Dental management of Alzheimer patients

A predictive test of dental cooperation in individualized treatment planning

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Nordenram G, Ryd-Kjellén E, Ericsson K, Winblad B. Dental management of Alzheimer patients. A predictive test of dental cooperation in individualized treatment planning. Acta Odontol Scand 1997;55:148–154. Oslo. ISSN 0001–6357.

The aim of the study was to investigate a possible relationship in Alzheimer patients between the stage of dementia, cognitive and functional capacity, and behavior as a dental patient. A special index for assessing behavior in the dental setting was used. The 40 participants were inmates of a nursing home and fulfilled the criteria for Alzheimer's disease in accordance with DSM-III-R. A deficiency in the dental behavior index (DBI) of 50% or less did not correlate with cognitive, functional, or graphic capacity. These subjects were generally aware of earlier regular dental treatment and behaved as if dental visits were familiar to them, although their cognitive, functional, and graphic capacities were more impaired than disclosed by the dental behavior index. A deficiency in the dental behavior index of 50% or more was more correlated with the other capacity assessments. Finding a proper treatment level for an Alzheimer patient is a delicate task in which it is essential to balance awareness of various aspects of impairment and realistic anticipation of benefit. The dental behavior index can be an appropriate instrument in this complex process. □ *Elderly; geriatric dentistry; gerodontology; treatment need*

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Dementia is a major disorder of old age. The commonest form of dementia, Alzheimer's disease (AD), accounts for about 50–60% of cases of senile dementia and generally occurs in people more than 65 years of age (1, 2). In Sweden, as in most other modern societies, the increasing prevalence of dementia in old age has medical, sociologic, and financial implications, because of increasing proportions of elderly in the populations (3).

In comparison with earlier generations of elderly, most of whom were edentulous and had removable full dentures, the elderly of today have better oral health and may be expected to retain their natural dentitions lifelong (4, 5). Older adults in modern society are more aware of the importance of oral health to their quality of life (6). To maintain lifelong good oral health, the elderly now need more regular dental care, including prevention. Oral health is said to be important to general health in older patients (7, 8). Increasing preservation of teeth among older people means increased risk for oral disease, specially for frail and chronically ill elderly people, because they are susceptible to caries and other oral infections. Dementia reduces the patient's ability to accept conventional dental treatment (9–16). Some demented patients may require preoperative sedation for dental care, and some treatment must be carried out under general anesthesia.

Close observation of the patient's behavior in the dental clinic may give the dentist valuable information about the gravity of the patient's dementia and capacity to cooperate as a dental patient. Such information adds an important dimension to the dentist's treatment decision-making and planning.

The aim of the present study was to investigate a possible relationship in Alzheimer patients between the stage of dementia, cognitive and functional capacity, and behavior as a dental patient. A special index for assessing behavior in the dental setting was used in the study.

Materials and methods

The inmates of a nursing home in Stockholm who fulfilled the criteria of Alzheimer's disease on the basis of the DSM-III-R (APA) (17) were invited to participate in the study. Consent for the patients to participate was also sought from their next of kin.

Up to 40 patients were included. The exclusion criterion was an additional handicap such as a stroke. The examinations took place in the nursing home over a period of 3 months.

Cognitive functions were registered on the basis of the Mini-Mental State Examination (MMSE) (18).

Activities of daily living (ADL) functions are of importance, as cognitive loss and functional impairment are distinct aspects of dementia severity, both of which might influence dental behavior (19). An assessment in accordance with Katz's index of independence in ADL (20, 21) was available for each patient.

The MMSE ratings and the ADL ratings were registered (E. Ryd-Kjellén), and the ADL also confirmed by the ward nurses. This information was withheld from the dentist until after assessment in the dental clinic.

During the oral examination five items of the patient behavior were observed and registered in a structured form (Appendix). The dental behavior index is constructed to assess different faculties that may be impaired by Alzheimer's disease: memory, understanding verbal instruction, understanding a function, and ability to perform and coordinate a function. The scales of the assessed faculties comprise four steps. First, the patient's familiarity with the dental office was observed. If the patient was not able to recognize the kind of room and the kind of chair he was sitting in, he was given verbal assistance to try to prompt recognition of the environment. Then the patient was informed about the oral assessment at hand, and the dentist took a probe and a mirror from the dental unit tray in front of the patient. The normal patient reaction in this situation, opening the mouth spontaneously or on request, was scored as 4 and a sucking motion as 0. The patient was shown a toothbrush and asked if he recognized it. The scoring system was the same as for the recognition of the dental environment, with immediate recognition scored as 4, and no reaction scored as 0. Next, the patient was asked to use the toothbrush and was given a glass of water. A kidney bowl was placed in front of the patient. A score of 3, impaired function, was given when the patient put the toothbrush somewhere near the mouth, brushing but with inadequate or no brushing motion. Poor function, a score of 2, was given when the patient brushed something, but not the mouth. Refusal to cooperate was scored as 1, refusal being a more active response than no reaction, scored as 0. The last item evaluated was the patient's response to a request to rinse out: he was given a glass of water and the spittoon was placed in front of him. Scoring was the same as for the toothbrushing test.

The observations were made independently by the dentist and the dental nurse while the patient was in the dental clinic. Immediately after the patient had left, the dentist and the nurse discussed their impressions, agreement was reached on the scores, and the formula was filled in by the dentist (G. Nordenram). The total score of five dental items was 20.

The capacity to perform a free-hand human figure drawing (HFD) has long been used to assess intellectual development in children (22). The details drawn in the HFD are believed to represent the subject's awareness of, and interest in, primarily elemental aspects of everyday life (23). The absense of essential details in the HFD might indicate initial cognitive deterioration.

The technique has potential for the assessment of regression of cognitive function in dementia (24, 25). The drawing of a free-hand human figure by impaired elderly subjects seems to mirror the developmental stages of childhood. In the drawing this corresponds to a decline from a two-dimensional human figure to stick figure, to headfooter, to scribbles of different kinds (26–28). The technique has been applied to assessment of cognitive function in the elderly (29–31). The subject's graphic functioning level in free-hand HFD was measured separately (K. Ericsson), without access to information on the identity of the patients or the results of the other examinations.

Table 1. Participants and nonparticipants cognitively assessed on the basis of the Mini-Mental State Examination (MMSE) and 7 of 36 participants who refused to draw a human figure (HFD)

	All	Dropouts	Cases	Refused HFD
Number	40	4	36	7
Men	5	2	3	1
Age, years				
Mean ± $s_{\bar{x}}$	87 ± 7.0	85 ± 4.3	86 ± 7.3	87 ± 6.8
Range	73–100	79–89	73–100	77–95
MMSE				
Mean ± $s_{\bar{x}}$	8.2 ± 6.9	8.3 ± 8.7	8.1 ± 6.8	13.0 ± 3.9
Range	21–0	21–2	18–0	18–6

After the oral examination and the assessments, the dentist estimated treatment need from two different perspectives, normative and realistic (32).

First, *normative need* related to oral disease, function, and pain was considered with reference to different treatment goals.

1. No need for oral treatment. No oral diseases and satisfactory oral function.

2. Modest treatment need. Minor oral care, mostly preventive, is required to reach the treatment goal of supporting and maintaining oral health.

3. Intensive treatment need because of periodontal disease, caries lesions, mucosal lesions, poor chewing function. The treatment goal is to arrest or retard oral deterioration and, if possible, improve oral function.

4. Need for immediate treatment: pain, sores, loose teeth, or oral infections seriously affecting general health. The goal is to relieve the patient's oral discomfort.

Second, *realistic need* was estimated, taking into account individual aspects of the patient's capacity, general health, and ability to cooperate in the dental clinic and in the ward.

1. No treatment need. The patient is virtually unconscious or uncooperative. Nothing in the oral environment is harmful or painful to the patient.

2. Modest treatment need. The patient's capacity to cooperate is quite limited, and heavy sedation or even general anesthesia is needed for dental treatment. Such treatment should be performed only if it will without question improve the patient's oral comfort and quality of life.

3. Extensive treatment need. The patient wants dental treatment, and oral health can thereby be maintained and even improved.

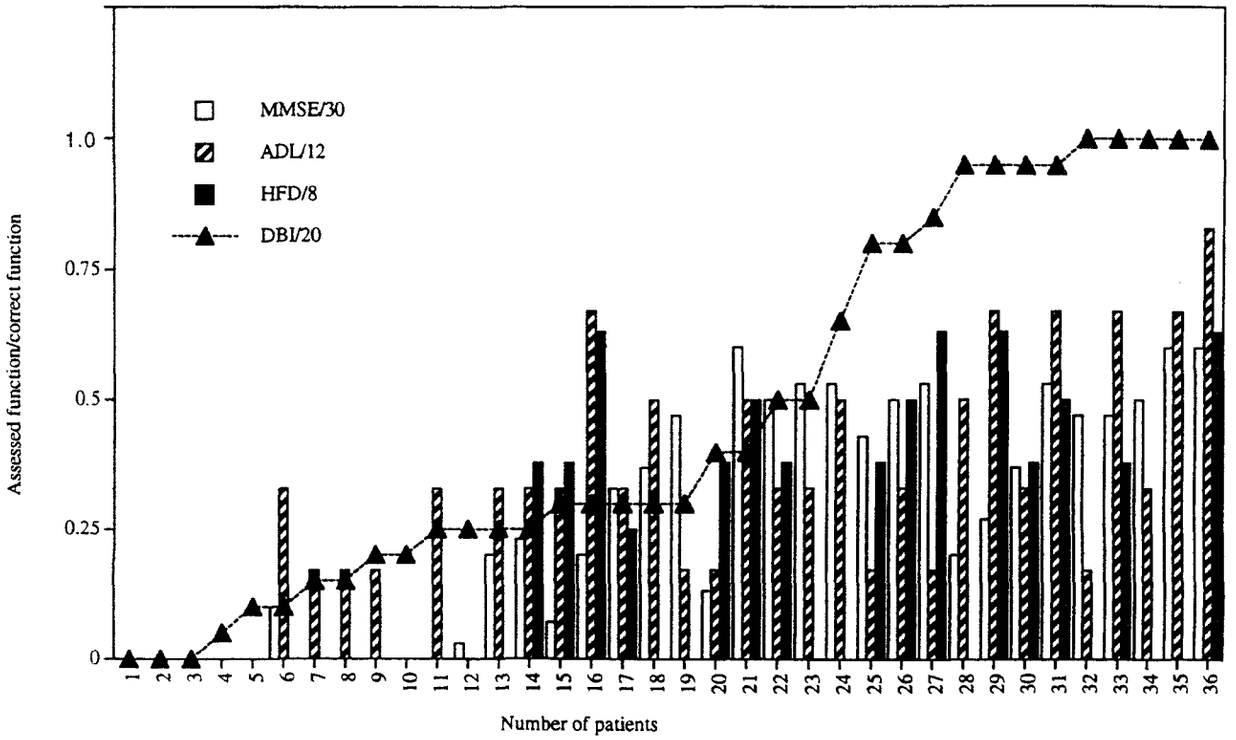

Fig. 1. Dental Behavior Index (DBI), Mini-Mental State Examination (MMSE) of cognition, Katz's index of Activities of Daily Living (ADL) for 36 Alzheimer patients, and with human figure drawing (HFD) capacity for 15 patients who could or were prepared to draw.

4. Immediate treatment need. Regardless of the patient's ability to cooperate, oral treatment is necessary because of oral pain, risk of aspiration, suspicion of malignancy, fever from oral infection, and so forth.

The study was approved by the Ethical Committee of Huddinge University Hospital.

Results

Informed consent to participate in the study was given by all 40 patients from the dementia wards and/or their guardians.

Four patients did not complete all assessments: one died, one moved to another town, and two did not accept the appointment after all. Demographic data, including nonparticipants, are presented in Table 1.

For 21 patients there was no graphic test, 2 because of poor eyesight, 12 because they did not understand, and 7 because they did not want to draw. The 7 patients who refused HFD had an average MMSE of 13.0 (standard deviation ($s_{\bar{x}}$) ±3.9), compared with an average MMSE of 8.1 ($s_{\bar{x}}$ ±6.8) for the whole group.

The assessment indices were calculated as part of perfect function. A graphic presentation is given in Fig. 1.

A correct dental behavior of 50% or more of DBI does not correlate with cognitive, functional, or graphic capacity. The 10 patients in the graph, with normal or very slightly impaired dental behavior (DBI, 20–17), recall, except for no. 35, their former dentist and described events from earlier dental visits. They were obviously aware of their earlier dental experiences. Patient 35, with a DBI index of 20, said that she wanted to leave the hospital as soon as possible, and this mental condition might explain why she gave a short negative reply. Patients 25 and 26 in the graph, with DBIs of 16, could not remember anything about earlier dental care, but the presence of crowns and bridges suggested that they had previously received regular dental treatment. These patients behaved as if dental visits were familiar to them, although their cognitive, functional, and graphic capacities were more impaired than disclosed by the dental behavior index.

Except for Patient 16 in the graph (Fig. 1), a deficiency in dental behavior of 50% or more correlated with the other capacity assessments. Patient 16 had better function in drawing and in ADL than her capacity in MMSE and in the dental clinic implied. She did not recognize the dental clinic and assumed that the toothbrush was a spoon, which she used to stir the rinsing water in the glass. She behaved restlessly in the

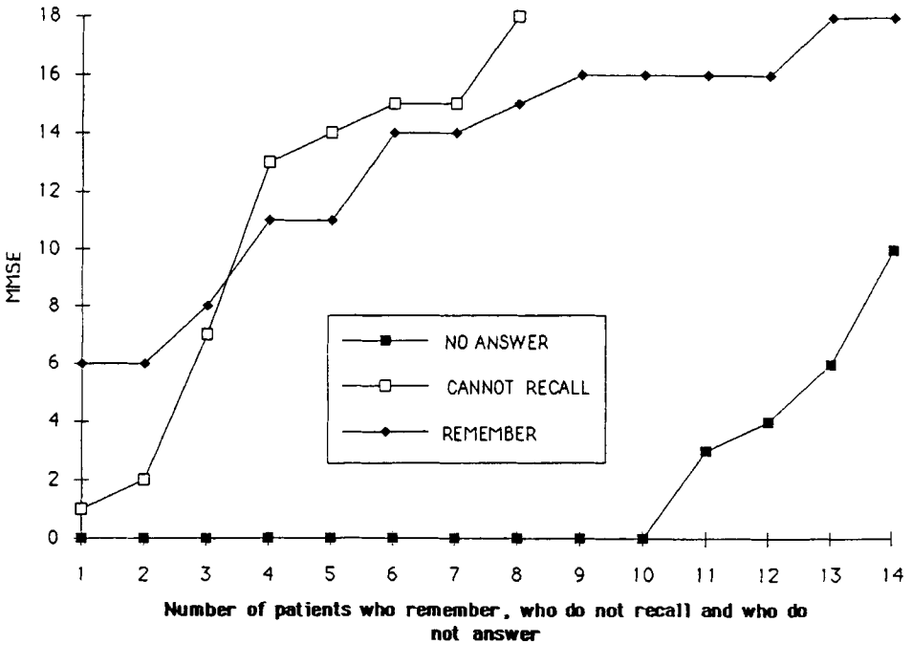

Fig. 2. Cognitive capacity expressed as Mini-Mental State Examination (MSE) for 14 subjects who could remember episodes from earlier dental treatment, 8 subjects who could not recall, and 14 who could not answer. Total MMSE score = 30.

dental clinic and could not concentrate on verbal instruction. Physical actions like walking around, making sentences, and eating were better preserved, and such capacity might be better expressed in tests with more motor action, such as ADL and drawing.

Fourteen of 36 patients could recall earlier dental treatment such as episodes or the name of the dentist. This group had an average MMSE of 13 ± 4 (range, 6–18). In comparison, in the 22 patients who could not recall episodes from earlier dental treatment or did not answer, the average MMSE was 9 ± 6 (range, 0–18). Eight of these subjects tried but could not remember, and 14 could not answer at all (Fig. 2).

Sucking reflex and/or continuous involuntary oral movements including an overactive tongue were registered as oral dysfunctions for 16 of 36 subjects. This group had an average MMSE of 5 ± 5, compared with MMSE of 12 ± 7 associated with normal oral activity. Oral dysfunctions such as those mentioned above seem to be more frequent in the later stages of dementia.

When questioned about oral pain, discomfort, or chewing problems, the subjects had few complaints. Of 36 patients, 14 were unable to answer, 16 were contented, 5 were unsure whether they had any oral problem, and only 1 had a specific complaint: a sore from her denture.

In 13 cases the treatment levels, both normative and realistic, were the same. In the other cases the normative estimation indicated a greater treatment need than the individual perspective (Fig. 3). Only one case was assessed as an immediate normative need, level 4, but modest realistic need, level 2. This particular subject had many tooth remnants, some of which were loose, and no dental support for chewing function, but she had no problems eating, was well nourished, had no oral discomfort and obviously experienced a good quality of life. As it was doubtful whether she could adapt to a denture, her current oral condition was better left alone, as long as she had no pain. The predicted positive effects of treatment, such as utility and delight with a new denture were not considered to outweigh intangible negative factors such as discomfort during treatment and limited ability to adapt to new oral conditions.

Normative need, level unnoticed, was registered in 33 of 36 (92%), and realistic need, level unnoticed, in 22 of 36 (61%).

Discussion

Seven subjects who refused to draw had better cognitive capacity than the group. These subjects may still be aware of their shortcomings and more critical of their graphic talent. In a study by Ericsson et al. (30) this self-

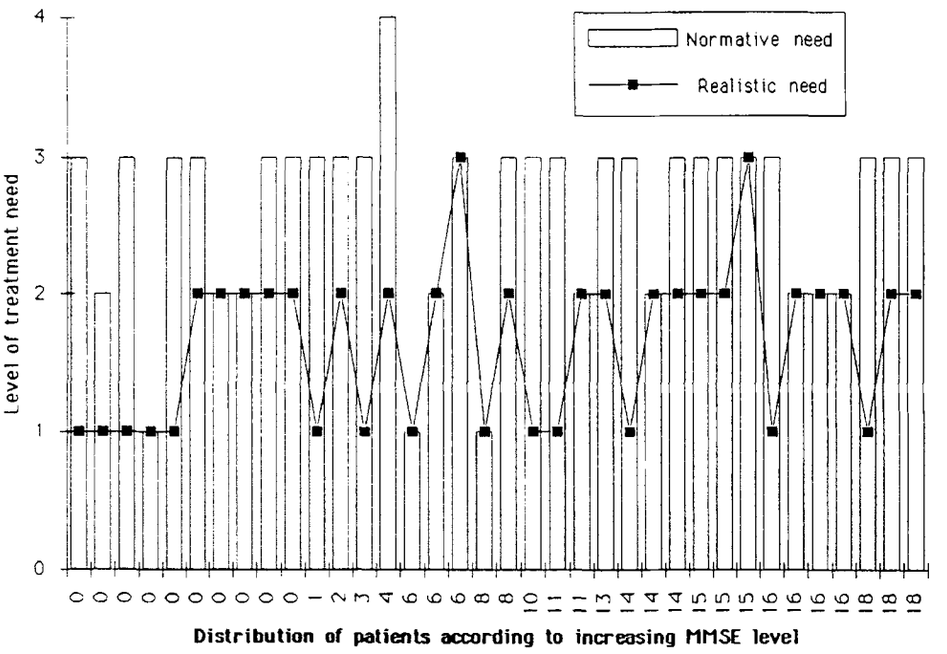

Fig. 3. Normative and realistic treatment need for 36 Alzheimer patients in accordance with increasing Mini-Mental State Examination (MMSE) level (minimum = 0 of 30; maximum = 18 of 30). 1 = no need, 2 = modest need, 3 = great need, 4 = immediate need.

critical posture was noted in nondemented and mildly demented elderly.

A minor deficiency in the dental behavior index, up to 50%, was not a predictor for stage of dementia in this study but indicated that loss of other capacities taken together had reduced the patient's ability to cope with dental procedures. Preserved dental behavior, despite impairment from Alzheimer's disease, may be attributable to memories from an earlier life-long habit of regular visits for dental care. Positive memories can be supportive, whereas negative memories can be rejective. Negative memories might explain some of the refusal reactions.

If the deficiency in the dental behavior index was greater than 50%, the total impairment of capacities due to dementia was at about the same level, and this affects treatment decisions and treatment planning. Inconsistencies between the indices may indicate the influence of other factors on the demented patient's dental behavior, such as personality, earlier lifestyle, and general health (33).

Only 1 subject was dissatisfied with her oral health, and 14 could not respond to questioning at all, but the other 21 had no complaints. Elderly people do not report oral problems as frequently as their oral conditions warrant. A general question about oral health is inadequate, and should be followed by further, more specific questions about chewing problems, as elderly people seem to regard poor chewing as a separate issue (24). Other explanations for this underestimation of oral comfort in old age may be the presence of other more acute health problems, depression, financial restraints, consumption of analgetics, and, as in this study, the mental state. Some elderly people have negative expectations of oral health and associate oral discomfort or even oral pain with the natural process of aging: they tend to accept oral problems as inevitable. Elderly people generally have a poor perception of their need for oral care in comparison with normative needs (35). Professional clinical assessment of the patient's normative need leads to overestimation, based on the assumption that the elderly will benefit from the treatment, whether they want it or not. Treatment need must be balanced with regard to autonomy, as treatment and care without consent is an assault, except in the case of emergency (36).

A realistic treatment need for demented elderly people must take into account the perceived need, expressed desires, and physical and mental state of the patient, and relate these to the predictive benefit in terms of quality of life.

In this study there is a discrepancy between normative needs and realistic, individually adjusted need (Fig. 3). Vigild (32) makes this distinction specifically for different items such as decay, prostho-

dontic need, need for periodontal surgery, and prevention among elderly Danish subjects in nursing homes. She reports normative prosthodontic need to be 64% and realistic prosthodontic need to be 19% among the edentulous and normative treatment need because of decay to be 70% and realistic treatment need because of decay to be 38% among the dentate elderly. The values for normative and realistic treatment need are higher in this study, 92% and 61%, as they include all kinds of treatment need and at different levels. However, the discrepancy of 31% between normative and realistic need is similar to Vigild's figures of 32% for decay among the dentate elderly and 45% for prosthodontic need among the edentulous elderly.

Oral dysfunctions such as sucking reflex or involuntary oral movements affect the capacity for adaption. Good muscular coordination is necessary for the stability of a denture during function (37). For a demented patient the advantages of new dentures must always be considered in realistic treatment planning. Even minor changes in the oral environment, such as new fillings, can be disturbing when the capacity for adaption is impaired by dementia.

The dementia progress gradually obstructs the basic premises for dental treatment. Successful restorations of poor oral status by multiple restorations, crowns, bridges, or dentures is a difficult challenge in cases of progressive dementia. The anticipated benefit in terms of better chewing function or better nutritional status may never be realized (38, 39).

Conclusions

If a person with dementia disease has initially good oral health and is accustomed to regular dental care, it is important to maintain and support this habit, to preserve oral health lifelong.

If there is initial oral deterioration the realistic treatment goal must be to improve the condition, often by palliative means, but sometimes only emergency treatment is required.

Improved oral hygiene would benefit all dementia patients but must be given with respect for autonomy, as treatment and care without consent is an assault, except in an emergency.

Finding the proper treatment level for each Alzheimer patient is a delicate task. A high degree of awareness is necessary, to balance the patient's mental impairment with the implications of dental treatment for a realistic expectation of the anticipated benefit of treatment. Various aspects of the patient's limited capacity have implications for dental management. The dental behavior index can be an appropriate instrument in this complex process.

Acknowledgements.—This study was supported by the Foundation for the Aging Research, SHMS-90, and the Swedish Dental Society. We thank the nurses of Stureby nursing home and, in particular, Madeleine Wretfors, dental nurse, for kind collaboration in the study and Dr. Joan Bevenius for revision of the manuscript.

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Received for publication 25 June 1996
Accepted 6 December 1996

Appendix: Dental Behavior Index (DBI)

Item 1: Familiar. The patient's recognition of the dental office/dentistry? 4 = Yes, immediately; 3 = after thinking; 2 = with prompting; 1 = probably; 0 = not at all.

Item 2: Behavior. Behavior in oral assessment with mirror and probe. The dentist introduces the action by stating that she is going to examine the patient's teeth and brings the instrument in front of the patient's mouth. 4 = Opens his/her mouth spontaneously or on request; 3 = opens his/her mouth after instruction on how to do so; 2 = closes his/her mouth involuntarily (not an active movement); 1 = refuses to open his/her mouth, compresses his/her lips; 0 = sucking behavior when the lips are touched.

Item 3: Recognition. Recognition of a toothbrush: the dentist shows the patient a toothbrush and asks the patient if he/she recognizes what it is. 4 = Yes, immediately; 3 = after thinking; 2 = with prompting; 1 = probably; 0 = not at all.

Item 4: Toothbrushing. The dentist dips the toothbrush in a glass of water and asks the patient to use it to brush his/her teeth. A kidney bowl is placed in front of the patient. 4 = Adequate function; 3 = impaired function; 2 = poor function; 1 = refuses; 0 = no reaction.

Item 5: Rinsing. Behavior in 'please rinse': the patient is given a glass of water, accompanied by the request to rinse out, and a spittoon is placed in front. 4 = Adequate function; 3 = after instruction; 2 = incorrect function; 1 = refuses; 0 = no action.

Five items and total DBI score = 20.