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### Treating highly anxious dental patients in a dental fear clinic

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# Chapter 1

## INTRODUCTION AND AIM OF THE STUDY

## **Introduction**

Dental anxiety is a frequently encountered phenomenon. A study conducted in 1990 indicated that 22% of Dutch adults of 16 year and older was highly anxious and 4% could even be considered as phobic (Stouthard & Hoogstraten, 1990). Ten years later, it is still safe to say that dental anxiety can pose such a problem for dental patients that they may neglect their oral health or avoid visiting the dentist, both leading to deteriorated oral health.

For most highly anxious adult dental patients it will be possible to be treated without any extensive problems by a general dental practitioner (De Jongh, 1994). However, a relatively small, but substantial part cannot and may seek help in centers for special dental care. In these centers, dentists experienced and trained in the treatment of highly anxious dental patients have the possibility to conduct dental treatment using one of various specific supporting treatment techniques. These techniques can be broadly distinguished in treatment modalities based on a psychological approach and in treatment modes using a pharmacological agent. With regard to the psychological approach, a wide variety of special treatment programs based on behavior therapy, cognitive therapy, or a general psychological approach to highly anxious dental patients has been applied (e.g., Berggren & Carlsson, 1984; De Jongh, Muris, Ter Horst, Van Zuuren, Schoenmakers, & Makkes, 1995; Moore, 1991). An extensive description of most procedures, varying from informational control and time-structuring to distraction and systematic desensitization can be found in Milgrom, Weinstein, and Getz (1995). Reviews of studies assessing the effect of these behavioral management approaches for highly anxious dental patients indicated that they are successful, but no clear differences in efficacy among these methods could be found (Ter Horst & De Wit, 1993; Kent, 1997; Klepac, 1988; Tolksdorf & Siefert, 1992).

Dental treatment can also be conducted utilizing some form of conscious sedation induced by a pharmacological adjunct. In conscious sedation, the patient has a minimally depressed level of consciousness that enables the patient to maintain an airway and respond appropriately to physical stimulation and verbal commands (Kaufman & Jastak, 1995). The most widely used, safe form of conscious sedation is nitrous oxide sedation (NOS; Stach, 1995). The combination of nitrous oxide gas (20-40%) with oxygen used in dentistry is inhaled through a nasal mask in order to reach a

state of general relaxation that can be helpful in reducing the aversiveness of dental procedures.

The use of intravenous sedation (IVS) is a relatively safe alternative to treat patients who have problems accepting conventional dental treatment or treatment using nitrous oxide sedation (Milgrom et al., 1995; Kaufman & Jastak, 1995; Oei-Lim, Kalkman, Makkes, Ooms, & Hoogstraten, 1997; Tolksdorf & Siefert, 1992). Intravenous administration of benzodiazepines, such as diazepam and midazolam, leads to a conscious sleep-induced, anxiety-relieving state that can be reached within a short time with a high degree of controllability (Tolksdorf & Siefert, 1992). A recently introduced drug for conscious IVS, propofol, seems even more appropriate for use in dentistry than the benzodiazepines. This drug has a very rapid induction, a short elimination half-life, a rapid recovery, and as a consequence, the level of sedation is highly controllable (Kaufman & Jastak, 1995; Oei-Lim et al., 1997). In some cases patients receive dental treatment under general anaesthesia (GA), a controlled state of unconsciousness accompanied by partial or complete loss of protective reflexes, including inability to independently maintain an airway and respond to physical stimulation or verbal command (Kaufman & Jastak, 1995).

Studies about the above-mentioned, most widely used, pharmacological procedures mainly dealt with the efficacy of the drug in reducing state dental anxiety of highly anxious dental patients in order to enable them to undergo dental treatment (e.g., Milgrom, Beirne, Fiset, Weinstein, Tay, & Martin, 1993a). Nitrous oxide sedation and IVS using diazepam, midazolam, or propofol have found to be successful in this respect (e.g., review Kaufman & Jastak, 1995). The same applies to the oral administration of sedatives in dental treatment (e.g. Liu et al., 1991), a form of sedation that will not be further discussed here, since its effectiveness has been found to be relatively unpredictable (Kaufman & Jastak, 1995).

In order to provide effective and efficient care for patients in dental fear clinics using both behavioral management techniques (BM) and pharmacological treatment modes (i.e., nitrous oxide sedation (NOS), intravenous sedation (IVS), and general anaesthesia (GA)), it is important to know how these treatment modes relate to treatment outcome. The aim of the present study is to assess outcome of these different treatment modes in a dental fear clinic in terms of dental anxiety and dental attendance after treatment and to determine for which type of patient treatment is most successful. To introduce this topic, outcome studies from clinics using both behavioral and

pharmacological treatment modalities are discussed below, for clinics out- and inside The Netherlands separately. In addition, results of studies that tried to assess correlates of treatment success are given. Finally, the structure of the present thesis is presented.

## **Background**

### *Treatment outcome in dental fear clinics outside The Netherlands*

One of the most important studies comparing a behavioral management approach with a pharmacological treatment mode was conducted in Sweden (Berggren & Linde, 1984). In this study a relatively large sample (n=99) participated in a true experiment, with patients being randomly allocated to either a behavioral management technique (BM) consisting of desensitization in combination with biofeedback training or treatment under general anaesthesia (GA). In the early eighties, the period in which this study was carried out, only a limited number of studies with regard to effectiveness of treatment of highly anxious dental patients in a clinical setting had been carried out. Until then, the most commonly used method for overcoming clinical problems of severe dental anxiety was general anaesthesia, followed by attempts to apply conventional dental treatment (Berggren & Linde, 1984). From this perspective, it was a logical choice to conduct a study in which patients were randomly allocated to either BM or treatment under general anaesthesia, in order to investigate the benefits of the behavioral approach. Patients included in the study had no somatic or psychiatric health problems, they had to accept either of two treatment modes, and after extractions, there had to be at least four cavities left. These cavities were treated in two standardized treatment sessions for each patient after either BM or GA. The dentist rated patients' behavior on a 7-point scale and a score of 4 or higher was considered unsuccessful. At first glance, this study seems to be well designed. However, a number of questions can be raised: alcohol and drug abuse was more common in the GA group than in the BM group, and ten of the 50 BM patients had some treatment under GA because of acute pain before BM started. With respect to the aforementioned success criterion, BM did better than GA. Reduction measured by the Dental Anxiety Scale (DAS; Corah, 1969), the most widely used questionnaire to assess dental anxiety, was also higher in the BM group than in the GA group (see Table 1 for the mean DAS scores of the reported studies in this chapter). There was no difference between the groups with respect to the general dental practitioner's (GDP) rating of patients' treatability in a community clinic. In the discussion it is stated that

the study clearly shows that the BM approach is superior to GA in several respects. Next to the already mentioned results, the BM group revealed better adaptation to the treatment situation in terms of a lower frequency of late cancellations and broken appointments. No mention is made of the pre-treatment differences between the groups.

A two-year follow-up of the patients described in Berggren and Linde (1984) showed that the reduction remained substantial, but there was a slight and statistically significant increase of the mean dental anxiety score compared to the score immediately after treatment in the fear clinic (Berggren, 1986). There was still a difference between the BM and GA group with respect to this reduction in DAS. In addition, the number of patients scoring high on the DAS (>14) was relatively higher in the GA group than in the BM group. Regular dental attendance at two-year follow-up can be considered high; 82.1% of the respondents visited a dentist regularly, this result being again better in the BM group than in the GA group.

In a long-term follow-up study of the same dental fear clinic with other patients (Hakeberg, Berggren, & Carlsson, 1990), patients were randomly allocated to either systematic desensitization (BM) by a psychologist or to treatment after pre-medication with diazepam (P). Ten years later only patients who completed treatment (15 out of 20) were asked to participate in the follow-up. Fourteen patients were assessed. The results indicated that all 6 patients (out of 14) treated with BM were regular attenders. For the P group, 5 patients visited a GDP regularly and 3 did not. Median DAS score at follow-up was 12 for the total group. Other outcome measures, such as physiological indices, did not reach statistical significance (Carlsson, Linde, Berggren, & Harrison, 1986).

In 1977, 29 adult patients of the Swedish clinic were assigned to behavioral management (BM) using modified systematic desensitization and biofeedback, pre-medication with benzodiazepine, and general anaesthesia (Hakeberg, Berggren, Carlsson, & Gröndahl, 1993). These patients were followed up ten years later. Dental anxiety measured with the DAS revealed a reduction, however, not among the GA patients. In addition, the BM group showed a statistically significant higher proportion of regular attenders than the GA group. Even dental health of GA patients was worse than of BM patients ten years later.

Subjects in a study by Hammarstrand, Berggren, and Hakeberg (1995) were 22 female patients randomly allocated to two treatment modes without pharmacological

adjuncts, i.e., hypnotherapy (BM-HT) and a “psychophysiological treatment” consisting of muscle relaxation, gradual exposure and biofeedback (BM-PP). Eleven female patients treated under GA served as a control group. It is not clear whether these control patients were randomly allocated to GA or were treated with GA on the basis of a clinical decision. There were no statistically significant differences found with regard to the DAS between the experimental and GA group.

Results of treatment in a Norwegian dental fear clinic are provided in the thesis of Willumsen (1999). She describes a randomized clinical trial in which 62 patients who met specific inclusion criteria were allocated to NOS, cognitive therapy or applied relaxation. The results suggest that treatment with psychological methods has advantages above treatment with NOS. Regrettably, statistical power was insufficient to assess treatment mode differences in a more convincing way. Another disadvantage of this study is the limited possibility to generalize results. Of the initial 133 patients interested in treatment at the dental fear clinic, only 62 remained. Thus, it seems that results cannot be generalized to all patients applying for treatment at such clinics.

The largest dental fear clinic in the USA is the Dental Fears Research Clinic in Seattle. In general, patients are treated here with a BM approach, varying from time-structuring to relaxation and systematic desensitization, sometimes supported by NOS or IVS. The clinicians working in this clinic assimilated their experiences in a patient management book (Milgrom et al., 1995). Enneking, Milgrom, Weinstein, and Getz (1992) analyzed 111 patient records to assess treatment outcome in terms of completion of the first phase of the dental treatment plan and relapse because of additional psychological treatment. The results indicated that patients who received NOS as an adjunct relapsed less. Too few patients were treated with IVS to compare them with patients treated with a BM approach or NOS.

Next, Goodall, File, Sanders, and Skelly (1994a) conducted their research in a hospital sedation unit in the United Kingdom where highly anxious dental patients were treated with either NOS or IVS. Of a sample of 101 patients, it was possible to randomly allocate 61 patients. The remaining 40 patients were clinically allocated to NOS or IVS on the basis of their preference or clinical contra-indications. Clinically allocated patients appeared to have higher levels of dental anxiety at baseline. Although no post-treatment differences were found between the two treatment modes, there were differences in irritability level during treatment, indicating an advantage of

NOS above IVS. There was no evidence to suggest that patients clinically allocated to IVS did any better than patients randomly allocated.

Table 1 Means and standard deviations (or medians given in italics) on the DAS before and after treatment and at follow-up for the studies mentioned in this chapter

Study	Group	Before treatment	After treatment	Follow-up
<i>outside The Netherlands</i>				
Berggren & Linde (1984)	BM (n=50)	18.2 ± 2.3	8.3 ± 3.2	
	GA (n=49)	18.8 ± 1.8	10.8 ± 2.5	
Berggren (1986)	BM (n=44)	18.1 ± 2.4	7.7 ± 2.9	9.1 ± 4.2
	GA (n=40)	19.0 ± 1.5	10.6 ± 2.8	12.2 ± 4.2
Hakeberg et al. (1990)	BM (n=6)	<i>15.5</i>	8	<i>11</i>
	P (n=6)	<i>17</i>	<i>15</i>	<i>12</i>
Hakeberg et al. (1993)	BM (n=12)	<i>16.5</i>		<i>12</i>
	Pre-m (n=8)	<i>18</i>		<i>12</i>
	GA (n=9)	<i>18</i>		<i>16</i>
Hammarstrand et al. (1995)	BM-PP (n=8)	<i>16</i>	8.5	
	BM-HT (n=5)	<i>20</i>	7	
	GA (n=11)	<i>16</i>	<i>11</i>	
Willumsen (1999)	NO (n=21)	17.0 ± 3.1	10.0 ± 3.1	
	CT (n=21)	17.0 ± 3.0	9.3 ± 2.9	
	AR (n=20)	17.8 ± 2.4	8.1 ± 1.9	
<i>inside The Netherlands</i>				
Makkes et al. (1987)	Total (n=60)	17		11
Van der Zijpp et al. (1996)	Total (n=208)	17.8 ± 2.7		14.1 ± 3.8

#### *Treatment outcome in dental fear clinics in The Netherlands*

The first study with regard to the effectiveness of treatment in a dental fear clinic in The Netherlands was conducted in the clinic that also took part in the studies discussed in the present thesis (Makkes, Schuurs, Thoden van Velzen, Duivenvoorden, & Verhage, 1987). This clinic, the Center for Special Dental Care in Amsterdam (SBT), is the largest dental fear clinic in the Netherlands. In the above-mentioned study, 60 highly anxious adult dental patients were treated with behavioral management techniques, i.e., an empathic attitude of the dental team and graduated exposure, supported when needed with nitrous oxide sedation. There was a reduction of DAS scores and this reduction maintained at the same level six months later.



In December 1993, Van der Zijpp, Ter Horst, De Jongh, & Makkes (1996) sent questionnaires to 332 patients who were treated with a BM approach, with NOS, IVS or under GA. Treatment modes were not compared with respect to DAS scores, but with respect to the course of treatment. It was found that patients that quitted treatment were treated more often with a BM approach than with NOS. Dental attendance was assessed in different ways. 39% of the patients still visited the dental fear clinic. Of patients that did not visit the SBT anymore, 53% visited a GDP regularly, 11% irregularly, and 36% had not visited one yet. Excluding patients that finished treatment less than 6 months ago at the SBT, 64% visited a GDP regularly.

### *Correlates of success*

A number of studies tried to find predictors of success in treatment of highly anxious dental patients (Berggren & Carlsson, 1985; Enneking et al., 1992; Goodall, Skelly, & File, 1994b; Hammarstrand et al., 1995; Kleinhauz, Eli, Baht, & Shamay, 1992; Liddell, Di Fazio, Blackwood, & Ackerman, 1994; Makkes et al., 1987; Moore, 1991, Moore, Berggren, & Carlsson, 1991a; Moore, Brødsgaard, Berggren, & Carlsson, 1991b; Schuurs, Makkes, & Duivenvoorden, 1992; Willumsen, 1999). For example, reports of dentists treating highly anxious dental patients indicated that the presence of concomitant anxieties may influence treatment negatively (e.g., Berggren, 1992; De Jongh, 1994; Milgrom, Weinstein, Roy-Byrne, & Tay, 1993b). Support for this relation has been found in some studies (Berggren & Carlsson, 1985; Makkes et al., 1987). However, other studies confirmed the relation between the presence of general or multiple fears and treatment success for only one of several outcome measures (Moore, 1991; Moore et al., 1991a & 1991b), or were not able to confirm it at all (Goodall et al., 1994b; Hammerstrand et al., 1995).

In addition, other psychopathological dimensions may have a negative impact on treatment outcome (Kleinhauz et al., 1992), although a study by Willumsen (1999) did not find a statistically significant relation between general psychopathological distress and dental anxiety after treatment. With regard to dental anxiety before treatment and gender, the results were not conclusive as well (Schuurs et al., 1992; Willumsen, 1999; Goodall et al., 1994b; Liddell et al., 1994; Moore, 1991). Finally, none of other background variables such as educational level, age, DMFS and previous avoidance of dental treatment were found to be related to treatment outcome (e.g., Hammerstrand et al., 1995; Liddell et al., 1994; Moore, 1991; Willumsen, 1999). Thus, although there is

some evidence that concomitant anxieties and psychopathology are correlated to treatment success in dental fear clinics, the findings thus far are not impressive.

In conclusion, the results of studies carried out thus far are not conclusive about the relative effectiveness of psychological versus pharmacological treatment modes and its predictors. Although there seems to be a slight advantage for the behavioral approaches, the number of studies on this topic is limited. In addition, most studies have insufficient sample sizes or do not compare treatment modalities at all.

### **Aim and structure of the thesis**

As mentioned before, the aim of the present thesis is to assess the outcome of behavioral and pharmacological treatment modes in a dental fear clinic and to determine for which type of patient treatment is most successful. Hence, there is a need for suitable instruments to be able to differentiate highly anxious dental patients in such a way that treatment can be planned more efficiently. Therefore, measurement instruments that are designed to meet this goal are presented and evaluated in the present thesis as well.

In Chapter 2 a description is given of how treatment of highly anxious dental patients in the Netherlands was organized at the moment this research project was initiated. Semi-structured interviews were held with dentists from Centers for Special Dental Care where highly anxious adult dental patients were treated. Findings with respect to personnel, intake, assessment, treatment modalities, and post-treatment procedures are described.

Next, results are reported of research carried out at the Center for Special Dental Care in Amsterdam (SBT), as mentioned before the largest dental fear clinic in the Netherlands. The aim of Chapter 3 was to assess psychological characteristics (i.e., eight psychopathological dimensions) of highly anxious dental patients that apply for treatment at the dental fear clinic, and to compare the severity of the psychological complaints of these patients with the level of severity found in the Dutch general population.

The set of pre-treatment questionnaires used in the studies described in Chapters 4 to 6 were the ones patients filled out before this research project started. In February 1997, a new set of questionnaires was introduced in the clinic in order to be able to differentiate patients better. In Part II the psychometric qualities of those

questionnaires of which the reliability and validity in a population of highly anxious dental patients were not assessed before are presented and evaluated. In Chapter 4, the reliability and validity of a short version of a relatively new dental anxiety questionnaire is discussed. In Chapter 5, a translation of a questionnaire, developed by Kent, Rubin, Getz, and Humphris (1996) to determine the extent to which severe levels of dental anxiety affect patients' social well-being outside the dental setting is presented. Next, the last chapter of Part II assessed the reliability and (factorial) validity of an instrument to measure the presence of multiple anxiety dimensions, such as social phobia and agoraphobia, the Fear Survey Schedule III.

In the third and final part of this thesis, treatment modes are compared with respect to patient characteristics and treatment outcome, and possible correlates of treatment success are assessed. The aim of the seventh chapter is to assess differences among patients assigned to the different treatment modes (i.e., BM, NOS, and IVS) with regard to psychological characteristics. In addition, dental variables before (e.g., number of decayed teeth) and after treatment (e.g., number of fillings made) are taken into account. In Chapter 8, first, the outcome of the three different kinds of treatment modes is determined in terms of dental anxiety reduction after treatment along with dental anxiety reduction and dental attendance at a follow-up one year later. Secondly, it is determined to what extent psychopathological characteristics predict treatment outcome.

Finally, results of a prospectively conducted study are presented in Chapters 9 and 10. The aim of Chapter 9 was to determine outcome of treatment in a dental fear clinic in terms of dental anxiety level after treatment, duration of treatment, patient's ability to visit a general dental practitioner (GDP), satisfaction after treatment, and, finally, dental attendance after one year. Additional aims were to investigate with which treatment modality the best results could be obtained and to determine which treatment-dependent variables were related to dental anxiety after treatment. Chapter 10 determines the influence of pre-treatment variables on treatment outcome in patients treated with a BM approach. The thesis finishes with a summary and general discussion.

As indicated at the start of each chapter, most chapters were published in peer-reviewed journals or have been submitted for publication. As a consequence, the information presented in some of the chapters shows overlap. In addition, some terminology may vary across chapters due to varying requirements across journals.

With regard to lay-out and references, the text is uniformed and abstracts are omitted. Finally, all different kinds of non-drug treatment modes are captured by the term behavioral management approach in the present thesis. It should be noted that when the term BM is used throughout this thesis without any specification, methods varying from time-structuring, information control and systematic desensitization are meant.

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