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**Original Article**

## **Dental Patient Preferences and Choice in Clinical Decision-Making**

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### **Abstract**

In economics, the concept of utility refers to the strength of customer preference. In health care assessment, the visual analogue scale (VAS), the standard gamble, and the time trade-off are used to measure health state utilities. These utility measurements play a key role in promoting shared decision-making in dental care. Individual preference, however, is complex and dynamic. The purpose of this study was to investigate the relationship between patient preference and educational intervention in the field of dental health. The data were collected by distributing questionnaires to employees of two companies in Japan. Participants were aged 18–65 years and consisted of 111 males and 93 females (204 in total). One company (Group A) had a dental program of annual check-ups and health education in the workplace, while the other company (Group B) had no such program. Statistical analyses were performed with the *t*-test and Chi-square test. The questionnaire items were designed to determine: (1) oral health-related quality of life, (2) dental health state utilities (using VAS), and (3) time trade-off for regular dental check-ups. The percentage of respondents in both groups who were satisfied with chewing function, appearance of teeth, and social function ranged from 23.1 to 42.4%. There were no significant differences between groups A and B in the VAS of decayed, filled, and missing teeth. The VAS of gum bleeding was 42.8 in Group A and 51.3 in Group B ( $p < 0.05$ ). The percentage of persons having a regular dental check-up every three months was 34.1 and 31.3% in Groups A and B respectively. These results suggest that low preference results from lack of opportunity or utilization of dental care in the worksite. Ascertaining the factors involved in patient preference may have significant potential benefits in shared decision-making.

**Key words:** Health state utilities—Patient preferences—Time trade-off—Visual analogue scale—Clinical decision-making

## Introduction

The development of new technologies and quality improvement in dental care provide an increasing range of possibilities for dental treatment. In a clinical setting, there are two viewpoints of decision-making. One is the health professional's decision, and the other is the patient's choice and acceptance. The principles of informed consent and informed choice mean that doctor-patient interaction, communication, and the exchange of health information are of the utmost importance. These processes promote shared decision-making in a clinical setting<sup>2,6,15,17,25</sup>.

Dentists' clinical decision-making during diagnosis and treatment plan formulation is based on the dental examination and on the oral health of patients. In this process, there are three factors to be considered: evidence, clinical skills of the dentist, and patient preferences. Patient preferences and choice are influenced by past healthcare intervention experience and awareness of individual health state<sup>4,7,20</sup>.

The terms "value", "preference", and "utility" are often used interchangeably in the field of the health economics<sup>19,27</sup>. Health state utility refers to the measurement of the strength of individual preference for particular health outcomes<sup>16,20</sup>. In health care assessment, the visual analogue scale (VAS), the standard gamble (SG), and the time trade-off (TTO) are used to measure health state utilities. Expected utility theory provides a conceptual framework for rational decision-making under uncertain conditions<sup>21</sup>. The VAS is used as a rating scale to measure the individual value of teeth<sup>1,3,8,13,14</sup>. The advantage of this method is that it is simple and easily understood by patients<sup>19</sup>.

The SG provides a method for measuring an individual's preference for a particular health state or a number of different health states within a given period of time based on the axioms of expected utility theory<sup>15,18</sup>. The TTO method has been developed as an alternative to the SG in health research<sup>26</sup>. The SG and TTO measure how much risk an indi-

vidual is willing to accept, and how much time he/she is willing to spend to achieve health improvement.

In the dental field, Fyffe *et al.* proposed the dental visual analogue scale (DVAS) and the dental free time-trade off in 1999<sup>14</sup>. In their report, subjects were asked the amount of free time they would be prepared to forego each day, in the form of extra time devoted to tooth brushing in return for a given improvement in dental health.

In this study, it was hypothesized that patients' preference for dental health state utilities would be higher when provided with sufficient health information.

The objectives of this study were to measure the dental health state utility of Japanese employees using the VAS and TTO to ascertain the factors involved in patient preference in educational intervention related to oral health.

## Materials and Methods

The data were collected by questionnaires administered to employees of two banks in Japan. Participants were from 18 to 65 years old and consisted of 111 males and 93 females (204 in total). This study was conducted as a cross-sectional study in two groups. Group A employees worked in a bank which provides a free dental program of annual check-ups and continuous health communication. In this program, dental professionals talk about their assessment of oral health with patients at each check-up. Group A consisted of 156 employees (85 males, 71 females) with the following age distribution: under 35 years, 53.2%; 35–44 years, 32.7%; over 45 years, 14.1%. Group B employees had no such dental program at their company. Group B consisted of 48 employees (26 males, 22 females) with the following age distribution: under 35 years, 54.1%; 35–44 years, 20.9%; over 45 years, 25.0%.

The questionnaire items were designed to measure oral health-related quality of life (QOL), dental health state utilities (using

VAS), and TTO for regular dental check-ups. The oral health-related QOL item was, “Are you satisfied with the condition of your teeth and mouth?” There were three categories for this item (chewing function, teeth and mouth appearance, and social functioning), and each category was evaluated on a 5-point Likert scale (very satisfied, satisfied, neutral, dissatisfied, and very dissatisfied). According to some reports, those who are satisfied with their oral health status tend to be eager to get health information<sup>22)</sup>, so in this study degree of satisfaction was used to evaluate oral health related QOL. Therefore, those who answered “very satisfied” and “satisfied” were combined into a single “satisfied” group.

For the dental health state utilities item, respondents were instructed to consider 11 oral health states and evaluate each on a scale of 0 to 100, with 100 being the best imaginable tooth and 0 being the worst imaginable tooth. The 11 oral health states evaluated were painless decayed front tooth, painful decayed front tooth, esthetically filled front tooth, missing front tooth, painless decayed back tooth, painful decayed back tooth, metal filled back tooth, missing back tooth, gum bleeding, and removable dentures. To measure the TTO for dental check-ups, the subjects were asked the frequency with which

they would be willing to have dental check-ups under the assumption that doing so would result in lifelong oral health maintenance. These utility measurements were based on the DVAS and the dental freetime trade-off reported by Fyffe *et al.*<sup>14)</sup>.

Figure 1 shows the conceptual framework of patient preference and choice in shared decision-making. In the present study, it was hypothesized that oral health information and the interaction between dental professionals and patients may be major factors which determine patient preference.

The data were analyzed using SPSS (version 13.0). Statistical analyses were performed with the *t*-test and Chi-square test.

### Results

Figure 2 shows the oral health-related QOL of participants in the two groups. These QOL results represent a subjective evaluation of participants’ own oral health status. The percentage of respondents satisfied with chewing function, appearance of teeth, and social functioning such as conversation ranged from 23.1 to 42.4% in Group A and from 25.0 to 39.6% in Group B. In Group A, for chewing function, the percentage of

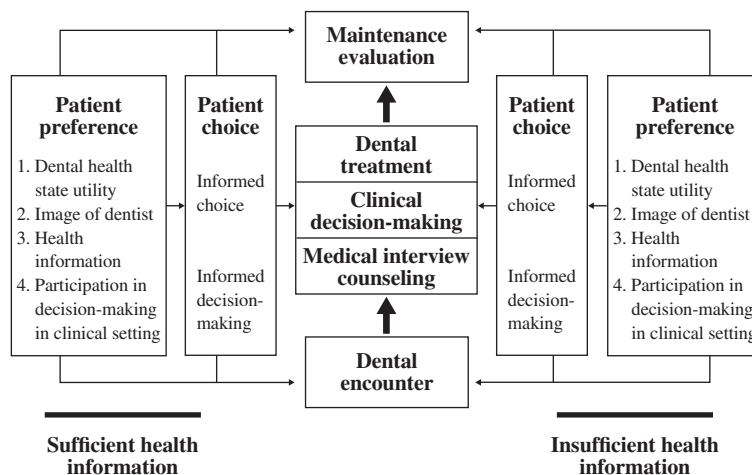


Fig. 1 Patient preference and choice in shared decision-making

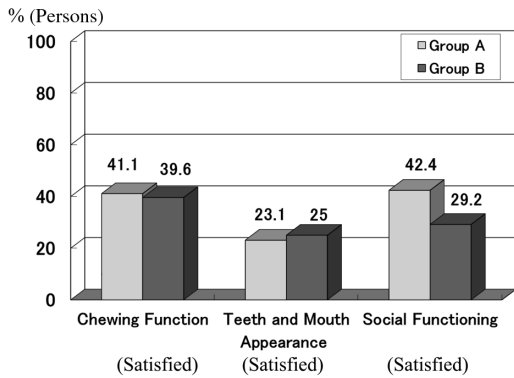


Fig. 2 Oral health related QOL

Group A: Health education program in workplace, n = 156.

Group B: No program in workplace, n = 48.

No significant differences were observed between groups (Chi-square test). Oral health-related QOL items comprised three categories for this item (chewing function, teeth and mouth appearance, and social functioning), and each category was evaluated on a 5-point Likert scale (very satisfied, satisfied, neutral, dissatisfied, and very dissatisfied). Those who answered “very satisfied” and “satisfied” were combined into single “satisfied” group.

respondents answering “neutral” was 30.3% and those answering “dissatisfied” or “very dissatisfied” was 27.7%; for appearance of teeth, the percentages were 38.2% for “neutral” and 38.2% for “dissatisfied” or “very dissatisfied”; and for social functioning, the percentages were 45.4% for “neutral” and 11.2% for “dissatisfied” or “very dissatisfied”. In Group B, for chewing function, the percentages were 39.6% for “neutral” and 20.9% for “dissatisfied” or “very dissatisfied”; for appearance of teeth, the percentages were 39.6% for “neutral” and 35.4% for “dissatisfied” or “very dissatisfied”; and for social functioning, the percentages were 56.3% for “neutral” and 14.6% for “dissatisfied” or “very dissatisfied”. There were no significant differences between the two groups.

Figure 3 indicates the respondents’ preference weights (Group A and B combined) for 11 dental health state utilities. The results show that “painless decayed teeth” and “esthetic filled teeth” were given a preference weight of over 60. On the other hand, “bad breath”, “missing tooth”, “removable den-

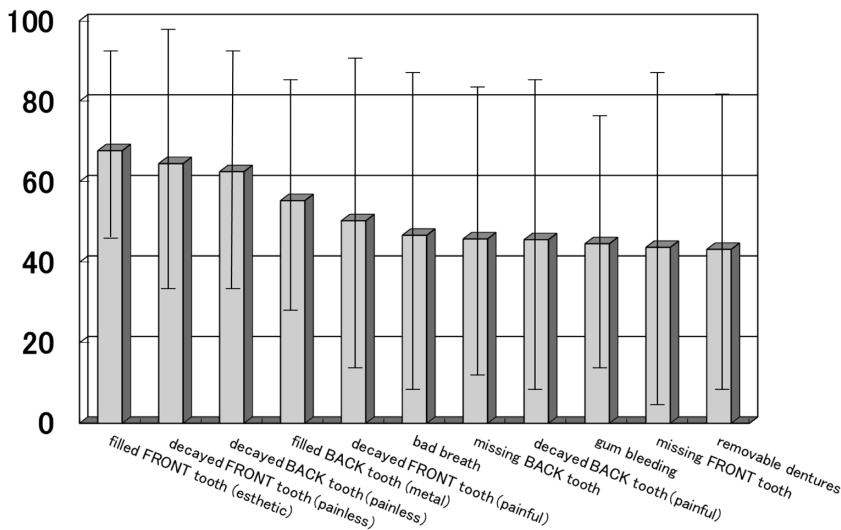


Fig. 3 Preference weights of dental health state utilities

For dental health state utilities item, respondents were instructed to consider 11 oral health states and evaluate each on scale of 0 to 100, with 100 being best imaginable tooth and 0 being worst imaginable tooth. SD: —, n = 204.

tures”, and “gum bleeding” were all valued at around the same level, within a range of 43.7 to 46.8. Among the subjects of this study, removable dentures were given the lowest preference weight of all.

Figure 4 shows the difference of dental health state utilities between Group A and B. If health educational intervention has the hypothesized effect on patient preference, the preference weight of dental health state utilities in intervention group would be lower than that of the control group. A significant difference between the two groups is found in “gum bleeding”. The health state utility of gum bleeding was 42.8 in Group A and 51.3 in Group B ( $p < 0.05$ ). For the other dental health state utilities, a significant difference was not indicated in this study.

Figure 5 shows the shortest acceptable interval between dental check-ups of the two groups. Participants were asked the shortest interval between dental check-ups they would be willing to accept in return for a given improvement in dental health. The percentage of persons who expressed willingness to

undergo regular dental check-ups every three months or every month was 36.3% in Group A and 32.6% in Group B. This shows that participants in the health intervention group have a willingness to have dental check-ups more frequently.

## Discussion

Health perception and behavior in adults are affected by factors such as age, sex, job, and community<sup>10,11</sup>. Measuring the preferences of individuals is a new approach in dentistry and medicine, so there is insufficient data on the determinants of preference and choice in dental treatment. Additionally, the response of individuals to utility measurement instruments depends on the accuracy, completeness, and clarity of the health information provided<sup>18</sup>.

The main objective of this study was to assess the effectiveness of health education on patient preferences. In previous studies in the dental field, the VAS, the SG, and the

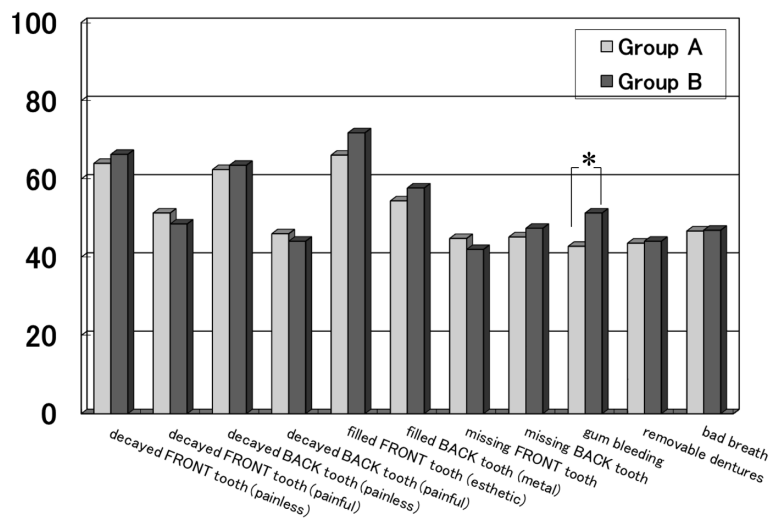


Fig. 4 Difference in preference weights of dental health state utilities in relation to health intervention level

Preference weights: best imaginable tooth = 100; worst imaginable tooth = 0.

Group A: Health education program in workplace,  $n = 156$ .

Group B: No program in workplace,  $n = 48$ .

\*  $p < 0.05$  ( $t$ -test).

TTO have been applied to assess health state utilities within the framework of a health economics model. Among these methods, the VAS has been used extensively in medical field, although there have been debates in the medical literature as to whether VAS produces ratio results or simply ordinal results<sup>23)</sup>.

In this study, participants weighted tooth states in an order consistent with that found in previous studies<sup>13,14)</sup> and in an order which would appear to make sense; *i.e.*, tooth states which involved an element of pain had lower preference than those without pain, restored teeth were more highly valued than decayed teeth, and healthy teeth scored the highest.

In studies measuring health state utilities, participants are often asked to show their preference on a scale from 1 (best) to 0 (worst), or alternatively from 100 to 0. Investigators can measure, on a rating scale, the desirability of a health state associated with an intervention by asking subjects to locate the intervention on a scale with two fixed endpoints, or “anchors”, which represent two health states.

Edwards *et al.* presented patients with descriptions of a range of possible outcomes associated with alternative approaches to managing asymptomatic third molars<sup>9)</sup>. In a study of young adults in the U.K., the tooth

health state utilities were 70 for infection in the gum surrounding the tooth, 66 for occasional low grade pain, and 58 for crowding of the lower front teeth<sup>1)</sup>. In another study of regularly attending adolescent dental patients, a decayed and painful front tooth and a missing front tooth were given the lowest median utility value of 0.05, with the highest median utility value of 1.0 being assigned to a healthy front tooth<sup>14)</sup>. One remarkable difference between the present study and Fyffe’s study concerns the results for decayed front teeth without pain and esthetic filled teeth<sup>14)</sup>. In this study, participants assigned similar health state utilities to decayed and filled teeth. Bad breath, gum bleeding, and missing front teeth and back teeth were all given about the same weight. One possible reason for this difference is that there are differences in regular access to dental care between Japan and the U.K., each of which has its own unique health insurance system<sup>12)</sup>. In the U.K., the national health system focuses on prevention, thereby encouraging regular dental attendance. This regular access to dental health care is likely to promote awareness in patients about the importance of oral health<sup>24)</sup>.

A relationship between health educational intervention and preference weight given to health state utilities was clearly indicated in one of the utilities: gum bleeding. This result is likely a reflection of the interaction between patient and dentist in the clinical setting. Periodontal disease is a major oral health concern for adults. Therefore, dental professionals provide patients with explanations concerning preventive measures and objective symptoms of gum disease. Patients are then able to check daily for bleeding from the gums. This close communication between dental professional and patient may alleviate patients’ fear of periodontal disease.

The TTO method is applied in health care fields to measure patients’ willingness to consider giving up time each day in exchange for better health<sup>5,7)</sup>. In the dental field, regular dental check-up is a major health behavior for improving oral health. This study is the

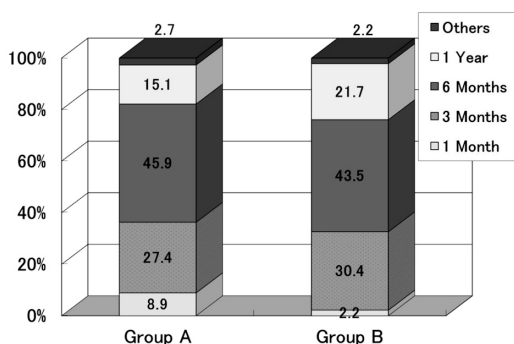


Fig. 5 Interval of willingness to have dental check-ups  
Participants were asked shortest interval between dental check-ups they would be willing to accept in return for given improvement in dental health.

Group A: Health education program in workplace, n = 156.

Group B: No program in workplace, n = 48.



first attempt at adapting the TTO to evaluate the willingness of adults to sacrifice time for regular dental visits. Fyffe *et al.* reported on dental free time trade-off, focusing on tooth brushing in daily life<sup>14</sup>. Maintenance of periodontal health is recommended by dental health professionals. On the other hand, those who have regular dental check-ups tend to be influenced by socioeconomic factors and the medical care system. Concerning the willingness of patients to undergo regular dental visits, the individual value placed on dental care or the accessibility to dental care has not been measured in previous studies. A limitation of this study is that Group A consisted of subjects receiving free annual dental check-ups, while Group B subjects must pay for their check-ups. Since Group B was not provided with information concerning the cost of a dental check-up at the time of answering the survey questions, their concern about cost may have affected their responses. However, the group receiving education did tend to show a willingness to undergo dental check-ups more frequently, and this is likely due to the fact that the education took place in the workplace.

An individual's strength of preference for something is determined by what he is willing to trade-off (or sacrifice) to have it. Utilities are measured by the maximum sacrifice that a subject is prepared to make. Patient choice is revealed in one's preferences, and patient preferences regarding oral health are influenced by encounters with dental professionals and subjective evaluation of oral health status.

Shared decision-making is an effective way to improve patient satisfaction and health behavior<sup>6,17</sup>. However, in order for shared decision-making to be successful, it is essential that dental professionals obtain detailed knowledge of their patients' values and preferences regarding oral health. Without this knowledge, there is a real danger of falling back into the same old patterns of one-way communication, resulting in treatment decisions made unilaterally by the dental professional. However, in the typical clinical setting,

obtaining such detailed patient information is no easy task. Therefore, this type of study is likely to improve shared decision-making in dental settings. Patient participation in clinical decision-making promotes patient self-determination and satisfaction with dental care. Furthermore, patient participation is related to oral health behavior and awareness level.

In conclusion, this study has focused on the effects of dental educational intervention in the workplace on dental health utility preferences. The results support health education intervention, as dental care utilization was shown to improve patient preference and choice in shared clinical decision-making. The VAS and TTO can be used to estimate the value placed on teeth by individuals; however, determining the most appropriate use of these tools in evaluating patient preference will require further study.

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