Natural tooth preservation versus extraction and implant placement: patient preferences and analysis of the willingness to pay

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In brief

- Highlights the importance of ensuring the patient's participation during dental treatment decision-making.
- Suggests dental treatment cost may influence patients' dental visits and oral health.
- Patients may prefere to preserve natural tooth by a conservative treatment approach

Objectives The aim of this study was to evaluate the patients' willingness to pay (WTP) values and preference for the treatment of a tooth with very poor prognosis, among two options: root canal therapy and crown positioning or tooth extraction, implant insertion and crown positioning. **Methods** A total of 103 patients were recruited from a private dental clinic and interviewed. A questionnaire measured individuals' preferences among the two alternative treatments for a tooth with poor prognosis and the maximum amount of money they would be willing to pay for their choice with a starting bid of €2,000 in €100 increment/decrement. Demographic data, patient choice, median values and WTP association with socio-demographic factors (Student ttest and one-way ANOVA) and correlation between variables (Pearson chi-square test) were revealed. **Results** Seventy-six percent of patients expressed a preference for root canal therapy, while the remaining 24% chose the dental surgery. A fair agreement between previous experience and current therapeutic choice was found (P = 0.0001). The WTP median value was €2,000 and 46% of participants would pay an additional sum of money for the therapy (median: €300). The preferred treatment was influenced by previous experience, but no association was found between WTP values and socio-demographic factors. **Conclusion** Patients tend to prefer a conservative approach for the treatment of a tooth with poor prognosis and are willing to pay an additional fee to receive their treatment choice.

Introduction

In 1948 the World Health Organisation defined health as 'a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.'[1] Consequently, oral health must also include well-being, and general health and oral health should not be interpreted as separate entities. Therefore, oral health is a critical component of the overall health, since the health of the mouth mirrors the condition of the body as a whole, and must be included in the provision of healthcare and the design of community programmes. Oral health importance has improved significantly over the last 30 years and healthcare is still in transition. This means that the treatment decision-making process shifted from the traditional paternalistic model of the 1980s (where the physician is the solely responsible for clinical decision-making, assuming the dominant role, while the patient is a passive object with his/her preferences and opinions rarely, if ever, taken into consideration) to the new shared decision-making approach (where the patient has a larger role in the healthcare decision-making process).[2–4] In this person-centred model, the patient is dynamic, context-aware and cooperates with the health professional in order to achieve the most satisfactory treatment decision for him/herself, creating a balance between the preferences of the former and the expertise of the latter. Pain, negative earlier dental experiences and negative attitudes in a patient's family are often cited as the major factors in the development of dental anxieties.[5,6] Therefore, despite advances in dental care, dental fear and anxiety can lead to avoidance strategies of patients to elude dental treatment.[7] Consequently, a vicious circle of dental fear could occur, whereby people delay dental visiting allowing the continued progression of oral disease, thus resulting in a further deterioration in oral health, which may require a more traumatic and invasive emergency treatment, leading to a maintenance or increase in their level of dental fear.[8] According to the concept of patients' role preferences in relation to dental treatment decision-making, today, choices about dental healthcare could be made by the patient in agreement with the clinician, but the patient's participation during dental consultations could be influenced by several variables, such as patients' characteristics, fears and previous dental treatment, and dentists' professional

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behaviour.[9] Many people delay dental visiting also due to financial reasons; therefore, in addition to satisfaction, the economic cost of treatment is another factor determining the ability of the patient to access dental care.[10] A special cost-benefit analysis determines patients' willingness to pay (WTP), which measures an individual's strength of preference for an intervention by the maximum amount of money an individual would sacrifice for that intervention.[11] In other words, WTP expresses the economic value that patients assign to the treatment benefits and the maximum amount of money they would be willing to pay.

The aim of this study was to evaluate the preference of patients among two alternative interventions for the treatment of a hopeless tooth. In addition, the amount of willingness to pay for their treatment choice was identified.

Table 1 Demographic and clinical profile of the participants (N = 103)

Characteristic	N patients
Gender	
Female	51 (50%)
Male	52 (50%)
Age (years)	
Range	2365
Mean ± standard deviation	44.1 ± 9.5
Education	
Nil or primary	6 (6%)
Secondary	36 (35%)
Tertiary	61 (59%)
Employment status	
Nil	5 (5%)
Employee	65 (63%)
Private practice	33 (32%)
Personal income (€/year)*	
<15,000	22 (21%)
15,00030,000	46 (45%)
>30,000	35 (34%)
Dental care-routine check-ups/year	
0	19 (18%)
1-2	81 (79%)
>2	3 (3%)
History of hopeless tooth	
Yes	62 (60%)
No	41 (40%)
Current treatment preference	
Restorative dentistry	78 (76%)
Surgery	25 (24%)

*Questionnaire optional field

Material and methods

Participants

A total of 103 consecutive patients attending, for the first time, a private dental clinic, were recruited for the study during a period of two months. The participation was voluntary and informed consent and approval were obtained for each subject. Inclusion criteria for enrolled subjects included the age of majority and a normal comprehension and verbal expression of the patients for the purpose of the interview.

Study procedures

General socio-demographic information about age, gender, level of education and personal income, were collected for each subject. A closed answer questionnaire was administered to participants by means of a short individual interview in a comfortable and reserved room away from the operative area. Before filling out the form, patients were asked to imagine having a hypothetical clinical condition characterised by the presence of a hopeless tooth, which is a tooth requiring an endodontic treatment or retreatment, a pre-prosthetic reconstruction or a surgical crown lengthening procedure, to be retained. All these strategies need a great effort of both the clinician and the patient, and have a rather uncertain prognosis, especially without a periodontal treatment. A trained interviewer illustrated the two treatment options: root canal therapy and crown positioning, aimed at saving the tooth, or tooth extraction, implant insertion and crown positioning. The interviewer clearly explained the major differences between the two proposed solutions. Participants were invited to ask questions if they had doubts or concerns about information received. Appropriate photographs and diagrams were used to explain the two treatment options. Patients who had the same experience in the past were asked to give a positive or negative opinion of their own previous treatment choice, taking into account several factors such as pain, discomfort, time required for rehabilitation, longevity of the proposed solutions, procedures for maintenance of oral hygiene and possible complications in the short and long term. They were then asked which treatment option they would prefer, and the maximum amount of money they would be willing to pay to receive the dental care, in order to determine the expenditure deemed appropriate by the patient to his/her choice. Proposing the same starting cost basis of €2,000 for both treatment solutions (the average market price in Italy), if the patient was willing to pay this price, increments of €100 were added until the patient was unwilling to pay the amount. Conversely, decrements of €100 were deducted if the subject was unwilling to pay the starting bid price, until the patient was willing to pay the amount or the amount reached zero. This amount was recorded as WTP.

Statistical analysis

The patient was the statistical unit. Mean values, standard deviations and ranges were calculated for age, while absolute or relative frequencies were calculated for the remaining patient-related variables. The agreement between previous experience and current choice was evaluated with Pearson chi-square test. Further analysis was performed to study the influence of the socio-demographic factors on the WTP values. For that Student ttest and one-way analysis of variance (ANOVA), with *post hoc* Bonferroni's Multiple Comparison were applied. Descriptive statistical analysis was performed by using GraphPad Prism 5.03 (GraphPad Software, San Diego, Calif., USA). Differences were considered significant at $P < 0.05$, with a 95% confidence interval (95% CIs).

Results

The details concerning the clinical and demographic profile of the 103 participants are summarised in Table 1. The age of participants ranged from 23 to 65 years (mean age 44.1±9.5 years) and the gender distribution was homogeneous (51 females [50%] and 52 males [50%]). The majority of participants (62/103; 60%) claimed to have already had a similar experience in the past: 58% (N = 36) underwent a dental restorative treatment, while 42% (N = 26) experienced a surgical procedure and 92% of these patients were satisfied with his/her decision.

With regard to the overall level of acceptance of proposed therapies, 76% (N = 78) of patients preferred the endodontic treatment, while the remaining 24% (N = 25) directed his/her choice to the dental surgery. None of

the participants chose 'no treatment'. Of the patients previously treated with restorative treatment, 36 out of 36 would confirm the same choice. Of the patients previously treated surgically, only 19 out of 26 declared they wish to undergo the same treatment. According to the chi-square (χ^2) test, the difference between the two above groups regarding the influence of the past treatment in the preference for the new treatment was statistically significant (P <0.001). Overall, there was a fair agreement between previous experience and current choice (55/62, 89%, Cohen k = 0.3). There was no significant difference in the choice of treatment between patients with and without a previous experience (P = 0.06).

Regardless of the new treatment solution, the mean WTP value was €1,926 (median: €2,000; 25th percentile: €1,600; 75th percentile: €2,300). In particular, 46% of participants (N = 47) would accept to pay an additional sum of money to the standard cost of therapy (median: €300), 13% (N = 13) deemed appropriate the starting price of €2,000, and 42% (N = 43) were unwilling to pay the amount proposed (Fig. 1).

Considering socio-demographic factors WTP values were not associated with gender, age, educational attainment, annual income and type of employment (Fig. 2). Within patients who chose restorative dentistry, a significant difference was found related to education (tertiary vs secondary, P <0.05) and type of job (employee vs private practice, P <0.01) (Fig. 3).

With respect to dental-care routine check-ups, both patients visiting the dentist more than twice a year and those who do not go there at all, showed less willingness to sacrifice for the care solution (67% and 58%, respectively), while 53% of participants that have regular dental visits once or twice a year, expressed being willing to pay an additional amount of money for the treatment of their choice (median WTP value of €2,100).

Discussion

The importance of oral health as part of general health is now well established. In the past, medical and dental treatment decision-making was made unilaterally by physicians, but in recent years, patients wish to be involved in decisions about healthcare and to take an active part in the decision-making process.[12] The clinician provides all relevant information to the patient who makes an informed decision according to circumstances and previous experiences. Nevertheless, negative

Fig. 1 Mean willingness to pay (WTP) value of patients regardless of the new treatment solution

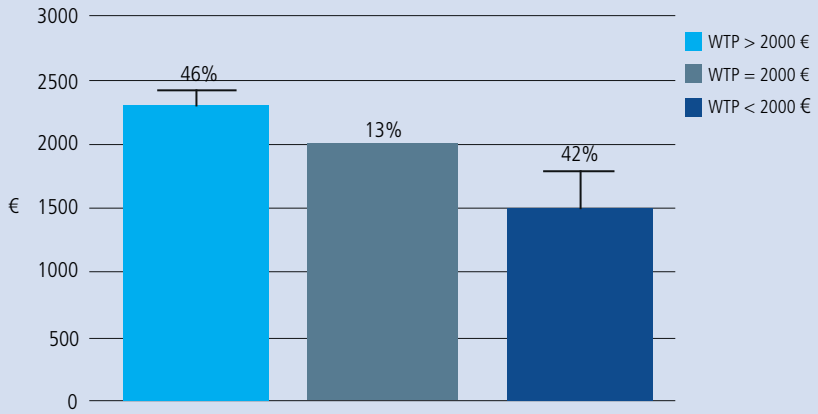


Fig. 2 Association between mean willingness to pay (WTP) values and gender (A), age (B), educational attainment (C), type of employment (D) and annual personal income (E) of participants

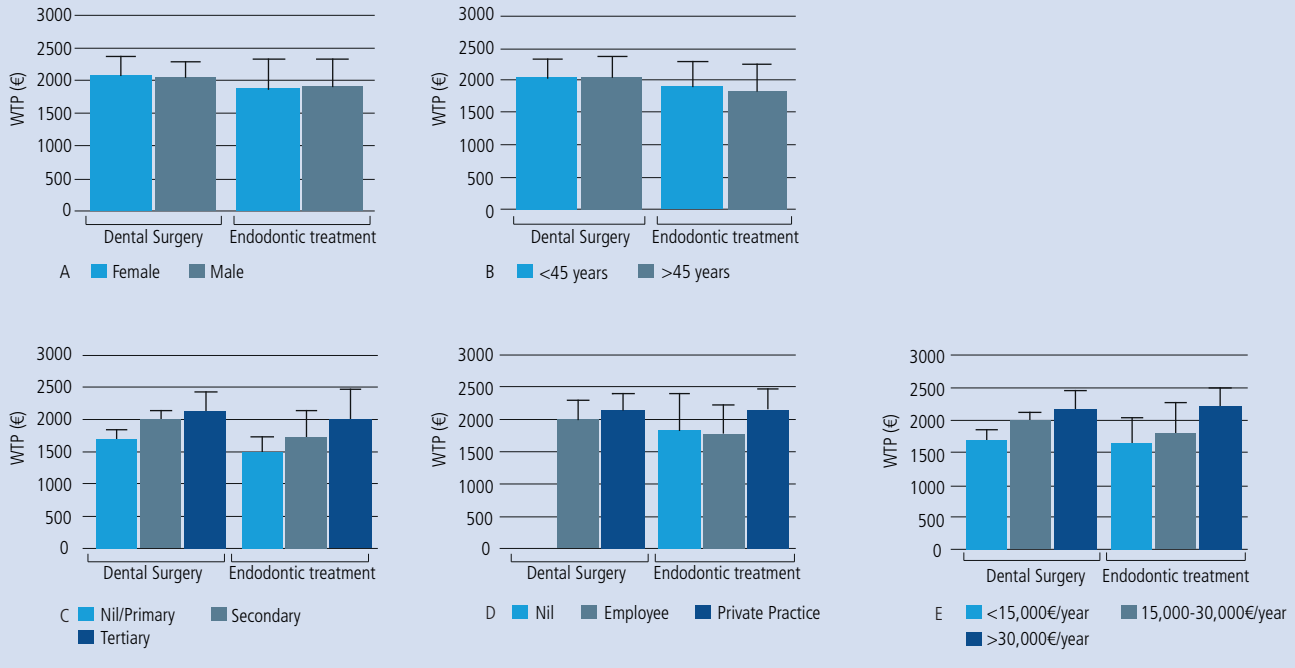
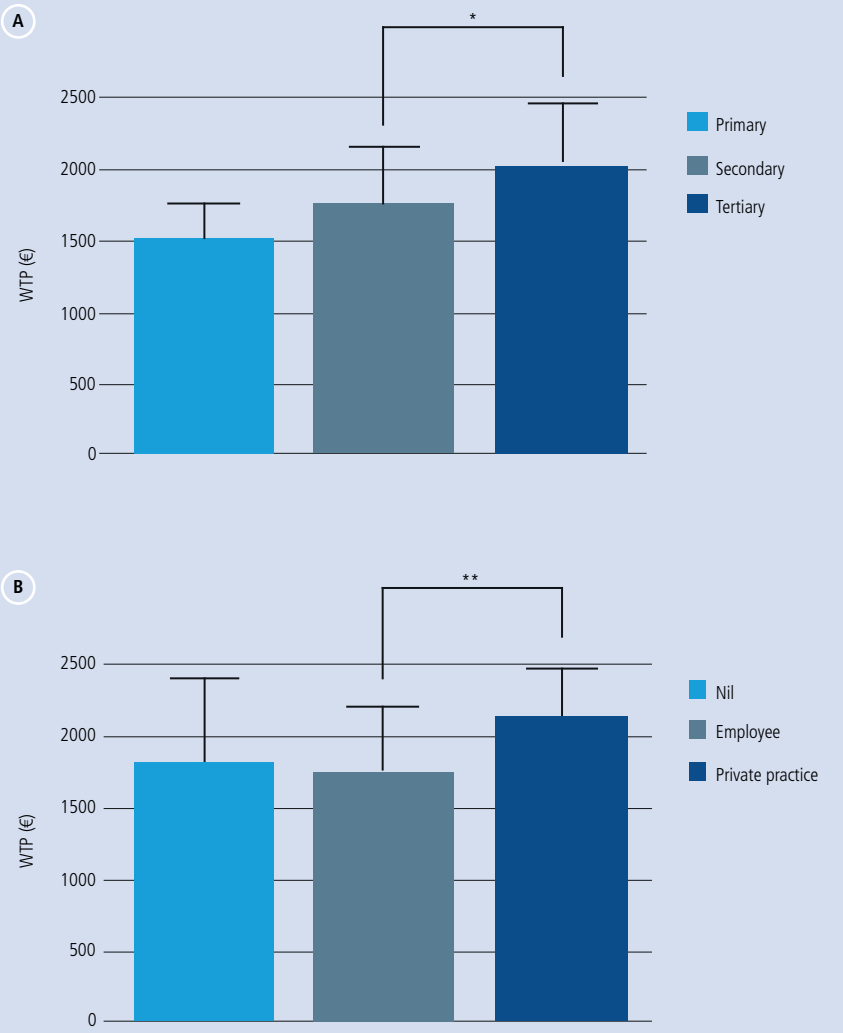


Fig. 3 Association between mean willingness to pay (WTP) values and educational attainment (A) and type of employment (B) of participants within restorative dentistry group. Significant differences are indicated by asterisks: *P <0.05 and **P <0.01, respectively



past experiences, lack of knowledge of the subjects of dentistry and, consequently, lack of trust in the dentist, perceptions based on media reports of dental malpractice or death during dental treatment, lack of time for discussion, loss of confidence in the dentist and features of dentists' communicative behaviour, are all factors that may influence the ability of the patient to participate during dental consultation for treatment decisions.[13] Indeed, despite the growing importance of oral health and the advances in dental care, dental fear and anxiety can lead to avoidance of necessary dental treatment. People with high dental fear or dental phobia often suffer from several anxiety, mood, personality, behavioural and social disorders.[14,15] It is often assumed that dental fear aetiology is contingent upon unpleasant and painful previous experiences associated with a dental examination or procedure, as well as fear-relevant stimuli, such as sitting in the waiting room, the vibrations and the sound of the drilling, the sight of the injection needle and the disgustingness (blood, smell associated with dental surgery and fear of contamination with germ and diseases).[16–18] Lack of control, that is unpredictability and uncontrollability, can also act as a trigger of dental fear, since patients cannot view what is happening and are unable to anticipate when pain might occur.[19] Furthermore, negative family attitudes toward dentistry, in particular dental fear in families and concerns about being ridiculed or laughed at by other people, has also been implicated as a cause of dental fear.[20] Dental patient demographic variables, such as gender and age correlated with dental anxiety (women and young patients reported dental treatment fears more frequently than men and older people), while income and education do not.[21,22] Negative dental behaviours allowed the demonstration of a vicious cycle, in which avoidance of dental treatment among fearful dental patients may result in deterioration of oral health and concomitant negative psychological and psychosocial consequences, subsequently reinforcing fear and leading to increased anxiety.[23] Therefore, it is mandatory for clinicians to be aware of not only patients' preferences, but also of their dental history, in order to evaluate both the oral status and the psychological condition (in particular the level of anxiety and fear).[19]

In the hypothetical scenario described by Friedman and Mor,[24] when a patient has to decide between two treatment options for a wrist's fracture, one of which is the conventional treatment with an 80% chance of 'success', but with the possibility of sporadic discomfort and risks, while the other is the amputation of the hand and its replacement with a state-of-the-art prosthesis, with 97% chance of 'success' without discomfort, the patient selected the first treatment option with no hesitation. The analogy of this scenario applies to recent articles comparing endodontic therapy to implant-supported single tooth replacement[25–27] and also to the present study, in which a trend has been reported that suggests that restorative treatment is well-accepted by patients (P <0.01) with respect to surgical procedures. Indeed, there is an agreement between participants that had experienced endodontic treatment and then confirmed the same choice, and patients that claimed to have never had a similar experience in the past and also chose the restorative approach. Also, 11% of participants that underwent a surgical procedure in the past directed its choice to the restorative treatment. The results herein reported are in accordance with other studies indicating that endodontic and restorative treatment is preferred over extraction and implant placement, but clinical and cost data may indicate that there could be an increased choice toward implants in the future.[28,29]

The measurement of patients' preferences by means of the WTP index, might be helpful when dealing with decisions in health economics,[30] since financial barriers in accessing dental care, especially for patients of low income, appear to have negative effects

on dental visiting and oral health.[10] However, in the present study, the majority of patients (58%) accepted to pay additional money to the cost of the treatment, regardless of proposed therapy, previous experience, age or personal income. In the study herein reported, the starting cost basis proposed was €2,000 for both treatment solutions; since we decided to propose a price in Euros we considered that the same amount of money in Pounds is a reasonable quote in England.

Despite the limitations of this study, it can be concluded that most participants preferred the endodontic treatment, even those who experienced a surgical procedure or had not had a hopeless tooth in the past, and most of the patients were willing to pay an additional fee to receive their treatment choice.

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