A model for oral health care for elderly persons in nursing homes with an estimate of the resources needed

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The study proposes a model for oral health care for elderly persons living in nursing homes. It is suggested that the oral health services should take place at the nursing home and should be the responsibility of one dentist and that part of the activities should be performed by a dental hygienist. The goals for the program are to meet the realistic need for treatment, to cover emergency and palliative treatment, and to institute measures to prevent the onset of oral diseases. The realistic need takes into consideration the expressed demand for treatment and the mental and physical state of the elderly. The resources required for the establishment of the program are assessed on the basis of time estimates for the various activities necessary to meet the goals. The annual cost per elderly person will be around DKK 1000 (USD 150). It is concluded that the program would lead to a much needed improvement of oral health care for the nursing home residents at a relatively modest extra expense when compared with the cost of the existing oral health services, which is sporadic and mainly emergency-based. □ *Dental service; geriatric dentistry; treatment needs*

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Oral health care for institutionalized elderly persons has so far, by and large, been limited to emergency care, and the oral health of elderly persons in nursing homes is far from satisfactory (1–4). However, the organization of more comprehensive oral health services for these elderly persons has become a matter of increasing interest in many countries (4–7). In 1986 the Danish Parliament enacted a law making it possible to offer free dental services for physically or mentally handicapped persons, such as residents of nursing homes, who are not able to use the existing dental services. However, it was not made compulsory for the muncipalities to offer oral health services to elderly persons in nursing homes. To convince the political decision makers that these services are indeed needed, realistic goals must be formulated.

The planning of oral health services for elderly persons in nursing homes requires information on the need for treatment—but not only the professionally assessed normative need, which may lead to an overestimation of the costs. Rather, planning should be related to a realistic need for treatment, which takes into consideration the wishes of the elderly—that is, the expressed demand—and also the general mental and physical state of each individual.

The purpose of the present study was to propose a model for an outreaching, adequate, and comprehensive oral health care for elderly persons in nursing homes and to estimate the resources needed for such a program.

Materials and methods

The construction of the model is based on previous epidemiologic surveys in Danish nursing homes (8–11). The target population comprised 566 institutionalized elderly persons in 8 randomly selected nursing homes in the eastern part of Denmark. The institutions were selected in accordance with a

Table 1. Distribution of the study population with regard to age and sex

Age group, years	Women		Men		Total	
	n	%	*n*	%	*n*	%
-64	7	41	10	59	17	100
65–74	40	61	26	39	66	100
75–84	119	64	67	36	186	100
85–	172	79	45	21	217	100
Total	338	70	148	30	486	100

sampling plan ensuring the inclusion of nursing homes of different types within municipalities with different degrees of urbanization.

Some of the elderly did not want to participate in the study, and some of the terminally ill were not examined. Thus, the study population comprised 486 elderly persons, equivalent to 86% of the target population. The age and sex distribution of the study population is shown in Table 1. Approximately two-thirds of the residents were women, and female residents more than 85 years of age comprised 35% of all nursing home residents.

Before the clinical examination sociologic and medical data were collected through interviews with the head nurse and with the elderly, and nursing home administrators were asked about annual expenses for dental care.

The examinations took place at the institutions. No radiographs were taken. The clinical examination comprised oral mucosal lesions, denture condition, denture hygiene, dental caries, oral hygiene, and periodontal diseases. Details on the methods used, including description of criteria and estimation of intraexaminer variability, have been described previously (8–11). A short summary is given here.

Denture status and the need for prosthodontic treatment

Full and partial dentures were examined with regard to stability, retention, occlusion, vertical height, and defects. The prosthodontic treatment need was classified as a need for a new or partial removable denture or relining or existing dentures (8). The assessment of the realistic treatment need was based on the examiner's judgement, taking into account the expressed demand and the mental and physical health of each person and by applying the ethical principle of regression (what would you do if the patient was your own mother/father?).

Table 2. Time requirements for activities in the program

Activity	Time
Dentist	
Examination per elderly person	15 min
Follow-up consultation (once a year)	15 min
Consultation with staff (per elderly per year)	15 min
Caries therapy per tooth	30 min
Extractions per root remnant	10 min
Palliative or emergency treatment per elderly	15 min
Relining per denture	45 min
New denture	4 h
Transportation to and from the nursing home per day	1 h
Dental hygienist	
Scaling per elderly person	30 min
Fluoride treatment per elderly person	10 min
Instruction of residents (individual)	15 min
Instruction of staff (group sessions in each nursing home)	2 h
Transportation to and from the nursing home per day	1 h

Denture hygiene

The hygiene of the maxillary denture base was assessed after rinsing the denture slightly with water to remove food remnants. After a short period of drying the following criteria were applied (12): score 0 = no visible plaque; score 1 = moderate accumulation of visible plaque; and score 2 = abundance of plaque.

Periodontal health

Oral hygiene and gingival condition were scored by means of the Plaque Index (PLI) and the Gingival Index (GI) (13, 14), and the periodontal conditions were assessed by

means of the Community Periodontal Index of Treatment Needs (CPITN) (15). Because few teeth remained, the conditions were recorded per quadrant, even when only one tooth was left.

Dental caries

Coronal dental caries was recorded by means of the criteria described by WHO (16) at surface and tooth level, whereas root surface caries was scored at tooth level only. Only active caries with cavitation was recorded. Caries was scored on all teeth, including the third molars. Root remnants were registered separately.

Results

General health status

Most of the elderly persons were markedly handicapped, and 16% were in too poor mental condition to be interviewed at all. As many as 28% were totally helpless, 46% were partially helpless, and only 26% were able to manage daily life activities alone. Among the latter, some had serious difficulties in seeing and hearing, and others were very anxious. According to the head nurses, only 5% were able to visit a dentist on their own; 67% needed to be accompanied, and 28% could only be transported in an ambulance or by wheelchair transportation. According to the head nurses, the annual turnover of the elderly in the nursing homes was approximately 30%.

Existing oral health services

Since the time of admission to the nursing home, 6% of the elderly had been seen regularly by a dentist or practicing dental technician (at least once a year), 30% had had emergency care only, and 64% had not received any dental care at all. The mean annual expenses for dental service per resident in the eight nursing homes varied from 160 to 340 Danish kroner (DKK), with an average of DKK 250 (USD 38). The existing oral care was solely curative and sporadic, only given to very few in each nursing home. In most cases the resources were used on new dentures. These were relatively expensive, each set costing up to 30 times the average amount available per resident. The new dentures were seldom or never used.

The residents' opinion about organization of a dental service

Among the elderly who were able to undergo an interview, 86% wanted an oral check-up regularly, and 72% preferred the dental service to take place at the institution. Before the time of admission 16% had had their own dentist or practicing dental technician. However, only 9% wanted to continue this arrangement.

Clinical findings

The results of the clinical examination have been published previously (8–11) and are only summarized briefly to the extent necessary for the development of the model for oral health care. The estimated treatment needs of 500 individuals according to these findings are as follows: caries therapy, 100 teeth; extraction, 110 root remnants; palliative or emergency treatment, 60 individuals; denture relining, 100; new complete dentures, 6; partial dentures, 2; and scaling and fluoride treatment, 130 dentate persons.

Dental status. The prevalence of edentulousness was 74%, and female residents were more often edentulous (80%) than the men (62%). Among the edentulous, 80% had a full set of complete dentures, 12% had a complete denture in only one jaw, and 8% had no dentures at all. The average number of teeth among the dentate was 9.5 (range, 1–28), and the average number of root remnants was 1.6 (range, 0–12).

Denture condition, denture hygiene, and prosthodontic treatment need. Approximately 40% of the dentures were not satisfactory with regard to stability and retention; 52% of the complete denture wearers had unacceptable occlusion, and in 56% vertical height was not satisfactory. Among all denture wearers 22% had abundant plaque, 52% had moderate amounts, and only 26% had

Table 3. Dentist and dental hygienist hours needed to provide oral health care for 500 elderly residents in nursing homes

Dentist hours	
Examinations (500 × 2 × 15 min) including follow ups (500 × 15 min) and consultation with staff (500 × 15 min)	500 h
Caries therapy of 100 teeth (100 × 30 min) and extraction of 110 root remnants (110 × 10 min)	69 h
Palliative and emergency treatment (60 × 15 min)	15 h
Prosthodontic treatment (relining of 100 dentures, 6 new complete dentures, 2 partial dentures)	107 h
Transportation	140 h
Total	831 h
Dental hygienist hours	
Scaling (130 dentate persons × 4 × 30 min)	260 h
Fluoride treatment (130 × 4 × 10 min)	87 h
Instruction of residents (500 × 4 × 15 min)	500 h
Instruction of staff (8 nursing homes × 2 × 2 h)	32 h
Transportation	150 h
Total	1029 h

dentures without visible plaque on the denture base. Among all, 67% had a normative need (professional assessment), but only 19% had a realistic need for prosthodontic treatment. Among these most should be treated with relinings because very few had an expressed demand and could benefit from new dentures.

Periodontal health, oral hygiene, and periodontal treatment need. Only 3% of the dentate elderly persons had healthy periodontal conditions, and 17% had pockets 6 mm or deeper. Abundant plaque was found in 68% of the dentate subjects; 32% had abundant calculus; 70% had gingival bleeding; and 25% had severe gingivitis with spontaneous bleeding and ulcerations. All the dentate elderly subjects needed professional cleaning and instructions in dental hygiene, whereas complicated periodontal therapy was hardly ever indicated owing to the generally poor physical and mental health of the residents.

Dental caries and the need for operative caries therapy. The average number of surfaces with untreated decay (including root surface caries) was almost 10 (range, 0–60). Among the dentate 70% had a professionally assessed need for operative caries therapy. Almost half of these elderly persons either did not want operative treatment or were not able to express their demand owing to poor mental or physical state. Some of the elderly did not know whether they wanted treatment. If these are added to those who explicitly expressed a demand for treatment, the total realistic need for operative caries therapy included 54% of those who had a professionally assessed need, equivalent to 210 teeth or root remnants to be repaired or extracted.

Palliative and emergency treatment. Palliative or emergency treatment should be given to those elderly persons who had a professionally assessed need for operative caries therapy but did not want treatment or were not able to express their demand. Finally, 3.3% of the elderly had traumatic ulcers.

Model for oral health care

The clinical examination of the elderly persons in nursing homes showed a substantial unmet need for oral health care. The interviews showed that very few of these elderly persons had their own dentist, that a large majority wanted dental care, and that this care should take place at the nursing home. Furthermore, the assessment of the physical and mental state indicated that for many of the elderly a visit to an external dental clinic is unrealistic. On the basis of these findings the following model for comprehensive oral health care for elderly in nursing homes is proposed.

Principles of the model

The main principles in this model are that 1) the dental services should take place at the nursing home; 2) the services should be the responsibility of *one* dentist employed for the program; and 3) part of the activities should be carried out by a dental hygienist.

The program includes 1) oral examination

of all residents by the dentist twice yearly; 2) consultation with staff about each elderly subject; 3) effectuation of all realistic treatment needs as well as the necessary follow-up, emergency, and palliative treatment; 4) oral hygiene instructions for all and scaling and fluoride treatment for the dentate elderly subjects four times a year, carried out by the dental hygienist; and 5) instruction of the institutional staff twice a year.

Table 4. The annual operational costs for the provision of dental care for 500 elderly in nursing homes, in Danish kroner

Salary, dentist	140,000
Salary, dental hygienist	100,000
Salary, chairside assistant	70,000
Laboratory work (relinings, new dentures) and consumable materials	100,000
Depreciations and administration	90,000
Total	500,000

Estimate of resources

The resources needed for the implementation of the model for oral health care for elderly persons in nursing homes include dental manpower, laboratory expenses, consumable supplies, and depreciation of equipment. The time requirements for the various activities in the program are listed in Table 2. These estimates are based on three different sources (17–19) and take into account that more time is needed for the treatment of the elderly than when dealing with younger patients. Table 3 shows the total need for dental manpower for the provision of oral health care to the (approximately) 500 nursing home residents who were included in the study. The dentist and dental hygienist hours listed in this table have been calculated by applying the time estimates from Table 2 to the findings from the study. Table 3 shows that the need for dental manpower totals 831 dentist hours and 1029 dental hygienist hours. In Denmark the contractual annual working hours for publicly employed dentists and dental hygienists constitute 1440 and 1900 hours, respectively. Hence the dental manpower requirements correspond to about half of the annual capacity of one dentist and half the capacity of one dental hygienist. In addition, there will be a need for chairside assistance. The total cost estimates for the program are listed in Table 4, which shows that the annual cost per elderly person for dental care would be around DKK 1000.

Discussion

The capacity of the proposed oral health care program has been estimated on the basis of the realistic treatment needed. This implies that a major part of the conditions diagnosed by the dentist is not treated. From the traditional dentist's point of view this may seem unsatisfactory. However, one must bear in mind that treatment of dental disorders without proper consent is an assault except in case of emergency. It should also be kept in mind that if all the realistic treatment need is met, this would represent a tremendous improvement compared with the present situation, in which oral health care for nursing home residents in Denmark is practically non-existent. Most of the need for caries therapy and for prosthodontic treatment is related to conditions that have accumulated over a span of years. When this has been taken care of, the need for these categories of treatment will be reduced considerably. It must, however, be realized that there is a high annual turnover of elderly persons in nursing homes, so that each year there will be a sizeable fraction of newcomers who will need a lot of attention. The reduction in prosthodontic and caries treatment need will most likely be counterbalanced by treatment of newcomers and by an expected increase in the number of elderly persons who demand treatment once the program has become better known to the nursing home residents. Thus it can be assumed that the estimate of the resources required for the program is reasonably correct.

The annual cost of the services described per elderly subject is around DKK 1000 (USD 150). This is the same as the cost per child in the Danish Child Dental Health Service (20), although the treatment of eld-

erly persons is more time-consuming. The average cost per elderly person in the present dental service for nursing homes residents is around DKK 250. However, this amount does not include all public subsidies for dental care, nor does it include the cost of transportation of the elderly to the dental clinic or the cost of having institutional staff accompany the elderly to the dentist. The actual expenses for dental care are therefore higher than the DKK 250 per year, even though the care does not cover very much and includes only a few persons. In other words, it would be possible to achieve a much-needed improvement of the oral health care in nursing homes for a relatively modest extra expense.

A previous Danish study of nursing home residents (4) has estimated the cost of comprehensive oral health care at DKK 2200 per resident. This estimate was based on prices from private practice, and the treatment need estimated primarily from the professionally assessed need. The suggested oral care included mainly the curative aspects, and neither regular check-ups nor regular oral hygiene procedures were foreseen.

The establishment of outreaching, comprehensive, preventive, and curative oral health services is dependent on the allocation of resources and is hence a political decision. Although the new law encourages the municipalities to establish dental care for institutionalized elderly persons, this has not become compulsory. It is to be hoped that the proposed model will be a useful tool for health planners and political decision makers in the planning of oral health services for nursing home residents.

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