

Evaluation of an Oral Disease Control Program Administered to a Clinic Population at a Suburban Dental School

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THIS STUDY INCLUDED 99 patients. Seventy-four of these participated in the Oral Disease Control program at Emory University School of Dentistry and 25 control patients did not. Those who completed the Oral Disease Control program were examined and scored from 2 to 24 months afterward. The Patient Hygiene Performance Scoring was used. It was found that there was no significant difference in levels of plaque between subjects who completed the Oral Disease Program and those who did not participate. Also, the patient's knowledge of the causes of dental caries and gingival disease bore no significant relationship to the amount of plaque present. Further, certain selected hygiene habits had no significant effect on plaque level. The patients studied were enthusiastic about the control program and developed an increased awareness of oral disease control. However, this study confirms others that demonstrate the need for repeated professional reinforcement in any effective oral disease control program.

Since the pioneering efforts of Loe and co-workers,¹ various studies have been performed on groups of patients to demonstrate that instruction in oral disease control, plus regular dental care, would markedly slow the progression of destructive periodontal disease and the incidence of gingivitis.

Suomi's deliberate studies of matched pair populations in Mountain View and Santa Monica, California provided longitudinal evidence that the loss of attachment could be altered with an oral hygiene program associated with regular professional visits.²⁻⁴ In the mid-1970's a series of articles appeared in the literature with school children as subjects; these studies examined and confirmed the need for repeated professional contact during the school year, as well as effective patient oral hygiene procedures to reduce plaque accumulation and gingivitis.⁵⁻⁸

In 1975, Nyman, Rosling and Lindhe compared ten post-periodontal surgery patients placed on a 2 week recall with a control group of ten patients on a 6 month recall.⁹ The test group maintained high standards of oral hygiene and showed minimal periodontal breakdown over the 2 year period. The control patients, on the other hand, had severe periodontal breakdown and were deemed failures. The same workers later reported the recurrence of periodontal disease (including loss of at-

tachment) in 25 patients who had had periodontal therapy.¹⁰ These patients had been instructed only once in oral hygiene procedures.

The preponderance of the literature appears to establish the requirement of including regular and repeated professional visits in conjunction with adequate patient home care in order to achieve acceptable levels of periodontal health. Two articles in the literature, however, stand out in failing to conclude the same results. Glavind¹¹ used split mouth techniques to compare monthly recalls against semi-annual recalls over a 2 year period. The 28 subjects in the study were periodontal patients on maintenance. After the test period no significant differences were cited between the two groups. A second report demonstrated, over a 7-year period, no significant decline in periodontal health in patients with removable partial dentures;¹² these patients, however, had oral hygiene instruction during their first visit and were given yearly professional maintenance.

The present paper will present a longitudinal evaluation of 99 patients, of whom 74 presented to the Oral Disease Control Clinic at Emory University School of Dentistry, and 25 served as controls. We will present data describing the patient population and the evaluation of the oral hygiene performance of this group, their attitudes about and knowledge of oral disease control procedures. For this purpose, the following hypotheses were tested:

H₁: There is no significant difference in levels of

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plaque reported between subjects who participated in the complete Oral Disease Control program and patients who did not.

H₂: There is no significant relationship between knowledge of causes of dental decay and gingival disease, and level of plaque.

H₃: There is no significant relationship between selected hygiene habits and level of plaque.

H₁ was tested using a one-way analysis of variance procedure. H₂ and H₃ were tested using Pearson Product Moment Correlation Coefficients.^{13, 14}

METHODS AND MATERIALS

Patient Population

The patients arriving at this suburban dental school are generally parallel socioeconomically to the population found in Suomi's studies.²⁻⁴ Each patient, however, pays a fee and is assigned an individual dental student for the duration of the Oral Disease Control Program and for subsequent needed dental care.

The 74 subjects who participated in this study were randomly selected from patients in the Oral Disease Control Clinic who had completed the four-visit oral hygiene program. These subjects received a follow-up dental examination and were asked to complete a questionnaire (Fig. 1) regarding the quality of treatment and general knowledge about and attitudes toward oral hygiene. This Treatment Group included 22 (29.70%) males and 52 (70.30%) females. Fifty were Caucasian and 24 were Black. The average age of this group was 36.12 years (SD $\pm$ 15.37), with a range of 14 to 61 years.

A Central Group of 25 patients who had not participated in the oral hygiene program were randomly selected to serve as a control group. Only the dental examination was conducted on this group. No demographic information, knowledge nor attitudinal data were collected on these individuals.

Patient Hygiene Performance Scoring (PHPS) and Evaluation of Patients in Study

The patient population was subjected to a Patient Hygiene Performance (PHP) scoring technique¹⁵ which consists of the following:

1. The patient to be graded takes into his mouth a solution of 2% erythrosin dye in water (10 drops "Trace" in 2 tablespoonfuls of water) and swishes it around the mouth and over the teeth for 30 seconds then rinses briefly; the plaque and debris are stained red.
2. The examiner, using a mouth mirror, examines and grades the following tooth surfaces:
 - a. Maxillary right first molar-buccal
 - b. Maxillary right central incisor-labial
 - c. Maxillary left first molar-buccal
 - d. Mandibular left first molar-lingual
 - e. Mandibular left central incisor-labial
 - f. Mandibular right first molar-lingual

When grading, the specified surface of the tooth is divided longitudinally into thirds: mesial, middle, and distal; the middle third is also divided into gingival, middle, and occlusal or incisal areas. There is therefore a total of five areas on each surface.

3. Using the presence of stain in the specified areas as the criterion, the five areas are graded individually as follows:
 - a. If no stain occurs in the section under consideration, a score of zero (0) is assigned.
 - b. If stain is definitely present in the section, a score of one (1) is assigned. When in doubt, a score of zero (0) is assigned.
 - c. If a specified central incisor is missing, or cannot be used, the adjacent central incisor is substituted and scored. If the adjacent central incisor is also missing or cannot be used, an M is placed on the chart. If a specified molar is missing, the next tooth posterior to the specified tooth is scored. If all teeth posterior to the specified tooth are missing, an M is marked. Those surfaces marked M are not used in computations of the debris score.
4. The debris score for each surface is determined by adding the values of each of the five subdivisions (possible scores 0 to 5). The debris score for the specified surface of each of the six teeth is entered in a table on the form provided for scoring the PHP. The PHP is then calculated by dividing the sum of the scores by the number of surfaces graded.

Calibration

An initial sample of 25 patients, randomly selected from the clinic, were scored using the PHPS. They were also given a Patient Questionnaire (PQ), described in the following section. These patients had not participated in the Oral Disease Control Program. A preliminary analysis of the data from both instruments indicated that both PHPS and the PQ functioned as desired. Thus, no revisions of either instrument were conducted.

Examiners reached and maintained an interrater reliability of 0.95 utilizing the PHPS. The examiners scored each participant as described above and recorded their findings. After being rated, the patients were instructed to fill out the questionnaire. The examiners did not know the prior scores of the patients. Data reduction was achieved by one of the authors who did not do examinations.

A series of four weekly appointments are utilized to develop techniques and knowledge of preventing and controlling oral disease in the Oral Disease Control Clinic. Included in these conferences are discussion of nutrition, diet, counselling, and instruction in brushing and flossing techniques which are tested with the PHPS. After the final visit, patients are given a 1-month recall at which time information is reviewed and an evaluation is done using the PHPS. The patients in this study were seen from 2 to 24 months after completion of their initial appointments and a single 1-month recall.

Patient Questionnaire (PQ)

The secondary purpose of this study was to determine whether attitudes, knowledge or selected hygiene habits were associated with the level of plaque accumulation at the time of the follow-up visit.

In order to test H₂ and H₃ a questionnaire was designed (Fig. 1). H₂ and H₃ refer to patient attitude and knowledge. The PQ was developed to measure:

1. Attitudes toward oral hygiene.
2. Attitudes toward services provided in the Oral Disease Control Clinic (ODCC).

PATIENT QUESTIONNAIRE

Following is a questionnaire which will help the Emory Dental Clinic serve you and others better. We ask your cooperation in this matter. Please be honest and take some time to think about your responses! Write additional comments on the back of this questionnaire.

	POOR	ADEQUATE	GOOD
Service provided by the Emory Dental Clinic is	_____	_____	_____
Clinical skills of the Dental students are	_____	_____	_____
Interpersonal skills of the Dental students are	_____	_____	_____
Dental students' rapport with patients is	_____	_____	_____
How many times a week do you:		How many times a year do you:	
Floss _____		Visit the Emory Dental Clinic _____	
Brush _____		Visit a dentist in private practice _____	
Use staining tablets _____			
Dental decay is caused by _____			
Gum disease is caused by _____			
Flossing removes _____			
Brushing removes _____			
Fluorides retard/prevent _____			
	YES	UNCERTAIN	NO
Would you like to know more about dental and gum care?	_____	_____	_____
Are you interested in knowing why and how different types of gum disease occur?	_____	_____	_____
Do you ever examine your teeth for decay on your gums for infection?	_____	_____	_____
Has the program made you practice better dental hygiene?	_____	_____	_____
Do you care for your teeth primarily because your dentist(s) urges you to?	_____	_____	_____
Do you worry about losing your teeth?	_____	_____	_____
Do you like the appearance of your smile?	_____	_____	_____
Do you feel you got your money's worth in your visits to the Oral Disease Control Clinic?	_____	_____	_____

Figure 1

3. Knowledge of causes of dental decay and periodontal disease.
4. Selected hygiene habits.

RESULTS

Plaque Scoring

No significant differences in level of plaque were found between those subjects who had participated in the complete ODCC activities and patients who had not (Table 1). The experimental subjects were evaluated 2 to 24 months after completion of the program.

The average level of plaque found in the Treatment Group across both the four-treatment visits, one recall visit and one follow-up visit decreased (Table 2). Although the level of plaque decreases throughout the period of direct intervention, the average level of plaque reported at the follow-up visit was not significantly different from that reported at the time of the initial visit (Table 2). Further, the length of time between initial visit and follow-up was not significantly related to follow-up level of plaque after 6 months post-completion of the program (Table 3). In short, individuals whose follow-up visit occurred sooner after termination of the treatment did not manifest lower plaque scores than those whose sustained time was greater. This interpretation is supported by an examination of the average level of plaque reported for three different periods of time between initial and follow-up visits (Table 4), as no significant differences were found in examinations of the confidence intervals placed about each mean.

Patient Attitudes and Knowledge—Relation to Plaque Control

Ninety percent or more of the subjects in the Treatment Group indicated that they practice better dental hygiene because of the treatment and that the treatment was worthwhile (Table 5). Furthermore, over 94% of these subjects rated the quality of the services provided by the ODCC as good (Table 5). Perhaps more impor-

Table 2

Average Level of Plaque in Treatment Group Across All Visits (N = 74)

The level of plaque decreased while the patient was under weekly supervision but the average level of plaque reported at the follow-up visit was not significantly different from the initial visit.

	Mean	SD	SE	N
Initial	15.22	±5.29	±0.62	74
Second	9.96	±4.10	±0.48	74
Third	7.70	±4.46	±0.52	74
Fourth	5.51	±3.16	±0.44	70
Recall	5.42	±3.70	±0.51	52
Follow-up (test)	12.51	±5.54	±0.64	74

tantly, none of the subjects rated the quality of the services as poor.

Attitudes toward dental hygiene in general were also positive (Table 6). The majority of subjects indicated that they wanted to know more about dental and gingival care, were interested in disease cause and control, and that pressure from their dentist did not cause them to take better care of their teeth.

As the ODCC treatment had no significant sustained effect on level of plaque, the Treatment Group was stratified on two hygiene variables—weekly brushing and weekly flossing. The stratification was based on acceptable hygiene habits necessary for maintaining healthy teeth and gingiva. Thus, the subjects were stratified by brushing habits (twice daily or more vs. less than twice daily) and then by flossing habits (once or more daily vs. less than once each day). As reported in Table 7, there were twice as many subjects who brushed less than twice a day, than there were who brushed more frequently. And, among those who brushed less than twice daily, neither age, hygiene habits, length of time between initial and follow-up visit, nor knowledge about dental and gingival disease were significantly related to level of plaque.

In the group who did not report brushing twice or more daily, all hygiene habits were significantly related (including brushing and flossing). However, knowledge was not significantly related to level of plaque, although length of time between initial and follow-up visits was. And, when stratified by flossing habits, i.e., more than seven times per week or less than eight times per week, the same lack of relationships were found between dental hygiene habits and either knowledge or level of plaque at the follow-up visit (Table 8). There was considerable variability in knowledge (Table 9) as well as in level of plaque accumulation (Table 1). However, these variables were not significantly related (Table 3).

Nonetheless, several significant relationships were detected in this study. For example, in brushing, the use of staining tablets and yearly visits to the Emory Clinic were all significantly and negatively related to age. Thus, younger patients tended to report lower levels of dental hygiene practice than did older patients (Table 3). Further, these three dental hygiene practices (brushing, floss-

Table 1

Total Level of Plaque Found at the Follow-Up Visit

No significant difference in the level of plaque was found between Treatment and Control Groups. df = degree of freedom; F = Fisher ratio; P = probability.

Group	N	Mean (sur-faces)	SD	SE	95% Confidence interval
Treatment	74	12.51	±5.54	±0.64	11.23–13.80
Control	25	13.40	±4.70	±0.94	11.46–15.34

Source	df	Sum of squares	Mean squares	F	P
Between	1	14.68	14.68	0.51	0.48
Within	97	2772.48	28.58		
Total	98	2787.16			

Table 3**Intervariable Correlation Matrix for the Treatment Group**

Each coefficient is based on a different sample size. Numbers in parentheses are the sample size for that variable. The length of time between the initial visit and follow-up was not significantly related to the follow-up level of plaque. Individuals whose follow-up visit occurred sooner after termination of the treatment did not manifest lower plaque scores than those whose sustained time was greater.

	Age	Weekly flossing	Weekly brushing	Use of staining tablets	Visits to ODC	Time	Plaque
Weekly flossing	0.08 (70)						
Weekly brushing	-0.26* (71)	0.36† (70)					
Use of staining tablets	-0.35† (61)	0.27* (60)	0.18 (62)				
Visits to ODC	-0.11 (43)	0.39† (42)	0.20 (44)	-0.20 (34)			
Times	0.13 (73)	-0.14 (71)	-0.26* (72)	-0.11 (62)	-0.17 (44)		
Plaque	0.08 (73)	-0.03 (71)	-0.09 (72)	0.02 (62)	-0.005 (44)	0.31† (74)	
Knowledge	0.02 (73)	-0.07 (70)	-0.05 (71)	-0.02 (62)	-0.16 (74)	-0.03 (74)	-0.0 (71)

* $P < 0.05$; † $P < 0.01$.

Table 4**Time Intervals from Initial to Follow-Up Visits as it Relates to Plaque and Knowledge 95% Confidence Interval**

No significant differences were found in examinations of confidence intervals of average level of plaque or knowledge for three different periods of time between initial and follow-up visits.

Interval	Mean	SD	N
Less than 181 days (6–30 day periods)	Plaque 9.00 Knowledge 2.50	±7.72 ±.84	6
181–365 days (6–30 day periods)	Plaque 11.70 Knowledge 3.04	±4.89 ±1.15	27
365–540 days (6–30 day periods)	Plaque 12.83 Knowledge 3.06	±4.90 ±1.24	23
540–720 days (6–30 day periods)	Plaque 12.11 Knowledge 2.50	±3.02 ±2.07	9

Table 5**Attitudes Toward Oral Disease Control**

	Poor	Adequate	Good
Service provided by the Emory University Dental Clinic is	4.10% (N = 3)	95.90 (N = 71)	
Clinical skills of the dental students are	5.40 (N = 4)	94.60 (N = 70)	
Interpersonal skills of the dental students are	2.70 (N = 3)	97.30 (N = 71)	
Dental students' rapport with patients is	5.40 (N = 4)	94.60 (N = 70)	

ing, and use of staining tablets) were all significantly and positively related.

DISCUSSION

As stated previously, our suburban population compared favorably with the cross-sectional group in Suomi's studies.^{2–4} In addition, the flossing and brushing habits reported in our study parallel the home care of Suomi's group,^{2–4} as well as Ramfjord's^{16–19} and Lindhe's^{5,6} pop-

Table 6**Attitudes Toward Dental Hygiene**

	Yes	Uncertain	No
Would you like to know more about dental and gum care?	61.40%	21.40	17.10
Are you interested in knowing why and how different types of gum disease occur?	75.70	4.30	20.00
Do you ever examine your teeth for decay or your gums for infection?	78.70	4.10	17.60
Has the program made you practice better dental hygiene?	92.90	2.90	4.30
Do you care for your teeth primarily because your dentist(s) urges you to?	20.30	9.50	69.40
Do you worry about losing your teeth?	79.50	4.10	16.10
Do you like the appearance of your smile?	61.10	20.80	18.10
Do you feel you got your money's worth in your visits to the Oral Disease Control Clinic?	90.50	8.10	1.40

ulations. The difference being that, in the present study, the test group did not maintain high levels of plaque control during the nonsupervised period, whereas the previous works mentioned provided close professional supervision of patients and resultant maintenance of a low level of plaque. Furthermore, it can be said that during the period of direct relationship with the Oral Disease Control program, our patients consistently performed good plaque control. Therefore, we may postulate and concur with the previous studies that supervised repeated reinforcement is an essential requirement for establishment of a long term effective plaque control program. The increase in PHP scores over a period of time occurred when many of the patients had been returned to various departments of the dental school for treatment. It would appear therefore that faculty rein-

Table 7

Intervariable Correlation Matrix for the Treatment Groups Who Brushed More or Less Than 14 Times Per Week

Weekly brushing less than 15 ($N = 53$). Weekly brushing more than 14 ($N = 21$). (Each coefficient is based on a different sample size.) (1) There were twice as many subjects who brushed less than two times a day than there were who brushed more frequently. (2) Among those who brushed less than twice daily, neither age, hygiene habits, length of time between initial and follow-up visits nor knowledge of dental and periodontal disease were significantly related to the level of plaque. (3) In the group who reported brushing twice or more daily, all hygiene habits were significantly related (including brushing and flossing). However, knowledge was not significantly related to the level of plaque although the length of time between initial and follow-up was.

	Age	Weekly flossing	Weekly brushing	Staining tablets	Clinic visits	Time	Plaque
Weekly flossing	0.26						
	0.12						
Weekly brushing	-0.31	0.23					
	-0.14	0.33*					
Use of staining tablets	0.32	-0.13	-0.00				
	-0.44*	0.26†	0.05				
Clinic visits	-0.41	0.42	0.050	0.00			
	-0.00	0.39†	0.31†	0.24			
Times	0.04	-0.10	0.24	0.40	-0.25		
	0.11	-0.07	-0.26†	-0.18	-0.12		
Plaque	0.15	0.13	0.16	0.04	-0.36	0.29	
	0.02	-0.04	-0.06	0.07	0.18	0.30†	
Knowledge	-0.04	-0.23	-0.13	0.04	-0.16	-0.12	-0.16
	0.06	0.10	0.23	-0.08	0.28	0.06	0.06

* $P < 0.01$; † $P < 0.05$.

Table 8

Intervariable Correlation Matrix for the Treatment Groups Who Flossed More or Less Than Seven Times a Week

Flossing more than seven times a week ($N = 48$). Flossing less than eight times a week ($N = 26$) (Each coefficient is based on a different sample size). No significant relationship was found between dental hygiene habits and either knowledge or level of plaque at the follow-up visit.

	Age	Weekly flossing	Weekly brushing	Staining tablets	Clinic visits	Time	Plaque
Weekly flossing	0.10						
	-0.09						
Weekly brushing	-0.36*	0.11					
	-0.28*	0.40†					
Staining tablets	0.36*	-0.03	-0.19				
	-0.51†	0.17	0.20				
Clinic visits	0.28	0.06	-0.03	0.17			
	-0.25	0.26	0.21	0.14			
Time	-0.12	0.17	-0.37	-0.04	0.09		
	0.29	-0.12	-0.11	-0.09	0.22		
Plaque	-0.12	0.46†	-0.01	0.04	0.17	0.28	
	0.26	-0.05	-0.12	0.08	-0.01	0.29*	
Knowledge	0.04	-0.55†	0.09	0.09	0.30	-0.10	-0.11
	0.21	0.26	0.06	-0.11	0.04	0.06	0.07

* $P < 0.05$; † $P < 0.01$.

forcement of plaque control during this period was lacking.

All hypotheses were accepted. H_1 established that the Oral Disease Control program does not have an effect on oral hygiene that is sustained beyond the supervisory period. We strongly support recent studies²⁰⁻²³ showing that regardless of the specific approach to teaching oral hygiene (five visits, two visits, all in one, etc.), professional reinforcement is the ultimate factor in establishing long term effective plaque control.

There was no significant relationship between any of

the selected hygiene habits and level of plaque accumulation at the follow-up visit. Neither knowledge of how to prevent dental decay or periodontal disease, nor participation in dental hygiene activities, were associated with the amount of plaque observed. It is also of interest that the use of staining tablets was significantly and negatively related to the length of time between initial and follow-up visits. Whereas, level of plaque at the follow-up visit was significantly and positively related to this time interval.

Having accepted H_2 and H_3 , we have established an

Table 9
Results of Patient Questionnaire

Considerable variability in knowledge was evident.

	Mean	SD	N
Weekly flossing	6.59	±3.97	71
Weekly brushing	12.62	±5.36	72
Weekly use of staining tablets	0.42	±1.14	62
Yearly visits to ODC	10.30	±14.85	44
Yearly visits to dentist in private practice	0.90	±2.38	51
Knowledge (total possible = 5)	2.67	±1.47	57
Age	36.12	±15.37	74

interesting paradox. Patients were overwhelmingly pleased with the program and felt they had had an increased understanding and knowledge of oral hygiene procedures. Thus, evidence which further establishes the need for professional reinforcement of patient's hygiene performance seemingly has been presented. Obviously, even with well motivated and satisfied patients, plaque scores were not reduced during the unsupervised period.

The attitudinal section of this study represents a unique contribution to the literature of plaque control and patient motivation. To our knowledge, patients' plaque scores previously have not been compared with assumed understanding of oral hygiene procedures and disease processes.

REFERENCES

1. Loe, H., Theilade, E., and Jensen, B.: Experimental gingivitis in man. *J Periodontol* **36**: 177, 1965.
2. Suomi, J., Greene, J., Vermillion, J., Doyle, J., Chang, J., and Leatherwood, E.: The effect of controlled oral hygiene procedures on the progression of periodontal disease in adults: Results after 2 years. *J Periodontol* **40**: 416, 1969.
3. Suomi, J., Greene, J., Vermillion, J., Doyle, J., Chang, J., and Leatherwood, E.: The effect of controlled oral hygiene procedures on the progression of periodontal disease in adults: Results after third and final year. *J Periodontol* **42**: 152, 1971.
4. Suomi, J., Greene, J., Vermillion, J., Doyle, J., Chang, J., and Leatherwood, E.: Oral hygiene and periodontal disease in an adult population in the United States. *J Periodontol* **43**: 677, 1973.
5. Axelsson, P., and Lindhe, J.: Effect of fluoride on gingivitis and dental caries in a preventive program based on plaque control. *Community Dent Oral Epidemiol* **3**: 156, 1975.
6. Axelsson, P., and Lindhe, J.: The effect of various plaque control measures on gingivitis and caries in school-children. *Community Dent Oral Epidemiol* **4**: 232, 1976.

7. Horowitz, A., Suomi, J., Peterson, J., and Lyman, B.: Effects of supervised daily plaque removal by children. II. 24 Months result. *J Public Health Dent* **37**: 180, 1977.

8. Bennie, A., Tullis, J., Stephen, K., and MacFadyon, E.: Five years of community prevention dentistry and health education in the county of Sutherland, Scotland. *Community Dent Oral Epidemiol* **6**: 1, 1978.

9. Nyman, S., Rosling, B., and Lindhe, J.: Effect of professional tooth cleaning on healing after periodontal surgery. *J Clin Periodontol* **2**: 80, 1975.

10. Nyman, S., Lindhe, J., and Rosling, B.: Periodontal surgery in plaque infected dentitions. *J Clin Periodontol* **4**: 240, 1977.

11. Glavind, L.: Effect of monthly professional mechanical tooth cleaning on periodontal health in adults. *J Clin Periodontol* **4**: 100, 1977.

12. Bergman, B., Hugoson, A., and Olsson, C.: Caries and periodontal status in patients fitted with removable partial dentures. *J Clin Periodontol* **4**: 134, 1977.

13. Snedecor, G. W., and Cochran, W. G.: *Statistical Methods*, ed 6, Ames, Iowa, Iowa State University Press, 1967.

14. Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., and Bent, D. H.: *Statistical Package for the Social Sciences*, ed 2. New York, McGraw-Hill Book Co., 1975.

15. Podshadley, A., and Haley, J.: A method of evaluating oral hygiene performance. *Public Health Rep* **83**: 259, 1968.

16. Ramfjord, S.: The role of dental health education and auxiliary personnel in prevention of periodontal disease. *Int Dent J* **23**: 304, 1973.

17. Ramfjord, S., Knowles, J., Nissle, R., Burgett, F., and Shick, R.: Longitudinal study of periodontal therapy. *J Periodontol* **44**: 66, 1973.

18. Ramfjord, S., Knowles, J., Nissle, R., Burgett, F., and Shick, R.: Results following three modalities of periodontal therapy. *J Periodontol* **46**: 522, 1975.

19. Ramfjord, S.: Design of studies or clinical trials to evaluate the effectiveness of agents or procedures for prevention, or treatment, of loss of the periodontium. *J Periodontol Res* (suppl.) **14**: 78, 1974.

20. Soderholm, G.: The effects of preventive dental care in employees of a Swedish shipyard. In Manuscript, 1979.

21. Woofter, C., Self, J., Phaller, F., and Egelberg, J.: A step-by-step versus an all in one approach to teach plaque control. In Manuscript, 1979.

22. Axelsson, P., and Lindhe, J.: Effects of controlled oral hygiene procedures on caries and periodontal disease in adults. *J Clin Periodontol* **8**: 133, 1978.

23. Soderholm, G., Nobreus, N., Attstrom, R., and Egelberg, J.: Different methods of teaching plaque control. I. A 5-visit versus a 2-visit program. In Manuscript, 1979.

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