

Planning and Conducting an INCREMENTAL DENTAL PROGRAM

Paulo S. Freire,* D.D.S., M.P.H.,
Rio de Janeiro, Brazil



In an incremental dental care program in Aimorés, Brazil, initial care was provided for selected age groups the first year and maintenance care was begun the succeeding year. Preventive measures were fluoridation of water supplies and topical application of fluoride to the teeth of children. Extensive use of auxiliary personnel enabled dentists to increase their productivity. The Aimorés plan has been accepted as a pattern for such programs in other communities in Brazil.

An incremental care program is a method of obtaining reduction of accumulated dental needs at the beginning of an organized effort within a given population and of managing the increment of need over a determined period.

The organized effort consists of combinations of corrective and preventive dental services adapted to recipient populations. Specifically, we have used two methods of prevention associated with the incremental program: (1) fluoridation of public water supplies and (2) topical application of fluoride to the teeth of children.

Corrective services are provided by dentists and dental auxiliary personnel. Development of extended utilization of auxiliary personnel has allowed greater production of service units per clinical hour. Klein¹ estimated that the productivity of a dentist utilizing dental assistants could increase services in the range of 33 to 75 per cent. Moen² found great variation in productivity levels of dentists working with and without auxiliary personnel. Incremental service programs conducted by the U. S. Public Health Service at Woonsocket, R.I., and Richmond, Ind.,³⁻⁸ begun in 1946 are well documented. Both of these projects sought to establish levels of accumulated dental needs in school children and to devise methods of controlling and treating the annual increment on a maintenance basis.

A study project was begun in Brazil in 1952 to establish methods and procedures in dental public health for that country.⁹ This project was conducted at Aimorés, in the State of Minas Gerais, for seven years. It was my privilege to be the clinician in this project for two successive years. The project was supported by the Special Public Health Service of the Health Ministry, at that time a coopera-

Table 1 • Plan of development of Aimorés program

Years	Age							
	7	8	9	10	11	12	13	14
1	C.T.* C.T.							
	T.A.†							
2	C.T. M.T.‡ M.T.							
	T.A.							
3	C.T. M.T. M.T. M.T.							
	T.A.			T.A.				
4	C.T. M.T. M.T. M.T. M.T.							
	T.A.			T.A.				
5	C.T. M.T. M.T. M.T. M.T. M.T.							
	T.A.			T.A.				
6	C.T. M.T. M.T. M.T. M.T. M.T. M.T.							
	T.A.			T.A.			T.A.	
7	C.T. M.T. M.T. M.T. M.T. M.T. M.T. M.T.							
	T.A.			T.A.			T.A.	

*C.T., complete treatment. †T.A., topical application of sodium fluoride. ‡M.T., maintenance treatment.

tive health agency, established as a bi-national program with the government of Brazil and the government of the United States of America. This program was designed to provide corrective and preventive dental services to school children ranging in age from 7 to 14 years.

The criterion of selection was made on the basis of incremental development of

the needs in such a way that all students 7 and 8 years old would receive dental service in the first year of project operation (Table 1); five schools were covered in the first year by a dental service team equipped to operate in each of the five schools.

The second year of operation required that all new students 7 and 8 years of age would receive initial services and that all students participating in the first round of services would be provided maintenance care by the team. This procedure allowed addition of one age group per year; however, more than one additional age group was included if time permitted.¹⁰

Topical application of 2 per cent sodium fluoride solution was made by a dental hygienist trained within the Special Public Health Service Foundation dental service. The applications were made for 7, 10 and 13 year old children as a coordinated preventive service.

Although the original plan of the project established a seven year span of operations, it was possible to reduce this span to five years through more effective use of dental auxiliary personnel in the service team. Five years of operation revealed two important and significant develop-

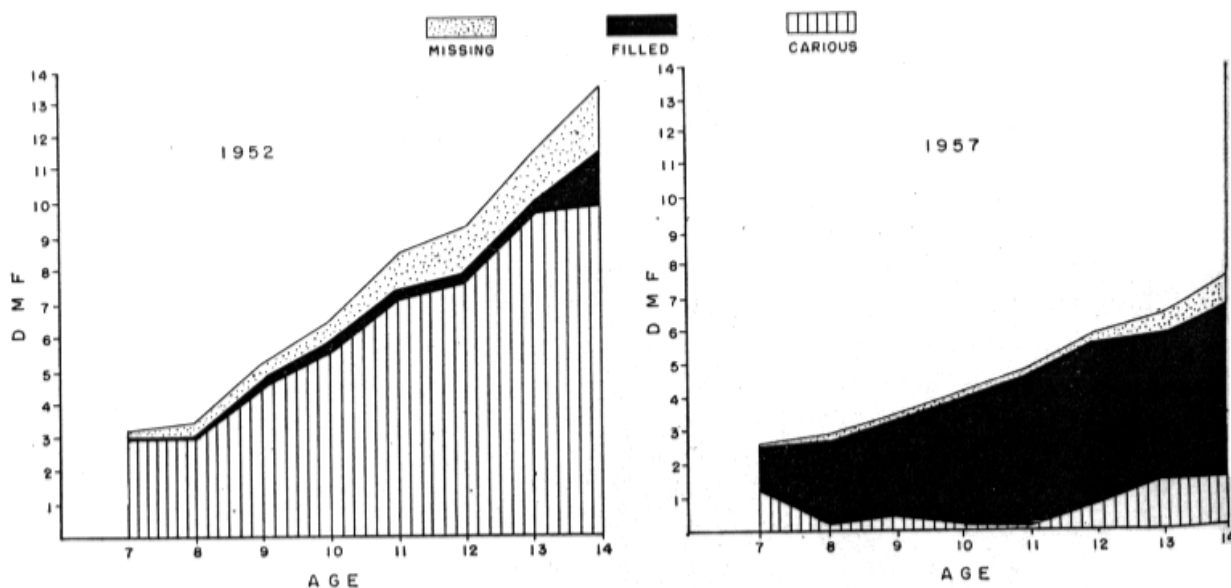


Fig. 1 • Decayed, missing and filled teeth in children in Aimorés in 1952 and 1957 by age

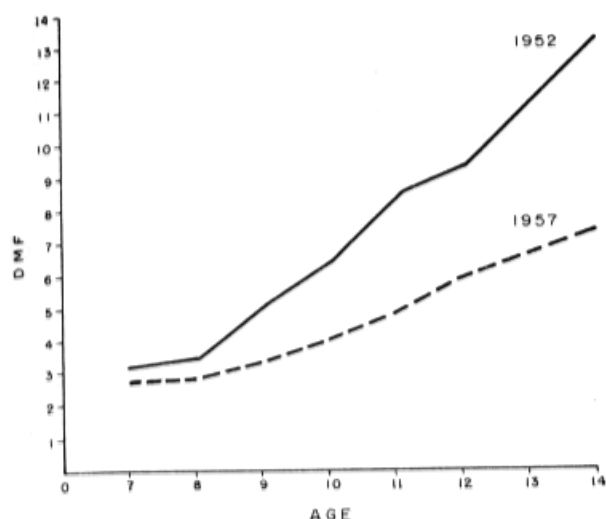


Fig. 2 • Average number of decayed, missing and filled teeth per child in Aimorés by age

ments: (1) absence of accumulated dental needs and (2) significant increases in caries-free teeth.

The Aimorés project, in comparison with the Richmond and Woonsocket projects, differed in composition as follows:

1. Initial services: Aimorés, selective coverage by age by year. Richmond-Woonsocket, total coverage of accumulated needs in all age groups before instituting maintenance care services.

2. Personnel (full-time employment): Aimorés, 1 dentist, 1 hygienist, 1 dental

assistant and 1 orderly. Richmond-Woonsocket 3 to 7 dentists, 2 dental hygienists, 1 secretary, and 3 clerks.

3. Mode of operation: Aimorés, first year devoted to provision of initial care for selected age groups—no attempt made to provide initial care in remaining age groups. Maintenance care was begun subsequent to initial service but in succeeding year. Richmond-Woonsocket, first cycle devoted to reducing total accumulated needs of all age groups; second cycle devoted to maintenance care.

Initial experience in Aimorés, and subsequent experiences in reproduction of incremental service projects throughout Brazil, have established certain facts. We are now able to provide a four year program for incremental dental care covering 800 to 1,000 school children. The factors responsible are identified as (1) better trained dentists, (2) better trained and utilized dental auxiliary personnel and (3) improved equipment used more effectively (Fig. 1, 2).

Accordingly, expansion of our programs after 10 years has demanded certain modifications of the plan and design.

One of the most important aspects of our experience in Brazil was the constant analysis and revision of our various program operations conducted throughout the nation. Difficulties were encountered

Table 2 • Observed increment of carious teeth and teeth for which extraction is indicated in some communities using incremental school programs

Age (years)	Increment (C & E I*)						
	Aimorés	Valadares	Cons. Pena	Bocaiuva	Pirapora	B. Guandu†	Januária
7	0.84	0.68	0.84	0.38	1.39	0.63	0.87
8	0.69	0.68	0.98	0.69	0.98	0.64	0.41
9	1.20	1.16	1.12	0.57	1.69	0.71	0.75
10	0.76	1.23	1.31	1.15	1.37	0.89	1.26
11	1.13	1.60	1.82	1.44	1.45	0.81	2.39
12	1.51	1.13	2.51	1.78	2.65	1.29	4.40
13	1.64	2.55	3.79	2.34	3.83	1.32	8.06
14	1.29	4.55	5.36	3.29	6.60	1.81	9.02

*C & E I, carious teeth and teeth for which extraction is indicated. †Water fluoridated.

Table 3 • Mean number of carious teeth and teeth for which extraction is indicated in initial program; evaluation of prevalence

Age	C & EI*
7	2.57
8	3.32
9	4.30
10	4.58
11	6.51
12	7.66
13	9.85
14	9.63

*C & EI, carious teeth and teeth for which extraction is indicated.

in the second year of operation when maintenance services were begun. Quality services in the initial coverage must be of the highest level to assure minimal increment in succeeding years.

We have observed that, during the first year of maintenance services, a large population of children develop increments of less than 1 unit of service. For example, some age groups have developed an increment of only 0.3 unit. At this rate, it would require three children to equal one full unit of service. Assuming that each clinical appointment takes 20 to 25 minutes, the net loss of treating these three patients is equivalent to 40 to 50 minutes. Multiplication of this time-loss over a period of several clinical sessions becomes impressive in terms of program management.

Table 2 demonstrates the observed increment among various child populations within one particular state—that of Minas Gerais—where the Special Public Health Service Foundation is responsible for operation of many dental health activities.

Our observations tend to show considerable variation in incremental units between similar age groups in selected communities. This variability, as observed, cannot be related at this time to any apparent factors within these communi-

ties; however, this wide variability of increment does complicate program planning and dictates that a high degree of flexibility in adaptation of maintenance operations be assured.

PLAN

The plan is based on the prevalence and the incidence of dental caries. The indicator of units of increment is a compounded factor made up of carious teeth and teeth indicated for extraction (C & EI).

According to program requirements, the plan consists of two major cycles: (1) the initial program (first cycle) and (2) the maintenance program (second and additional cycles). In each instance, it is necessary to determine the baseline of caries activity in a selected population.

Computation of relative value of the "carious" (C) element is obtained by establishing the arithmetic mean of affected teeth in each age group of a particular child population, likewise an arithmetic mean is established for the "extraction indicated" (EI) element. Addition of these two arithmetic means provides a numerical indication of the incremental services required for each particular age group (Table 3).

The difference of the incremental services required for the lower age group, when compared with that of the higher age groups, indicates a value which can

Table 4 • Differences between ages in initial program

Age	Difference of C & EI* between ages
7 to 8	0.75
8 to 9	0.98
9 to 10	0.28
10 to 11	1.93
11 to 12	1.15
12 to 13	2.19
13 to 14	0.00

*C & EI, carious teeth and teeth for which extraction is indicated.

be utilized in the programming process (Table 4), revealing the decayed, missing and filled teeth (DMF). Estimation of the caries activity is necessary each year before initiation of service activities. These data are extremely important in the planning processes applied to each community.

The use of the factor (C & EI) provides a measurement of accumulated needs observed in child populations during given incidental periods. In the initial cycle, this factor indicated prevalence of need and, in succeeding cycles, it formed a measurement of incremental services required.

INITIAL PROGRAM (FIRST CYCLE)

Planning of operations within the initial program or first cycle of services, is based on the amount of clinical work to be done. In this cycle, we planned definitely to provide essential services to all 7 and 8 year old children (and some 6 year olds if possible).

The productive capacity of each operating team is measured in terms of available clinical manhours and the units of work possible within each manhour. Reasonable adaptation of the productive capacity of each team is made to the needs requirements of each child population in the initial cycle.

Often in the initial program, there is an oversupply of available clinical manhours. These available clinical hours are applied to an expansion of services to additional age groups according to the differential which has been computed previously (Table 4). Attempt must be made to choose the group who, if treated, will avoid unnecessary accumulative needs at a particular age level. In Figure 3, it can be seen that the logical selection would be the 10 year age group. Our intent is to avoid unnecessary increment as a future work load at the eleventh year of this group.

If in succeeding years the increment of the treated groups did not exceed the

Table 5 • Maintenance program; mean of the increment by age after control of accumulated needs

Age	Increment C & EI*
7	0.84
8	0.69
9	1.20
10	0.76
11	1.13
12	1.51
13	1.69
14	1.29

*C & EI, carious teeth and teeth for which extraction is indicated.

value of 1, then it is necessary to choose another age group which does qualify with an increment of over 1.

We have come to recommend that dental care services not be carried into the age groups above 12 years.

MAINTENANCE PROGRAM

First priority in any year is given to the initial program group (7 and 8 year olds). The maintenance program is put into operation after the initial treatment group has been completed. The first months of service program are always devoted to participants in the initial cycle.

Actual provision of maintenance care services is carried out only after it has been determined that any particular age group can qualify under the "policy of 1"

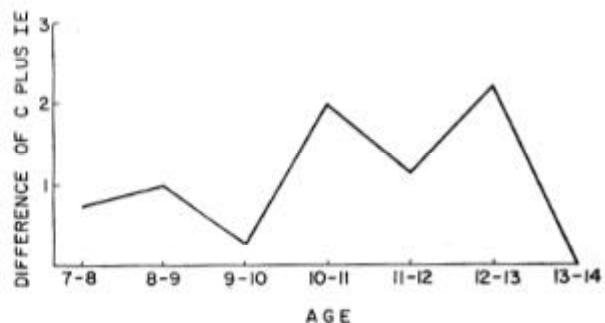


Fig. 3 • Difference in incidence between age groups

as far as increment is concerned.

It has been observed that in some instances it may be three years after the initial cycle that age groups may qualify for maintenance services. Before the amount of maintenance services needed has been determined, the time is used to provide services to those age groups that require services comparable to initial cycle groups.

Table 5 shows age groupings in relation to the assessed incremental levels. This listing provides a means of selection for application of maintenance care at the appropriate level.

Assistance is given to most 13 and 14 year olds since they are a small group.

ANALYSIS OF METHOD

The method of program design and operation, as presented, has been applied to two communities in Brazil for purposes of study and testing of its elements. Two years of experience have accrued in these communities now under study.

It may be that the ideal incremental care services might be the complete elimination of accumulated needs in all persons within a community; however, costs of providing such services are prohibitive in developing countries. The limited funds and technicians available do not allow an expansion in development at the ideal level. Since the professional manpower is the most costly item in the program, we must consider some way of providing facilities, personnel and equipment to achieve greater productivity and thus lowered manhour costs.

Utilization of the method makes it possible for us to shorten the time necessary to accomplish initial services and placement of the program at the maintenance level. Conserved time allows extension of services to a larger number of children.

Assessment of dental needs of children at the beginning of the school year provides real data from which one can plan specific programming of time, personnel, and funds.

Basic planning must be accomplished by the local dental service team since the needs among specific age groups vary from one community to another. The team, in making its own work plans, has a greater satisfaction from the work they will accomplish. They become more responsible through having made the plan.

When this method is used, the incidence controlled at the level of 1 will be identical in the Aimorés, Richmond and Woonsocket projects.^{5,11} (Fig. 1).

SUMMARY AND CONCLUSIONS

Annual analyses of the Special Public Health Service Foundation dental programs in all communities have shown the necessity of revising the plan being used. These data have shown significant variations in increment each year when the programs effectively eliminated the accumulated needs.

Considerable clinical service time was lost because children were scheduled for the service, then their increment was found to be less than 1.

Management of the problem was accomplished through study of the method in which prevalence was the basis for planning of the initial program and in the incidence when the maintenance program begins.

When it is possible to extend treatment services to other age groups, it becomes more rational to base extension on the gross differences in increment levels between those age groups.

Preventive services were patterned in all communities after the Aimorés plan.

This incremental dental care program includes the following:

1. The participation of a local dental service team, particularly in the planning of their work program, which gives the team greater responsibility and a greater insight and appreciation of the work they accomplish.

2. Economy in time and cost can be achieved through elimination of those

age groups from the maintenance program whose increment is below 1.

3. Proper planning in the beginning of an incremental dental program will achieve significant reduction in time consumption necessary to satisfy accumulated needs.

4. Depth of understanding and keen insight into all elements of an incremental dental care program will allow more rational expansion and flexibility throughout the entire program operations.

Avenida Rio Branco 251 Andar 13

*Chief, dental section, Special Public Health Service Foundation, Rio de Janeiro, Brazil.

1. Klein, Henry. Civilian dentistry in war time. J.A.D.A. 1:648 May 1944.

2. Moen, B. D. Nineteen fifty survey of dental profession. III. The dentist's work week. J.A.D.A. 41:505 October 1950.

3. Waterman, G. W. Effective use of dental assistants. Pub. Health Rep. 67:390 April 1952.

4. Waterman, G. W., and Knutson, J. W. Studies on dental care services for school children; first and second treatment series, Richmond, Ind. Pub. Health Rep. 68:583 June 1953.

5. Waterman, G. E., and Knutson, J. W. Studies on dental care services for school children; third and fourth treatment series, Richmond, Ind. Pub. Health Rep. 69:247 March 1954.

6. Law, F. E.; Johnson, C. E., and Knutson, J. W. Studies on dental care services for school children; third and fourth treatment series at Woonsocket, R.I. Public Health Rep. 70:402 April 1955.

7. Law, F. E.; Johnson, C. E., and Knutson, J. W. Studies on dental care services for school children; first and second treatment series at Woonsocket, R.I. Pub. Health Rep. 68:1192 Dec. 1953.

8. Waterman, G. E. Richmond-Woonsocket studies on dental care services for school children J.A.D.A. 52:676 June 1956.

9. Chaves, M. M., e Frankel, J. M. Principios basicos para a organizacao de um servico dentario escolar. Rev. Serv. espec. saúde pub. 5:469 December 1952.

10. Freire, P. S., e Loures, O. F. Organizacao de um programa dentario escolar em base incremental. Rev. Serv. espec. saúde pub. 9:307 July 1957.

11. Freire, P. S. A Odontologia Sanitaria na idade escolar. Rev. Serv. espec. saúde pub. 11:603 June 1961.

Freire PS. Planning and conducting an incremental dental program. *The Journal of the American Dental Association* 1964; 68 (1): 199-205.