

Evaluation of an oral health service for nursing home residents

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The purpose of this study was to evaluate a comprehensive, on-site, oral health care program for nursing home residents. Before and after a 1-year evaluation period the elderly residents in the nursing home (NH-1) were interviewed and examined clinically. A comparable control group comprising the elderly residents in another nursing home (NH-2) were also interviewed and clinically examined before and after a 1-year period. The main objectives of the program were to increase the utilization of the dental care system, to meet the need for immediate attention, to improve oral hygiene, to reduce the prevalence of oral mucosal lesions, gingivitis, and untreated decay, and to meet the realistic prosthodontic treatment need. All the elderly residents accepted a yearly examination by a dentist, and 50% were treated in NH-1 during the evaluation period, compared with 16% in NH-2. The need for immediate attention was reduced by 56% in NH-1 and had increased by 20% in NH-2. Whether the activities in NH-2 qualify as an oral health program with on-site examinations and referral for treatment outside the institution is discussed. The annual cost per resident during the evaluation period was a little more in NH-2 than in NH-1. The conclusion is that oral health improved during the observation period in both nursing homes. The rate of participation and the improvement in oral health was most evident in NH-1. □ *Geriatric dentistry; institutionalized; program adequacy; program evaluation; public dental service*

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A previous Danish study has shown that nursing home residents who are regular users of oral health services have better oral health than non-users (1, 2). It can therefore be assumed that the oral health of the elderly residents will improve by increasing their use of oral health services.

Poor general health makes it difficult for nursing home residents to visit dental clinics outside the nursing home. In addition, such visits are time-consuming for the institutional staff because it is usually necessary to accompany the resident to the dentist (3). The establishment of oral health services within the nursing home would probably reduce these difficulties.

Evaluation studies of dental care programs for old-age pensioners are scarce (4–6); so far, such studies have not been carried out in Denmark either among the elderly living at home or among those in institutions.

The purpose of the present study was to evaluate a comprehensive oral health care

program for nursing home residents established on-site.

Materials and methods

Study population

The target program group included all elderly residents in a nursing home in the eastern part of Denmark (NH-1). The control group comprised all the elderly in another nursing home in the same part of the country (NH-2). The social and political structures of the two towns where the nursing homes were situated were similar, and the existing oral health service in both nursing homes was sporadic, covered only emergency care, and was free of charge.

Some of the elderly residents did not want to participate in the study, and in some cases permission to examine terminally ill residents was not given. Thus, the study population in the program group comprised 89%

Table 1. The distribution of the elderly residents in NH-1 and NH-2 with regard to age, sex, and degree of helplessness in the original groups (1) and in the final groups at the second examination (2)

	NH-1				NH-2			
	Group 1		Group 2		Group 1		Group 2	
	%	(n)	%	(n)	%	(n)	%	(n)
Age, years								
0-74	17	(23)	12	(11)	9	(6)	11	(6)
75-84	44	(61)	46	(42)	47	(30)	45	(24)
84+	40	(55)	42	(38)	44	(28)	43	(23)
Total	101	(139)	100	(91)	100	(64)	99	(53)
Sex								
Women	67	(93)	67	(61)	66	(42)	66	(35)
Men	33	(46)	33	(30)	34	(22)	34	(18)
Total	100	(139)	100	(91)	100	(64)	100	(53)
Degree of helplessness								
Totally helpless	24	(33)	21	(19)	8	(5)	13	(7)
Partly helpless	42	(58)	38	(35)	67	(43)	70	(37)
Able to manage alone	35	(48)	41	(37)	25	(16)	17	(9)
Total	101	(139)	100	(91)	100	(64)	100	(53)

($n = 139$) of the target population at the first examination, and 93% ($n = 64$) in the control group. After approximately 1 year, when the participants were reexamined, 65% ($n = 91$) of the program population and 83% ($n = 53$) of the control group were still alive, and they all agreed to reexamination. The final groups did not differ from the original groups with regard to age, sex, or degree of helplessness; nor did the final program group differ from the final control group with regard to age and sex. However, there was a higher frequency of elderly residents who were able to manage alone in the final program group than in the final control group. In the latter the partly helpless comprised most of the group (Table 1).

Methods of evaluation

The design of the study was quasi-experimental, with the intention to establish a control group in which no intervention was planned. Furthermore, in the program nursing home the situation was analyzed with a view to assessing the extent to which the objectives of the program were obtained.

Thus, the evaluation model (7-9) also fits into the goal model category (10). Program evaluation in accordance with this model involves five questions: 1) What are the problems that the program is designed to deal with, and how important are they? (program appropriateness); 2) To what extent were the problems solved? (percentage improvement or program adequacy); 3) To what extent did the activities attain the objectives? (program effectiveness); 4) What was the cost of attaining the objectives?; and 5) What desirable and undesirable side effects occurred? (10).

In the present study the goals of the program were set by the author and were partly based on the realistic treatment needs of the elderly, which take into consideration not only the professionally assessed need and the expressed demand for treatment but also the physical and mental health of each individual (1, 2, 11).

The main objectives of the program were 1) to increase the utilization rates of the dental care system; 2) to meet the need for immediate attention; 3) to improve oral hygiene; 4) to reduce the prevalence of oral mucosal lesions, gingivitis, and untreated

decay; and 5) to meet the realistic prosthodontic treatment need.

The effectiveness and adequacy of the program are to some extent interrelated. If the objective of the program was to reduce the prevalence of untreated decay by 50%, the program would be 100% effective if this objective was attained, but only 50% adequate, since half of the problem persisted. If the objective of the program was to eliminate the defined problem, program adequacy and effectiveness would be identical. In the present study it was not relevant to quantify the expected reductions in disease prevalences (e.g. gingivitis, untreated decay). Therefore, the study only assessed the program adequacy and not the effectiveness.

Before the start of the program data on oral health problems, age, and general health were collected through interviews with the elderly and with the head nurses (1-3, 11, 12). Thereafter, the elderly were examined clinically with regard to oral mucosal lesions, denture status and denture condition, oral hygiene, dental caries, and periodontal diseases. All examinations and interviews were carried out by me, and details on the methods used have been published previously (1-3, 11, 12). Twelve and 14 months after the start of the program all the elderly participants in the final program group and in the final control group were reexamined. The same methods and criteria were applied. The examiner did not know whether, or to what extent, treatment had been carried out in a given individual.

The oral health care program

The program was established on-site. It was free of charge and offered consultations, treatment, and preventive measures. The institutional staff was informed about oral hygiene procedures and received information about oral health problems. The dental personnel were employed by the municipality and included one dentist and one chairside assistant, each of whom spent an average of 1.6 h per resident during the evaluation period. A dental hygienist was employed for a total of 0.4 h per resident

during the first 2 months of the program; her involvement was discontinued owing to budgetary problems. After the initial examination the dentist in charge of the program or the head nurse received information about those residents who needed immediate attention. Apart from providing this information, I was not involved in any stage of the program.

No comprehensive oral health program was offered in NH-2. After the initial examination the head nurse was informed about those who needed immediate attention. The head nurse decided whether they should be referred for treatment.

The institutional staff were not told that the residents would be reexamined after a 1-year period.

Data analysis

No statistical tests for significance were carried out. The results of the program were analyzed in two different ways: 1) in terms of the program adequacy (percentage improvement), in which the output was related to the variable as measured before the start of the program, and 2) a comparison of disease prevalences and of program adequacy between the program nursing home and the control nursing home.

Results

Interest in the program

Most (69%) of the elderly residents in NH-1 expressed interest in attending the program; 21% were not able to answer the question; 7% preferred to continue visiting their previous dentist; and 3% did not know.

Participation in the program

Participation in the program was recorded when the elderly residents had undergone treatment. In NH-1, 50% ($n = 45$) had participated. Among the non-participants 67% (25 edentulous and 6 dentate) had not joined because they thought nothing was wrong, and they needed no treatment; 26% (9 eden-

Table 2. Prevalences of (in percentage) and number of elderly residents (*n*) with certain oral health problems in NH-1 and NH-2 before and after the program, and the percentage improvement

	NH-1 (<i>n</i> = 91)			NH-2 (<i>n</i> = 53)		
	%	<i>n</i>	% impr.	%	<i>n</i>	% impr.
Need for immediate attention						
Before	35	32	56	38	20	-20
After	15	14		45	24	
Perceived need						
Before	40	36	33	51	27	33
After	26	24		34	18	
Chewing problems						
Before	33	30	23	30	16	-38
After	25	23		42	22	
Denture stomatitis						
Before	29	21	24	40	17	12
After	22	16		35	15	
	<i>(n</i> = 73)			<i>(n</i> = 43)		
Poor denture hygiene						
Before	17	13	23	22	10	0
After	13	10		22	10	
	<i>(n</i> = 75)			<i>(n</i> = 45)		
Dissatisfied with lower dentures						
Before	28	17	47	17	6	-83
After	15	9		31	11	
	<i>(n</i> = 60)			<i>(n</i> = 36)		
Realistic prosthodontic treatment need						
Before	21	19	68	26	14	50
After	7	6		13	7	

tulous and 3 dentate) were not able to answer the question; and 7% (*n* = 3) had continued with their previous dentist. However, all the elderly had accepted the yearly examination by me and had considered this part of the program. Before the program started 8% of the program group had had yearly check-ups.

In NH-2, 16% of the elderly residents had received dental treatment: 8% from their previous dentist, and 8% from a dentist found by the nursing home. In addition, 17% had been seen by a clinical dental technician. Furthermore, in NH-2 all the elderly residents had accepted the yearly examination by the author. Before the initial examination, 4% had had yearly dental check-ups.

Improvement in oral health

In NH-1 there was an improvement in several of the oral health variables during the evaluation period, both when comparisons were made with the control group and when considering the extent to which the objectives had been attained. Table 2 shows, for example, a reduction of 56% in the number of elderly persons needing immediate attention. This frequency had increased by 20% in NH-2. Among the dentate elderly residents no improvement in the oral health variables was seen when comparisons were made with NH-2 (Table 3), whereas the degree of attainment of the objective was seen as a reduction in the prevalence of abundant plaque (20%), abundant calculus

Table 3. Prevalences of (in percentage) and number of dentate elderly residents (*n*) with certain oral health problems in NH-1 and NH-2 before and after the program, and the percentage improvement

	NH-1 (<i>n</i> = 27)			NH-2 (<i>n</i> = 12)		
	%	<i>n</i>	% impr.	%	<i>n</i>	% impr.
Abundant plaque						
Before	74	20		50	6	
After	59	16	20	42	5	17
Abundant calculus						
Before	33	9		42	5	
After	19	5	44	25	3	40
Gingival bleeding						
Before	74	20		58	7	
After	70	19	5	42	5	29
Untreated decay						
Before	67	18		75	9	
After	48	13	28	58	7	22

(44%), and untreated decay (28%). The program had no effect on the occurrence of gingivitis.

Cost of the program

Before the program the average annual cost of dental care per elderly person in NH-1 was 176 Danish kroner (DKK), excluding the costs of transportation and of letting the institutional staff accompany the elderly to a dental clinic, whereas the cost of the program was DKK 557 per participant, including laboratory expenses, depreciation of equipment, and supplies.

In NH-2 the annual cost of dental care had been DKK 162 per participant. This cost increased to DKK 572 during the evaluation period. Transportation expenses and the cost of letting the institutional staff accompany the elderly for treatment outside the NH were not included.

Satisfaction with the program

The majority (91%) of the residents who participated in the program in NH-1 were either satisfied or very satisfied with the oral health care service, and all, including those

who had not been satisfied, wanted to continue in the program.

Discussion

When assessing the appropriateness of a program, one asks whether the objectives are desirable in relation to other goals. This depends on who answers the question and what his or her values are. All can agree that good oral health is desirable, but the dentist and elderly persons may disagree, for example, as to whether new dentures will improve oral health. Therefore, the question of appropriateness should be assessed not solely from the professional point of view of the dentist. The goals for the present oral health care program for elderly residents in nursing homes were therefore formulated in such a manner as to be acceptable to the elderly residents, and, no less important, to the political decision makers.

In the present evaluation study a before-and-after design was used. Theoretically, changes in the oral health status of the elderly residents during the evaluation period might be explained by examiner bias and/or inconsistency in the registration. However,

the examiner did not know at the second examination whether treatment had taken place. Hence, the possibility of examiner bias was minimized, and the crude criteria applied enhanced the reproducibility of the registrations.

The elderly residents in NH-2 were re-examined after 1 year with a view to establishing a control group. Although there was no intention of offering an oral health program, the head nurse was informed about which of the elderly needed immediate attention. This led to an increase in the number of referrals to dental treatment. Thus, NH-2 was not a control group in the sense that no dental health activities took place. The Danish Dental Association has suggested that the oral health problems of elderly residents in Danish nursing homes be solved by offering dental examinations on-site and subsequent referral of the residents to private practice for treatment. In light of this, it seems relevant to consider the activities in NH-2 as a program and to assess the possible improvement during the evaluation period. There were some improvements of the oral health variables in NH-2. But with regard to the utilization of the oral health care system and to most of the oral health variables, the improvements were most evident in NH-1.

The comparison of oral health factors before and after an evaluation period is, however, likely to lead to an underestimation of the effect because the oral health of the elderly residents probably would have deteriorated if no oral health services had been offered (8, 13). Thus, the true effect of the activities might have been somewhat better than what was found in the present study. The study has assessed only the short-term effect of the program. A longitudinal evaluation, however, is precluded by the high annual death rate of elderly in nursing homes; therefore, the long-term value of the program can only be demonstrated by following successive generations of elderly nursing home residents.

The prevalence of abundant calculus and gingival bleeding had decreased more in NH-2 than in NH-1. However, the number of dentate elderly residents in NH-2 ($n = 12$) was too low to make this observation con-

clusive. One of the main objectives in NH-1 was to improve oral hygiene; therefore, it was somewhat disappointing that the improvement of the factors relevant to oral hygiene was either non-existent (compared with the control group) or rather modest (objective attainment). In all probability, this is due to the fact that the dental hygienist was only attached to the program for the first 2 months.

The annual expenditures for oral care had been low in both nursing homes, and in both this cost increased during the evaluation period. It was, however, surprising that the cost increase was at least as high in NH-2 as in NH-1. The cost of the oral health care in NH-2 would have been even higher if the cost of transportation and of letting the institutional staff accompany the elderly residents to the dentist were added. The finding is in agreement with an American study in which the cost for on-site dental care was found to be lower than that for off-site dental care (4).

A relevant question is whether the effect is worthwhile considering the objectives, the program activities, and the costs. When dealing with old and disabled people, cost-effectiveness is of minor importance since a characteristic of welfare societies is that they take care of weak and helpless citizens even if the cost-effectiveness is low.

In a previous publication a model was proposed for oral health care for nursing home residents (12). As in the NH-1 program, the model program was on-site and the responsibility of one dentist. The cost of the NH-1 program was lower than the estimated cost of the model program—DKK 557 compared with DKK 1000 per resident per year. However, in the model program the dentist in charge examines all the elderly twice a year, and this expense is included in the budget. In the present study I undertook all the examinations in both nursing homes, and this expense is not included. Furthermore, the model program (12) budgeted for a dental hygienist 2 h per year per elderly resident, whereas the hygienist in the NH-1 program was employed only during the first 2 months and thus spent very little time per resident.

Even in a country as small as Denmark, there are considerable differences among nursing homes. The differences relate to the geographic location, to the management, and to the engagement of the institutional staff and reflect variations in oral health and in oral health care. Therefore, it is not possible to generalize about the results of the present evaluation study (13, 14). Hence, no statistical tests of significance were applied.

It can be concluded that the utilization rates of the dental care system increased considerably, also in comparison with the control group; that the frequency of elderly residents in need of immediate attention was reduced by more than 50% during the evaluation period; and that the oral health care program also resulted in improvement of other oral health factors. There was some, although less, improvement in the oral health in the control group. However, it is noteworthy that the cost of this was at least as high as the cost of the comprehensive oral health program in NH-1. It is hoped that the present study will encourage local initiatives to offer oral health care to the institutionalized elderly and to evaluate interventions, in order to develop and improve such programs.

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