

Less fillings – cheaper dental care?

A longitudinal investigation of the treatment profile during 10 years organized child dental care

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Little attention has been paid to the cost savings of reducing the number of filled surfaces in an ongoing dental program for children. The purpose of the present investigation was to analyze how projected reductions in filled surfaces affect costs. Records from 173 pupils leaving ninth grade in Lier District were collected and all treatments through 10 years were registered. Applying time-estimates provided through a separate investigation and the estimated costs of the public dental service in the district to the treatment profile, total time and cost investment were calculated. Of the total treatment time per person 41 per cent was used for fillings. The cost saving of a planned 30 and 50 per cent reduction is estimated. It is suggested that substantial savings may be obtained rather from changes in the structure of an organized program than from preventive efforts.

Key-words: Community dentistry; operative dentistry; costs

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The incidence of dental caries among children assessed by the number of filled teeth has been high during many decades in Scandinavia. During the latest decade, however, encouraging reports show a remarkable decline in the number of tooth surfaces that have to be filled (3, 5, 6). The improvement of the children's dental status can be explained by various preventive actions; community-, school-, and family-based. Two main factors may have caused the change in society's attitude toward prevention: 1) Good dental health is a value in itself, and as such should be equitably distributed in the po-

pulation. 2) Organizing dental services aimed at caring for the disease level that was prevalent 10–15 years ago is, and has been, very expensive. The claim for more efficient use of resources in health services also hits dentistry. Reducing the need for treatment among children is believed to reduce cost.

Though a number of studies have shown that fluoride programs have reduced the need for fillings per year per child (2, 4), little attention has been paid to the cost savings of reducing the number of filled surfaces in an ongoing dental program for children. Ast, Cons, Pollard &

Garfunkel (1) showed a cost saving of 50 per cent during 6 years incremental care comparing a fluoridated with a nonfluoridated town. The saving, however, was calculated only from the reduced number of fillings and extractions. They also showed that the chairtime was reduced in the fluoridated town by 39 %, indicating a lower real cost-saving.

In an unpublished Norwegian cross-sectional study of 6–17 year old children (7) it was demonstrated that while the number of filled surfaces was reduced from 5.8 to 1.5 from 1972–1976, the number of dentist-hours remained the same. This and other reports based their estimates on yearly averages of the cross-sectional type (4). In incremental programs for children the total investments may be better analyzed in a longitudinal perspective, cumulating the periodical input for later evaluation in relation to results.

The questions asked before the implementation of this study were: What is the reduction of costs in a public dental program of reducing the number of fillings? Is the cost-reduction proportional to the reduced number of filled surfaces? To answer these questions it was necessary to gather information on the proportion of total service time used for filling-therapy.

The purposes of the following investigation were to:

- 1) Calculate the total service time per child during 10 years of public dental service
- 2) Calculate the total time spent on fillings
- 3) Convert the finding in 1) + 2) in monetary terms
- 4) Estimate the cost-saving of a planned reduction of the need for fillings by 1) 30 and 2) 50 per cent.

Total service time is here defined as total dentist chairtime. Time spent by other personnel on group-based preventive programs was not included.

MATERIAL AND METHODS

Total treatment

Dental records from all pupils finishing 9th grade in 1979 in the Public Dental Service, Lier district (county of Buskerud, 40 km. from Oslo) were collected. The pupils had received dental treatment at 4 different clinics employing 5 dentists. Pupils who had not attended the service each of the 10 years registration period were excluded (31 %). From 1973 records all kinds of treatments were registered, including examination and local prophylaxis.

Treatment time

Treatment time per pupil was not routinely recorded. To estimate the total time during 10 years service per child, a separate survey was carried out. During a 2 weeks period all district dental officers in the county were asked to record the numbers of whole minutes used for a defined range of operations. The participation rate was 82 % (40 dentists). Average number of minutes per type of operation was then calculated, thus arriving at the number of minutes the «average, typical» district dental officer in 1979 used to perform each of the most common treatments.

Costs

The costs of the public dental service was calculated for each of the clinics. The costs included all expenses for the municipality, county and state (wages, rent, cleaning, upkeep, group-based preventive program etc.). Total costs were divided by total registered working time to arrive at the cost per minute. (Details of this part of the registration will be published separately).

Table 1. Number of service items through 10 years public dental service per pupil leaving ninth grade according to clinics in Lier District 1979

Clinic	Examinations	X-rays	Cleaning, polishing	Filled surfaces	Endodontics*	Surgery	Extractions	Traumatic injuries	Orthodontic treatment
I n = 33	12	6.8	11	23.3	0.2	-	4.0	0.3	0.5
II n = 55	10	13.9	10	38.8	0.1	0.1	3.4	1.2	1.1
III n = 50	13	12.1	4	35.4	1.1	0.2	4.2	0.1	0.1
IV n = 35	10	14.1	5	44.4	0.2	0.1	2.9	-	-
All n = 173	11.4	11.0	7.6	36.3	0.1	0.1	3.6	0.1	0.1

* Units of measurement: the root

Table 2. Average treatment time in minutes per average district dental officer according to service type. County of Buskerud 1979

	Examination*	Cleaning, polishing	Per filled surface	Per filled root	Per surgery case	Per extraction	Orthodontics	Traumatic injuries
Time in minutes	10.5	12.7	9.4	34.0	29.0	11.8	20.0	19.3

* X-rays are included

Total treatment time, according to specified items, after 10 years public dental service in a group of 16 year olds. Lier 1979

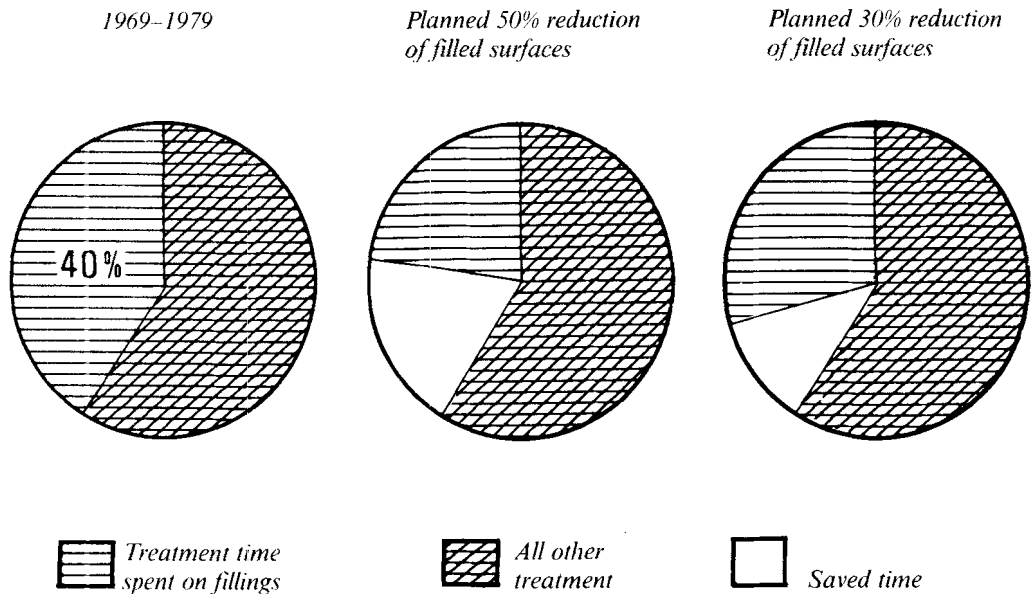


Fig. 1. Distribution of total treatment time after 10 years public dental service in a group of 16 year olds in Lier district. Situation in 1979 and two projections.

RESULTS

Total treatment

The treatment profile per child through 10 years is seen in Table 1. The table also shows the variations among the 4 clinics.

Treatment time

The average time (in minutes) spent on each treatment type appears from Table 2. Only simple orthodontic cases, which were not referred to specialists, are included. Applying these 1979 average time-estimates to the treatment profile in Table 1 (the district average) provides a total treatment estimate during 10 years public care (Table 3). When including time for administration and lost time due to wait-

ing etc. the number of minutes add up to 839, or 14 hours per pupil.

Costs

The cost of one minute was 3.35 N. kr. in the district as a whole. There were only small differences between the clinics. The total cost per pupil for each clinic is seen in Table 4. Multiplying the minute-price with the total number of minutes spent for tooth-filling (Table 2) provides the cost of the filled surfaces through 10 years service.

Projected saving of reducing the number of filled surfaces

Fig. 1 visualizes the 1979 situation with

Table 3. *Number of services, treatment time and estimated total treatment time through 10 years public dental service*

Service	Number		Average treatment		Estimated total time in minutes per person
Examination	11.4	x	10.5	=	119.7
X-ray	11.0	x	3.2*	=	35.2
Cleaning + polishing	7.6	x	12.7	=	96.5
Filled surfaces	36.3	x	9.4	=	341.2
Endodontics	0.1	x	34.0	=	3.4
Surgery	0.1	x	29.0	=	2.9
Extractions	3.6	x	11.8	=	42.5
Orthodontics	0.1	x	20.0	=	2.0
Traumatic injuries	0.1	x	19.3	=	1.9
Total					645.3 = 10.8 hours
		+ administration and time lost			194.7
					839.0 = 14,4 hours

* Dental assistant's time to develop the x-ray

Table 4. *Estimated cost of 10 years public dental service per pupil leaving ninth grade in Lier district 1979 according to clinic*

	Clinic			
	I	II	III	IV
Total investment in minutes	697	903	776	880
Costs per minute in N.kr.	3.48	3.43	3.07	3.42
Total costs in N.kr.	2426	3099	2382	3009

regard to time spent on restorative care related to total care time. The figure also shows the projections, one is a planned 30%, the other a 50% reduction of filled surfaces in coming cohorts. The time savings (and consequently the cost-savings) are not proportional to projected percentage reduction in filled surfaces.

DISCUSSION

Two aspects of this investigation are believed to be of special importance: One is the methodologic approach, that is the longitudinal registration of cohort events. Longitudinal data have the following advantages in comparison with cross-sectional: a) Program results can be

weighed against total investment, b) Cohort characteristics can be identified and taken into consideration, c) Yearly variations within cohorts can be observed.

In this study the following assumptions had to be made: 1) Applying the 1979 average time estimates on 10 years treatment history evens out variations in the involved dentists' speed of working. 2) The time to prepare and fill one surface is the same regardless of the site of the teeth and the level of disease. Such assumptions, though often necessary, simplify estimation in retrospective studies but tend to limit the usefulness of the methods.

The other aspect is the actual cost saving of a planned reduction in the need for filled surfaces. As visualised in Fig. 1 the projected saving is not as big as might have been imagined in the first place. This can be explained in the following way: Seen in a longitudinal perspective the investment of time (costs) for fillings constitute 40% of the total investment in the present study. If this factor is changed without any changes in the rest of the investment, the savings will be limited to the saving of just that factor. It is, however, realistic to believe that the total treatment profile will change somewhat under real life conditions. The time for prevention, either chairtime or group-based time, is likely to increase in order to obtain the projected reduction of new carious lesions. However, this change increases the total time and costs. A decrease in total costs, is therefore more likely to lie with structural changes in the system of delivery of services such as change of time interval between periodical examinations, delegation of tasks to dental hygienists and other personnel and relying more on the individual's own oral hygiene activities than on professional help.

When benefits in monetary terms are estimated from preventive programs it seems important to state explicitly whe-

ther or not the preventive program is part of a complete dental care delivery program. If it is, the costs of the total program should be the denominator and benefits the numerator. Otherwise, the benefits may be overestimated. In the present dental care delivery system built on the incremental model, services other than the restorative make the greater part of the cumulated time investment, and such services are likely to increase in the future. This is a positive development if all parts of the program are reviewed periodically for their degree of efficiency.

Summing up, the present investigation has shown that when operating dental care programs, positive results of preventive efforts should not automatically be expected to reduce the cost substantially. If program budgets are cut down for some reason, savings are more likely to occur from changes in program structure. There seems to be a need for adequately designed, prospective studies to provide further understanding of the costs of running organized dental care programs.

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