



Dee McDonnell-Boudra

Amy Martin and Iyad Hussein

In Vivo Exposure Therapy for the Treatment of an Adult Needle Phobic

Abstract: Dental anxiety is a widespread problem. Behavioural interventions are effective in reducing dental anxiety and dentists are well placed to carry out these interventions. This article aims to familiarize dentists with simple behavioural techniques that can be used to treat patients presenting with dental anxiety. A case study detailing the assessment and treatment of an uncomplicated needle phobia using *in vivo* graded exposure is included in order to demonstrate the use of these techniques.

Clinical Relevance: Familiarity with simple, behavioural interventions for dental anxiety will enable dentists to respond appropriately to patients who present with mild fear and anxiety. Early intervention may play a role in the reduction of phobic anxiety in the dental setting. Dentists with an interest in behavioural management may also wish to treat patients with uncomplicated dental phobia.

Dent Update 2014; 41: 533–540

Fear of dentistry and the inability to receive routine dental treatment due to dental anxiety are widespread problems.¹ Of adults in the UK, 36% experience moderate dental anxiety and 12% experience extreme dental anxiety.²

The terms dental anxiety and dental phobia are often used interchangeably. However, there are important differences between the two. Dental phobia is classified as a 'Specific Phobia'. This is a '*marked and persistent fear of clearly discernible, circumscribed objects or situations*'.³ Patients are aware that their fear

is excessive and irrational, and the phobic stimulus is avoided at all costs or endured with great distress. The main difference between dental anxiety and dental phobia is the impact it has on normal functioning. In order to be classified as a dental phobia, the avoidance, anxious anticipation or distress in feared situations has to interfere significantly with the individual's occupational or social functioning.

Behavioural approaches have been shown to be effective in the treatment of dental anxiety.⁴⁻⁷ Considering the scope of the problem, a better knowledge of simple behavioural management techniques may improve dental care for the majority of dentally anxious patients.

Aetiology of dental anxiety

The aetiology of dental anxiety is not always clear. No single biological or psychological theory fully explains the development of anxiety disorders.⁸ However, it is generally accepted that phobias are learned fears. Dental phobia has been linked to early conditioning experiences, such as traumatic or painful dentistry, or vicarious learning (when the fear is learned by observing the fear of others).⁹

Treatment for dental anxiety

Treating specific phobias using behavioural interventions has been considered one of the success stories in the field of psychiatric treatment.¹⁰ Unfortunately, within the field of dental anxiety research, it has been difficult to draw definitive conclusions regarding the relative effectiveness of various treatments. However, evidence suggests that the most robust treatment for uncomplicated dental phobia is graded exposure to the fear-provoking stimulus.¹¹ This treatment is based on Wolpe's theory of reciprocal inhibition whereby patients learn to relax the voluntary muscles during gradual exposure to fear-provoking stimuli.¹²

Predictors of successful outcomes using behavioural interventions

Behavioural interventions have a reported success rate ranging from 70–80% in the treatment of dental anxiety.¹³ Dentists who wish to treat anxious patients using behavioural interventions should be aware of factors predicting who is likely to respond to treatment and who may need more specialist intervention.

Dee McDonnell-Boudra, MA(Hons), DClinPsychol, Clinical Psychologist/Honorary Clinical Teaching Fellow, Department of Special Care Dentistry, **Amy Martin**, BDS, MFDS RCPS(Glasg), MSCD RCS(Ed), DipConSed (Nwcl), Specialty Dentist in Special Care Dentistry and Dental Anxiety/Honorary Lecturer, **Iyad Hussein**, DDS, MDentSci(Leeds), StatExam(GDC), Specialist in Paediatric Dentistry/Clinical Lecturer, Dundee Dental Hospital and School, Park Place, Dundee, DD1 4HR, UK.

Research findings suggest that patients are significantly more likely to maintain regular dental attendance following treatment for their dental anxiety if they are treated by dentists who received supervised training in exposure treatment from a psychologist.¹⁴ On the other hand, additional psychopathology, general psychological distress, and low motivation predict poorer outcomes for behavioural interventions aimed at reducing dental anxiety.¹⁵⁻¹⁸ As behavioural treatments for dental phobia have a good chance of providing some relief for most patients, the presence of co-morbid psychological problems is not a reason for withholding treatment. Instead, patients should be referred to psychiatric or psychological services so that their difficulties can be addressed in a more specialist setting. Pharmacological methods should be considered for patients reporting low motivation to overcome their anxiety, as they may be less likely to engage in behavioural interventions aimed at reducing their anxiety.

Guidelines for carrying out graded exposure

Graded exposure involves presenting a patient with anxiety-inducing stimuli in an incremental fashion in order to reduce the intensity of their emotional response. The following procedures should be adhered to in order to promote the efficacy of exposure. Patients are first taught relaxation techniques and then develop a hierarchy of fear-inducing tasks, starting from the least anxiety-provoking aspect of treatment to the most anxiety-provoking. Patients are introduced to the least anxiety-provoking aspect of treatment and, once they are able to tolerate this, they progress through the hierarchy until they are able to tolerate the most feared part of treatment.

Treatment sessions should last for at least 30–60 minutes and tasks should be repeated frequently and regularly until they provoke little or no anxiety.^{19,20} The clinician should ensure that the patient experiences some anxiety, but unmanageable anxiety levels should be avoided. It is important that the patient does not leave the surgery in a state of high anxiety. If a practice task becomes

too distressing, the patient can return to the preceding task and continue exposure until anxiety levels are suitably reduced.

Clinicians should remember to ask patients to rate their anxiety after every exposure. This allows clinicians to gauge when to move on to more challenging tasks, and draws the patients' attention to the effectiveness of exposure. Treatment works best if the patient practises exposure between sessions. This may involve practising relaxation and looking at pictures or videos of fear-inducing stimuli.

Dentists are well placed to carry out exposure-based treatments aimed at reducing dental anxiety.²¹ These methods can be used in one session with patients presenting with mild forms of dental anxiety, and may prevent the exacerbation of fears among individuals at risk of developing dental phobia. Patients presenting with uncomplicated phobias may also be treated by dentists, but treatment may need to be carried out over a series of appointments. The following case describes the use of *in vivo* graded exposure in the treatment of a young woman presenting with a needle phobia.

Case study

Miss B, a 20-year-old civil servant, was referred to the Department of Special Care Dentistry at Dundee Dental Hospital by her general dental practitioner (GDP). She attended for regular, six-monthly appointments with her GDP but had never needed treatment. At her most recent check-up, bite-wing radiographs revealed interproximal caries on the UL6 mesial.

When she attended for treatment, her GDP discovered that Miss B was extremely anxious about needles. Despite his best efforts, he could not administer local anaesthetic and had to abandon treatment. Miss B explained that she had needed sedation to have blood taken at a recent visit to her GP, firstly and unsuccessfully with oral diazepam and then by inhalation sedation.

Miss B's GDP referred her, requesting treatment by whichever method was deemed appropriate.

Session 1

Miss B reported being anxious about needles for as long as she could

remember. She did not recall a triggering incident. She rated her fear of needles as 10/10 on a scale from 0–10, where 10 is extremely anxious. Her fear of needles had remained stable over time. She was free from symptoms of anxiety unless she was thinking about an upcoming appointment with her dentist or doctor. She reported shaking, increased perspiration, palpitations, and hyperventilation when she was thinking about, or confronted with, a needle. She denied any specific catastrophic thoughts regarding needles. Despite her anxiety she did not avoid dental or medical appointments because she was concerned about the impact this would have on her health. However, she endured these appointments with dread, which only abated if she discovered that she did not need treatment that required needles. She was aware that her fear was irrational and she felt frustrated with herself for being unable to control her anxiety.

Miss B was not aware of any family members with a fear of needles, and she denied any other fears or phobias. She denied a history of mental health problems in herself or in her family. She reported good social support and a generally cheerful disposition. She enjoyed her job and had a number of hobbies and interests. She particularly enjoyed travelling but was unable to contemplate visiting destinations that required her to have immunizations. She generally coped well with stress, which added to her frustration at her inability to manage her anxiety regarding needles. She reported no current stressors or significant life events.

Miss B rated her motivation to overcome her fear of needles as 8/10 on a scale from 0–10, where 10 is very motivated. She completed the Modified Dental Anxiety Scale (MDAS). The MDAS is a widely used questionnaire measuring dental anxiety. It comprises five questions assessing patients' responses to a variety of dental situations. Responses for each question are scored from one (not anxious) to five (extremely anxious), giving a range of scores from 5–25. The average score among groups of patients from different countries is 11.3, with respondents who scored 19 or above being classed as extremely dentally anxious, or phobic.²² Miss B scored 21/25. Upon questioning, she explained that she was not anxious about any other aspect of dentistry,

with the exception of local anaesthetic. Although she had indicated on the MDAS that she would be extremely anxious if visiting her dentist for treatment tomorrow or while waiting in the waiting room, this anxiety related to her anticipation of needing local anaesthetic. In addition, her response to the question regarding having a tooth drilled indicated that she was extremely anxious, but she explained that this was because drilling probably required local anaesthetic to be administered first (Table 1).

Miss B was advised that she was suffering from a needle phobia. She was given information regarding the development of phobias, what maintained them and how they are treated. Specifically, it was explained that phobias are learned fears that are maintained through avoidance. As such, patients do not learn

strategies for coping with their fear, or recognize that their fear may be unfounded.

Treatment of phobias involves learning coping strategies to manage fear and gradual exposure to the phobic stimulus. In this way, patients can learn that fear dissipates after repeated exposures and they can learn to relax in previously anxiety-provoking situations. Miss B indicated that she was happy to commence treatment and a further appointment was arranged.

Session 2

Miss B was taught diaphragmatic breathing and the rationale for this exercise. It was explained that anxiety caused an increase in heart rate and respiration. In addition, when people are anxious they sometimes hold their breath or hyperventilate, both of which exacerbate the anxiety response. Focusing on taking

slow, deep breaths counteracts the anxiety response. Miss B was asked to place her hands on her abdomen and to inhale through her nose for four seconds and exhale through her mouth for five seconds. She was asked to observe the movement of her abdomen and to ensure that it rose when she inhaled and fell when she exhaled. She was encouraged to practise with her eyes closed until she felt relaxed and comfortable with the technique.

Miss B was then taught progressive muscular relaxation. It was explained that muscular tension is associated with anxiety and that learning to reduce this tension can reduce anxiety. The technique involves tensing and relaxing all of the major muscle groups in a sequential fashion and concentrating on the difference between the feelings of tension and relaxation. Miss B was asked to lie back in

CAN YOU TELL US HOW ANXIOUS YOU GET, IF AT ALL, WITH YOUR DENTAL VISIT? PLEASE INDICATE BY INSERTING 'X' IN THE APPROPRIATE BOX				
If you went to your Dentist for TREATMENT TOMORROW, how would you feel?				
<input type="checkbox"/> Not Anxious	<input type="checkbox"/> Slightly Anxious	<input type="checkbox"/> Fairly Anxious	<input type="checkbox"/> Very Anxious	<input type="checkbox"/> Extremely Anxious
If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?				
<input type="checkbox"/> Not Anxious	<input type="checkbox"/> Slightly Anxious	<input type="checkbox"/> Fairly Anxious	<input type="checkbox"/> Very Anxious	<input type="checkbox"/> Extremely Anxious
If you were about to have a TOOTH DRILLED, how would you feel?				
<input type="checkbox"/> Not Anxious	<input type="checkbox"/> Slightly Anxious	<input type="checkbox"/> Fairly Anxious	<input type="checkbox"/> Very Anxious	<input type="checkbox"/> Extremely Anxious
If you were about to have your TEETH SCALED AND POLISHED, how would you feel?				
<input type="checkbox"/> Not Anxious	<input type="checkbox"/> Slightly Anxious	<input type="checkbox"/> Fairly Anxious	<input type="checkbox"/> Very Anxious	<input type="checkbox"/> Extremely Anxious
If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?				
<input type="checkbox"/> Not Anxious	<input type="checkbox"/> Slightly Anxious	<input type="checkbox"/> Fairly Anxious	<input type="checkbox"/> Very Anxious	<input type="checkbox"/> Extremely Anxious

Table 1. Modified Dental Anxiety Scale.²⁸

the dental chair and close her eyes. She first focused on her breathing and was then instructed to begin tensing the muscles in her feet as she inhaled. She was asked to hold the tension for 10 seconds and to release the tension for 20 seconds upon exhalation. She progressed in this way, moving up through her legs, abdomen, arms, hands, shoulders and face until she felt completely relaxed.

Miss B was encouraged to practise these techniques at home on a daily basis. She was reminded that, in the sessions that followed, she would learn to replace feelings of anxiety with relaxation as she moved through a hierarchy of gradually more anxiety-provoking tasks. She was assured that she would not move on to more challenging tasks until she felt relaxed during the previous task and was reporting anxiety levels of 3/10 or less. If she felt that a particular task was too overwhelming, she could raise her hand to indicate that she would like to stop, and she could return to the preceding task until she felt relaxed again.

Session 3

Miss B was asked about her practice of relaxation since the last session. She reported daily practice for approximately ten minutes each night before bed. She reported that she had mastered the technique and felt ready to commence exposure to needles.

Miss B was introduced to *in vivo* graded exposure. It was explained that each task would be broken down into 3, 5 and 10 second exposures and that the time would not increase unless she felt relaxed. She would be asked to rate her anxiety after each exposure, and encouraged to practise her relaxation techniques throughout exposure. She was encouraged to ask questions at any point during treatment.

Miss B was introduced to the component parts of the dental syringe, and their functions were explained. The syringe was assembled and Miss B was allowed to handle it. She was asked to rate her anxiety. She reported anxiety of 6/10. She was encouraged to practise relaxation while the clinician explained the length and flexibility of the needle. She was informed that, for a normal infiltration, only the tip of the needle had to be inserted and that topical

anaesthetic would be applied to the area before injection. Topical anaesthetic was applied to the buccal sulcus and its efficacy demonstrated by touching the treated area and comparing the sensation to an untreated area on the corresponding side of the mouth. Following this exposure, Miss B rated her anxiety as 2/10.

Miss B was asked to think about how close she could come to an unsheathed needle with the safety cap still on. She was given a variety of options including touching a fingernail, elbow, shoulder, chin, lip, anterior tooth or the gingiva beside the UR4. She opted for a 3 second exposure on her shoulder and rated her anxiety as 6/10. This fell to 3/10 following repeated 3 second exposures. Treatment continued in this way with repeated exposures of 5 and 10 seconds on her shoulder, progressing once an anxiety rating of 3 or less was reported. She was then able to progress to cap-on exposure on her chin for 3, 5 and 10 seconds. The clinician explained that it was important to simulate what would take place if she were actually receiving an infiltration, so the chair was reclined and the chair light positioned accordingly before commencing cap-on exposure on her chin. Anxiety peaked at 5/10 and fell to 2/10. She was coached to use her breathing and relaxation techniques throughout exposure.

At the end of her first exposure session, Miss B's attention was drawn to the efficacy of exposure therapy in reducing anxiety, and her coping was praised. It was agreed that at the next session she would start with cap-on exposure on her chin to consolidate what she had learned, and would progress at her pace until she was able to receive an infiltration.

Session 4

Miss B decided she was able to start with cap-on exposure on her chin for 5 seconds. The chair and light were positioned before exposure began. Her anxiety peaked at 5/10 and fell to 3/10 after repeated exposures. She moved on to cap-on exposure on her chin for 10 seconds and her anxiety remained below 3/10. She quickly progressed to being able to tolerate the capped needle on her gingiva beside her UR4. The importance of simulating a real-life situation was reinforced and

therefore topical anaesthetic was applied to her gingiva before commencing cap-on exposure for 3, 5 and 10 seconds. During exposure, Miss B's anxiety peaked at 5/10 and fell below 3/10.

The clinician explained that exposure would continue in the same way, but this time the cap would be removed from the needle. Miss B decided that she would be able to tolerate cap-off exposure on her chin for 3 seconds. Her anxiety peaked at 4/10. When her anxiety had reduced to 3/10, exposure continued for 5 and 10 seconds. At this point she felt unable to tolerate the needle resting flat on her gingiva but decided she could try this on an anterior tooth. Anxiety remained below 3/10 during 3, 5 and 10 second exposures. Miss B progressed to cap-off exposure on the gingiva. Topical anaesthetic was applied and repeated exposures continued for 3, 5 and 10 seconds. Miss B reported that her anxiety peaked at 4/10 and quickly fell to 3/10. She reported confidence in her ability to manage her anxiety. The clinician explained that at the next visit she would practise cap-off exposure on her gingiva and progress to an infiltration when she felt ready to do so.

Session 5

Miss B felt able to begin cap-off exposure on her gingiva. The chair was positioned and topical anaesthetic applied. Miss B's anxiety peaked at 6/10 and quickly reduced to 3/10. The clinician explained that the next step was to give her a short infiltration. More topical anaesthetic would be applied and the infiltration would last for three seconds. Miss B was reminded that she could raise her hand at any point if she felt unable to continue. She was encouraged to think about how quickly her anxiety had reduced since her first visit, using graded exposure. She was advised that it was normal for patients to find this part of the procedure the most difficult, and she was encouraged to focus on her anxiety management strategies. Miss B agreed to continue, and she successfully tolerated a 3 second infiltration beside her UR4. She reported that her anxiety had peaked at 8/10 just before the infiltration and fell to 4/10 afterwards. The clinician drew Miss B's attention to the fact that her anticipatory anxiety was much worse than the anxiety

she experienced just after the infiltration. Exposure continued for 3 seconds until her anxiety fell to 3 or below and she moved on in this way until she was able to tolerate repeated 10 second infiltrations while experiencing no anxiety.

Miss B was delighted with her achievement. The clinician explained that at her next visit she would receive an infiltration and her restoration would be completed.

Session 6

Miss B's restoration was completed successfully. During the infiltration her anxiety peaked at 4/10 and fell to 3/10. Following treatment she completed the MDAS and scored 8/25. She was referred back to her GDP. The referral letter included a brief summary of the strategies used to help Miss B reduce her anxiety. Strategies such as a timed infiltration would help Miss B manage any residual anxiety she might experience if she required an infiltration in the future.

Miss B was delighted with her ability to manage her dental anxiety following treatment using graded exposure. She attributed her success to being able to learn strategies to manage her fear and the opportunity to confront her fear of needles in an incremental fashion. She was confident that she would be able to have dental treatment carried out in general practice in the future.

A summary of Miss B's treatment using graded exposure is shown in Table 2. It must be emphasized that this is an example of the process. More or fewer sessions may be required depending upon the patient's particular circumstances.

Discussion

Despite the relative success of behavioural therapies in the treatment of a range of phobias, the lack of availability of such treatment remains a significant barrier to its use in the field of dental anxiety.²³ More collaboration between dentists and psychologists is necessary in order to ensure that patients are able to access the full range of treatment options available to treat their dental anxiety. This is supported by the suggestion that dentally anxious patients deem psychological approaches to be an acceptable form of treatment for their

difficulties.²⁴

Saeed²⁵ and colleagues suggest that, although some dentists report using a wide variety of behaviour management techniques, this use is not underpinned by a detailed understanding of the underlying principles upon which these techniques are based. This may have significant implications for the effectiveness of the techniques being used. Furthermore, there is still limited opportunity to gain actual clinical experience in the assessment and psychological management of dental anxiety within dental schools.²⁶ In addition, dentists report not using psychological

techniques to treat dental anxiety owing to the lack of time available in practice, a shortage of confidence in using the techniques, the lack of fees available under NHS regulations, and feeling stressed while treating anxious patients.²⁷

In order to work towards reducing the number of individuals who develop dental anxiety and treating those with established dental anxiety, it is imperative that greater emphasis is placed on the teaching of psychological treatment methods, and that dentists have an opportunity to practise these skills at undergraduate and postgraduate level.

Session 1	<ul style="list-style-type: none"> ■ Assessment of patient's difficulties. ■ Explanation of patient's difficulties including how phobias develop and are maintained. ■ Explanation of graded exposure.
Session 2	<ul style="list-style-type: none"> ■ Teach coping strategies (diaphragmatic breathing and progressive muscular relaxation). ■ Reinforce rationale for graded exposure.
Session 3	<p>Graded exposure:</p> <ul style="list-style-type: none"> ■ Component parts of dental syringe explained. ■ Look at and handle assembled syringe. ■ Cap-on exposure on shoulder (3, 5 & 10 seconds). ■ Cap-on exposure on chin (3, 5 & 10 seconds).
Session 4	<p>Graded exposure:</p> <ul style="list-style-type: none"> ■ Cap-on exposure on chin (3, 5 & 10 seconds). ■ Cap-on exposure on gingiva (3, 5 & 10 seconds). ■ Cap-off exposure on chin (3, 5 & 10 seconds). ■ Cap-off exposure on anterior tooth (3, 5 & 10 seconds). ■ Cap-off exposure on gingiva (3, 5 & 10 seconds).
Session 5	<p>Graded exposure:</p> <ul style="list-style-type: none"> ■ Cap-off exposure on gingiva (3, 5 & 10 seconds). ■ Timed infiltration (3, 5 & 10 seconds).
Session 6	<ul style="list-style-type: none"> ■ Complete restoration.

Table 2. Summary of treatment using graded exposure to treat a needle phobia.

This will help dentists become more knowledgeable and confident when treating dentally anxious patients.

Although time and financial constraints may mitigate against treating phobic patients in NHS practice, the techniques described above could be used quickly and easily to treat individuals with mild forms of anxiety. Suitably trained dentists working in private practice, who wish to treat uncomplicated, highly motivated phobic patients using behavioural management techniques, may be concerned that the cost of treatment might deter patients. However, it is worth bearing in mind that the potential cost of this type of treatment may not differ significantly from what clinical psychologists working in private practice routinely charge for treating phobic patients using behavioural techniques.

Conclusion

Behavioural techniques are effective in reducing dental anxiety for the majority of patients. Dentists who choose to familiarize themselves with these techniques may be able to play a role in preventing phobic anxiety in patients presenting with mild fear or anxiety. Using strategies, such as timed infiltrations or timed drilling to introduce patients to treatment, may ultimately facilitate quicker treatment, boost patients' confidence and reduce anxiety.

Dentists may also wish to use strategies such as graded exposure to treat patients with uncomplicated, specific phobias. Although this form of treatment may take longer to execute, it can be immensely rewarding for both dentists and their patients.

References

- Bernson JM, Hallberg LR-M, Elfström ML, Hakeberg M. 'Making dental care possible – a mutual affair'. A grounded theory relating to adult patients with dental fear and regular dental treatment. *Eur J Oral Sci* 2011; **119**: 373–380.
- Hill KB, Chadwick B, Freeman R, O'Sullivan I, Murray JJ. Adult Dental Health Survey 2009: relationships between dental attendance patterns, oral health behaviour and the current barriers to dental care. *Br Dent J* 2013; **214**(1): 25–32.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders IV*. New York: American Psychiatric Association, 1994.
- Kvale G, Berggren U, Milgrom P. Dental fear in adults: a meta-analysis of behavioural interventions. *Community Dent Oral Epidemiol* 2004; **32**(4): 250–264.
- Willumsen T, Vassend O, Hoffart A. One-year follow-up of patients treated for dental fear: effects of cognitive therapy, applied relaxation, and nitrous oxide sedation. *Acta Odontol Scand* 2001; **59**: 335–340.
- Getka EJ, Glass CR. Behavioural and cognitive-behavioural approaches to the reduction of dental anxiety. *Behav Ther* 1992; **23**: 433–448.
- Wide Boman U, Carlsson V, Westin M, Hakeberg M. Psychological treatment of dental anxiety among adults: a systematic review. *Eur J Oral Sci* 2013; **121**: 225–234.
- Little JW. Anxiety disorders: dental implications. *Gen Dent* 2003; **51**(6): 562–568.
- Berggren U, Carlsson S. A psychological therapy for dental fear. *Behav Res Ther* 1984; **5**: 487–492.
- Choy Y, Fyer AJ, Lipsitz JD. Treatment of specific phobia in adults. *Clin Psychol Rev* 2007; **27**: 226–286.
- Aartmann IHA, De Jongh A, Makkes PC, Hoogstraten J. Treatment modalities in a dental fear clinic and the relation with general psychopathology and oral health variables. *Br Dent J* 1999; **186**: 467–471.
- Wolitzky-Taylor KB, Horowitz JD, Powers MB, Telch MJ. Psychological approaches in the treatment of specific phobias: a meta-analysis. *Clin Psychol Rev* 2008; **28**: 1021–1037.
- Berggren U. Long-term management of the fearful adult patient using behaviour modification and other modalities. *J Dent Educ* 2001; **65**(12): 1357–1368.
- Kvale G, Raadal M, Vika M, Johnsen BH, Skaret E, Vatnelid, H, Øiamo I. Treatment of dental anxiety disorders. Outcomes related to DSM-IV diagnoses. *Eur J Oral Sci* 2002; **110**: 69–74.
- Berggren U, Carlsson SG. Usefulness of two psychometric scales in Swedish patients with severe dental fear. *Community Dent Oral Epidemiol* 1985; **13**: 70–74.
- Kleinhaus M, Eli I, Baht R, Shamay D. Correlates of success and failure in behaviour therapy for dental fear. *J Dent Res* 1992; **71**: 1832–1835.
- Berggren U, Hakeberg M, Carlsson SG. Relaxation vs. cognitively orientated therapies for dental fear. *J Dent Res* 2000; **79**: 1645–1651.
- Hägglin C, Carlsson SG, Hakeberg M. On the dynamics of dental fear: dental or mental? *Eur J Oral Sci* 2013; **121**: 235–239.
- Lindsay SJE. Fears and anxiety: treatment. In: *The Handbook of Clinical Adult Psychology*. Lindsay SJE, Powell GE, eds. London: Routledge, 1994: pp172–198.
- Butler G. Phobic disorders. In: *Cognitive Behaviour Therapy for Psychiatric Problems. A Practical Guide*. Hawton K, Salkovskis PM, Kirk J, Clark DM, eds. Oxford: Oxford University Press, 1991: pp97–128.
- De Jongh A, Adair P, Meijerink-Anderson M. Clinical management of dental anxiety: what works for whom? *Int Dent J* 2005; **55**: 73–80.
- Humphris GM, Freeman R, Campbell J, Tuuti H, D'Souza V. Further evidence for the reliability and validity of the Modified Dental Anxiety Scale. *Int Dent J* 2000; **50**(6): 367–370.
- Newton T, Asimakopoulou K, Daly B, Scambler S, Scott S. The management of dental anxiety: time for a sense of proportion? *Br Dent J* 2012; **213**: 271–274.
- Forbes MDL, Boyle CA, Newton T. Acceptability of behavioural therapy for dental phobia. *Community Dent Oral Epidemiol* 2012; **40**: 1–7.
- Saeed MHB, Daly B, Newton JT. Knowledge and practice of behavioural management principles among dentists treating adults with learning disabilities. *Spec Care Dentist* 2012; **32**(5): 190–195.
- Dailey YM, Humphris GM, Lennon MA. The use of dental anxiety questionnaires: a survey of a group of UK dental practitioners. *Br Dent J* 2001; **190**: 450–453.
- Hill KB, Hainsworth JM, Burke FJT, Fairbrother KJ. Evaluation of dentists' perceived needs regarding treatment of the anxious patient. *Br Dent J* 2008; **204**: 1–5.
- Humphris GM, Morrison T, Lindsay SJ. The Modified Dental Anxiety Scale: Validation and United Kingdom Norms. *Community Dent Health* 1995; **12**(3): 143–150.