

COMPLIANCE LEVELS OF RECOMMENDED MAINTENANCE
IN A PRIVATE PERIODONTAL PRACTICE

A THESIS
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF SCIENCE
IN THE GRADUATE SCHOOL OF THE
TEXAS WOMAN'S UNIVERSITY
COLLEGE OF HEALTH SCIENCES

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MAY 1995

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December 7, 1994


(Date)

To the Associate Vice President for Research and Dean of the Graduate School:

I am submitting herewith a thesis written by Shannon T. Hale entitled "Compliance Levels of Recommended Maintenance in a Private Periodontal Practice." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science with a major in Health Sciences Instruction.


Major Professor


We have read this thesis and recommend its acceptance:







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ACKNOWLEDGEMENTS

I would like to thank my Advisor, Dr. Barbara J. Cramer, for her encouragement, prodding, and unfailing faith in me. In addition, I would like to acknowledge my committee members, Dr. Susan Ward and Pat Fallon, M.S. for their guidance and support. I would also like to express my appreciation and thanks to Dr. Thomas Wilson for fostering an enthusiasm to lifelong learning, as well as invaluable experience over the years, and the opportunity to conduct this study in his private practice. This accomplishment was greatly influenced by my family, friends, and co-workers who were supportive and extremely tolerant of stressful periods over the development of this thesis.

ABSTRACT

COMPLETED RESEARCH IN HEALTH SCIENCES
Texas Woman's University, Denton, Texas

Hale, S.T. Compliance Levels of Recommended Maintenance in a Private Periodontal Practice. M.S. in Health Sciences Instruction, 1995, 55 pp. (B. Cramer).

The problem of this study was to determine if there was a difference in the patient compliance level of periodontal maintenance after an alteration of dental practice strategies. The following variables were examined: activity status of patients, alternating status, and type of periodontal treatment initially rendered. A follow-up descriptive study using an ex post facto design was the strategy employed. In this study, the percentage of patients in complete compliance to the recommended periodontal maintenance or supportive periodontal therapy (SPT) program was 32%. In addition, it was determined that patients who alternated recall appointments with their general dentists had a higher compliance rating than those patients who did not alternate. The compliance levels of patients treated with surgery as compared to those treated with scaling and root planing were similar.

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Control of gingival inflammation and the progression of periodontal disease requires commitment and action of both the patient and the dental professionals. "If a person once has developed periodontitis, it has to be assumed that he or she is at risk for future loss of periodontal attachment if bacterial action is not contained in some way" (Ramjord, 1987, p. 433). "Long-term management of such conditions demands both a high standard of professional and favorable patient compliance with the maintenance care recommendations" (Heasman, Jacobs, & Chapple, 1989, p. 24). Non-compliance may generate the recurrence of periodontal disease activity often resulting in tooth loss (Wilson, Glover, Schoen, Baus, & Jacobs, 1984, p. 472). Wilson et al., conducted a study in a private periodontal practice, and found that 84% of the subjects involved in the study did not follow regular maintenance schedules (p. 472). Another periodontal study, found that "the percentages of patients who failed to comply with post-surgical maintenance therapy ranged from 11% to 45% over periods of between two and 14 years" (Heasman et al., 1989, p. 24). Thus, if compliance

with periodontal maintenance is crucial to the success of periodontal treatment and reduction of tooth loss, studies to improve patient compliance appear to be needed.

Statement of the Problem

The problem for this study was: is there a difference in the patient compliance level of periodontal maintenance after an alteration of dental practice strategies?

Purposes of Study

The purposes of this study were:

1. To determine the overall periodontal maintenance compliance level of patients.
2. To determine the periodontal maintenance compliance level of active patients.
3. To determine the periodontal maintenance compliance level of inactive patients.
4. To determine if the type of treatment (surgery, or scaling and root planing) a patient received had a different compliance level.
5. To compare the compliance level of active patients which alternated recall to those who did not alternate recalls with their general dentist.
6. To compare the overall periodontal maintenance compliance level of this study, to the 1984 study's

compliance level.

7. To profile demographic data including the following:

- (a) Age range of study patients
- (b) Average age of study patients
- (c) Overall compliance level of male patients
verses overall compliance level of female patients
- (d) Recall interval with highest complete
compliance level.

Research Hypotheses

This research focused on the following research hypotheses:

1. There is no statistically significant difference in the patient compliance level of periodontal maintenance after the alteration of dental practice strategies as compared to the 1984 study done in the same periodontal practice.
2. There is no statistically significant difference in the periodontal maintenance compliance levels of active and inactive patients.
3. There is no statistically significant difference in the periodontal maintenance compliance levels of patients that were treated with surgery and those receiving scaling and root planing.

4. There is no statistically significant difference in the periodontal maintenance compliance level of active patients who had alternating recalls with their general dentists and those periodontal patients who had non-alternating recalls.

Definition of Terms

For increased understanding, a definition of terms was developed. The following terms were defined for this study:

1. Active Patients. Patients that had completed therapy, either surgery or scaling and root planing, and had been patients in the dental practice for at least one year ($n=430$).
2. Alternating Recall. Patients that interchanged the dental treatment sites where they had their periodontal maintenance procedures, between the periodontal practice and their general dentist.
3. Alteration of Dental Practice Strategies. Change of office hours, clear recall system, patient education, and positive communication with patients.
4. Complete Compliance Level. The total personal participation in periodontal maintenance procedures as prescribed by the periodontist. Determined by dividing the actual number of maintenance visits by the recommended number of visits ($= 1$).

5. Inactive Patients. Active patients who ceased to seek dental treatment at the study site for two years (n=173).
6. Monitoring of Periodontal Status. The collection of data, such as: periodontal pocket readings, bleeding on probing, appearance of tissue, presence of suppuration, mobilities, and fremitus.
7. Nonalternating Recall. Patients that had their periodontal maintenance procedures performed at only the periodontal office.
8. Periodontal Disease. Patients that had 4 mm periodontal pockets which included bone loss--not gingivitis cases.
9. Periodontal Maintenance Procedures. These procedures included monitoring of periodontal status and a prophylaxis.
10. Scaling and Root Planing. These procedures involved closed debridement and smoothing of root surfaces in conjunction with local anesthesia.
11. Supportive Periodontal Therapy (SPT). This term is a synonym for periodontal maintenance. At the initiation of this study, periodontal maintenance was used predominately, however, as the study progressed supportive periodontal therapy (SPT) had become the accepted term in the dental field.

12. Surgery. This term included three types of open debridement, smoothing of root surfaces, and some regenerative procedures, which included flap, osseous, and osseous grafting procedures.

Assumptions

It was assumed that the records involved in the data collection of the study were accurate, and the approach to periodontal maintenance was consistent with all patients during the study period. It was also assumed, that both people collecting data did so in the exact same way. Lastly, it was assumed that prior knowledge of the 1984 study existed.

Limitations

The use of one dental practice impacted the generalization of the results. In addition, a sample of convenience was used which may influence generalizability.

Significance of the Study

This study was initiated to determine if alteration of dental practice strategies affected the periodontal maintenance compliance level since the study conducted by Wilson, Glover, Schoen, Baus, & Jacobs (1984, p. 468), and this study. Knowledge and understanding of implemented

approaches to periodontal maintenance might have improved compliance. In addition, the results of the study may be used to establish methodological concepts that may need to be stressed in dental hygiene education programs.

Furthermore, information gained may lead to a higher success rate of treatment in periodontal practices, and benefited the patients through the reduction of oral diseases, thereby, saving teeth as well as money.

CHAPTER II

REVIEW OF LITERATURE

This literature review focuses on the content of the accepted composition of a periodontal maintenance visit. It also discusses the need for periodontal maintenance which includes: prevention of periodontal malpractice suits, monitoring and control of periodontal disease, and retention of teeth for as long as possible. In addition, assignment of recall intervals for periodontal maintenance are explored. Compliance to recommended recall intervals, barriers to compliance, and the attempt to overcome those barriers are investigated. Last, an overview of the 1984 study done in the same periodontal practice and its findings are summarized.

Periodontal maintenance, commonly referred to as supportive periodontal therapy (SPT), is an integral part of periodontal therapy. O'Leary and Hurt (1986), stated periodontal maintenance is "an extension of periodontal therapy. The continuing periodic assessment and prophylactic treatment of the periodontal structures that permits early detection and treatment of new or recurring abnormalities or disease." (p. 17)

Several periodontal disease activity patterns have been suggested. One, the continuous paradigm, proposes periodontal destruction occurs slowly, continuously, and progressively (Greenstein & Caton, 1990, p.543). Secondly, longitudinal studies have noted that disease activity have occurred in an episodic or random burst theory. This has been supported by documentation of subjects experiencing several millimeters of attachment loss in some areas within months, while other locations changed at a slower pace, remained stable or gained attachment (Greenstein & Caton, 1990, p. 543). Lastly, the synchronous multiple burst hypothesis contends disease activity occurs during a particular period of life and then goes into remission. It has been suggested that all three theories may often work simultaneously (Greenstein & Caton, 1990, p. 543).

In addition, "We are beginning to understand that while individual microorganisms are important, they are no more important than the way the host interacts with them. It is this dynamic interrelationship that controls whether or not disease is present" (McGuire, 1988, p.4). Host factors that have been attributed to periodontal disease progression include: polymorphonuclear leukocyte (PMN) defects, smoking, medications, puberty, systemic diseases (such as diabetes), pregnancy, faulty dental restorations, and general life stresses, which reduce the effectiveness of the

immune system (McGuire, 1988, p.6).

Periodontal Maintenance Composition

A periodontal maintenance visit consists of a thorough periodontal examination, an oral prophylaxis and review of the patients health status or changes. Assessment of the patient's oral hygiene efforts are evaluated and individually tailored to the needs of the patient.

For effective monitoring, records of dental findings are imperative. The most common dental records include periodontal probing, examination, progress notes, and full mouth X-rays at regular intervals. "The progress notes should record any loss of attachment and increased pocket depth, bleeding, mobility, degree of oral hygiene compliance, or change in health status" (Finley, 1988, p. 48). In addition, "at any moment in time, there is no practical clinical test to detect deteriorating areas. Identification of these sites requires longitudinal monitoring and comparison of replicate assessments obtained at different time points" (Greenstein & Caton, 1990, p.544).

"Formerly, it was assumed that probing conducted and recorded on six key teeth in the mouth would reflect the overall health of the periodontium . . . however, with the advent of recent periodontal disease activity theories, the necessity of probing six points on each tooth for every

patient is now widely accepted as the standard of care" (Wilson, 1988, p.8).

The periodontal probe is the most common assessment tool for diagnosis of periodontal disease, although it is not entirely accurate. In relation to the probe in periodontal disease evaluation, Ference (1989) stated

The degree of probe penetration into the pocket is dependent upon the degree of inflammation at a particular site. Probing inflamed tissues can result in the probe severing the epithelial attachment and coming to rest in the connective tissue attachment causing an over estimation of attachment loss. Lack of local inflammation will cause the probe to stop above the connective tissue attachment causing an under-estimation of attachment loss. Essentially the probe provides an approximation of true attachment loss or what is referred to as probing attachment loss. This loss of attachment represents a past history of disease activity at a given site in the mouth. No information regarding present disease activity can be gained unless repeated reproducible probing attachment measurements are made over time. (p. 30)

In an attempt to alleviate the pressure variations on the periodontal probe from operator to operator, standardized probes have been developed that have specific designs to provide consistent grams of pressure.

Bleeding seen after gentle probing consistently in an area may be an indicator that periodontal breakdown is occurring (Wilson, 1988, p.8). Plaque and suppuration scores are often used as indicators of possible areas of future periodontal breakdown. A study performed by Badersten, Nilueus, and Egelberg (1990), found

diagnostic predictability of plaque scores, suppuration and bleeding on probing were limited. However, residual probing depths greater or equal to 7.0 mm had a higher predictive value of probing attachment loss. In addition, sites with increased probing depths of greater or equal to 1.0 mm also showed improved predictability . . . in fact, the results suggests that a deepened probing is the most valued score of those investigated to detect probing attachment loss. (p. 106)

A study done by Claffey, Nylund, Kiger, Garrett, and Egelberg (1990), stated

Accumulated plaque scores demonstrated low predictability. Accumulated bleeding scores showed modest predictive values of disease activity. Suppuration on probing was not a frequent finding during the observation interval, and also had modest predictive power. Increase in probing depth compared to baseline, and deep residual probing depth had modest predictability after 3 and twelve months, but showed increasing accuracy in revealing probing attachment loss over later time intervals. (p.113)

Claffey et al., (1990) also noted, "after a few years of maintenance, increase in probing depth, particularly combined with high frequency of bleeding on probing, showed the highest predictive value for probing attachment loss of the scores examined" (p. 113). In addition, it has been noted that the absence of bleeding on probing has a high negative predictive value for disease progression. In other words, the lack of bleeding on probing is "a good indicator for the maintenance of periodontal stability" (Lang, Adler, Joss, & Nyman, 1990, p. 720).

Other clinical methods that are needed as part of a periodontal examination are: fremitus (movement of teeth in

function), tooth mobility, gingival recession, as well as furcations and concavities. "These parameters should be recorded before therapy, with probing depths, bleeding upon probing, and fremitus being updated at each maintenance visit" (Wilson, 1988, p. 9). In most cases fremitus should be eliminated through occlusal adjustment as soon as possible during therapy (Wilson, 1988, p. 9).

The oral prophylaxis performed at a periodontal maintenance visit should

include scaling and root planing, polishing, monitoring of the patient's plaque control program, probing for any recurrence of pocket depth, gingival bleeding or other signs of disease, and check for mobility . . . any problem area should be treated as soon as it is detected. (Finley, 1988, p. 48)

Wilson (1988) indicated that

Removal of subgingival secretions is of the utmost importance during the periodontal maintenance visit. This is done before the removal of supragingival deposits/plaque . . . since subgingival accretions contribute greatly to periodontal problems and supragingival accretions (especially dental stain) contribute very little, the vast majority of time spent should be on subgingival scaling and root planing. (p. 63)

Need for Periodontal Maintenance

Periodontal maintenance is an important factor in the treatment of periodontal disease. It helps to prevent law suits for periodontal malpractice, monitor and control periodontal disease, and for the retention of teeth for as long as possible.

"Its [sic] hard to realize that the failure to diagnose periodontal disease is one of the most often cited claims for dental malpractice" (Ebersold, 1989, p. 483). He goes on to say that

patients are much more aware of legal rights, much more aware of the profession's emphasis on prevention and informed consent. Individual patients who have been told that they have periodontal disease after 15 or 20 years in the care and treatment of their long-time family dentist CAN BE AN EXTREMELY HOSTILE GROUP. (Ebersold, 1989, p. 483)

It is important to have recordings of patient information that is clear, accurate and up to the current acceptable standard of care.

The standard of care affects the outcome of litigation . . . in all jurisdictions, the grumpy patient must present evidence of the applicable standard of care to set the stage for their claim of negligence. Plaintiffs have to show what the correct diagnosis or treatment should have been before they can allege that the dentist failed to live up to that standard For the periodontal specialist, there is a very particular and rigid protocol leading to diagnosis, and once a diagnosis is made there are specific treatment choices . . . they gather large amounts of information, recording this information and proceeding with treatment based on a solid set of baseline figures. Success or failure may then be measured by repeating the clinical fact-gathering series. (Ebersold, 1989, p. 484)

Recording of periodontal information is vital to assessment of disease activity, but also for protection from malpractice suits. "The most common unrecorded disease activity in dentistry is periodontal disease" (Ebersold, 1989, p. 485). The best evidence of compliance to the current standard of care is to identify the disease, its

severity, and location (Ebersold, 1989, p. 485).

Current standard of care records should include as safeguards

a full mouth series of dental X-rays. If the patient refused to have dental X-rays, then the record should contain a note, stating the facts and the dentist's efforts to convince the patient of the safety and necessity of dental X-rays, along with the admonition that the consequences of a missed diagnosis shall be born by the patient. Periodontal probe readings of the entire mouth, recorded on a chart with space for recorded readings at subsequent visits should be part of the periodontal record . . . the location of bleeding points, plaque scores, color, texture, appearance of the soft tissues, and amount and level of abrasion/erosion. (Ebersold, 1989, p. 486)

The importance of periodontal maintenance to monitor and attempt to control the progression of periodontal disease has been researched. It is strongly related to the retention of teeth as long as possible. Goldman, Ross, & Goteiner (1986), followed patients for 15 years of periodontal maintenance and they stated that

the objective of periodontal therapy is to maintain the natural dentition in a healthy, functional and pain free state. The presence of periodontal pockets or mobility should not constitute success or failure of a case. The important consideration is that neither pocket depth nor mobility should be increasing. (p. 347)

The purpose of their study was to "provide additional information on the effects of periodontal treatment and maintenance therapy on a group of patients seen for at least 15 years" (Goldman et al., 1986, p. 352). Most of their patients had intermediate to severe periodontitis. They

found that one tooth per person was lost due to all possible causes (not restricted to periodontal disease), with the most common tooth loss being molar teeth with furcation involvement. Molars have a worse prognosis than other periodontally involved teeth (Goldman et al., 1986, p. 352).

One study felt their most important finding was

that attachment levels and pocket depth 1 year after periodontal treatment can be maintained close to post-treatment levels over 7 more years with prophylaxis every 3 months, regardless of unavoidable variations in the effectiveness of the patient's plaque control. (Ramfjord, Morrison, Burgett, Nissle, Shick, Zann, & Knowles, 1982, p. 29)

Halazonetis, Smulow, Donnenfeld and Mejias (1985), designed a study "to determine whether patients treated in a postgraduate periodontal clinic and seen on a 3 month recall schedule developed pockets 3 years after therapy" (p. 515). Their study found that "patients with fair oral hygiene developed almost twice as many pockets as patients with good oral hygiene" (Halazonetis et al, 1985, p. 520). This finding was different than the previously noted study of Ramfjord et al., (1982). Halazonetis et al. (1985), found pockets tended to recur in areas with deep pockets before treatment, molars and maxillary teeth (p. 520).

Another study, reported findings on

44 patients who were treated for periodontal disease, but for various reasons elected not to participate in the maintenance phase of treatment. No evidence could be found that any of the patients had maintenance periodontal scaling between their individual examination periods. The patients returned to the

office because of an acute situation or were referred back by their family dentists. The variables studied were tooth mortality, probing depths and bone scores and health status of furcations. Furthermore, the prognoses for good, questionable and hopeless teeth were analyzed. (Becker, Burton, Becker, & Berg, 1984, p. 505)

This study "totally supported the concept that treatment without maintenance is of questionable value in terms of maintaining periodontal health" (Becker et al., 1984, p. 508). In this study of treatment without maintenance

there was a high incidence of tooth loss, worsening of the health status of furcations, and no reduction of mean probing depth scores between examinations. Furthermore, significant loss of bone between examinations was noted. In light of these findings, motivational techniques plus reinforcement of the importance of the maintenance phase of treatment should be considered prior to performing definitive periodontal surgery. In the absence of maintenance, surgical intervention is apparently of little value in restoring periodontal health. (Becker et al., 1984, p. 509)

A study conducted by Wilson, Glover, Malik, Schoen, and Dorsett (1987, p. 231), was designed to "see what effect compliance had on tooth loss in the complete and erratic compliance groups" to recommended periodontal maintenance schedules. This study indicated that

patients who complied with suggested maintenance intervals retained more teeth than those who maintained erratic intervals . . . although even erratic compliers did tenfold better in tooth loss than noncompliers. . . it appears that patients who receive periodontal therapy and had even erratic maintenance, fared better than those not having therapy or maintenance. (Wilson et al., 1987, p. 234)

They also suggested, it may be helpful to "estimate

compliance before therapy begins and use this information when formulating a treatment plan" (p. 234).

Another study that stressed the importance of periodontal maintenance in regard to tooth loss, noted "both surgical and non-surgical therapy have produced successful retention rates, and it appears that maintenance may be a more influential determinant in tooth retention than the type of therapy initially rendered" (Wood, Greco, & McFall, 1989, p. 516). Their results "confirmed the low rate of tooth mortality occurring when patients with periodontal disease are treated and then kept on a maintenance program . . . the vulnerability of molar teeth to periodontal disease was again supported" (Wood et al., 1989, p. 519). They suggested "it would seem wise to make posterior teeth, particularly molars, the primary area of attention by the clinician at recall appointments . . . it appears the rate of tooth loss due to periodontal disease in treated and maintained patients is low" (Wood et al., 1989, p. 520).

Assignment of Recall Intervals

The assignment of periodontal maintenance recall intervals is very important to the success of periodontal therapy. Since "periodontal disease is the result of opportunistic infection by infective organisms which cannot

be eliminated from the mouth over prolonged time" (Ramfjord, 1987, p. 433), the time frame set for recall is critical. In addition, "those who have experienced severe periodontal breakdown in the past are more likely to have disease progression than those who have not" (Johnson, 1989, p. 37).

In relation to setting maintenance intervals Wilson (1988) stated

In years past, patients were seen twice a year for dental maintenance. This practice was based more on tradition than scientific evidence. Recent articles have pointed out the necessity for more frequent recalls for the average patient with periodontal disease. . . At present we set maintenance intervals based on changes in probing depth and the amount of bleeding seen after probing. In general terms, the more stable the patient, the less often they are seen. (p. 64)

Sbordone, Ramaglia, Gulletta & Iacono (1990) designed a study to explore repopulation of bacteria after root planing and scaling, which used both cultural microbiology and darkfield microscopy. The patients in this study did not receive special oral hygiene instructions which could have affected recolonization patterns after therapy. Their findings indicated "a single course of scaling and root planing would significantly modify the subgingival microflora" (p. 582). The pattern of repopulation of bacteria pretreatment level time frames follow

1. after 7 days:
A. viscosus, A. naeslundii, Capnocytophaga spp.,
 and Eikenella corrodens

2. at 21 days: (anaerobic cocci)
Streptococcus intermedius, Veillonella parvula,
and Peptostreptococcus micros
3. prior to and at 60 days:
Fusobacterium nucleatum, B. Gingivalis, and B. intermedius

Sixty days after treatment there was no significant variation in any of the clinical and microbiological parameters from pretreatment levels. This seemed to indicate that a single session of scaling and root planing, in the absence of oral hygiene instruction and additional therapy, is clearly insufficient to maintain a subgingival microflora compatible with health . . . the effects of scaling and root planing are short lived . . . this would support the need for frequent recall visits for patients who may be periodontally at risk (albeit, difficult to identify) and unable to maintain a proper standard of oral hygiene. (Sbordone et al., 1990, p.583)

Axelsson and Lindhe (1981), found that patients who were put on

a carefully designed recall program involving prophylaxis once every 2 - 3 months during a 6-year period were able to maintain:

1. excellent oral hygiene standards
2. healthy gingivae
3. shallow periodontal pockets
4. unaltered attachment levels.
5. no tooth loss

In contrast, patients who were not maintained in a similar carefully supervised program showed after 3 and 6 years obvious signs of recurrent periodontitis including frank gingivitis, increasing frequency of deepened pockets, further loss of attachment, and some tooth loss. (p. 290)

In conclusion,

maintenance care should secure over time the results obtained by periodontal therapy, and if possible, encourage regeneration of lost periodontal support (soft tissue and bone). It should preserve oral and dental health and intercept any upcoming threats to health status. (Ramfjord, 1987, p. 434)

Compliance to Recommended Recall Intervals

Now that the need for periodontal maintenance has been examined, the patients compliance to recommended recall intervals becomes integral to the regimen. This section discusses the barriers to compliance and explores overcoming barriers.

One study suggested that an unrealistic level of patient compliance is demanded by dental professionals (Johansson, Oster, & Hamp, 1984, p. 696). In addition, it was indicated "the more complex the demands of the treatment, the poorer the rates of adherence" (Meichenbaum & Turk, 1987, p. 55). The following have been proposed as some of the reasons patients decide not to adhere to treatment regimens

1. uncertainty about effectiveness of the treatment
 2. past experiences with health care providers
 3. determination that the inconvenience (effort, expense, side effects) outweighs potential benefits
 4. embarrassment about being in treatment (social stigma that may accompany treatment)
 5. pessimism or skepticism about the effectiveness of treatment
 6. desire to maintain control over some domains of life
 7. impatience with the level of progress or the treatment process
 8. sense of fatalism
 9. experience of others who had the treatment.
- (Meichenbaum & Turk, 1987, p. 51)

Another study explored the importance of the patients personality traits, which could be a major factor in some of

the reasons listed above. In one particular study, the patients that had periodontal treatment with no follow-up maintenance seemed to encounter more stressful life events than those in the group that did have maintenance (Becker, Karp, Becker, & Berg, 1988, p. 49). In addition, the patients that did not adhere to periodontal maintenance tended "to be more critical in nature, and more child oriented in their thinking" (Becker et al., 1988, p. 51). It was also suggested that "the need for frequent maintenance visits and the complexity of plaque control probably causes these patients to place periodontal maintenance at a low priority during times of stress" (Becker et al., 1988 p. 51).

Furthermore, several studies stressed the importance of "patients dental history, and the need to be realistic in assuming how much the patient will change his past habits" (Wilson et al., 1984, p. 472). Another investigation explored the relationship between a patient's oral hygiene levels before and after hygiene instructions--whether the initial oral hygiene levels could be a "reliable predictor of the patients acquired or lifelong hygiene" (Alcouffe, 1989, p. 120). This study found "good oral hygiene level patients continued to be good, and bad oral hygiene level patients remained bad" (Alcouffe, 1989, p. 122). Additionally, several studies allude to "the most reliable

predictor of future preventive behavior seems to be past behavior. A child that has regular dental care is more likely to continue when older. People develop attitudes early in life about toothbrushing" (Alcouffe, 1989, p. 122). The "determination of dental patients knowledge and beliefs about periodontal disease would seem appropriate" (Bader, Rozier, McFall, & Ramsey, 1989, p. 60), since, "past history of compliance may modify the therapeutic approach employed" (Wilson et al., 1984, p. 472).

Supplementary variables of importance in compliance follow

1. general health motivation (concern for health)
2. evaluation of practitioner and medication care (treatment plan)
3. health care provider--patient relationship
4. perceived susceptibility to recurrence of the illness
5. structure of treatment regimen
6. cues (or reminders) to action and cues reinforcing the threat of illness
7. belief in ones personal self-efficacy, conviction that one is capable of carrying out the health recommendation. (Meichenbaum & Turk, 1987, p. 53)

Another area that has been suggested as a major factor in noncompliance to periodontal maintenance procedures (SPT), was the long-term expense of treatment. One study dealing with compliance, found that 60% of patients considered treatment too expensive. Mendoza, Newcomb & Nixon (1991), found that "patients covered by dental insurance, tended to be significantly more compliant than those patients without dental insurance" (p.735).

It has been suggested that

Patients need to be seen as active participants in clinical decision-making process, collaborators and allies who share responsibilities in the treatment regimen. Those patients actively involved in treatment programs (viewed themselves as partners, informed of treatment rationale and encouraged to report negative effects of treatment procedure) demonstrated higher rates of adherence and more favorable treatment outcome. (Meichenbaum & Turk, 1987 p. 81)

Uitenbroek, Schaub, Tromp, & Kant (1989), proposed "patient dimensions that can be influenced are dental attitude, knowledge, motivation and perceived needs" (p. 87). To foster a collaborative relationship with patients, the health care providers should

1. introduce oneself
2. explore patients worries, goals, and expectations
3. answer all patient questions
4. avoid unexplained medical jargon (educate without being too technical)
5. discuss pros and cons of alternative evaluations and treatments
6. engage in some nonmedical talk--being friendly rather than business like
7. elicit patient suggestions and preferences and negotiate any disagreements. (Meichenbaum & Turk, 1987, p. 81)

The Wilson et al., (1984) study, on periodontal maintenance therapy found the "less often patients were asked to come in for maintenance, the better they complied" (p. 472). It has also been noted that "educating in the use of increased number of plaque control aids, is time consuming and inefficient" (Heasman, Jacobs, & Chapple, 1989, p. 27). This is supported by guidelines for giving information to patients

1. be selective in information given, the fewer the instructions, the greater the recall
2. be specific, clear, detailed, concrete, simple in communicating and giving of instructions--use down to earth non-technical language
3. do not overload patient with details
4. organize materials--there is greater recall of information presented in first third of communication
5. include rationale of treatment regimen, specific patient behavior required, and possible consequences of failure to follow the regimen
6. use explicit categorization of topics where possible . . . diagnosis, diagnostic tests, prescribed treatment, what patient must do
7. repeat important information when possible--emphasized material is recalled better
8. use concrete illustrations, analogies, anecdotes, self-disclosure--heightens personal relevance of material
9. use oral and written materials together--supplement with anatomical models, take-home booklets, educational sheets, and audiovisual material when appropriate
10. individualize instruction and give feedback and praise for effort
11. check patients comprehension--ask questions and solicit feedback
12. involve patient in therapeutic planning and decisions
13. help patient remove barriers caused by regimen itself
14. help patient set realistic goals that can be subdivided into easily attained steps
15. do not oversell program. (Meichenbaum & Turk, 1987, pp. 131-132)

In addition to presenting information to the patient, interventions can help to reduce patient forgetfulness. For example, encouraging patients to keep appointments

1. mail reminders
2. telephone confirmation
3. cards with date/time of next appointment
4. follow-up file for noting and contacting patients who missed their appointments
5. decrease waiting times in office. (Meichenbaum & Turk, 1987, p. 140)

There are many factors related to compliance to recommended periodontal maintenance therapy, and ideas on how to overcome them. Many of these factors are interrelated, and closely intertwined.

Review of the 1984 Study

Since the current study was designed to be a pseudo-replica of the 1984 study on compliance to periodontal therapy (SPT) at the same periodontal practice, a review of that study is in order (Wilson et al., 1984, pp. 468-473). An overview of the study and a summary of the findings follows.

The patients involved in the study were all treated in the same office from the time period of 1971 to 1981. For this study active therapy was defined as scaling and root planing--with or without some type of periodontal surgery. The patients were classified as to age, sex, diagnosis, prognosis, procedures performed, number of quadrants treated and compliance with prescribed maintenance intervals.

A total of 961 patients were studied. The importance of maintenance therapy to the success of their treatment was stressed and was included in the consent form for treatment. The degree of compliance was calculated by adding the total number of visits during the period of maintenance therapy and dividing by total number of years in maintenance

therapy. Those patients who did not return to the office for maintenance therapy were given the compliance status of none.

Sixteen percent of the patients were in complete compliance with the recommended maintenance schedule when compliance for all the years was averaged. Wilson et al., (1984) stated that "the results of this study are an excellent example of the differences that often exist between our perceived ideal and clinical reality" (p. 471).

It was noted that the less often patients were asked to come in for maintenance, the better they complied. Wilson et al., (1984) found that this was apparent in the group recommended for a six month interval. They also found that patients that had surgery had a tendency toward compliance in comparison to those who had root planing alone (p. 472).

In addition, Wilson et al., (1984) stated that "if maintenance therapy is important, then we need to investigate what behavior changes we and our patients need to make to improve their recall record" (p. 472). They found that "84% of the patients seen in a private periodontal practice who were surveyed did not follow regular maintenance schedules. One third of the patients studied did not return after completion of active therapy for any maintenance therapy" (1984, p. 472).

In conclusion, there are many factors that effect the

patients compliance to periodontal maintenance recommendations. They range from patients beliefs, values and education, to communication, finances, office strategies, complexity of treatment plans, and the patients commitment to the recommendations.

CHAPTER III

PROCEDURES OF THE STUDY

This descriptive study was a quasi-replication of the 1984 study conducted by Wilson et al., (1984, p. 472). The purpose was to see if an increase of compliance to periodontal maintenance therapy had occurred with the implementation of new office practice strategies. Basically, the procedures used in this study followed closely the procedures of the 1984 study, and ex post facto data were used. The major procedural contrasts were the population and sample which included patients new to the practice since 1984. Three areas of data measurement from the 1984 study were omitted and were not examined in this study. Those areas were prognosis, diagnosis, and classification of localized or generalized periodontal disease. Two areas of data measurement were added to the instrument in this study, they were: status of activity or inactivity, and alternating or nonalternating recall status.

The dental strategies that were implemented in the periodontal practice after the 1984 study were as follows:

1. Office hours start time changed from 9:00 am to 7:00 am.

2. Clear, organized recall system and record keeping was initiated as follows:

(a) patients would schedule their next recall appointment before leaving the office.

(b) appointments were confirmed by phone the day before.

(c) when a patient missed an appointment, follow-up and attempts to reschedule patient would occur.

(d) to determine if alternating patients were on schedule for their recall appointments, post card or telephone communication was conducted in regard to periodontal and recall status. This information was obtained from the general dentist. Similar feedback was given to the general dentist after patients were seen in the periodontal office.

3. Patient education was stressed. Patients were informed from the beginning, that follow-up maintenance was critical for success of whatever treatment they were considering. Previously, patient commitment to regular periodontal maintenance was not focused upon.

4. Communication was focused on as well. Patients were addressed with an emphasis on a positive attitude rather than approaching them in a negative manner which was employed previously.

Setting

This study was conducted in a dental specialty office. All patients were from a periodontal practice in Dallas, Texas.

Population and Sample

The population consisted of all periodontal patients of a selected private periodontal practice. The sample consisted of all patients ($N = 603$) with periodontal disease, new to the practice for the time period 1985 to 1990. To qualify for inclusion in the sample, the patients had to be considered as active or inactive as previously defined in the definition of terms section. This was a sample of convenience. The criteria for this study required patients to have undergone treatment at this practice site, either surgery or scaling and root planing.

Protection of Human Subjects

The investigator assigned a 3-digit number to each subject (001 to 603). When the data were collected and analyzed, the code number was used, so names were excluded to assure anonymity. The subjects' patient charts were not exposed directly to any new data collection methods. This study was exempt from the Human Subjects Review Committee review as it involved the collection or study of existing

data in such a manner that subjects could not be identified. Agency approval was obtained (see Appendix A).

Instrument

The 1984 compliance study instrument was adjusted and used for data collection (with changes noted previously in this section. (see Appendix B). The instrument recorded: patient number, age, sex, status (active or inactive), year they were a new patient to the office, type of treatment rendered, space for five years worth of maintenance appointments, recommended maintenance interval, tooth loss experienced, reason for lost teeth, and if patient alternated recalls with their general dentist.

The procedures for recording these data were:

1. the age recorded was the patient's age at their new patient appointment.
2. sex was noted as either: 1--female or 2--male.
3. the patient status was classified as either: 1--active or 2--inactive.
4. the year noted was in reference to the year the individual was a new patient in the practice with the possible range of 1985 to 1990.
5. treatment options were recorded as either: 1--scaling and root planing or 2--surgery.
6. the five options for the recall interval: 0--no

recall interval set, 1--one to two months, 2--three to four months, 3--five to six months, and 4--seven to twelve months.

7. the two classifications for recall were: 1--non-alternating or 2--alternating.

8. tooth loss recorded the actual number of teeth lost for each patient during the study period (possible number of teeth ranged from 0 to 32).

9. the degree of compliance to periodontal maintenance was classified in this study as complete compliance.

10. the percentage of compliance was determined by dividing the actual number of periodontal maintenance appointments by the number of recommended maintenance visits as prescribed by the periodontist.

Collection of Data

All charts in the periodontal practice were examined to determine if they qualified for this study. If qualified, the pertinent data were located and documented on the instrument as discussed previously. Most data collection was done by the investigator. However, a limited amount of data collection was performed by another dental hygienist in the periodontal practice. Calibration of data collection between the two hygienists was achieved by collecting exact

information on 15 patients independently while using the same instrument. The findings of the two data collectors was compared with no difference found prior to collection of the data.

Treatment of Data

Research hypotheses one through four were tested by using the z score (test of proportions). The .01 alpha level of significance was used since the same test (z score of proportions) was used on all four research hypothesis. This was due to the inflation of the alpha level when the z score of proportions are repeated on data using the same subjects. To guard against making a Type I error (saying you have statistically significant difference when you really do not) a stricter level .01 was used to run the tests. The Bonferroni test was used to adjust the alpha level (level of significance). This formula involves the division of the alpha level by the number of tests that were to be run. Descriptive statistics, percentages and frequencies, were performed on all variables measured. Appropriate graphs and illustrations were used to support the narrative.

CHAPTER IV

FINDINGS

This study was designed to investigate complete compliance to recommended periodontal maintenance (SPT). In addition, this study was compared to the 1984 study previously done in the same practice.

Findings by Demographic Characteristics

The age of study patients ranged from 18 to 78 years, with the average age being 46 years. The complete compliance level of male patients was 33%, and the complete compliance level of female patients was 30%. The overall complete compliance rate of this sample ($N = 603$) was 32%. The recall interval with the highest complete compliance level was the 5 to 6 month interval at 56%.

Findings by Research Hypotheses

The first hypothesis stated that:

"There is no statistically significant difference in the patient compliance level of periodontal maintenance after the alteration of dental practice strategies as compared to the 1984 study done in the same periodontal

practice." The 1984 overall proportion of complete compliance to periodontal maintenance (SPT) recommendations was .16 ($n=158$). The overall proportion of the 1991 study was .32 ($n=191$). The z score of proportions was $z = - 5.06$; this was significant at the .01 level. The research hypothesis was rejected. Figure 1 illustrates the percentage comparison of the complete compliance level of the 1984 study 16%, and the 1991 study 32%.

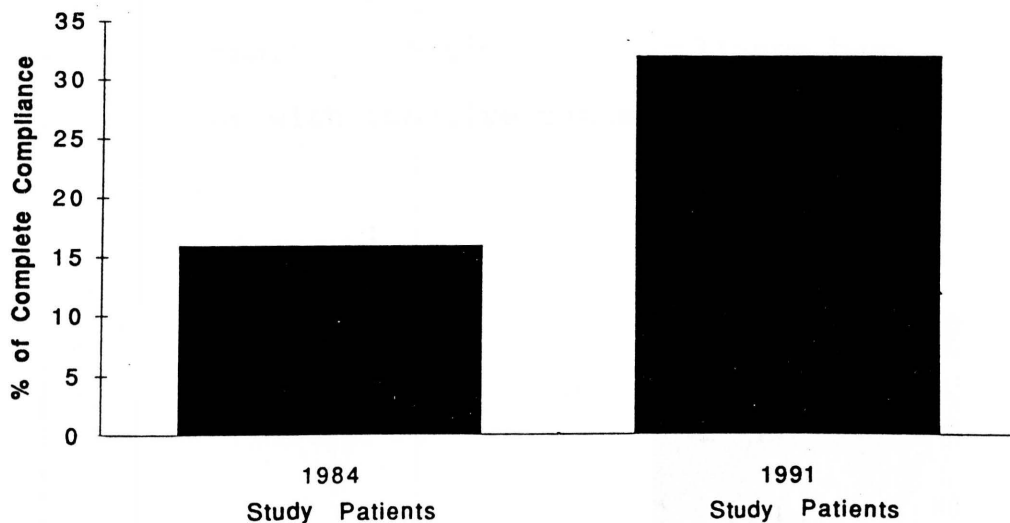


Figure 1.

Percentage comparison of the complete compliance level of 1984 and 1991 study patients

Hypothesis 2 stated:

"There is no statistically significant difference in the periodontal maintenance (SPT) compliance levels of active and inactive patients." The z score of proportions was used at the .01 level. The proportion of active patients with complete compliance was .43 ($n=184$), and the proportion of inactive patients that were in complete compliance was .04 ($n=7$). The z score of proportions was $z = 2.05$. This was not significant. The research hypothesis was not rejected. Figure 2 illustrates the percentage comparison of complete compliance based on activity status with inactive patients 4% and active patients 43%.

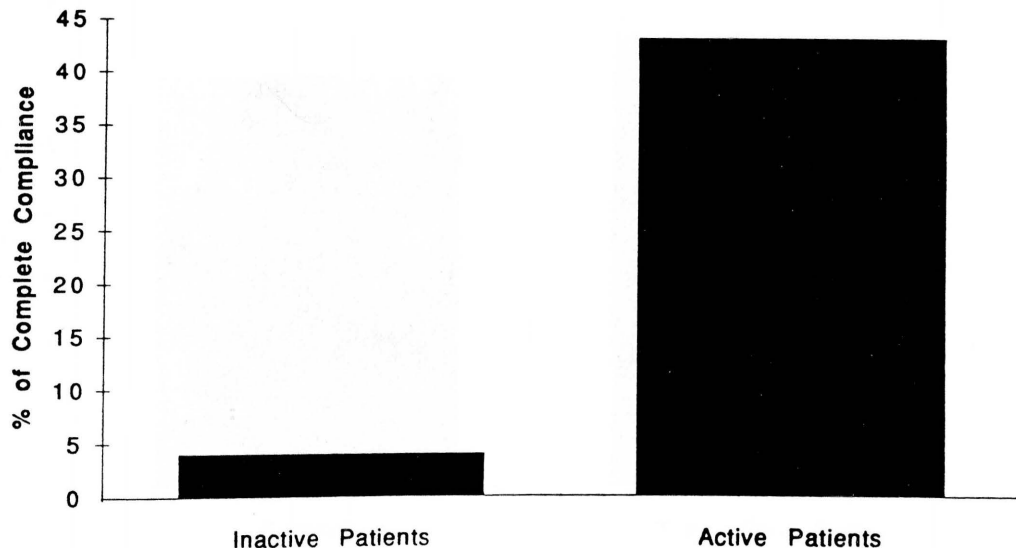


Figure 2

Percentage comparison of complete compliance based on activity status

Hypothesis 3 stated:

"There is no statistically significant difference in the periodontal maintenance (SPT) compliance levels of patients that were treated with surgery or scaling and root planing. The proportion of patients treated with scaling and root planing in complete compliance was .58 ($n=102$), and the proportion of patients in complete compliance treated with surgery was .52 ($n=89$). The z score of proportions was $z = .44$. This was not statistically significant at the .01 level. The research hypothesis was not rejected. Figure 3 illustrates the percentage comparison of complete compliance based on initial treatment rendered with surgery 30% and scaling and root planing 33%.

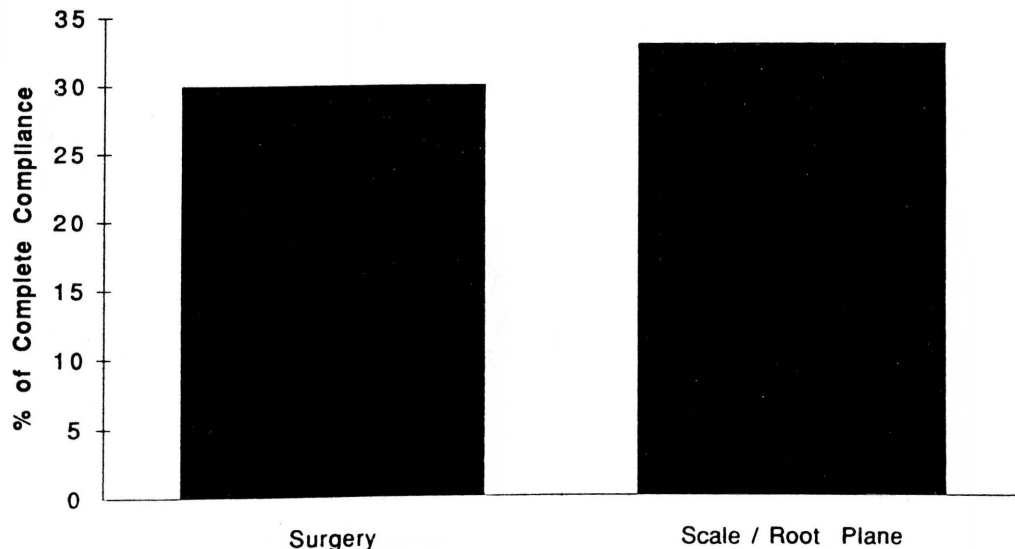


Figure 3

Percentage comparison of complete compliance based on initial treatment rendered

Hypothesis 4 stated:

"There is no statistically significant difference in the periodontal maintenance (SPT) compliance level of active patients who alternated recall appointments with their general dentist and those patients who were nonalternating." The nonalternating active patients proportion in complete compliance was .28 ($n=132$), and the alternating active patients in complete compliance proportion which was .47 ($n=59$). The z score of proportions was $z = -2.60$; this was statistically significant at the .01 level. The research hypothesis was rejected. Figure 4 illustrates the percentage comparison of complete compliance by alternating status with nonalternating at 28% and alternating at 47%.

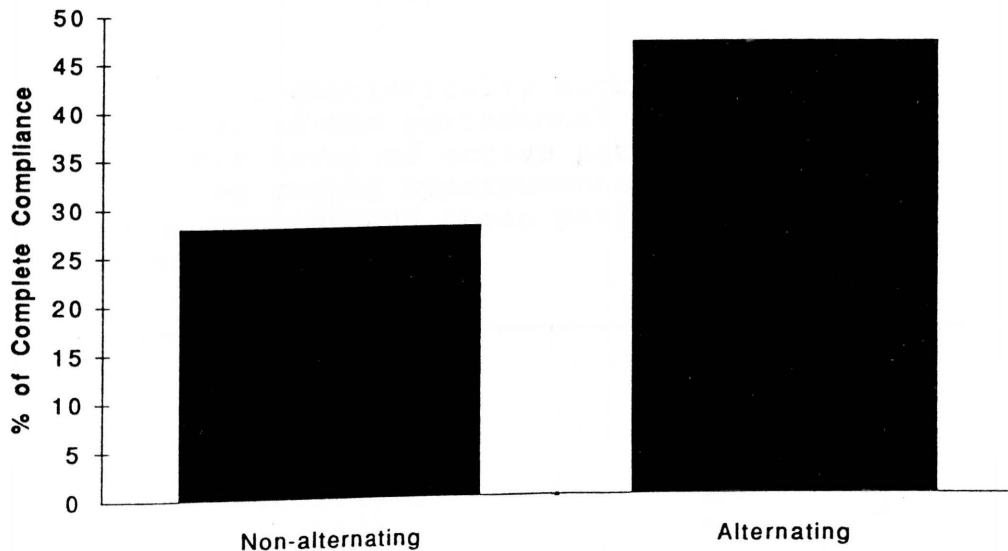


Figure 4.

Percentage comparison of complete compliance by alternating status

In summary, the disposition of the hypotheses follows.

Table 1

Disposition of Hypotheses

Hypotheses	Disposition
1. There is no statistically significant difference in the patient compliance level of periodontal maintenance after the alteration of dental practice strategies as compared to the 1984 study done in the same periodontal practice.	Rejected
2. There is no statistically significant difference in the periodontal maintenance compliance levels of active and inactive patients.	Not rejected
3. There is no statistically significant difference in the periodontal maintenance compliance levels of patients that were treated with surgery or scaling and root planing.	Not rejected
4. There is no statistically significant difference in the periodontal maintenance compliance level of active patients who alternated recall appointments with their general dentist and those patients who were nonalternating.	Rejected

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

Summary

This study was intended to determine if there was a difference in the patient compliance level of periodontal maintenance after an alteration of dental practice strategies. It was designed as a quasi-replication of a study done in the same private periodontal practice in 1984. At that time, it was determined that 16% of the patients were in complete compliance to recommended periodontal maintenance therapy recalls. After a change in some office strategies, a follow-up study was implemented. The changes were as follows:

1. change of office hours to accommodate patients
2. clear, organized recall system
3. patient education stressed
4. communication with a more positive approach than was used previously.

The population consisted of all periodontal patients of a selected periodontal practice. The patients included in the sample were patients new to the practice from 1985 to 1990 (N=603). The subjects had treatment consisting of

either scaling and root planing or periodontal surgery, and had been patients in the dental practice for at least one year.

The instrument for this study was the same as was used in this practice for the 1984 study. With exceptions being the sample patients not being the same. Three areas of data measured in 1984 were omitted from the current study. These included: prognosis, diagnosis, and classification of localized or generalized periodontal disease. Two areas of data measurement were added to the instrument in this study, they were: status of activity or inactivity, and alternating or nonalternating recall status.

The research hypotheses were tested by using the z score of proportions. The level of significance was .01.

The results of the research hypotheses were as follows:

1. "There is no statistically significant difference in the patient compliance level of periodontal maintenance after the alteration of dental practice strategies as compared to the 1984 study done in the same periodontal practice." The z score of proportions was $z = - 5.06$; this was significant at the .01 level. The research hypothesis was rejected.
2. "There is no statistically significant difference in the periodontal maintenance (SPT) compliance levels of active and inactive patients." The z score

of proportions was $z = 2.05$. This was not significant. The research hypothesis was not rejected.

3. "There is no statistically significant difference in the periodontal maintenance (SPT) compliance levels of patients that were treated with surgery or scaling and root planing." The z score of proportions was $z = .44$. This was not statistically significant at the .01 level. The research hypothesis was not rejected.

4. "There is no statistically significant difference in the periodontal maintenance (SPT) compliance level of active patients who alternated recall appointments with their general dentist and those patients who were nonalternating." The z score of proportions was $z = -2.60$; this was statistically significant at the .01 level. The research hypothesis was rejected.

Conclusions

The primary conclusions of this study were

1. The patient compliance level to periodontal maintenance after the alteration of dental practice strategies was greater than the prior 1984 level of compliance.
2. The patient compliance level to periodontal maintenance of the active and inactive patients was the same.

3. The compliance level to periodontal maintenance of patients treated with surgery or scaling and root planing was similar.

4. The compliance level to periodontal maintenance of patients who alternated recall visits with their general dentists was higher than the patients who did not alternate.

Discussion

The percentage of complete compliance to periodontal maintenance in this study was (32%) approximately twice the degree of compliance found in the 1984 study. This difference was statistically significant. It appeared that compliance of patients in this periodontal practice had improved. However, it cannot be concluded that the change in office strategies was the cause of this higher compliance rate. Other factors, such as a better understanding or awareness of periodontal disease in the dental field as well as within the general public could affect these findings. This education of the public is reflected by television commercials that make reference to gingivitis and prevention of gum disease. In addition, the increase of patients who have dental insurance may influence patients decision to seek treatment, and focus on preventive maintenance. Also, the popularity of a person being responsible for their own

health through diet, exercise, not smoking, preventive visits to their physicians and dentists, and even flossing their teeth, may have had an impact on compliance to recommended periodontal maintenance recalls. Education of children in regard to dental health in schools could also be a factor.

The other significant finding in this study was the higher rate of complete compliance in the patients who alternated recall visits with their general dentist. Again, this result cannot be solely attributed to changes in office practice strategies. The more stable patients are released from a periodontal practice to alternate recalls with their general dentist. Those patients whose condition is unstable are usually not put into the alternating status. This could be interpreted to mean that the patients that are nonalternating have either a poorer prognosis or a more complicated situation. It could also mean that these patients have more life stresses or less healthy lifestyles than those patients that are stable. This aspect was not addressed in this study. In addition, those patients with alternating status would have the benefit of returning to their referring general dentist where they may have had a long term relationship established. This also exposes the patient to two offices reinforcing the reasons for periodontal maintenance and offering support and

encouragement to the patient. The general dentist fees for their recall visit is likely to be less expensive than the specialist fees of the periodontist for periodontal maintenance visits.

A surprising result was the lack of significant difference between the active patients and the inactive patients complete compliance level. This could be due to the small sample size of inactive patients with a complete compliance level ($n=7$).

The most compliant recall interval group was the five to six month periodontal maintenance therapy group. This was similar to the 1984 study, which had the six month recall interval as the most compliant. This again, may be due to patient education, whereby it is recommended that the general public be seen for dental check-ups every six months. So, it stands to reason, those with periodontal maintenance recommendations set at five to six months are much more periodontally stable than those on shorter recalls, and they may be more compliant with oral hygiene procedures. They also have a less complicated program to follow.

The type of treatment rendered (surgery versus scaling and root planing) did not have a significant impact on the rates of complete compliance to recommended periodontal maintenance therapy. This could be that patients who have

undergone surgery are compelled to not repeat the procedure, while those who have not had surgery may be willing to comply to periodontal maintenance recommendations to avoid surgery.

Other factors that effected the generalizability of the results of this study, were the use of one dental practice, and the nonrandomized sample of convenience. In addition, due to the descriptive nature of the study, cause and effect conclusions cannot be drawn from the data.

Recommendations

Due to the enormous effect regular periodontal maintenance therapy (SPT) has on the success of periodontal treatment, further research in this area is warranted. To improve generalizability of results, replication of the study using more periodontal practices would be warranted. It would be interesting to explore the connection of life stresses and personal habits to compliance of periodontal maintenance. A similar study comparing the compliance of patients with dental insurance coverage to those without insurance may provide insight to the influence finances may have on compliance. Also, investigation into the patients opinions as to why recommendations are not followed, and their suggestions as to what could increase their compliance to recommended treatment would be of interest.

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APPENDIXES

APPENDIX A

LETTER OF AGENCY APPROVAL

TEXAS WOMAN'S UNIVERSITY
HEALTH SCIENCES INSTRUCTION PROGRAM

AGENCY PERMISSION FOR CONDUCTING SURVEY

The Office of Thomas G. Wilson, Jr., D.D.S.

GRANTS TO

Shannon T. Hale

a student enrolled in the master's degree program in Health Sciences Instruction at Texas Woman's University, the privilege of its facilities/data in order to study the following problem:

Is there a difference in the patient compliance level of periodontal maintenance after an alteration of dental practice strategies?

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. Other None

Date: 7-25-91

Shannon T. Hale
Signature of Student


Signature of Agency

Barbara J. James
Thesis Committee Chairman

APPENDIX B
INSTRUMENT FOR DATA COLLECTION

