Routine restrictions on activities after sedation do not have to last 24 hours
5. Fasting for conscious sedation is at the clinician's discretion.

There will be external academic audit for all training courses (except those run by Universities and Deaneries).

The two most controversial paragraphs, which have been revisited several times, relate to paediatric sedation. The issue is still the original one that was the raison d'etre for the establishment of IACSD mk 1, i.e. Ensuring that children who cannot cope with treatment under local analgesia with behavioural management techniques are managed as safely and effectively as possible.

The date for publication of the report is still unknown.

Current Sedation Politics and How it will Affect Future Sedation Practice - AoMRC

Christopher Holden BDS LDS RCS Eng DGDP (UK)
General Dental Practitioner
32 Tennyson Avenue, Chesterfield, Derbyshire S40 4SP

The Academy of Medical Royal Colleges (AoMRC) published the document 'Safe Sedation Practice for Healthcare Procedures Standards and Guidance' in October 2013. I was SAAD's representative on this working party and I was also one of the core group of editing members. At SAAD's 2013 Symposium I foreshadowed the publication.

The Academy's activity is focussed on providing policy and informing healthcare across College and Faculty boundaries.

This document defines fundamental standards and developmental standards in the safe practice of sedation, recommending competency-based formal training for all healthcare professionals involved in sedation.

For dentistry, the report largely highlights the progressive development of standards and the dental profession's insight compared to other specialties.

The document defines sedation by reference to both the United Kingdom definition of conscious sedation and the American Society of Anaesthesiologists' three levels of sedation. Dentistry should rightly consider the sections of the document devoted to pre-assessment, information and consent and educational and training standards. The latter is being addressed by the Intercollegiate Advisory Committee for Conscious Sedation in Dentistry (IACSD).

Dental healthcare professionals will also have an interest in the Academy's views on multi-sedation techniques, those at extreme levels of age, monitoring and the use of supplementary oxygen.

The document provides a framework for the more specific dentally orientated IACSD document which is yet to be published.

Annual Symposium and AGM

Saturday 3rd October 2015

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

Enquiries:

Details will be posted on the SAAD website
and included in the SAAD Newsletter Email

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Secretary's Correspondence

Francis Collier MSc BDS DipDSed (Lond)
SAAD Honorary Secretary & President-elect

Q. What type of monitoring is required when sedating the patient with inhalation sedation?

A. Where inhalation sedation using a titrated mixture of nitrous oxide and oxygen is being administered to an adult or child who has been designated an ASA 1 or 2 classification, then it is usual to monitor the patient using clinical criteria only. Clinical monitoring would normally include the level of consciousness of the patient, their demeanour, complexion, rate and depth of respiration.
The use of pulse oximetry or ECG monitoring might be considered necessary where the patient has, for example, a complex cardiac or respiratory condition. However, under such circumstances they would fall into an ASA classification of 3 or 4, and would therefore not be receiving their sedation in a primary care environment, but in a clinical setting which would offer an increased level of medical support.

Q. Which members of the dental team can offer sedation?

A. The General Dental Council expects a dentist who undertakes conscious sedation in the United Kingdom to have undergone theoretical and practical training, as well as a period of supervised clinical experience in each of the sedation techniques they propose to use. The sedationist may hold a formalised qualification in conscious sedation such as a diploma from a recognised educational establishment, such as a university dental school. They should at least be able to demonstrate initial theoretical and practical training through course attendance/ CPD certificates as well as a clinical log book to demonstrate hands-on clinical experience which has been acquired prior to commencing independent clinical practice. This log book should be verified by a clinical mentor who is experienced in the particular sedation technique under consideration, and who has directly supervised the clinical sedation cases of the inexperienced sedationist.

Q. How should consent be sought for sedation and on what type of form should this be documented?

A. Where dental treatment is to be provided for a patient, and the patient is not going to be in their normal state of consciousness during the procedure, then consent should be obtained in writing. This would clearly apply to general anaesthesia, any form of conscious sedation and I would strongly advise it where simple oral premedication alone is employed to facilitate the provision of operative treatment in an anxious patient. The form of the consent may be dictated by local protocols and the fact of a form having been signed by the patient is less important than that the patient has a full understanding of what is proposed. It is therefore advisable to ensure the patient has written information about conscious sedation techniques and that consent is sought at a juncture prior to the day of the procedure to allow the patient to consider their options in a less stressed situation and with subsequent reflection time prior to operative treatment commencing.
However, the consent form needs to clearly document both the type of sedation to be used as well as detail of the dentistry to be undertaken.

Q. I have never received any training in sedation and a patient who has had oral premedication prior to dental treatment at their last dental practice is asking for this again. Do I need to ask their General Medical Practitioner to prescribe it?

A. Even without any sedation training, it is within your scope of practice to prescribe small doses of anxiolytics such as diazepam or temazepam to aid an anxious patient's sleep the night before, journey to the surgery and acceptance of the dental care you are providing. For example, 10mg temazepam may be prescribed the night before and an hour before dental appointments for this purpose. However, it is extremely important that the patient receives written instructions to ensure that they are accompanied both to and from your surgery, and that they do not drive for the rest of the day. When the provision of such oral premedication is carried out by the patient's GMP such instructions are rarely if ever given, and this could leave you, as the dentist, in a vulnerable situation should the patient unfortunately have an accident because appropriate instructions were not given.

Q. I sometimes use oral or intranasal midazolam to sedate patients who are too anxious or unco-operative to allow initial cannulation for straightforward intravenous sedation. How do I manage this if the patient becomes over sedated and I cannot establish intravenous access?

A. As you are electing in such cases to give a bolus of midazolam rather than a titrated dose there is always the possibility of this situation occurring. For this reason, such techniques should only be used where absolutely necessary, where the sedationist is experienced and competent in cannulation, and where the venous access on the patient looks entirely promising. It should be standard practice to establish intravenous access at the earliest opportunity, to allow emergency reversal with flumazenil, if not augmentation of the initial midazolam dosage. Should the patient become over sedated prior to cannulation, with falling oxygen saturation and lack of responsiveness, and a cannula cannot be immediately placed, the patient should be managed with intermittent positive pressure ventilation with bag/valve/mask and oxygen, and if required subsequent to that an intramuscular injection of flumazenil. The flumazenil will inevitably work more slowly by the intramuscular route, and you should continue with IPPV until the effects of it are seen. Such techniques should therefore be employed in situations where the patient is fearful of the cannulation procedure, not where the sedationist is!

Q. I am hoping to run a sedation course. Can SAAD help me to do this and allow me to present it as a SAAD course? Can SAAD come and run courses away from London?

A. I am afraid that the only courses which can be 'badged' as SAAD courses are the SAAD run London based weekend courses. We do not provide or loan course materials for people to run sedation courses either. Also, the logistical problems in running the type of course with its practical components away from the usual London venues make it an impractical proposition.

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You are invited to express your views on any subject related to

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- **Write an essay on one topic in ENGLISH in A4 fomat with double spacing, as a Microsoft word document. Drummond-Jackson not exceeding 5,000 words, Dental Nurses not exceeding 2,500 words, Dental Students not exceeding 3,000 words.**
- **Entries must be received and acknowledged by 31st March 2015.**
- **Essays must be written in accordance to SAAD's Guidelines for Authors available from the SAAD website and on page 49 of this Digest.**
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- **Entries, accompanied by name, address and telephone number, should be emailed to fiona@saad.org.uk**

SAAD

NATIONAL COURSE
IN CONSCIOUS SEDATION
FOR DENTISTS AND DENTAL NURSES

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 basic sedation techniques. Alternative 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.

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.'

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The course is held at

Mile End Road Campus, Queen Mary, University of London.

It is registered with the FGDP and the KSS deanery for 12 hours CPD.

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Fiona Trimingham (Executive Secretary)
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Intravenous Sedation Pre-sedation instructions (per 200)	£19.25	£24.50	£8.50*
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Inhalation Sedation Information leaflet (per 200)	£19.25	£24.50	£8.50*
Medical History Forms (per 200)	£16.50	£22.00	£7.00*
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CBT Toolkit	£20.00	£30.00	£3.00
A History of SAAD by Peter Sykes	£5.00	£5.00	£3.00
Conscious Sedation: A Referral Guide for Dentists	50p	50p	£1.00

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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-orientated (in other words written to appeal to the readership of any interested in pain and anxiety control in Dentistry) and designed to inform, add to discussion or debate, or entertain. Research papers should also have appropriate study methods, valid data and conclusions that are supported by the data.

Publication Schedule

The following annual publication schedule is provided for guidance only and assumes a Digest publication date of January Year 01.

August Year -1 > July 31st Year 00: Articles may be submitted for Jan 01 Edition

August 1st 00: Submission for Jan 01 edition closed. (Articles submitted after 31st July will be considered for Year 02 Edition)

Submission and review

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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.

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Authors will be advised as soon as possible, that either their Paper….
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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).

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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.

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Examples of reference styles

Reference to an article

1. Molar L R, Fang-Jones Q, Jaw U. Are Teeth biting back?. Br Dent J 2006; 200: 144-146.

Reference to a book

2. Craig D C, Skelly A M. Practical Conscious Sedation. 1st ed. London: Quintessence, 2004.

Reference to a book chapter

3. Robb N D. Conscious sedation in Dentistry. In Heasman PA (ed) Master Dentistry. Vol. 2; Restorative Dentistry, Paediatric Dentistry and Orthodontics. pp 149-168. Edinburgh: Churchill Livingstone, 2003.

Reference to a report

4. Re-accreditation and re-certification for the dental profession. London: General Dental Council, 1997.

Reference to a webpage

3. General Dental Council. Scope of practice. 2009. Online information available at www.gdc-uk.org/Newsandpublications/Publications/Publications/Scopeofpractice April2009[1].pdf (accessed April 2012).

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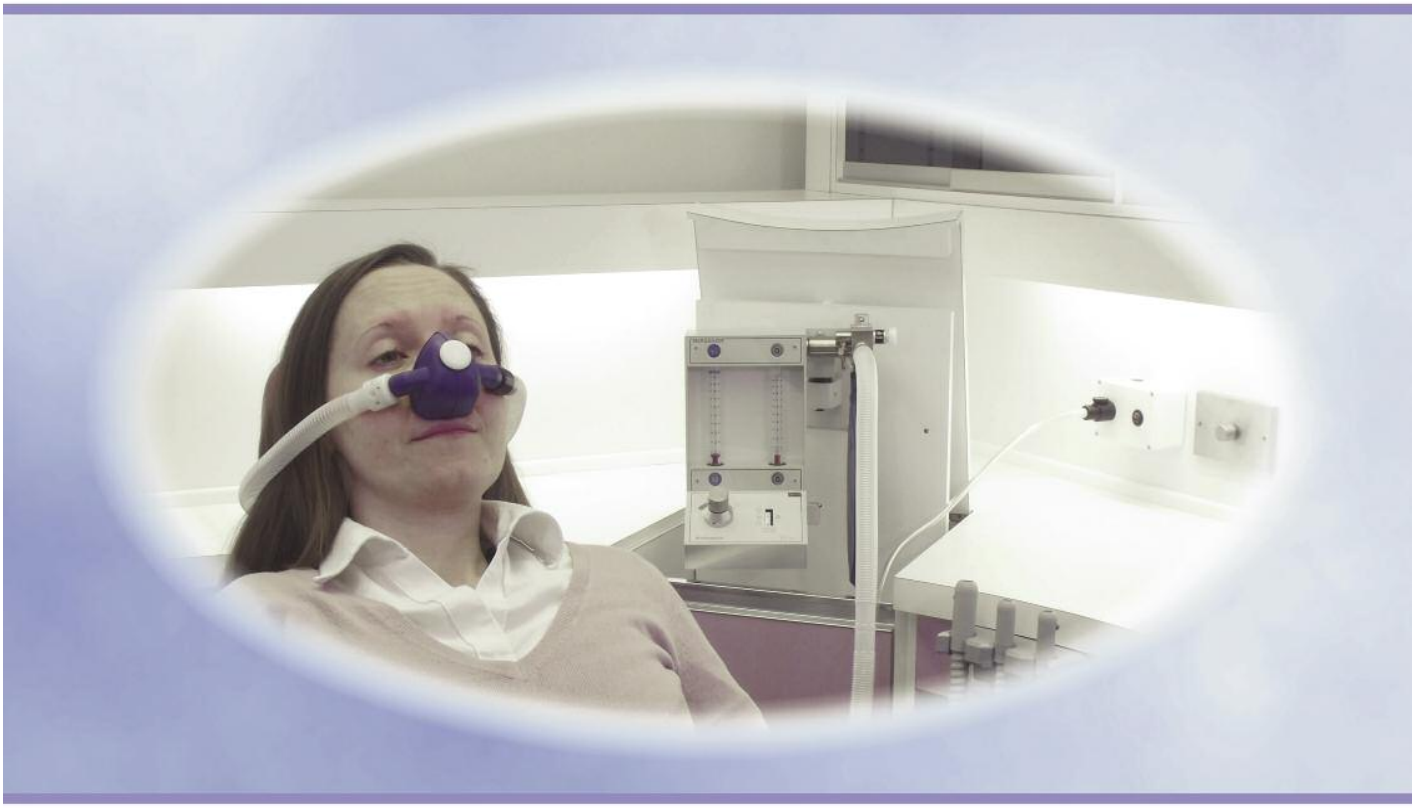

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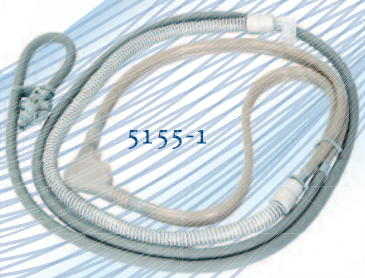

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DIARY SCAN Compiled by Dr C E Mercer

2015	DATE	ORGANISATION	THEME/TITLE	VENUE	CONTACT
FEBRUARY					
	20-21	ADSA	Las Vegas Meetings	Aria Hotel and Casino Las Vegas	www.adsahome.org/vegas2.html
	21-22	SAAD	Dental Nurse Part II Course	London	www.saad.org.uk/courses/online-registration-dates-times-costs/
MARCH					
	7-8	SAAD	National Course in Conscious Sedation for Dentistry (inc nurses)	London	www.saad.org.uk/courses/online-registration-dates-times-costs/
	8-9	SAAD	Inhalation Sedation Course for Dental Therapists/ Hygienists	London	www.saad.org.uk/courses/online-registration-dates-times-costs/
	9	Society for Education in Anaesthesia (UK)	Annual Scientific Meeting	Radisson Blu Birmingham, UK	www.seauk.org/?q=node/8
APRIL					
	21-23	British Pain Society	Annual Scientific Meeting	Manchester Central, Manchester UK	www.britishpainsociety.org/2015asm/index.htm
	23-25	ADSA	Annual Session	JW Marriott Austin, Texas	www.adsahome.org/annual1.html
	29-2 May	NWAC	World Anaesthesia Convention VI	Vancouver, Canada	www.nwac.org
MAY					
	19	DSTG	Annual Symposium	Royal Society of Medicine 1 Wimpole St, London W1	www.dstg.co.uk/meetings
	30-2 June	ESA	Euroanaesthesia 2015	Berlin, Germany	www.esahg.org/congresses/euroanaesthesia2015
JUNE					
	17-19	GAT	Annual Scientific Meeting	Manchester	www.aagbi.org/education/events/conferences
	13-14	SAAD	National Course in Conscious Sedation in Dentistry (inc nurses and Inhalation Sedation Course for hygienists and therapists)	London	www.saad.org.uk/courses/online-registration-dates-times-costs/
AUGUST					
	24-26	World Institute of Pain	20th Pain Conference and Practical Workshop	Kempinski Corvinus Hotel Budapest, Hungary	www.worldinstituteofpain.org/site/pages.php?pageid=32
SEPTEMBER					
	2-5	ESRA	34th ESRA Conference	Ljubljana, Slovenia	www.esra2015.kenes.com
	5-6	SAAD	Dental Nurse Part II Course	London	www.saad.org.uk/courses/online-registration-dates-times-costs/
	17-19	ESPA	7th European Congress on Paediatric Anaesthesia	Wow Hotel, Istanbul	www.euroespa.com
	23-25	AAGBI	Annual Congress	Edinburgh, Scotland	www.aagbi.org/education/event/1896
OCTOBER					
	3	SAAD	Annual Symposium & AGM	Royal Society of Medicine 1 Wimpole St, London W1	www.saad.org.uk
	8-10	IFDAS	IFDAS 2015	Berlin, Germany	www.ifdas.org
NOVEMBER					
	5-10	American Dental Association	156th Annual Session	Washington DC	www.ada.org/en/meeting/attendee-information/future-meetings/
	7-8	SAAD	National Course in Conscious Sedation for Dentistry (inc nurses)	London	www.saad.org.uk/courses/online-registration-dates-times-costs/
	26-27	SIVA	Annual Scientific Meeting	Newcastle on Tyne	www.siva.ac.uk
DECEMBER					
	5-7	ADSA	Chicago Review	Swissotel, Chicago, USA	www.adsahome.org/chicago.html