

Items used to assess oral health in care-dependent persons and changes in oral condition after care intervention

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Purpose: The purpose of the present study was to provide a reference for the selection of assessment items useful in examining changes in intra-oral condition and oral function before and after care intervention.

Materials and Methods: The subjects were 90 care-dependent individuals living in 17 facilities for the elderly. Each individual was examined by a dentist and assessed on a total of 32 items, and a care plan was prepared on the basis of this information. Professional care was provided twice a month for a continuous period of four months. The findings after care intervention were categorized as improved, unchanged, worsened or obscure.

Results: A significant improvement was observed in 12 items related to intra-oral condition (nine items related to oral hygiene status and three items related to denture handling and occlusion) and nine items related to oral function ($p < 0.05$ in all cases).

Conclusion: These results suggest that oral care intervention would exert an effect on intra-oral condition and oral function in care-dependent persons and underlines the appropriateness and usefulness of care in this subject group. Results obtained in this study offer an incentive for care-dependent persons and caregivers and thus can serve as a useful index on the frontlines of care. (Int Chin J Dent 2005; 5: 53-60.)

Key Words: assessment item, care-dependent person, intra-oral condition, oral function, oral health care.

Introduction

Normalization¹ and community-based rehabilitation² are gaining wide acceptance as social measures for care-dependent individuals living in facilities for the elderly and infirm, and oral cleaning, dysphagia rehabilitation and other forms of oral health care are considered to contribute to the quality of life (QOL) of care-dependent individuals.^{3,4}

In view of these contemporary trends, efforts to maintain oral health and to ensure that individuals use their mouths and teeth to ingest food right to the end of their lives are important, not only in terms of nutrition, but also in terms of human dignity.⁵ These efforts therefore constitute an essential duty of the dentist.

The first author, through home-visit dental treatment and dental health care activities, experienced cases in which oral health care intervention produced obvious results and other cases in which it was difficult to determine the actual effectiveness. A number of oral health assessment charts are available in Japan at present,⁶ but no assessment chart has been established to address the specific characteristics of care-dependent individuals or to provide an appropriate care menu responding to these characteristics. This situation jeopardizes both the selection of assessment items on the front lines of health care and the objectivity of the care menu prepared on the basis of the information thus obtained. It also obscures the evaluation of care results.

The purpose of the present study was to collect and analyze the practical data from oral health care conducted under control,⁷ with the aim of providing a reference for the selection of assessment items useful in determining intra-oral status, oral function and the effects of oral health care in care-dependent individuals.

Materials and Methods

The subjects of the present study were 90 care-dependent individuals (34 males and 56 females ranging in age from 43 to 95 years; mean=82 years) living in 17 facilities for the elderly participating in the Oral Health Care Project for Institutionalized Elderly conducted by Nagasaki Prefecture, Japan, in 1999 and 2000 to promote the normalization and community-based rehabilitation of care-dependent persons. They were suffered from dental and feeding problems related to oral health care and thus selected as examinee by caregivers in his or her facility. And these 17 facilities could accommodate 1,480 individuals. Prior to the start of research, informed consent was obtained from each person or his/her next of kin. All of the individuals were in either the chronic or maintenance stage of the impairments that impelled them to enter the facility (Fig. 1). The subjects did not include any patients in the acute stage of diseases such as cerebral apoplexy.

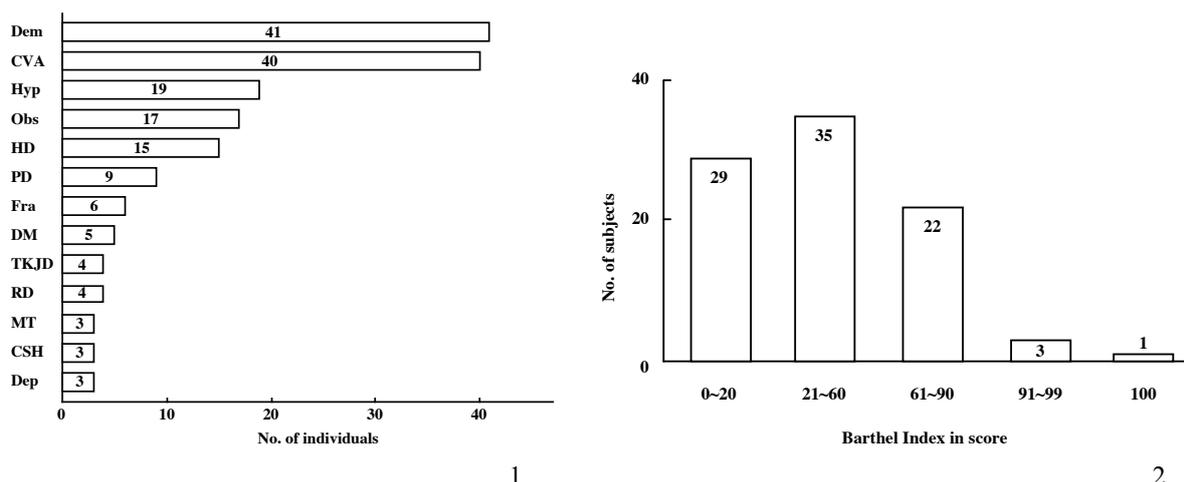


Fig. 1. Distribution of the cause of impairment in bedridden patients. Illnesses suffered by three or more individuals were extracted. The number of individuals overlaps in some cases. The abbreviations are: Dem, Dementia; CVA, Cerebro-vascular accident; Hyp, Hypertension; Obs, Obscure; HD, Heart disease; PD, Parkinson's disease; Fra, Fracture; DM, Diabetes mellitus; TKJD, Transformed knee-joint disease; RD, Respiration disease; MT, Malignant tumor; CSH, Chronic subdural hematoma; and Dep, Depression.

Fig. 2. Characteristics of subjects in Barthel Index: 0-20, total dependence; 21-60, severe dependence; 61-90, moderate dependence; 91-99, slight dependence; and 100, independence.

Table 1. Road map of oral health care intervention.

1. Evaluation of intra-oral conditions (18 items) and oral functions (14 items)
2. Making a report on supportive items of oral health care
3. Making a plan for oral health care (primary plan)
4. Holding a care conference by care team for each case
Amendment and confirmation of the plan for oral health care (final plan)
5. Daily oral health care by caregivers
6. Confirmation and guidance on oral health care methods once a month
Professional oral health care by dental hygienist twice a month
7. Four-months-later, reevaluation of the intra-oral conditions and oral functions
(on the same items at the first evaluation)

This road map was made with reference to literatures 9 and 10. Care team consisted of a dentist, oral hygienist and caregivers (nurse, physical therapist, occupational therapist, speech therapist, certified care worker, etc.). A doctor and a user's family also participate if needed.

The characteristics of activity of daily living (ADL) assessed by the Barthel Index⁸ are presented in Fig. 2. The oral health care intervention procedure adopted in the present study is summarized in Table 1. This procedure

was similar in certain respects to the procedures described in the other papers.^{5,7,9} To begin, the dentist in charge examined each individual and assessed 18 items related to intra-oral condition and 14 related to oral function (Table 2).

Table 2. Assessment items.

Intra-oral Conditions	Oral Functions
Oral Cleaning Condition (OCC)	Mouth Opening (MOp)
Gingival Swelling (GSw)	Ptyalism (Pty)
Gingival Bleeding (GBI)	Mouth Rinsing (MRi)
Dental Calculus (DCa)	Mastication (Mas)
Tongue Plaque (TPI)	Oral Sign in dysphasia (OSi)
Halitosis (Hal)	Tongue Movement (TMO)
Dry Mouth (DMo)	Oral Regurgitation (ORe)
Independence for Brushing (IBr)	Nasal Regurgitation (NRe)
Independence for Mouth Rinsing (IMR)	Swallowing at pharyngeal stage (Swa)
Independence for Denture Cleaning (IDC)	Cough (Cou)
Oral Mucousal Disease (OMD)	Hawking (Haw)
Existing Dentition (EDE)	Articulation (Art)
	Utterance (Utt)
	Hoarseness (Hoa)
Denture's Concerns	
With or Without Denture (WWD)	
Frequency of Denture's Usage (FDU)	
Independence for Denture's Insertion and Removal (IDIR)	
Independence for Denture's Management (IDM)	
Denture's Stability (DSt)	
Occlusion (Occl)	

Since a ranking scale was adopted for all items, the dentists in charge held prior consultations to determine and unify the evaluative standards. On the basis of the data thus obtained, the dentists in charge selected the items deemed necessary to support the oral health care in each individual from a list-table⁵ and then completed a report using these items (Fig. 3).

Next, while referring to the reports on care plan formulation,^{5,10} we selected the problems related to care management noted at the time of initial evaluation and drew up a preliminary plan for oral health care including a detailed list of goals and care items for each care-dependent individual (Fig. 4). Subsequently, the preliminary plan was discussed in a care conference attended by dentists, dental nurses and caregivers in the respective institutions and modified when necessary. Finally, the caregivers implemented oral health care every day according to the final plan reached on the basis of these preparations. And professional oral health care (POHC) by dental hygienist had given twice a month for four months. The findings recorded after care intervention were categorized as improved, unchanged, worsened or obscure.

The changes in oral conditions before and after care intervention were analyzed by the sign test, using the two-tailed test with an alpha level of 0.05.

Results

The subjects of the present study were people who had been admitted to facilities with some illness that impaired daily life functions. These underlying illnesses included dementia, cerebro-vascular accident (CVA), hypertension, heart disease and Parkinson's disease (Fig. 1).

The characteristics of their ADL (Barthel Index⁸) were summarized in Fig. 2 on a basis of classification modified by Shar et al.¹¹ The 64 subjects (71%) were total or severe dependent individuals, the median of the

Barthel Index were 40 (mean=43.5). And supportive items in present oral health care and number of care-dependent individuals by each item were summarized in Table 3.

A list on supportive items of oral health care	
Medical examination; 2000 year 2 month 6 day	
User's name; S. H.	
Sex; <input checked="" type="radio"/> male <input type="radio"/> female Birth date; 1923 year 1 month 25 day (age 77)	
Supportive items	Necessity of intervention
Intra-oral Conditions	
1. Halitosis	<input checked="" type="radio"/> yes <input type="radio"/> no
2. Dry mouth	yes <input checked="" type="radio"/> no
3. Gingival bleeding	<input checked="" type="radio"/> yes <input type="radio"/> no
4. Tooth mobility	yes <input checked="" type="radio"/> no
5. Dental caries	yes <input checked="" type="radio"/> no
Oral Functions	
6. Utterance	<input checked="" type="radio"/> yes <input type="radio"/> no
7. Articulation	<input checked="" type="radio"/> yes <input type="radio"/> no
8. Ingestion	<input checked="" type="radio"/> yes <input type="radio"/> no
9. Mastication	yes <input checked="" type="radio"/> no
10. Mouth Rinsing	<input checked="" type="radio"/> yes <input type="radio"/> no
11. Swallowing	<input checked="" type="radio"/> yes <input type="radio"/> no
12. Mouth opening	yes <input checked="" type="radio"/> no
13. Tongue movement	<input checked="" type="radio"/> yes <input type="radio"/> no
14. Lip seal	<input checked="" type="radio"/> yes <input type="radio"/> no
15. Nasopharyngeal closure	<input checked="" type="radio"/> yes <input type="radio"/> no
Denture	
16. Insertion and Removal	yes <input checked="" type="radio"/> no
17. Construction	yes <input checked="" type="radio"/> no
18. Repair	yes <input checked="" type="radio"/> no
19. Adjustment	yes <input checked="" type="radio"/> no
20. Cleaning	yes <input checked="" type="radio"/> no

Fig. 3. An example report on supportive items of oral health care. Dentist reports to users or his/her next of kin that problems were confirmed as indicated above and that appropriate support for oral health care will be provided.

name; S.H. age; 77 sex; male

goal of oral care	disease or impairment	ADL score	caregiver	dental chart	primary; 2000y.2m.6d. final; 2000y.2m.16d.		
1. improvement of dysphagia 2. improvement of oral hygiene status	(1) CVA (2) DM (3) dementia (4) ataxia in right hand	15	nurse; Sakamoto, K ST; Mizumoto, D	17-11,21-27 47-41,31-37 periodontitis	by dentist; Nakamura, Y. hygienist; Jojima, H.		
problems	user's goal	supportive item	details of care				evaluation
			when	where	How (contents of intervention)	who	
dysphagia ptyalism cough hoarseness	wants to be better	training of swallowing	every day	living room	exercise of swallowing before eating	nurse or family	improved
		lip seal	every day	living room	lip seal exercise, lip icing	nurse	improved
		nasopharyngeal closure	every day	living room	thermal stimulation	nurse	unchanged
articulation disability	Practices exercise	articulation training	2/week	treatment room	phonation of "pa", "ta", "ka", "la"	speech therapist	unchanged
		confirmation and guidance on care	1/month	Treatment room	tongue maneuver conference by care team	dentist	
poor oral cleaning	accepts professional oral health care (POHC)	POHC	2/month	Treatment room	professional oral hygiene care functional training of dysphagia	dental hygienist	improved
gingival swelling	independence of tooth brushing	encourage announce	every day	lavatory	announce and encourage brushing by care giver	nurse family	improved

Fig. 4. An example of plan for oral health care. Terms described in a format beforehand were printed by bold type. Italic descriptions were written by the dentist and/or dental hygienist in charge.

Table 3. Supportive items of oral health care, and number of care-dependent individuals taken corresponding intervention.

Supportive items	Contents of intervention	Number of individuals
Intra-oral Conditions		
1. Halitosis	Oral cleaning, Tongue cleaning, Periodontal treatment, etc.	59
2. Dry mouth	Fluid intake, Artificial saliva, Oral moisture jell, Functional oral health care, etc.	15
3. Gingival bleeding	Oral cleaning, Periodontal treatment, Scaling, etc.	44
4. Tooth mobility	Periodontal treatment, Teeth fixed, Occlusal adjustment, etc.	19
5. Dental caries	Dental caries treatment.	53
Oral Functions		
6. Mouth opening	Mouth opening exercise, etc.	12
7. Lip seal	Lip seal exercise, Lip icing, Lip massage, etc.	28
8. Ingestion	Lip seal exercise, Tongue maneuvers, etc.	36
9. Mouth rinsing	Lip seal exercise, Pushing exercise, Soft blowing exercise, etc.	23
10. Mastication	Mastication exercise, Denture's treatment, etc.	40
11. Tongue maneuvers	Tongue protrusion, Tongue ROM exercise, etc.	31
12. Nasopharyngeal closure	Soft blowing exercise, Thermal stimulation, etc.	17
13. Swallowing	Thermal stimulation, Mendelsohn maneuver, Supraglottic swallow, etc.	26
14. Articulation	Lip seal exercise, Tongue maneuvers, Phonation of "pa" "ta" "ka" "la", etc.	35
15. Utterance	Pushing exercise, Respiration exercise, Soft blowing exercise, etc.	31
Denture		
16. Insertion and Removal		26
17. Construction		25
18. Repair		17
19. Adjustment		21
20. Cleaning		49

ROM, Range of motion.

Among the oral conditions, the results on oral hygiene status after care intervention are shown in Fig. 5. The highest level of improvement was observed in oral cleaning condition (54%), followed by tongue plaque, halitosis, gingival swelling and gingival bleeding. A statistically significant improvement was observed in nine out of 11 assessment items in this category ($p < 0.05$). When the number of examinees [n] (shown in the column on the left side of Fig. 5), excluding the individuals found to have been in an optimal state at the first assessment, is presented as a common denominator of the rate of improvement expected to rise, and it is possible that the individuals found to be “unchanged” included those who maintained an optimal status as a result of care intervention.

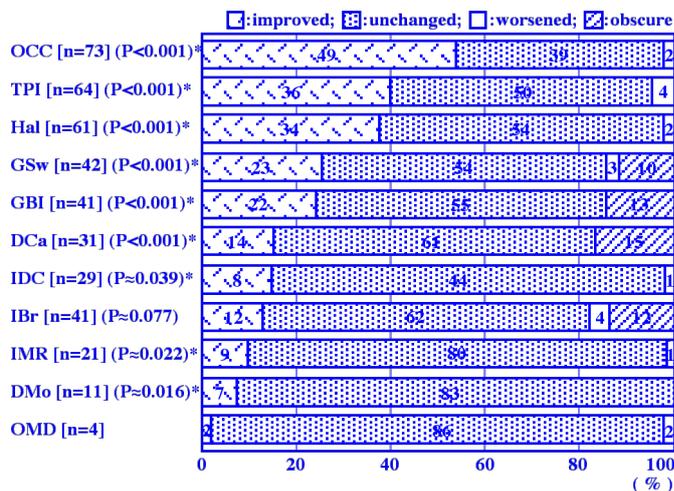


Fig. 5. Changes in oral hygiene status after intervention. Horizontal axis, changes after intervention (%). Figures on bar show the number of examinees. [n], The number of examinees in which positive effects were expected. Abbreviations are described in Table 2. * $p < 0.05$. No p-value was obtained in the case of number of examinees was less than six.

Among the oral conditions, the results on denture handling and occlusion after care intervention are shown in Fig. 6. A statistically significant improvement was observed in three items: denture's stability, independence for insertion and removal of denture, and occlusion ($p < 0.05$).

The changes in oral functions after care intervention are shown in Fig. 7. Since few of the examinees were expected to show positive effects of intervention, the rate of improvement was lower than that observed in oral hygiene status (Fig. 5), but the number of cases of worsening was low and a significant improvement was observed in nine items including oral sign in dysphasia after care intervention ($p < 0.05$).

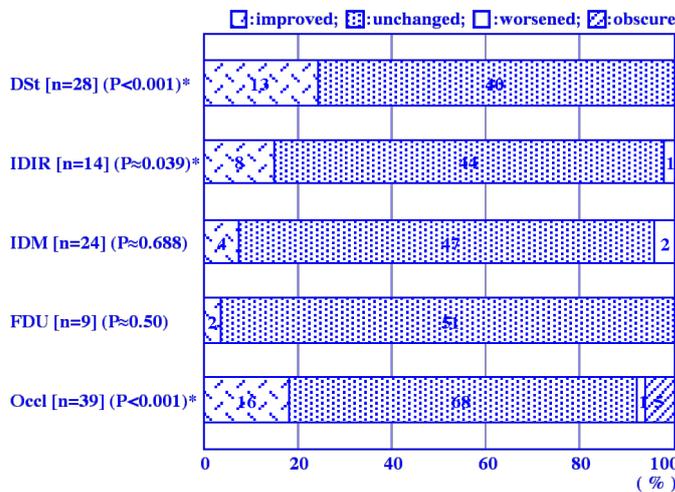


Fig. 6. Changes in denture wearing and occlusion after intervention. Horizontal axis, changes after intervention (%). Figures on bar show the number of examinees. [n], The number of examinees in which positive effects were expected. Abbreviations are described in Table 2. * $p < 0.05$.

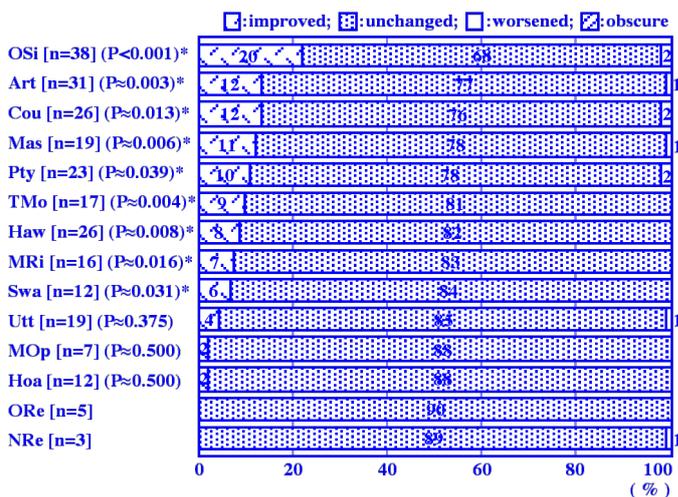


Fig. 7. Changes in oral functions after intervention. Horizontal axis, changes after intervention (%). Figures on bar show the number of examinees. [n], The number of examinees in which positive effects were expected. Abbreviations are described in Table 2. * $p < 0.05$.

Discussion

In studies on cerebral apoplexy patients, it was reported that very few subjects with a Barthel index of 40 or lower showed independence in feeding, continence, grooming or other functions and that these subjects were totally or partially dependent on care-givers for assistance in moving about.¹²

The characteristics of the subjects in the present study (Figs. 1 and 2) did not differ significantly from those in the other reports suggesting that the characteristics of patients in facilities are more or less consistent throughout Japan.^{12,13}

With regard to oral conditions and general health, current studies suggest that changes in oral conditions could exert an influence on food choice behavior,¹⁴ nutrition,¹⁵ physical and mental activity,¹⁶ and ADL and QOL.¹⁷ It

has also been reported that oral cleaning contributes to the prevention of aspiration pneumonia.¹⁸ Furthermore, it has been proposed that professional oral health care (POHC) combining dysphagia functional training conducted once every one or two weeks for a period of about six months can be expected to bring about an improvement in oral hygiene status.³

The concepts and methods of the oral health care administered in the present study share many common points with the above reports. These can be summarized as follows: 1) emphasis on oral health care and functional oral rehabilitation⁷ centering around oral cleaning and dysphagia rehabilitation, 2) implementation of a controlled oral health care management system,^{5,7} 3) POHC administered twice a month for a continuous period of four months, 4) assessment of oral function as well as oral condition, 5) evaluation of results by comparing conditions before and after the administration of care in a specific group of subjects.

In the present study, after the oral health care administered to individuals in the chronic and maintenance stage, significant improvement recognized in nine items related to oral hygiene conditions (Fig. 5), three items related to denture handling and occlusion (Fig. 6), and nine items related to oral functions (Fig. 7). These improvements are consistent with those reported in other studies.^{3,19} Thus above results seems to support an appropriateness and effectiveness of the care administered in our study, which included a combination of oral cleaning and dysphagia rehabilitation or professional oral health care intervention. Moreover, the items showing a significant improvement are variables that respond rapidly to care intervention and thus provide an index that will be useful on the front lines of oral health care and inspire both care-dependent individuals and their caregivers.

There were also some items in the present study that remained unchanged after care intervention. However, the 39 cases showing “unchanged” for oral cleaning condition (Fig. 5) are comprised of 16 individuals who maintained an optimal condition from before to after care intervention and 23 who had a poor condition before care intervention and showed no improvement thereafter. The same phenomenon occurred in the items related to denture handling and occlusion (Fig. 6) and oral function (Fig. 7). In other words, there are many cases in which “no change” expresses the fact that an optimal condition was maintained (i.e. deterioration prevented) throughout the period of the present study and thus underlines the effectiveness of the care intervention.

However, there were also items such as utterance and hoarseness in which improvement was lacking (Fig. 7), pointing to issues that need to be addressed, such as the period and methods of care and the organization of the care team. Future care intervention should allow for the selection of assessment items and care menus geared to the needs of specific subject groups, such as the stroke model, dementia model²⁰ and disusing syndrome model.²¹

The results of the present study reflect the characteristics of the care period, contents of care, and the care-dependent group. A long-term investigation is necessary to evaluate the effectiveness of occlusal improvement and other results of prosthodontic treatment, and further consideration should be paid to the assessment of care-dependent persons in the acute stage and to evaluation of the data thus obtained.

Conclusion

The results of the present study suggest that oral care intervention would exert an effect on intra-oral condition and oral function in care-dependent persons and underlines the appropriateness and usefulness of care in this subject group. Moreover the items showing a significant improvement offer an incentive for care-dependent persons and caregivers and thus can serve as a useful index on the frontlines of care.

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