DENTAL ATTENDANCE AFTER FEAR TREATMENT IN PRIMARY ORAL HEALTH CARE - DATA-BASED 10 YEAR FOLLOW-UP STUDY

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Taustaa: Hammashoitopelko on yksi yleisimmistä peloista vaikeuttaen hammashoitoa ja vaikuttaen yksilön elämänlaatuun. Poisjääntien ja sitä seuraavan suunsairauksien hoitamattomattomuuden takia pelko aiheuttaa sekä yksilölle että yhteiskunnalle merkittävää taloudellista kuormaa. Pelkoa voidaan kuitenkin hoitaa kognitiivisia ja käyttäytymisterapeuttisia menetelmiä käyttäen.

Tavoitteet: Tämän potilasasiakirjamerkintöihin perusutvan tutkimuksen tavoitteena oli selvittää, miten hammashoitopelkoon annettu hoito pelonhoidon perusperiaattein on vaikuttanut potilaiden hammashoitopalvelujen käyttöön 10 vuoden seurantajaksolla pelkohoidon jälkeen.

Aineisto ja menetelmät: Tutkimusjoukkona käytettiin kaikkia Oulun yliopistollisessa sairaalassa v. 2000–2006 hammashoitopelkoon hoitoa saaneita potilaita, joilla oli riittävät potilasasiakirjamerkinnät. Riittävät tiedot löytyivät 152 potilaalta; alunperin hoidettu n=263, joiden onnistuminen arvioitu v. 2006 n=163:lta. Näiden potilaiden potilasasiakirjoista kerättiin toimenpidetiedot hammastarkastusten, päivystyskäyntien sekä peruuttamattomien poisjääntien osalta rekisterin pitäjän eli Oulun kaupungin luvalla. Aineistoa kuvattiin frekvenssein ja jakaumin huomioiden pelonhoidon onnistuminen v. 2006, potilaan sukupuoli sekä ikä pelonhoidon aikana.

Tulokset: Pelonhoitoa 2-10 -vuotiaana saaneet potilaat kävivät seuranta-aikana merkittävästi useammin tarkastuksessa kuin tätä vanhempana hoidetut. Sukupuolella tai aiemmin havaitulla pelonhoidon onnistumisella ei todettu olevan merkittävää vaikutusta hammashoitokäyttäytymiseen 10-15 vuoden tarkasteluvälillä.

Johtopäätös: Varhainen pelkoon puuttuminen sekä pelon hoidon onnistuminen näyttävät olevan yhteydessä säännöllisempään hammashoitoon ja vähäisempään särkykäyntien määrään kuin vastakkaisessa tapauksessa. Niillä, joiden pelkoon puututtiin alle 10-vuotiaana, oli enemmän tarkastuksia ja vähemmän särkykäyntejä kuin vanhempana hoidetuilla. Niiden joukossa, joiden hoito katsottiin onnistuneeksi, oli muita enemmän tarkastuksia ja vähemmän särkykäyntejä ja myös vähemmän niitä, joilla ei ollut yhtään tarkastusta.

Avainsanat: hammashoitopelko, kognitiivinen ja käyttäytymisterapia CBT, pelonhoito

ABSTRACT

Background: Dental fear or dental anxiety is one of the most common fears in the society today. It may be treated effectively e.g. with cognitive-behavioural therapy or CBT.

Aim: The scope of this practise-based study was to investigate dental attendance of patients having received treatment for dental fear, based on CBT, in 10-15-year span following their fear treatment.

Materials and methods: Study participants had received treatment, mainly CBT, for dental fear by primary health care dentists interested and trained in the era, during 2000-2006 in the City of Oulu, Finland. The number of dental examinations, emergency visits and no shows were collected from the patient records if the City of Oulu; the organization or register keeper gave permission for this retrospective study. Data were analysed with IBM SPSS statistics processor.

Patient files of a total of 152 patients out of the original 163 were found with sufficient data, and comprised the study population. These data were quantified and cross-tabled with age, gender and perceived initial dental fear treatment success.

Results: Patients receiving dental fear treatment at the age of 2-10 years had significantly more dental examinations on average than those treated at later age. When treatment for a patient <10 years of age was initially considered successful, the number of emergency visits was significantly reduced. Gender did not seem to be a significant factor in later dental attendance.

Conclusions: Administering CBT at early age (2-10y) and successful outcome by CBT seem to be associated with more regular dental attendance and need for less emergency care than in the opposite case.

Key words: dental fear, dental anxiety, cognitive-behavioural therapy CBT

Introduction

Dental fear or dental anxiety is one of the most common fears in developed countries and its harmful effect on dental health and attendance is well known (Hakeberg et al. 2003, Pohjola et al. 2014). Dental fear is associated with missed or cancelled appointments, inferior self-care, and oral health problems in general (Rajwar et al. 2017).

Fear is one of the fundamental emotions in humans and has evolved for avoiding unpleasant and/or dangerous situations. This characteristic has been preserved in human psychology by increasing survival rates in the pre-agricultural times. Four distinct components of fear can be identified: subjective feeling of worry, anxiety or discomfort, cognitive component that is intermixed with the feeling, physiological and somatic reactions of the body, and actions such as fight, flight or avoidance. (Adolphs, 2013) All these reactions may be activated while attending dental care.

In the development of fear, the impact from individual perception, experiences and memories of the person himself as well as those of others and interpretation of those sensations re essential (Rantavuori et al. 2004). Although fear is considered as an integral part of normal human development, there are also conditioning-like patterns where a non-desirable fear response is associated with a benign stimulus. The distinction of a pathological, abnormal and permanent fear from normal, life-preserving, healthy fear is very small (Friis-Hache et al. 2003, King et al. 2014).

Fear is somewhat akin to a reflex, yet it is more adaptive in terms of both cognition and behavioural response. Whereas reflexes and fixed-action patterns are immediate and involuntary, fear-based behaviour is more regulated by cognitive processes. Dental fear can be described as a dynamic process unfolding with time rather than a one-off response to stimuli. This in turn implicates that it is possible to modify the fear response by psychological means such as cognitive behavioural

therapy (CBT) (Berge et al. 2017). Patients who have received cognitive behavioural therapy (CBT) for dental fear have reported significant, most often permanent decrease in their fear to the level not to disrupt dental care (Kvale et al. 2004, Armfield et al. 2013).

When planning dental treatment for a fearful dental patient, it is most important to recognize and identify the type of dental fear and its aetiology. Questionnaires (MDAS, VAS, GFS) have been developed for this. The questionnaire together with interactive dialogue with the patient and monitoring the patient's responses during the treatment give necessary information. For promoting the patient's sense of trust and control, several approaches can be administered, and they all hinge on the idea of focusing on the patient in all phases of the treatment listening to his responses and desires. The patient must be given tools for coping - he must be aware of the plan and timing. Sense of control can be emphasized by allowing the patient to determine the length of work intervals until the next rest pause during the operation. Allowing the patient to control the work intervals enhances both the sense of control and trust. These simple methods can be practised in general dental practise with a successful outcome (Berge et al. 2017). In addition to these techniques, more advanced techniques such as cognitive restructuring, distraction hypnosis can be used, but they require more skills from a dentist, but are effective in managing dental fear (Armfield et al. 2013). All approaches must be based on individual needs, for instance considering the age. Conscious sedation methods can be used together with the psychological approach to lower the threshold of fear. Management of complex dental fears is provided by dentists interested in this era and also in some clinics for referral patients. Such clinic was founded in 2000 in the Municipal Oral Health Care Unit in the City of Oulu, Finland. The aim of dental fear treatment is to alleviate fears to such level that following treatment can be administered in normal dental care.

The aim of this retrospective, practise-based follow-up study was to assess a long-term or 10-year outcome of dental fear treatment in the Clinic for Fearful Dental Patients (CFDP), City of Oulu, Finland, indicated by dental examinations, missed appointments, and emergency care.

Material and Methods

Study population

Patients in this retrospective, practise-based study had been referred from the Municipal Oral Health Care clinics in the City of Oulu to the CFDP during the period 2000-2006 for dental and dental fear treatment. The median age of the patients at the time of referral to dental fear treatment was 7 years (SD 7.3, min 2, max 51). The outcome of 163 patients was determined in 2006 as successful (according to patient records normal dental care without further mentioning of fear) or not-successful (patient still needed special care after treatment in CFDP). For this study, patient records of a total of 152 patients of the original 163, with sufficient data for evaluation were found in the patient database of the City of Oulu. The dates of all dental examinations, emergency visits and no shows after dental fear treatment were recorded for each patient.

Methods

Patients were treated in CFDP by three experienced clinical practitioners, specially trained in treating dental fear. One is lecturer on the topic for students and clinical practitioners, another has taken a course on dental fear treatment, and one is a qualified and registered hypnotherapist – all had years of experience in treating fearful patients. For all patients, any psychological, but suitable approach (CBT, DS, relaxation, distraction, or combination) was the main tool for treating dental fear. No patients were excluded i.e. due to age or mental handicap. A psychologist was consulted if needed. Additionally, conscious sedation was used when considered necessary. While dealing with dental fear, all dental procedures were accomplished in CFDP, too. The outcome after treatment

has been assessed in a similar fashion in 2006 (Kankaala et al., not published) and the scope of this study is to further evaluate the results of dental fear treatment in longer time scale.

Statistics

The data were collected in May 2016 and prepared for analyses.

The associations between outcome and independent variables were analyzed using cross tabulation and to test statistical significance of the findings chi square test; the difference between groups was considered statistically significant at $p<0.05$. The study population was dichotomized into two categories, 2-10 and >10 years. The number of dental examinations, emergency visits and missed appointments was recorded for each patient. These figures were categorized: 0, 1-5, 6-10 and >10 instances of the procedure of interest. Binary logistic regression model was conducted using success of the treatment in 2006 as dependent variable separately for age groups with cut-off point of 10 years. Independent variables were number of examinations (SAA), emergency visits (WYA) and missed appointments (900) as well as interaction term of SAA and WYA. OR (95% CI) were calculated, difference between groups was statistically significant with $p<0.05$. All analyses as well as figures were executed with the SPSS (version 16.0, SPSS, Inc., Chicago, Il, USA)

Ethics

Data were collected with the permission of the register keeper, Oral Health Section, City of Oulu, Finland. For this kind of practice-based retrospective follow-up study, no statement from the ethical board is required when analyses are carried out without identification. A permit was granted by the register keeper, City of Oulu before data acquisition. All identification details were stripped from the data before analysis.

Results

Patient files of n=152 patients, or 93% of those whose full records were found and registered in 2006, and 57% of the originally treated population (n=266); were analysed. A total of 2591 logged procedures done within a 10-year period from 2006 to 2016 were investigated. The proportion of male participants (n=89, 58.6%) was higher than that of females (n=63, 41.4%). Majority (79.6%) of the participants were 2-10 years old during the fear treatment.

The median number of dental examinations during the 10-year follow-up period varied between 1-5 visits, with a higher median of 6-10 visits in the age group 2-10 years (Table 1). The difference in the number of dental examinations between age groups 2-10 and >10 was found to be statistically highly significant ($p < .0001$)**.** On the other hand, almost a third (29%) of the patients older than 10 years of age at baseline had not had a single dental examination during the observation period. In total, one patient in 8 had completely missed dental examinations during the follow-up period. Both men and women had a median of 1-5 dental examinations during the observation (Table 2).

More than half of the patients (53.3%) had had 1-5 emergency visits, whereas 18.4% had had more than 5 emergency visits, while 28.3% had none (Table 1). Those originally in the age group 10 years or more were more likely to have 6-10 emergency visits (16.1% vs. 11.6%) and 10 or more visits (9.7% vs. 5.0%) than the rest. As for gender, men were somewhat overrepresented as compared to women in number of emergency visits (15.7% vs. 7.9% for 6-10 visits, 6.7% vs. 4.8% for more than 10 visits, Table 2).

Of all the patients aged 2-10 years old, 14.9% had 6 or more missed appointments in their records after dental fear treatment (Table 1). The median figure for missed appointments was 1-5 times, with 53.3% of all the patients falling into this category. Approximately one third (32.2%) of the

patients had participated or cancelled in time every appointment, whereas 3 patients (2.0%) had failed to show up more than 10 times. Interestingly, all 3 were found out to be male and in the lower age group of 2-10 years old at baseline. Women were slightly more likely to have no missed appointments than males (33.3% for females vs. 31.5% for males).

Perceived success of the initial dental fear treatment was determined in 2006 from the patient records, and the overall success rate at that point was almost 70% (67.7%) (Kankaala et al. 2017 not published). When the fear treatment was considered successful the proportion of those having no dental examinations at all was smaller during the following 10 years compared to the situation when the fear treatment had not been successful (Table 3). Consequently, the proportion of patients with 10 or more examinations was higher in the group with successful outcome (17.8%) than unsuccessful (10.3%).

The number of emergency visits was negatively associated with the outcome of successful dental fear treatment (Table 3). The number of patients with no emergency visits was considerably higher in the success group (31.8%) compared with the group with no success in dental fear treatment (20.0%). Consequently, the number of patients with 6 or more emergency visits was also higher in the unsuccessful group than in the successful group.

The number of missed appointments presents a somewhat conflicting picture when compared to previous two data sets (Table 3). There seems to be little or no correlation between the success in dental fear treatment and the number of missed appointments, except that all three patients with more than 10 of missed appointments were in the successful group.

For those 10 years or more success of dental fear treatment was statistically significantly associated with emergency visits OR 6.7 (1.46, 30.55) (Table 4).

Discussion

The aim of this retrospective, data-based follow-up study was to assess long-term outcome of dental fear treatment in a primary health care Clinic for Fearful Dental Patients (CFDP) in the City of Oulu, Finland indicated by dental attendance, missed appointments, and emergency visits. The results suggest that it may indeed be possible to alleviate dental fears via CBT administered even by general dentists. During the 10-year-follow-up those who had been referred to dental fear treatment at early age (<10 years) had more dental check-ups and less emergency visits than the ones referred later in life. The same was true for those, whose dental fear was considered successful in 2006 compared to those whose was not. As for missed and cancelled appointments, females had more missed appointments than the males, but success of dental fear treatment was not associated with them.

There are types of fear that not only induce a strong response, but are relatively impenetrable to control, trigger automatically and are mostly tuned by evolution. Whereas typically these fears, classified as phobias, are triggered by direct threats such as spiders and snakes, they can also develop in response to more benign stimuli such as open areas, crowds of people or – indeed – dental treatment. Patients with fear in dental office are most common, when every second reports fear of some degree (Pohjola et al. 2014) Dental fear, if not dealt with, persists complicating life throughout years. Due to irregular or non-existent dental attendance, dental fear also degrades person's dental status, which in addition to pain and discomfort causes expenses both to the individual and society (Liinavuori et al. 2016). Here, the type of fear was not reported. However,

patients here could not be treated in primary health care and there had to be attempts to deal with fear before referral. Besides they had treatment need that was also dealt with simultaneously with dental fear.

A statistically highly significant difference between age groups was found in later dental attendance: when dental fear treatment was given at the age of 2-10 years, the number of dental examinations was higher than when the patients were treated after the age of 10 years. This suggests that it is beneficial to treat dental fear at younger age, which is further reinforced by considering the reduced cost of dental care when problems are dealt with as early as possible. For example, it is more cost effective to stop initial caries lesions with fluoride treatment than to give restorative treatment later. On the other hand, this difference between the age groups may be due to the Finnish primary oral health care system where patients under 18 years of age are entitled for free of charge dental care and practically all children are treated in public health dental offices. They should also be checked at least at the age of 5, 7, 9, 12 and 15 (Decree set by the Finnish Government). The impact of costs of dental care on dental attendance was not investigated here, but could be a research topic in future.

Males tended to have a slightly higher number of emergency visits than females, as is reported also elsewhere in literature (Sun et al. 2015, Verma et al. 2014, Austin et al. 2009). Those who belonged in the age group >10 years at the time of dental fear treatment tended to have more dental visits than the ones treated younger. It can be discussed that the fear in the older age group was even more severe and consequently this group avoided regular dental care even after treatment in CFDP, which again causes poorer oral health and emergency visits.

Those in the age group >10 years were found to have significantly less emergency visits when fear treatment was initially deemed successful. This seems like another indication of fear treatment being successful, bringing fearful patients from emergency visits towards regular dental care.

The number of missed appointments after dental fear treatment was relatively high in the study population, when only one third either attended all appointments or cancelled them in time. This indicates that despite the success, this study population remains a challenge. There were some individuals who missed their appointments more than 10 times.

Short term success of dental fear treatment was also associated with later dental attendance. Those with successful outcome had more dental examinations than the ones with no success. Consequently, the number of examinations was higher in the success group, which is understandable considering that most of the study population also were caries risk patients. Also, the participants with short-term success in dental fear treatment had less emergency visits than the rest. However, initial success in dental fear treatment was not associated with future success, rather the opposite. The reasons for this can only be speculated.

The data used in this study is quite rigorous: there is little room for human error in terms of patient records which are usually meticulously held. Specifically, codes which comprised the data here are always recorded. Most participants were children at the time of the original dental fear treatment, and 10 years later, most likely still lived at home, because patient files of more than 9 in 10 could be recorded. This is also the benefit of the Finnish primary health care system where practically all <18 are treated there.

In a primary health care, methods for dealing with the patient's dental fear are somewhat limited, but can still be applied quite effectively to everyday clinical practise without special arrangements (Berge et al. 2017). The biggest difference between the study by Berge et al. (2017) and this one was that here all patients were included despite their physical or mental status or the work they demanded. Sometimes conscious sedation was demanded, but its use was not associated with later success of dental care. The overall success rate in 2006 was almost 70%, which can be considered high regarding the participants (Kankaala et al., not published).

In this study, dental fear treatments were carried out in primary health care by dentists who were interested in treating fearful patients, but who also had training for it. Psychologist was also consulted if necessary. Not one approach was used, but dental fear treatment was given according to individual needs. It is necessary to keep on training future dentists about dental fear– how to prevent, how to deal with. CFDP clinic is a good example how a clinic with light administration can be effective short- and long-term.

The median number of dental examinations after dental fear treatment was 1-5 during a 10-year period, which is likely to be fewer than the recommended number. The interval between check-ups should be decided on individual basis depending on the patient's oral health status: as for caries status 6-36 months are recommended. One to five examinations during the follow-up period does not meet the recommendations, especially if the study population are at high risk for dental caries. Certainly, patients who need less than one examination every two years exist, but these patients most likely won't represent a significant proportion of our patient sample. Among those receiving dental fear treatment at adult age, there may be a group of patients who have attended a private clinic afterwards, and these data are not available for us. These might offset data towards those with

no examinations or emergency visits. With patients under 18 years of age this is unlikely due to free of charge dental care in municipal office.

The patient sample was relatively small and patients of only one specialised unit for dental fear treatment were observed. However, the outcome could be monitored for 57% of the originally treated individuals and 93% of those for whom the short-term outcome was investigated in 2006. All patients were originally referred to dental fear treatment as treatment had failed in their own dental office. On the other hand, nobody was excluded from the study population which again is a strength – for instance number of those with mental disabilities was 17 (Kankaala et al., not published). Heterogeneity as for age in the study population can be considered a shortcoming. So, additional research with wider study populations is encouraged allowing further analyses for example according to age.

To conclude this practise- and data-based study suggests that an individual psychological approach for dental fear or anxiety can be effective in bringing patients to regular, examination-based oral care and in reducing the number of emergency visits in the span of 10-15 years afterwards. Furthermore, it is highly likely that administering dental fear treatment is much more beneficial when done at early age, as the results seem to be more persistent. Those with fear seem to remain as risk patients.

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Table 1. Number of dental examinations (A), emergency visits (B) and cancelled/missed appointments (C) after dental fear treatment categorized by age at the time of the treatment

A. Number and proportion of examinations

			n (%)					
			0	1-5	6-10	>10	Total	p value
Age	2-10		10 (8.3)	44 (36.4)	48 (39.7)	19 (15.7)	121	
	>10		9 (29.0)	18 (58.1)	4 (12.9)	0	31	<.0001
Total			19 (12.5)	62 (40.8)	52 (34.2)	19 (12.5)	152	
B. Number and proportion of emergency care visits								
Age	2-10	n	36 (29.8)	65 (53.7)	14 (11.6)	6 (5.0)	121	
	>10	n	7 (22.6)	16 (51.6)	5 (16.1)	3 (9.7)	31	0.6128
Total		n	43 (28.3)	81 (53.3)	19 (12.5)	9 (5.9)	152	
C. Number of missed and cancelled appointments								
Age	2-10	n	39 (32.2)	64 (52.9	15 (12.4)	3 (2.5)	121	
	>10	n	10 (32.3)	17 (54.8)	4 (12.9)	0	31	0.8519
Total		n	49 (32.2)	81 (53.3)	19 (12.5)	3 (2.0)	152	

Table 2. Number of dental examinations (A), emergency visits (B) and cancelled/missed appointments (C) after dental fear treatment categorized by gender

A. Number and proportion of examinations

			n (%)					
			0	1-5	6-10	>10	Total	p value
Gender	Female		9 (14.3)	27 (42.9)	18 (28.6)	9 (14.3)	63	
	Male		10 (11.2)	35 (39.3)	34 (38.2)	10 (11.2)	89	0.6459
Total			19 (12.5)	62 (40.8)	52 (34.2)	19 (12.5)	152	
B. Number and proportion of emergency care visits								
Gender	Female	n	17 (27.0)	38 (60.3)	5 (7.9)	3 (4.8)	63	
	Male	n	26 (29.2)	43 (48.3)	14 (15.7)	6 (6.7)	89	0.3765
Total		n	43 (28.3)	81 (53.3)	19 (12.5)	9 (5.9)	152	
C. Number of missed and cancelled appointments								
Gender	Female	n	21 (33.3)	34 (54.0)	8 (12.7)	0	63	
	Male	n	28 (31.5)	47 (52.8)	11 (12.4)	3 (3.4)	89	0.5359
Total		n	49 (32.2)	81 (53.3)	19 (12.5)	3 (2.0)	152	

Table 3. Number of dental examinations (A), emergency visits (B) and cancelled/missed appointments (C) after dental fear treatment categorized by initial treatment success

A. Number and proportion of examinations

			n (%)					
			0	1-5	6-10	>10	Total	p value
Perceived success	Unsuccessful		8 (17.8)	20 (44.4)	9 (20.0)	8 (17.8)	45	
	Successful		11 (10.3)	42 (39.3)	43 (40.2)	11 (10.3)	107	0.0775
Total			19 (12.5)	62 (40.8)	52 (34.2)	19 (12.5)	152	
B. Number and proportion of emergency care visits								
Perceived success	Unsuccessful	n	9 (20.0)	24 (53.3)	8 (17.8)	4 (8.9)	45	
	Successful	n	34 (31.8)	57 (53.3)	11 (10.3)	5 (4.7)	107	0.2691
Total		n	43 (28.3)	81 (53.3)	19 (12.5)	9 (5.9)	152	
C. Number of missed and cancelled appointments								
Perceived success	Unsuccessful	n	14 (31.1)	25 (55.6)	6 (13.3)	0	45	
	Successful	n	35 (32.7)	56 (52.3)	13 (12.1)	3 (2.8)	89	0.7102
Total		n	49 (32.2)	81 (53.3)	19 (12.5)	3 (2.0)	152	

Table 4. For those >10 years at the time of dental fear treatment in CFDP, binary regression model on association using original success of dental fear treatment as dependent variable, with dental attendance during 10-year-follow-up as for number of examinations, emergency visits and missed appointments.

Parameter	OR	95% CI		p
		Lower	Upper	
Dental check-up	2.28	0.961	5.427	0.061
Emergency visits	6.676	1.459	30.545	0.014
Missed appointments	0.758	0.541	1.063	0.109
Interaction check-ups and emergency visits	0.778	0.632	0.958	0.018