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

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# Chapter 7

## TREATMENT MODALITIES IN A DENTAL FEAR CLINIC AND THE RELATION WITH GENERAL PSYCHOPATHOLOGY AND ORAL HEALTH VARIABLES[1]

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## Introduction

Dental anxiety poses a problem both for the treatment of those suffering from it, and for the general dental practitioner. A high level of dental anxiety can influence dental treatment in such a way that it becomes (almost) impossible for the general dental practitioner to complete treatment. In the Netherlands, for highly anxious dental patients, treatment is possible in Centers for Special Dental Care in which other types of dental problems are treated as well (e.g., cranio-mandibular disorders). Here, highly anxious dental patients are treated with the aid of behavioral management techniques or pharmacological agents. Inhalation sedation with nitrous oxide for the treatment of anxious patients was introduced to the Netherlands about 20 years ago. Another form of conscious sedation that can now be applied in two Dutch centers is intravenous sedation with propofol as a single sedative agent (Oei-Lim, Kalkman, Makkes, Ooms, & Hoogstraten, 1997; Aartman, Eijkman, & Makkes, 1998). In many dental fear clinics, the primary goal, besides lowering anxiety, is to deliver needed restorative treatment. When this is appraised difficult or impossible because of extensive dental treatment, it is conceivable that sedative agents are used to facilitate treatment. In such cases, intravenous sedation and general anaesthesia might be most convenient for both patient and dentist.

It seems obvious that, when planning treatment, patients should be assigned to the treatment modality that is most appropriate for the individual patient. Therefore, dentists will consider the patient's need to undergo dental treatment, while at the same time intuitively appraising the chance that the patient will drop out of treatment and will continue to avoid regular dental care. However, little is known about how individual characteristics relate to a certain treatment mode.

Findings to date indicate that many patients suffering from high levels of dental anxiety also display other fears or psychological problems (Moore, Brødsgaard, & Birn, 1991; Roy-Byrne, Milgrom, Tay, Weinstein, & Katon, 1994; Aartman, De Jongh, & Van der Meulen, 1997). Some studies found that patients with multiple fears showed less dental anxiety reduction or needed more time for the same reduction to occur than patients with dental anxiety *per se* (Moore, 1991; Berggren & Carlsson, 1985; Makkes, Schuurs, Thoden van Velzen, Duivenvoorden, & Verhage, 1987). In addition, one study found that psychological problems other than multiple fears (i.e., somatization, psychoticism, and general psychoneuroticism) had a negative impact on treatment of

highly anxious patients (Kleinhauz, Eli, Baht, & Shamay, 1992). Thus, the presence and severity of psychological problems in addition to high levels of dental anxiety may influence treatment outcome (Moore, 1991; Berggren, 1992; Berggren, Carlsson, Hakeberg, Hägglin, & Samsonowitz, 1997), and, therefore, may have implications for treatment assignment as well. That is, it is possible that dentists are inclined to assign patients with psychological problems more often to a treatment mode in which a form of sedation is used. More specifically, patients treated with different treatment modalities would then display different levels of general psychopathology.

The aim of the present study was to assess the relation between psychological dysfunctioning and the treatment mode intuitively considered most appropriate for the patient. More specifically, do patients treated by intravenous sedation indeed display higher levels of general psychopathology as opposed to patients treated with behavioral management techniques alone. In addition, the impact of oral health variables on the allocation process is examined (e.g., number of decayed teeth). That is, it was assessed whether there are any differences among treatment modes (i.e., behavioral management (BM), nitrous oxide sedation (NOS), intravenous sedation (IVS), and general anaesthesia (GA)) with respect to the oral health status of patients.

## Material and methods

### *Subjects*

Highly anxious dental patients (n=211) who applied for treatment in the period from April 1995 until April 1996 at a dental fear clinic in Amsterdam, The Netherlands, served as subjects in the present study. The average duration of avoidance of any dental care was 6.8 years (SD=8.5, range 0-30) and 8.8 years (SD=9.1, range 0-34) for regular dental care in the present clinic.

### *Procedure*

Patients who applied for treatment at the dental fear clinic filled out several questionnaires, including measures on dental anxiety, general psychopathology, and medical status. After a waiting period of around 4 months patients were invited for a first appointment to the clinic. The intake involved a standardized introductory conversation and an examination by a dentist highly experienced in the treatment of anxious patients. This examination was a visual inspection using a dental mirror only.

In order to gather more information about patients' oral health, panoramic radiographs were taken. Patients were ensured that they were not to receive any dental treatment; the purpose of the first visit was to assess the oral health status and to allocate the patient to the most appropriate treatment mode. Hence, patients were not randomly assigned to the treatment modes.

All dentists working in the clinic were familiar with both the use of behavioral management and nitrous oxide sedation. The behavioral management approach of patients involved gradual exposure to feared stimuli and situations, and enhancing trust and feelings of security and control by using tell-show-do techniques. When considered necessary, behavioral management was supported by nitrous oxide sedation. In this clinic nitrous oxide was administered at concentrations ranging from 20 to 50% (mean is 35%). Patients experience dental treatment fully conscious and are able to control their own depth of sedation. With IVS on the other hand, patients are still conscious, but the anaesthetist controls the depth of sedation. Anaesthetist controlled intravenous sedation was carried out inside the dental fear clinic. Propofol was used as the single sedative agent (Oei-Lim et al., 1997). Individuals for whom general anaesthesia was deemed most useful were treated in a hospital setting.

For the present study purpose, the treatment mode with the highest amount of sedation was taken as the grouping variable. Thus, when patients received restorative treatment with use of NOS, the patient was allocated to the NOS group. Likewise, when patients were treated once (or more often) with IVS, they were allocated to the IVS group. However, when patients were referred to the oral surgeon for extractions under general anaesthesia as a first step of treatment, they were allocated to the treatment mode they received subsequently in the dental fear clinic.

*Instruments*

The Dutch version of the Revised Symptom Checklist (SCL-90; Arrindell & Ettema, 1986) was used to assess the severity of general psychopathology. This questionnaire consists of 90 items, which provide an indication of psychological dysfunctioning on eight dimensions: agoraphobia (7 items), somatization (12 items), anger-hostility (6 items), depression (16 items), interpersonal sensitivity and paranoid ideation (18 items), anxiety (10 items), cognitive-performance difficulty (9 items), and sleep disturbance (3 items). The total score provides an indication of psychological

dysfunctioning and is composed of the aforementioned subscales and nine non-scaleable items. This score can vary between 90 and 450, where 90 indicates no dysfunctioning at all and higher scores indicate some amount of dysfunctioning. The measurement method in its Dutch version differs from Derogatis (1977) original report on the SCL-90 in that the 5-point scale varied from 0 to 4, as did the General Symptom Index, because scores were divided by the number of items. Patients from the clinic of the present study all scored above average or higher (above the 65th or 80th percentile respectively) compared to the Dutch general population on all dimensions (Aartman, De Jongh, & Van der Meulen, 1997).

Dental anxiety was measured using two questionnaires, the Dental Anxiety Scale (DAS) and the Short version of the Dental Anxiety Inventory (S-DAI). The DAS (Corah, 1969) is a four item dental anxiety questionnaire with total scores that can range from 4 (not anxious at all) to 20 (extremely anxious). The S-DAI (Aartman, 1998) contains nine items and total scores on this questionnaire can range from 9 to 45. Furthermore, patients could indicate on a 10-point Likert-scale (Anxiety Scale, AS) how anxious they were to visit the dentist. Scores on this 10-point scale can range from 1 (not anxious) to 10 (extremely anxious).

From the panoramic radiograph the following pre-treatment variables were scored by two independent dentists: number of teeth present, number of retained roots, number of root-filled teeth, and number of decayed teeth. Retained roots of a tooth were counted as one root and were not counted as present or decayed. For all variables, third molars were included. For the number of decayed teeth, caries and secondary caries were rated per tooth for all teeth. In case of disagreement between the observers, their mean is used in the calculations.

The following variables were assessed from the patient records: the treatment mode the patient was assigned to, the dentist who had the first appointment with the patient, number of treatment visits, number of prosthetic treatment visits and number of visits to a psychologist. It was also recorded whether the patient had visited the oral surgeon for treatment under general anaesthesia. As post-treatment dependent variables, total duration of the restorative and surgical sessions, number of fillings made, number of extracted teeth, and number of root-filled teeth were scored. All these variables were

assessed with respect to the initial course of treatment; follow-up treatments were not included.

*Data analysis*

Differences between groups were analysed by one-way analyses of variance (ANOVA) using a Bonferroni-Holm correction for the number of tests (Holland & Diponzio Copenhaver, 1988). Mean differences between the two independent raters were computed to give an indication of their agreement. Effect sizes were computed when a statistically significant result was found. An effect size of f=0.10 was considered a small effect, f=0.25 a medium effect, and f=0.40 a large effect (Cohen, 1977).

**Results**

The 211 patients (132 women and 79 men) had a mean age of 34.3 years (SD=10.5, range 17-69). Twenty-five of these patients were referred to an oral surgeon for surgical treatment under general anaesthesia. Twelve of them subsequently received dental treatment at the dental fear clinic and were allocated to one of the four treatment modes (three were treated by a BM approach, five with NOS, and four with IVS). Nineteen patients had counselling appointments with the psychologist of the dental fear clinic with an average of two times (range 1-4); 32 patients underwent prosthetic treatment (average four times). Three dentists saw together 75% of the patients. No significant relation was found between the dentist who allocated and the treatment mode to which the patient was allocated. Furthermore, with regard to all variables, there were no statistically significant differences between patients treated under general anaesthesia and those who were not ($p>0.05$).

Of the 211 patients, sixty-seven did not receive restorative dental treatment in the clinic for several reasons (e.g., patient did not need restorative treatment, patient needed only prosthetic treatment, patient came for the psychologist only, patient referred to general dental practitioner in own neighbourhood, patient postponing treatment). Of the remaining 144 patients, 67 were treated by a BM approach (46.5%), 40 by NOS (27.8%), 33 patients by IVS (22.9%), and four patients received restorative dental treatment under GA (2.8%). With these patients, the following analyses were conducted.

Mean DAS and S-DAI scores were 17.5 (SD=2.8) and 40.1 (SD=5.7) respectively. Mean score on the 10-point scale was 8.9 (SD=1.6). Most patients had one or more additional visits prior to restorative treatment. Only restorative dental treatment sessions were recorded (i.e., fillings, extractions, root-canal treatments) for the purpose of the present study.

The number of restorative dental treatment sessions (including surgical treatment, i.e., extractions) of the 144 patients varied from one to twelve (M=3.0, SD=2.2). Total treatment duration varied from 0.5 to 12.3 hours (M=3.8, SD=2.5). During these sessions, a mean number of 2.2 extractions (SD=3.4), 0.5 endodontic treatments (SD=1.0), and 5.0 fillings (SD=4.4, range 0-21) were carried out.

Table 1 Means and standard deviations per treatment mode and results of one-way analysis of variance for the DAS, S-DAI, AS, and SCL-90 (GA excluded)

| | Mean (SD) | | | | | | |
|---|---|---|---|---|---|---|---|
| Variable | BM (n=67) | NOS (n=40) | IVS (n=33) | GA (n=4) | F | df | p |
| Age | 36.0 ± 10.7 | 32.2 ± 8.7 | 30. 5 ± 9.2 | 27.8 ± 8.7 | 4.11 | 2,137 | 0.02 |
| DAS | 17.1 ± 2.7 | 18.2 ± 2.0 | 17.8 ± 2.7 | 16.8 ± 2.1 | 2.24 | 2,137 | 0.11 |
| S-DAI | 39.5 ± 5.2 | 41.2 ± 4.3 | 41.1 ± 4.5 | 42.3 ± 3.6 | 1.85 | 2,129 | 0.16 |
| AS (1-10) | 8.8 ± 1.1 | 9.1 ± 1.0 | 9.2 ± 1.3 | 9.0 ± 1.4 | 1.76 | 2,130 | 0.18 |
| SCL-Tot[a] | 154.3 ± 60.6 | 162.6 ± 72.3 | 153.0 ± 52.6 | 148.9 ± 67.5 | 0.26 | 2,127 | 0.77 |
| SCL-Ago | 10.6 ± 5.6 | 11.1 ± 6.2 | 9.7 ± 3.2 | 9.3 ± 1.7 | 0.67 | 2,127 | 0.51 |
| SCL-Anx | 19.2 ± 9.3 | 20.9 ± 9.9 | 19.4 ± 8.6 | 16.5 ± 7.3 | 0.39 | 2,127 | 0.68 |
| SCL-Dep | 29.2 ± 13.9 | 28.8 ± 13.1 | 29.1 ± 12.4 | 29.8 ± 20.9 | 0.01 | 2,127 | 0.99 |
| SCL-Som | 21.6 ± 9.3 | 22.7 ± 11.6 | 22.2 ± 9.4 | 19.3 ± 9.2 | 0.13 | 2,127 | 0.88 |
| SCL-CPD | 15.6 ± 6.6 | 16.9 ± 8.8 | 15.6 ± 6.7 | 16.0 ± 5.9 | 0.39 | 2,127 | 0.68 |
| SCL-ISPI | 29.4 ± 11.3 | 31.4 ± 15.1 | 28.1 ± 9.9 | 26.5 ± 12.5 | 0.64 | 2,127 | 0.53 |
| SCL-A-H | 9.2 ± 3.5 | 10.0 ± 4.6 | 9.3 ± 4.7 | 9.3 ± 6.5 | 0.48 | 2,127 | 0.62 |
| SCL-Sle | 6.2 ± 3.9 | 6.6 ± 3.4 | 6.3 ± 3.5 | 7.8 ± 5.3 | 0.10 | 2,127 | 0.90 |

[a] Tot=SCL-Total psychoneuroticism score; Ago=SCL-Agoraphobia; Anx=SCL-Anxiety; Dep=SCL-Depression; Som=SCL-Somatization; CPD=SCL-Cognitive-Performance Difficulty; ISPI=SCL-Interpersonal Sensitivity and Paranoid Ideation; AH=SCL-Anger-Hostility; Sle=SCL-Sleep Disturbance.

With regard to differences among treatment modalities the following results were found (GA excluded, because of small sample size). First, the groups were compared with respect to age, sex, and medical status. The only statistically significant difference was found for age (see Table 1). *Post-hoc* analysis (Tukey's HSD procedure) revealed that patients treated with IVS had a lower mean age than patients treated with a BM

approach. There were no statistically significant differences between the BM, NOS, and IVS groups, both with regard to SCL-90 total score and its subscales ($p>0.05$). Also, with regard to DAS and S-DAI scores, no statistically significant differences were found ($p>0.05$) (Table 1). Average duration of avoidance was assessed for a small subset of patients (n=82). However, in this subset no relation was found between duration of avoidance and treatment mode.

Table 2 Means and standard deviations for the variables of the panoramic radiograph per treatment mode and results of ANOVA (GA excluded) for those who had a panoramic radiograph

| | Mean (SD) | | | | | |
|---|---|---|---|---|---|---|
| Variable | BM (n=37) | NOS (n=26) | IVS (n=25) | GA (n=3) | F[b] | p |
| Number of teeth | 25.2 ± 5.4 | 25.9 ± 5.2 | 26.4 ± 4.0 | 19.0 ± 11.8 | 0.46 | 0.63 |
| Number of retained roots | 1.7 ± 2.4 | 3.2 ± 4.3 | 1.4 ± 1.7 | 0.3 ± 0.6 | 2.80 | 0.07 |
| Number of root-filled teeth | 0.9 ± 1.5 | 0.7 ± 1.3 | 0.6 ± 1.0 | 0.7 ± 1.2 | 0.31 | 0.74 |
| Number of decayed teeth | 3.0 ± 2.0 | 3.6 ± 2.3 | 4.7 ± 3.0 | 4.8 ± 5.9 | 3.91 | 0.02 |

[b] df=2, 85

In Table 2 means and standard deviations of the variables scored from the panoramic radiograph are shown per treatment modality. From 91 of the 144 patients radiographs were available. There were no differences between the observers with respect to counting the number of elements from the panoramic radiograph. The mean differences for the number of retained roots and number of endodontically treated teeth were 0.05 (SD=0.28) for both. For number of decayed teeth the mean difference was 1.34 (SD=1.24). Analysis of variance yielded a statistically significant result for the number of decayed teeth. *Post hoc* analysis (Tukey's HSD procedure) indicated that the mean number of decayed teeth was higher for patients treated with IVS than for patients treated with BM. The effect size was 0.3, which is considered a medium effect (Cohen, 1977). With regard to the other variables that were scored from the panoramic radiograph, no statistically significant results were found.

Analysis of variance and a *post hoc* analysis for the other dental variables (Table 3) showed that the mean number of restorative treatment sessions was significantly higher in the BM and NOS group than in the IVS group. In addition, treatment duration was

higher in the IVS than in the BM group. Finally, with regard to the restorations, more fillings were made in the IVS group than in the BM group (Table 3).

Correlation coefficients between age and the oral health variables from the panoramic radiograph were computed. These correlations concerned the number of elements ($r=-0.49$, $p<0.001$), the number of decayed teeth ($r=-0.32$, $p=0.003$), the number of retained roots ($r=0.26$, $p=0.014$), and the number of endodontically treated teeth ($r=0.02$, $p>0.05$). No significant differences were found between men and women, or between patients who were treated and those who were not, or between patients who were treated under general anaesthesia (at the dental surgeon) and those who were not.

Table 3 Means and standard deviations of the clinical data per treatment mode and results of ANOVA (GA excluded)

| | Mean (SD) | | | | | | |
|---|---|---|---|---|---|---|---|
| Variable | BM (n=67) | NOS (n=40) | IVS (n=33) | GA (n=4) | F[c] | p | f |
| Number of restorative dental sessions | 3.1 ± 2.1 | 4.1 ± 2.6 | 1.9 ± 0.9 | 1.3 ± 0.5 | 10.41 | 0.00 | 0.3 |
| Duration (in 15 minutes) | 11.2 ± 7.9 | 16.0 ± 10.8 | 22.1 ± 9.4 | 16.8 ± 1.5 | 16.12 | 0.00 | 0.4 |
| Number of filled teeth | 3.9 ± 3.8 | 4.9 ± 4.4 | 7.0 ± 4.7 | 7.8 ± 4.1 | 5.86 | 0.01 | 0.2 |
| Number of extracted teeth | 1.6 ± 2.6 | 2.3 ± 3.9 | 2.8 ± 4.0 | 4.8 ± 4.1 | 1.53 | 0.22 | 0.1 |
| Number of endodontically treated teeth | 0.5 ± 0.8 | 0.5 ± 1.1 | 0.7 ± 1.2 | 0.0 | 0.62 | 0.54 | 0.1 |

[c] df=2, 137

## Discussion

The results of the present study indicated that 68% of the patients who applied for treatment at the dental fear clinic received restorative dental treatment. It was possible to treat 46.5% of the patients with a BM approach alone; more than one fourth of the patients was treated with NOS and somewhat less than a fourth with IVS.

In addition, the results showed that there were no differences among patients assigned to various treatment modes with regard to dental anxiety and general psychopathology. This finding is not in line with the general notion that patients with

high levels of general psychopathology are more difficult to treat, and consequently, more often assigned to treatment with a form of sedation. The result that dental anxiety level was not highest in the IVS group could be explained by the fact that all patients referred to the clinic scored high on the dental anxiety measures. Thus, the dental anxiety questionnaires used did not seem to differentiate these patients well enough. With respect to general psychopathology, the SCL-90 assesses a wide range of psychological complaints, and covers eight dimensions of psychopathology. Obviously, dentists did not take these dimensions into account when allocating the patients. However, it is not possible to rule out that psycho-social factors not specifically tapped by the SCL-90 influenced the allocation process. That is, variables such as personality disorders, social aspects of dental anxiety, coping skills, motivation, and multiple fears were not assessed in the present study.

However, dental variables were taken into account in the present study. With regard to these variables, the results indicated that patients allocated to treatment supported with IVS had more decayed teeth than patients allocated to a behavioral management approach alone. Furthermore, of patients treated with IVS more teeth were filled during treatment than of patients treated with BM. This suggests that the more restorations (i.e., fillings) were needed, the sooner IVS was chosen. In other words, treatment of patients with a more deteriorated oral health (i.e., patients who had to undergo more extensive dental treatment) was supported more often with IVS than treatment of patients with a relatively better oral health. Finally, patients treated with IVS appeared on the average to be somewhat younger than patients treated with BM. This is probably caused by the negative correlation between age and number of decayed teeth and could be explained by the fact that older patients already lost more teeth because of decay than younger patients.

The extent of decay was comparable to that found in other studies among highly anxious dental patients. For example, the present findings were in accordance with a study by Hakeberg, Berggren, and Gröndahl (1993). They found that highly anxious dental patients had a more deteriorated oral health than ordinary dental patients. Anxious patients in that study showed an almost equal number of missing ($4.4 \pm 4.9$) and root-filled teeth ($1.1 \pm 1.6$) as patients in the present study ($4.5 \pm 4.9$ and $0.8 \pm 1.4$ respectively (third molars excluded)).

Mean differences between the two independent observers indicated a satisfactory reliability for most variables assessed from the panoramic radiograph, although assessing decay from this radiograph is not recommended for future studies. It is conceivable that the amount of caries assessed from the panoramic radiograph was underestimated. However, there are no reasons to assume that a possible effect of underestimation was more pronounced in one treatment group than another.

In conclusion, since so many patients could be treated with a BM approach alone, we feel that training dentists in the application of psychological methods for the treatment of anxious dental patients should be stimulated, both at dental schools, dental hospitals, and in general practice. This is recommended because *in vivo* exposure to feared stimuli is the most effective way of treating specific phobias (Emmelkamp, Bouman, & Scholing, 1992). Furthermore, the findings suggest that anticipated extensive dental treatment has more impact on the decision of the dentist to use sedative agents, than either psychological dysfunctioning or dental anxiety level. Based on our clinical experience, we feel that oral health may be the chief, but not the exclusive, factor that discriminates the patient who is sent for IVS rather than BM. Therefore, we would recommend that more variables possibly related to dental anxiety are measured when patients apply for treatment.

Related to this, there is a need for new instruments in the field of dental anxiety that may enable a more adequate differentiation among highly anxious dental patients (see also Kent, 1997). As stated before, the existing dental anxiety measures are not suitable to do this. Recently developed questionnaires, measuring psychological reactions and social inhibitions due to dental anxiety (Kent, Rubin, Getz, & Humphris, 1996), or the occurrence and believability of negative cognitions related to dental treatment (De Jongh, Muris, Schoenmakers, & Ter Horst, 1995), might be of help and are introduced in the dental fear clinic. In this light, it might also be helpful to assess motivation and coping skills of patients that apply for treatment. Hopefully, this will target the array of behavioral, pharmacological, and combined treatments available more effectively.

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