SUPPORTIVE PERIODONTAL THERAPY

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Supportive Periodontal Therapy

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INTRODUCTION

The healthy periodontium which consists of four principal components i.e. the gingiva, periodontal ligament, alveolar bone, and cementum, provides the support which is necessary to maintain teeth in function. Periodontitis is defined as "an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with increased probing depth, recession, or both. Since virtually all cases of periodontal disease are infectious disorders, they can be prevented or effectively treated by controlling pathogenic microbes residing in supra-gingival and sub-gingival plaque. The treatment of periodontal and peri-implant diseases involves cause-related therapy, together with professional management, which may be undertaken nonsurgical or surgically to achieve optimal health, function, and esthetics.

After complete active periodontal treatment patients may or may not be effective in removing plaque, which further requires adherence to a maintenance program that reduces the risk of future disease progression. The maintenance and recall phase of periodontal therapy was renamed as **"SUPPORTIVE PERIODONTAL THERAPY"** which expresses the essential need for therapeutic measures to facilitate the patient's own efforts to control periodontal infection.

With the evidence from a number of studies, it can be concluded that "Tooth loss in periodontitis patients is inversely proportional to the frequency of maintenance visits".[1] Once the tooth loss occurs dental implants will become the treatment of choice in totally or partially edentulous patients. The survival of implants is high, but not free of complications. They are also susceptible to inflammatory diseases caused by biofilm accumulation.

The periodontal and peri-implant diseases progress either due to an absence of treatment or inadequate long-term management, resulting in attachment loss and bone loss which further compromise the patient-related outcomes like tooth retention, esthetics, and function. Maintenance care is a critical phase of periodontal therapy. The long-term preservation of the dentition is closely associated with the frequency and quality of Supportive Periodontal Treatment. Due to the chronic nature of periodontitis and the inability to predict disease progression, it is necessary to continuously adjunct monitoring and providing appropriate treatment to prevent recurrence of the disease. Thus, the established principles of periodontal maintenance are considered as a gold standard of care. Supportive periodontal care is therefore

largely founded on the chronic nature of the disease, patient maintenance and clinician ability to deliver the appropriate management.

Similarly, periodontal maintenance allows for monitoring of dental implants, as well as evaluation of mechanical and biological aspects of implant support and restoration.[2,3] Numerous studies have demonstrated the efficacy of periodontal maintenance, and have shown that recurrent periodontitis can be prevented or limited by optimal personal oral hygiene or through periodic PM. Maintenance care requires patients' understanding of the purpose of the maintenance program, time and effort on the part of the dentist and staff side. The more often patients present for recommended supportive periodontal treatment (SPT), the less likely they are to lose teeth.

The present library dissertation attempts to review the importance of **"Supportive Periodontal Therapy"** in the periodontal and peri-implant treatment procedure.

HISTORY

The periodontal maintenance program is also known as the recall and maintenance phase, but the name was changed to supportive periodontal treatment at the 1989 World Workshop in Clinical Periodontics.[1]

According to the Glossary of Periodontal terms 1986, Supportive periodontal therapy was known as Preventive Treatment and was defined as "Procedures performed at selected intervals to assist the periodontal patients in maintaining oral health". In 1992, supportive periodontal therapy was defined as "an extension of periodontal therapy".

According to Jan Lindhe, Supportive periodontal therapy is defined as "Therapeutic measures to support the patient's own efforts to control and to avoid re-infection".4 The prevention of periodontal disease requires as positive a program as that required for the elimination of the periodontal disease.

It was noted that a maintenance program should provide adequate therapy for previously existing periodontal conditions. Initially, the patient should be provided with thorough prophylaxis and complete reinforcement instructions in oral hygiene procedures every 3months. The 3 months interval should be increased, maintained, or decreased depending on an evaluation of the stability of the supporting structures. Close monitoring will indicate the appropriate time interval for each patient, and if necessary retreatment determined for those areas that may be deteriorating.

AIM AND OBJECTIVE

AIMS:

1.Prevent the occurrence of new diseases.

2.Prevent the recurrence of the previous disease.

THERAPEUTIC OBJECTIVES

1.To prevent the Progression and recurrence of periodontal disease in patients who have previously been treated for gingivitis and periodontitis.

2.To reduce the incidence of tooth loss by monitoring the patient‟s dentition and any prosthetic replacements of the natural teeth.

3.To diagnose and manage, promptly, other diseases or conditions found within or related to the oral cavity.

4.To prevent the loss of dental implants after clinical stability has been achieved.

OBJECTIVES

1.**Preservation of alveolar bone support**: As evaluated with a radiograph, bone height may not only be maintained but also improved when proper maintenance is provided after periodontal therapy.[5]

2.**Maintenance of stable clinical attachment levels:** Despite all the variability associated with clinical measurement maintenance of stable clinical attachment levels represent a reasonable clinical indicator to evaluate the stability of results.

3.**Control inflammation:** Without proper maintenance, dental plaque will re-accumulate and inflammation would be re-established in periodontal tissues.[6] On the contrary well-maintained patient will have low levels of inflammation after therapy.[5]

4.**Re-evaluation and reinforcement of proper home care:** Although 3-4 month recall seems to compensate for improper plaque control as far as its effects on clinical attachment levels are concerned.[7] However, the better the oral hygiene the patient maintains, the better the possibility of maintaining a stable result. With training and positive reinforcement, the level of plaque control can be improved in most patients, however, it may take several sessions with some patients.

5.**Maintenance of a healthy and functional oral environment:** In addition to the evaluation of periodontal parameters, the mouth and dentition should be thoroughly inspected and assessed for changes over time. This may require consultation with other specialties &/or treatment. Any patient concerns or complaints should be addressed by the dental team during these visits.

GOALS AND RATIONALE

RATIONALE FOR SUPPORTIVE PERIODONTAL THERAPY

1.Incomplete Subgingival Plaque Removal: This leads to the continuous loss of attachment, without the appearance of clinical gingival inflammation. Bacteria remaining even after the scaling, root planing and flap surgery recolonize the pocket and cause recurrent disease.

2.Bacteria associated with periodontitis can be transmitted between spouses and other family members.

3.The microscopic nature of the dentogingival unit after periodontal treatment. After periodontal surgical procedures, the tissue heals by the formation of long junctional epithelium which is weaker in inflammatory conditions and gets separated easily which leads to recurrence of the pocket formation.

4.Subgingival scaling alters the microflora of periodontal pockets.

Few studies stated that:

A.There is a decrease in the proportion of motile rods and spirochetes and elevation in the proportion of coccoid rods.

B.Pocket debridement suppresses components of the subgingival microflora associated with periodontitis.

All these alterations are said to be present for a short duration of time, and the periodontal pathogens may return to baseline levels within days or months.

GOALS OF SUPPORTIVE PERIODONTAL THERAPY

The goals of periodontal or peri-implant therapy are to ensure that the periodontal or peri-implant tissues are maintained in a state of health, with the achievement of an acceptable degree of disease stability, patient comfort and function.

Due to multi-factorial etiology and the complex nature and progression of the periodontal and peri-implant disease, there are no universally agreed clinical parameters of success.

The goals of successful periodontal recall regimens for teeth may be achieved with:

1. Stabilization of plaque score at 20-40%

2. Stabilization of bleeding scores at 10-25%

3. Probing depth reductions and maintenance of probing depth between 1-2mm (at 30%)

4. A residual probing depth of <5mm.

5. Gains in clinical attachment levels (Wilson 1996).

The goals of successful periodontal recall regimens for implants may be achieved with:

- Probing depth no greater than 5mm
- The absence of bleeding on probing
- The absence of implant mobility
- Absence of pain
- The absence of continuous radiolucency surrounding the implant
- Annual vertical loss of bone height no greater than 0.2m.

FREQUENCY AND EFFICACY

A counterpoint to the efficacy of frequent supportive periodontal treatment visits has been offered in a limited number of studies that found no difference in the progression of disease in patients seen less frequently compared with those who received more frequent supportive periodontal treatment. Most of the patients in this last group of studies maintained relatively high levels of oral hygiene.

For patients with a previous history of periodontitis, the results from a number of clinical trials suggest that the frequency of supportive periodontal treatment should be less than 6 months. Intervals of 2 weeks, 2-3 months, 3 months, 3-4 months, 3-6months and 4-6 months have been proposed and studied. These data indicate that most patients with a previous history of chronic periodontitis should be seen at least four times a year because that interval will result in a decreased likelihood of progressive disease as compared with patients seen less frequently.[8]

Specific microorganisms are associated with periodontitis. The subgingival population of these bacteria is suppressed following the root planing used during supportive periodontal treatment but may return to baseline levels within days to months later.[9]

The average time for the return to baseline is between 9 and 11 weeks, but this return can vary dramatically in different patients. If the clinician wishes to prevent the re-establishment of suspected pathogens, supportive periodontal treatment intervals of 3 months or less appear to be required.

Patients treated for periodontitis who comply with suggested supportive periodontal treatment intervals will experience less attachment loss and tooth loss than patients who do not demonstrate compliance with the supportive periodontal treatment schedule. This body of data supports the concept that it is advantageous if supportive periodontal treatment visits are performed every 3months. Supportive periodontal treatment intervals can be tailored to the individual needs of each patient and further modified based on ongoing clinical studies.[10]

The average time required for a supportive phase session is 1 hour and it may be divided as follows:

- 15minutes – examination and evaluation of oral hygiene.

- 30minutes – selective scaling and root planing polishing and fluoride application and
- 15minutes – evaluation, and determination of future needs.

RISK ASSESSMENT

A **Risk** is defined as the probability of an individual's developing a given disease or experiencing a health status change over a specified period.[11]

Risk assessment is presented as a way of examining risks so that they may be better avoided, reduced, or otherwise managed.

Risk implies uncertainty, so that risk assessment is largely concerned with uncertainty and hence with a concept of probability that is hard to grasp. The results of even the simplest risk assessments need to be compared with similar assessments of commonplace situations to give them some meaning. The results of risk assessments will necessarily be in the form of an estimate of probabilities for various events, usually injurious. The goal in performing a risk assessment is to obtain such estimates.

Risk can be identified in terms of risk factors, risk indicators, or risk predictors .[11]

Terminology: Three types of causation (of a disease) are generally identified:[12]

l. A sufficient cause,

2.A necessary cause, and

3.A risk factor.

A **Sufficient Cause** refers to any condition, characteristic, or exposure in the presence of which, the disease will always occur. This is the strongest type of causal relationship and is relatively rare.

Examples: Genetic anomalies or conditions.

A **Necessary Cause** is any condition, characteristic, or exposure that must be present for a disease to manifest itself.

An example of this is the organism *Mycobacterium tuberculosis,* which is a prerequisite for a person to develop tuberculosis. However, many people can carry this organism in their bodies without any symptoms of the disease.

A **Risk Factor** is any characteristic, behavior, or exposure with an association to a particular disease (are confirmed through experiments or randomized controlled trials.

Risk Indicator is a term used to describe a potential risk factor identified to be associated with disease from case-control or cross-sectional studies.

A risk factor that can be used to predict the future course of the disease, such as an increased probability of disease, is known as a **Risk Marker**.

Some risk factors can be modified to reduce one's risk of initiation or progression of the disease, such as smoking cessation or improved oral hygiene to reduce the risk of periodontal destruction, while other factors cannot be modified, such as genetic factors. A risk factor that cannot be modified is often referred to as a **Determinant.**

A **Risk Predictor** is a factor that has no current biological plausibility as a causative agent but has been associated with disease on a cross-sectional or longitudinal basis. Risk predictors may be either marker of disease or other historical measures of the disease.

Examples are the number of missing teeth or past evidence of periodontal disease. The number of missing teeth is a risk predictor for the disease but has little or no biological plausibility as a causative agent for periodontitis.

The AAP Guidelines describe risk assessment as „increasingly important in periodontal treatment planning and should be part of every comprehensive dental and periodontal evaluation".

It was concluded regarding the status of periodontal risk assessment, which remains true to this day, i.e a „**Universally accepted objective method of calculating a risk of developing or worsening periodontal disease at a future date does not exist.**" And, all such models for calculating risk and determining prognosis are probabilistic and thus are inherently limited in their practical application to the individual patient.

THE RISK ASSESSMENT PROCESS

A 4-step process for identification of high-risk individuals given by the University of North Carolina.

- The first step, **Identification of risk factors,** Clues to these factors usually come from clinical impressions, animal and *in vitro* laboratory experiments, and from prevalence surveys of populations. When a disease is found to have multiple risk factors (as is the case for Periodontitis), testing the ability of one risk factor at a time to identify individuals at risk gives an incomplete picture and the development of a risk assessment model becomes necessary.

- The second step, **Development of a risk assessment model or models**, i.e putting together the relevant risk factors into a multivariate model that identifies the combination of factors that will most efficiently distinguish between those who are at high or low risk of developing the disease.

- The third step involves **Screening population groups** for the factors included in the risk assessment model and using the model to predict each individual's risk of developing a disease. This step is called assessment.

- The fourth step, **Targeting**, involves the application of some health promotion/disease prevention regimen or treatment procedure to the individuals at increased risk with an evaluation of the effectiveness of the intervention.

Periodontal Risk Calculator:

Types of risk factors: modifiable or non-modifiable.

Modifiable Risk Factors: Smoking, DM, microorganism and periodontal diseases, socioeconomic status, psychological factors, stress, nutrition.

Non-Modifiable Risk Factors: Genetic factors, osteoporosis, aging, other systemic conditions.

Risk Models: To meet the objective of incorporating risk assessment into the diagnostic process, numerous risk assessment models have been introduced during the past decade

1.Periodontal Risk calculator: Example: Previser

Author(s)/ Year	Risk model	Risk variables	Notes
Page et al. (2002).[13]	Periodontal Risk Calculator (PRC)	11 factors: Age, smoking history, DM, history of periodontal surgery, BOP, furcation involvements, subgingival restorations, vertical intrabony defects, root calculus, PD, radiographic bone loss.	Only the deepest PD and greatest bone loss per sextant are entered for PD and radiographic bone levels.

Based on 11 parameters, "numeric risk and disease severity scores" are calculated that establish both an assessment of risk as well as a quantification of disease severity. These, in turn, are coupled with suggested treatment options for the clinician.

As an example of this, the PreViser Periodontal Risk Calculator has been in use for well over a decade, has been widely published and its algorithm has also been previously adapted for use by the American Academy of Periodontology for a Web-based "self-assessment tool" – the "Gum Disease Risk Assessment Test".

2.Periodontal Risk Assessment

Author(s)/ Year	Risk model	Risk variables	Notes
Lang & Tonetti (2003).14	Periodontal Risk Assessment (PRA)	6 factors: full-mouth BOP %, PD ≥ 5mm, tooth loss, radiographic bone loss-to-age ratio, systemic and/or genetic conditions, smoking	All sites of BOP and PD ≥ 5mm must be entered. Alveolar bone loss is limited to the most severe posterior site. Binary designation for "systemic and/orgenetic conditions" category. Six-point scale for each factor
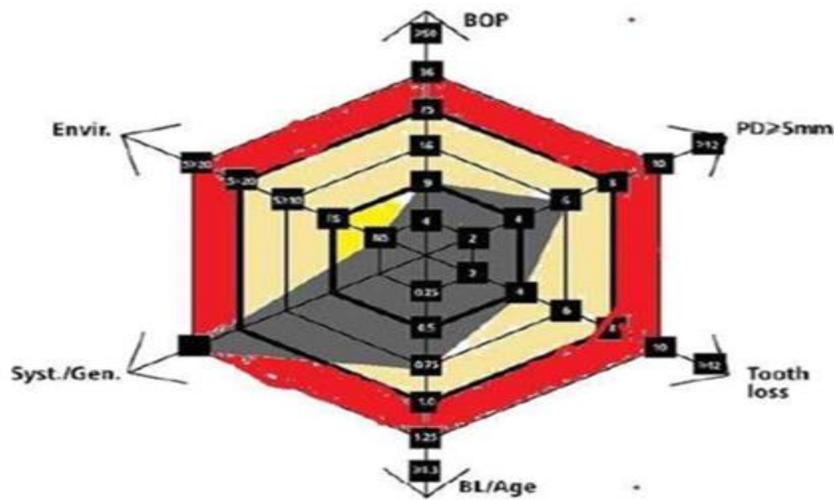
Figure: **3** Functional diagrams of a medium risk maintenance patient - A **moderate PRA** patient has at least two parameters in the moderate category, but at most one parameter in the higher-risk category (Adapted from Lang &Tonetti 2003).
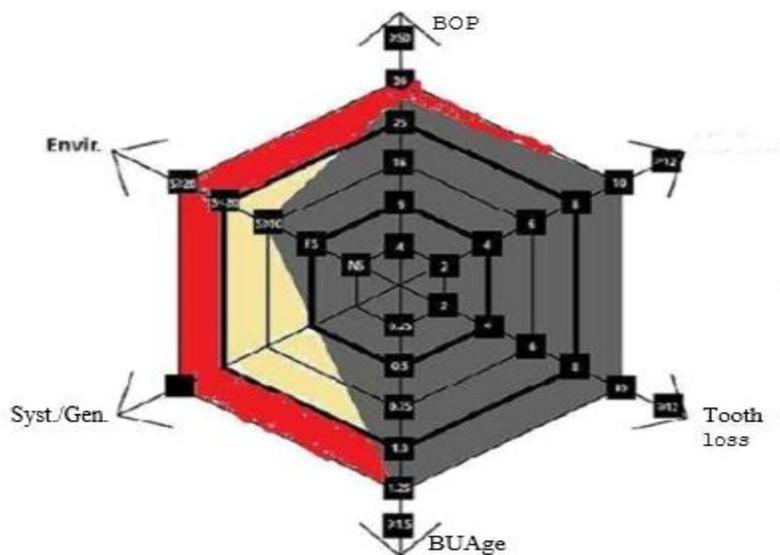
Figure: 4 Functional diagram of high-risk maintenance patients - A high PRA patient has at least two parameters in the high-risk category (Adapted from Lang & Tonetti 2003).

3.Modified PRA

Author(s)/ Year	Risk model	Risk variables	Notes
Chandra (2007).15	Modified PRA	8 factors: full-mouth BOP %, PD 5mm, tooth loss, CAI to age ratio, smoking, DM, dental status – systemic factors interplay, psychosocial factors	DM is separated from systemic conditions. Alveolar bone loss is not evaluated. Five-point scale for each factor.

It included both retrospective and current data and used a simplified format that retained 4 of the original 6 parameters, with the addition of, specifically, local-systemic factors (tooth-related, immunosuppression, genetic), stress, and diabetic and socioeconomic status.

The ease of interpretation, relative to the PRC, was embodied in the format of the risk diagram itself, which was color-coded into low-, medium-, and high-risk zones. The model was "primarily a retrospective one where information is gathered to assess the current risk for a patient, unlike other models where current status is assessed and future risk is predicted.
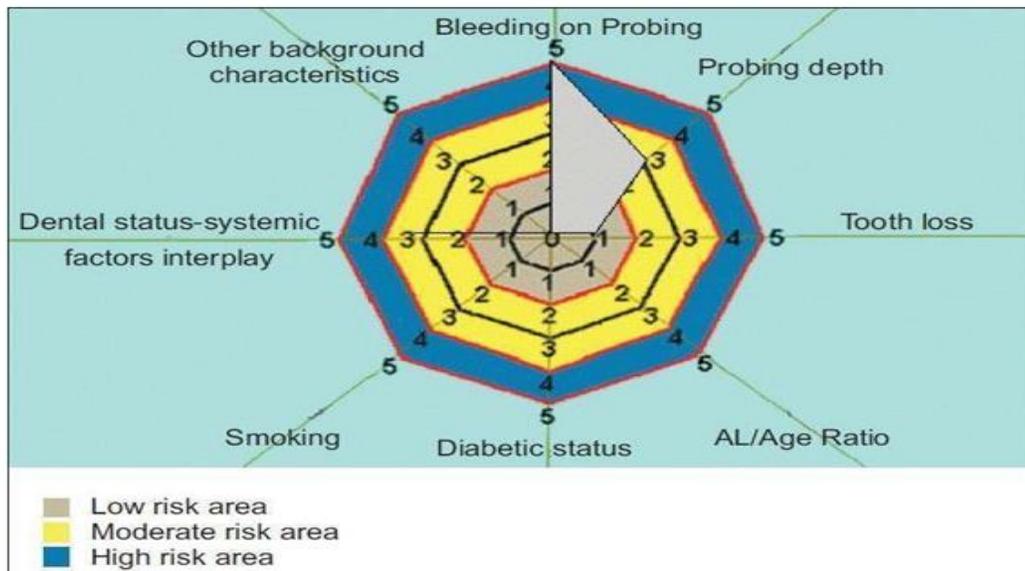
Figure 5: Modified PRA (Adapted from Chandra 2007)

4. Unife

Author(s)/ Year	Risk model	Risk variables	Notes
Trombelli (2009).16	Unife	5 factors: BOP %, PD ≥ 5mm, radiographic bone loss to age ratio, smoking, DM	All sites of BOP and PD ≥ 5mm must be entered. Alveolar bone loss included for one interproximal site of each tooth.

A numeric value for each parameter was calculated, based on its extent or severity, and patients were assigned to 1 of 5 risk categories derived from the sum of those values, i.e., 1(low), 2 (low-medium), 3 (medium), 4 (medium-high), or 5 (high).

5. Dento Risk

Author(s) /Year	Risk model	Risk variables
Lindskg *et al*. (2010)[17]	DentoRisk	20 factors: Systemic Predictors: Age in relation to history of chronic periodontitis, family history of chronic periodontitis, systemic disease and related diagnoses, result of skin provocation test, patient cooperation and disease awareness, socioeconomic status, smoking, clinician experience local Predictors: bacterial plaque (oral hygiene), endodontic pathology, furcation involvements, vertical intrabony defects, radiographic marginal bone levels, PD, BOP, marginal dental restorations, increaded tooth mobility, missing teeth, abutment teeth, presence of purulence

This model differs from others in that an assessment is first calculated for the patient"s overall dentition (level I). If an elevated risk is detected, a prognosis for annualized attachment loss for each individual tooth (level II) is then computed. This information can then be used during the treatment planning appointment, and provide the patient and clinician with a current and the future prognostication (based on completion of successful therapy).

6.Periodontal Risk Assessment Diagram Surface

Author(s)/ Year	Risk model	Risk variables	Notes
Leininger (2010).18	Periodontal Risk Assessment Diagram Surface (PRAS)	6 factors:full-mouth BOP %, PD $\geq$ 5mm, radiographic bone loss to age ratio, systemic status, smoking	Identical to PRA except uses 5-point scale for each factor

CLASSIFICATION

Classification of post-treatment patients:

The first year after periodontal therapy is important in terms of indoctrinating the patients in a recall pattern and reinforcing oral hygiene techniques. In addition, it may take several months to evaluate accurately the results of some periodontal surgical procedures. Consequently, some areas may have to have retreated because the results may not be optimal. Furthermore, the first-year patient often has etiologic factors that may have been overlooked and may be more amenable to treatment at this early stage. For these reasons, the recall interval for first-year patients should not be longer than 3 months.

The patients who are on a periodontal recall schedule are a varied group. Patients can improve or may relapse to a different classification, with a reduction in or exacerbation of the periodontal disease. When one dental arch is more involved than the other, the patient"s periodontal disease is classified by the arch with the worse condition.[19]

Maintenance patients are categorized into several classes depending on several characteristics for their periodontal recall schedule based on Merin"s classification into classes A, B and C. Class A patients who show well-maintained results for 1 year or more should be recalled once in 3-4 months. Class B patients who generally show poor results for 1 year or more should be recalled once in 3-4 months. Class C patients who generally show poor results following periodontal therapy should be recalled once in 1-3 months. Class A recall patients should be maintained by the general dentist, whereas class C patients should be maintained by the specialist. Class B patients can alternate recall visits between the general dentist and the specialist.[19]

Merin Classification	Characteristics	Recall Interval
First Year	First-year patient: Routine therapy and uneventful healing. First-year patient: a Difficult case with a complicated prosthesis, furcation involvement, poor crown to root ratios or questionable patient cooperation.	3months 1-2months

Class A	Excellent results well maintained for 1 year or more. Patient displays good oral hygiene, minimal calculus, no occlusal problems, no complicated prostheses, no remaining pockets, and no teeth with less than 50% of alveolar bone remaining.	6 months to 1year
Class B	Generally, good results maintained reasonably well for 1 year or more, but the patient displays some of the following factors: 1.Inconsistent or poor oral hygiene 2.Heavy calculus formation 3.Systemic disease that predisposes to periodontal breakdown 4.Some remaining pockets 5.Occlusal problems 6.Complicated prosthesis 7.Ongoing orthodontic therapy 8.Recurrent dental caries 9.Some teeth with less than 50% of alveolar bone support 10.Smoking 11.Positive family history or genetic test 12.More than 20% of pockets bleed on probing	3-4 months (decide on recall interval based on number and severity of negative factors)
Class C	Generally poor results after periodontal therapy and/or several negative factors from the following list: 1.Inconsistent or poor oral hygiene 2.Heavy calculus formation 3.Systemic disease that predisposes to periodontal breakdown 4.Many remaining pockets 5.Occlusal problems 6.Complicated prosthesis 7.Recurrent dental caries 8.Many teeth with less than 50% of alveolarbone support 9.Smoking 10.Positive family history or genetic test 11.More than 20% of pockets bleed on probing 12.Periodontal surgery indicated but not performed for medical, Psychologic, or financial reasons 13.Conditions too far advanced to be improved by periodontal surgery	1-3months (decided on recall interval based on number and severity of negative factors; consider re-treating some areas or extracting severely involved teeth)

COMPLIANCE

The ultimate aim of any medical/dental therapy is to achieve certain desired outcomes in the patients concerned. These desired outcomes are part of the objectives in the management of the diseases or conditions. However, despite all the best intentions and efforts on the part of the healthcare professionals, those outcomes might not be achievable if the patients are non-compliant which may have serious and detrimental effects from the perspective of disease management. Hence, therapeutic compliance has been a topic of clinical concern since the 1970s due to the widespread nature of non-compliance with therapy.

The success of non-surgical, surgical, and supportive periodontal therapy is associated with patient compliance. The prognosis of patients is critically dependent on the patient's" attitude desire to retain natural teeth, willingness, and ability to maintain good oral hygiene.[19]

Definitions:

Compliance has been defined as "The extent to which a person's behavior coincides with medical or health advice".

Adherence is defined as "The ability and willingness to abide by a prescribed therapeutic regimen".

"**Concordance**" -- Compared with "compliance", the term concordance makes the patient the decision-maker in the process and denotes patients-prescribers agreement and harmony.20 Therapeutic **non-compliance** occurs when an individual"s health-seeking or maintenance behavior lacks congruence with the recommendations as prescribed by a healthcare provider.

Types of compliance:

1.Non-compliance:- the patient does not comply at all.

2.Erratic compliance: - patient complies occasionally.

3.Complete compliance: - patient complies 75% of time .[21]

Type of non-compliance

1. Receiving a prescription but not filling it.

2. Taking an incorrect dose.

3. Taking medication at the wrong times.

4. Increasing or decreasing the frequency of doses.

5. Stopping the treatment too soon.

6. Delaying in seeking healthcare..

7. Non-participation in clinic visits

8. Failure to follow the doctor's instructions.

9. "Drug holidays", which means the patient stops the therapy for a while and then restarts the therapy.

10. "White-coat compliance", which means patients are compliant to the medication regimen around the time of clinic appointments.

The first study on the degree of compliance with supportive periodontal treatment schedules was published by Wilson *et al*. in 1984.[21] Of the approximately 1000 patients followed for up to 8 years, only 16% complied with suggested supportive periodontal treatment intervals, 34% never came back for maintenance, and the rest complied erratically.

Various fixed and intermediate variables that affect the patient compliance: (Hoogstraten et al. 2005).
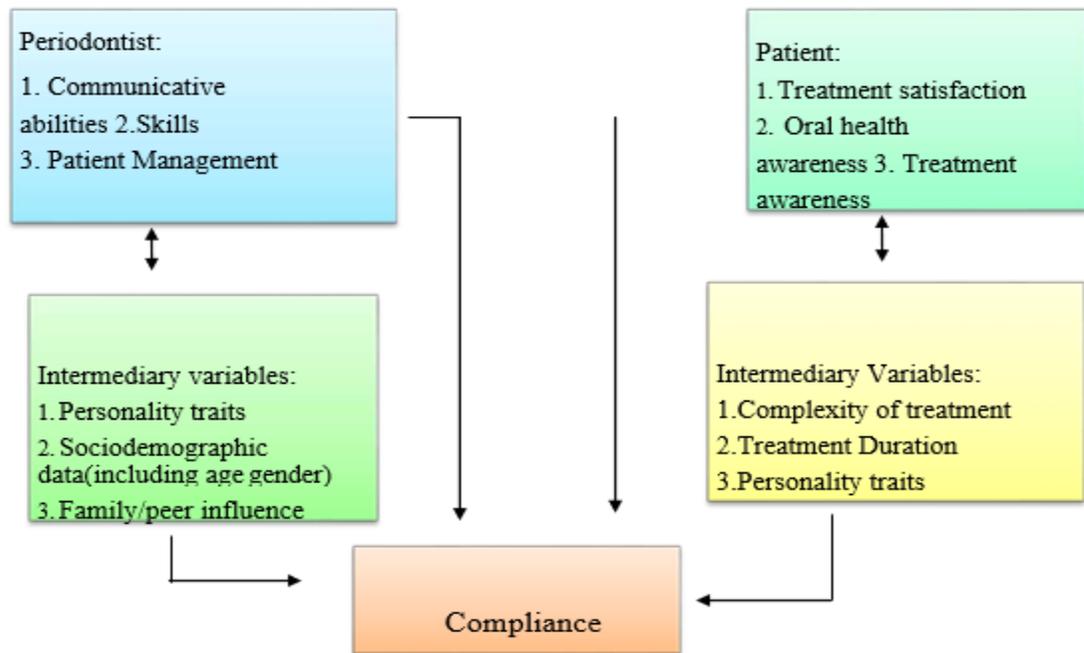
A controversial question regarding compliance is….

"In clinical medicine, what is considered to be good or acceptable compliance?" Although it must be acknowledged that this is still controversial, about good medication compliance, it has commonly been defined as taking 80 to 120% of the medication prescribed.

Factors affecting the compliance:[22]

Category	Factors
Patient-centered factors	**Demographic Factors:** Age, Ethnicity, Gender, Education, Marriage Status **Psychosocial factors:** Beliefs, Motivation, Attitude Patient-prescriber relationship, Health literacy, Patient knowledge, Physical difficulties, Tobacco Smoking or alcohol intake, Forgetfulness, History of good compliance.

Therapy-related factors	Route of administration treatment complexity, Duration of the treatment period, Medication side effects, Degree of behavioral change required, Taste of the medication, Requirements for drug storage.
Health care system factors	Lack of accessibility, Long waiting time, Difficulty in getting prescriptions filed Unhappy clinic visits.
social and economic factors	Inability to take time off work Cost and Income Social support
Disease factors	Disease symptoms Severity of the disease

A shortlist of compliance improving action that has been shown to work:

For all regimens:

a. Keep the prescription as simple as possible.

b. Give a clear instructions on the exact treatment regimen, preferably written.

For long-term regimens:

Reminders:

c. Call if appointment missed.

d. Prescribe medication in concert with the patient's daily schedule

e. Stress importance of compliance at each visit

f. Titrate frequency of visits to compliance need

Rewards:

g. Recognize patient's efforts to comply at each visit

h. Decrease visit frequency if compliance high

Social support:

i. Involve the patient's spouse or another partner.

Possible methods of improving compliance - The following methods have been developed to increase compliance which has proved successful in private practice. They are generalities and must be individualized to each patient and therapist.

Simplify:

The simpler the required behavior, the more likely it is to be carried out.

Accommodate:

The more dentists practice and their suggestions fit the patients" needs, the more likely patients are to comply. Satisfied patients tend to comply with more of the recommended therapy than dissatisfied patients.

Remind patients of appointments:

The reason for a failure for a given appointment may be from a patient side or from the dentist side which creates problems for both the patient and the dentist.

Patients break appointments for various reasons. Other factors that may contribute are age, race, psychosocial problems and the percentage of previous noncancelled appointments. Communication is a key element along which avoids this general problem. Appropriate vehicles for appointment reminders include postcards and telephone contact.

Keep records of compliance:

Patients can "get lost in the system" and efforts should be made to keep up with them. This often requires advanced systems, and a computer for appointment control and tracking missed visits. Communication with the patient should be initiated as quickly as possible when non-compliant behavior is noted. The sooner the patient is contacted after missing the appointment, the more likely they are to keep their new appointment.

Inform:

Providing written informed consent is useful in reducing non-compliance. Telling the patient the causes of the disease process and their role in its treatment improves compliance. In

addition, find out what the patient's goals are for their teeth and then show them how they may achieve their goals only if they participate in the management of the disease.

Provide positive reinforcement:

Positive feedback and constructive guidance can help the patient to do better when compared to a negative approach to their compliance problem.
Identify potential non-compliers:

If any patient is suspicious regarding compliance (not following), then discuss the problems which he/she may encounter due to it. Then track these patients closely. Ensure the dentist's involvement. There is evidence that, in some cases, dentists are more likely to encourage compliance than dental hygienists. Noncompliance decreased by 50% when these general approaches were applied to a private periodontal practice over 5 years.

MAINTENANCE PHASE

Once the periodontal therapy is completed, the principal concern is to maintain achieved periodontal health by preventing recurrence, which is referred as the "Maintenance Phase of Periodontal Therapy."

"Once a state of oral health has been established, periodic evaluation is necessary for the continued health of the supporting structures of the teeth".[24]

In 1916 Widman stated that "If one succeeds in having the patient carry out effective mouth hygiene after the operation, there is no return of pyorrhea"

Bunting in 1928 emphasized that „procedures must be performed thoroughly to keep the teeth clean from secondary deposits, so that diseases recurrence is limited.

During the past 20 years, the main thrust of maintenance is oral cleanliness because plaque and calculus are believed to be intimately associated with the development of periodontal disease. However, with increasing knowledge of periodontal disease, methods for maintaining periodontal health become more sophisticated.

A MAINTENANCE PROGRAM:

The main assumption of the maintenance program is that "Adequate therapy has been provided for whatever periodontal disease existed".

Initially, the patient should be provided with thorough prophylaxis and complete reinforcement instructions in oral hygiene procedures every 3 months. The 3-month interval should be increased, maintained, or decreased depending on the evaluation of the stability of the supporting structures.

In determining the optimum interval, the three most critical factors are:
 (1) The degree of inflammation in the gingival tissues,
 (2) Amount of plaque and calculus accumulation, and
 (3) Changes in gingival crevice depth and level of the attachment apparatus.[2]

According to clinical studies, close monitoring is important to develop a time interval that is appropriate for each individual to maintain the health of the periodontium.

1. Patients with good oral hygiene and healthy and stable periodontium the maintenance appointments can be prolonged.

2. The patients with suboptimal plaque control and a concomitant high prevalence of bleeding sites recalled more frequently,

3. Patients with healthy gingival conditions but with a severely reduced height of periodontal support are recalled at short intervals (not exceeding 3-4 months) to exclude or at least reduce the risk of tooth loss.

Factors to be recorded and evaluated at maintenance visit:

1.Changes in general health status,

 2.Scoring of plaque and calculus accumulation; and

 3.Notation of problem area(s) for edema, bleeding, pocket development, attachment loss, tooth mobility, and oral tissue changes.

Management of time during maintenance visit (generally 1 hour) –

The first 10-15 minutes – For clinical evaluation of the periodontal and caries conditions.

The second 30-40 minutes - used to clean and polish all supragingival tooth surfaces, following the instrumentation of the subgingival sites that have been diagnosed as being inflamed.

Last 5-15minutes - used to provide adjunctive preventive measures such as topical application of fluoride or chemical plaque control agents. In addition to the evaluation of the periodontal and caries conditions, the vitality of abutment teeth for fixed bridgework should be checked.[25] A small percentage of integrated dental implants ultimately fail either due to trauma (from the occlusion or an ill-fitting prosthesis) or from an infection similar to periodontitis, or from a combination of these factors.

A typical maintenance visit for implants consist of -

1.Updating the patient‟s medical and dental history.

2.Review of oral hygiene and modification if needed.

3.Examination of implant and peri-implant tissues.

4.Evaluation of patient complaints in the area of implants.

5.Evaluation implant stability: manually or by using computerized devices.

Setting Maintenance Intervals:

A. Patients with both teeth and implants should see the periodontist as often as necessary to keep the periodontium or peri-implant tissues healthy.

B. Totally edentulous patients with implants should be seen at least once per year.[10]

Re-education:

During the recall visits the plaque score record in previous visits are used as an educational tool, highlighting to the patient-specific areas where plaque is accumulating. Many patients just require 'fine-tuning' of their oral hygiene along with specific advice needed for the more difficult areas i.e. interproximal areas, furcation areas, and root surfaces. The importance of daily plaque removal from these areas must be emphasized.[26]

Re-motivation:

Compliance is the most difficult aspect of periodontal care. Patients usually respond well to periodontal therapy during the active phase of treatment, but patients who are well educated in oral hygiene techniques and who demonstrate an ability to achieve low plaque levels, show decreased compliance over time.

Patients slip back easily into their old ways. Re-motivation and positive reinforcement of patients are necessary to maintain the high standard of oral hygiene required for periodontal health. Re-motivation involves reminding the patient about the nature of the periodontal disease and the potential consequences of the untreated disease, the relationship between plaque and periodontal disease and the patient's power to prevent disease progression with good oral hygiene practice. This information and advice should be given in a language that is non-threatening, and in layman's terms. Positive reinforcement and acknowledgment of the successes achieved by the patient are important for ensuring on-going compliance.

It may be difficult to change a non-complying patient into a very compliant one, but with re- motivation, at least the small improvement in oral hygiene behavior achieved is maintained. Therefore, regular **supragingival prophylaxis** and calculus removal should be performed at appropriate intervals based on individual needs during maintenance care.

Sub-gingival debridement should be confined to:

Sites that show an increased probing depth, Sites that demonstrate re-infection and suppuration, Sites that are difficult for the patient to access and demonstrate persistent bleeding on probing, for example, furcation areas and pockets >4 mm.[22]

Adjunctive use of antimicrobial agents:

The evidence-based rationale supporting the use of adjunctive antimicrobials within maintenance care is increasing day by day.

Use of antimicrobials during SPT by the professional:

Subgingival irrigation:

Slots and Jorgensen (2000) advised using mechanical debridement followed by subgingival irrigation with povidine-iodine during Supportive periodontal therapy appointments of periodontitis patients due to bactericidal potential in areas with difficult access.

Disadvantage:

Due to the short-term effect of subgingival irrigations, additional anti-microbial means should be indicated when a more prolonged antimicrobial effect is desired.

Sustained release delivery systems:

Local antimicrobial therapy is an alternative approach aimed at providing antimicrobial concentration adequate to penetrate the biofilm in the periodontal pocket for prolonged time periods.

Kasaj *et al.* 2007 evaluated the effectiveness of a controlled-release chlorhexidine chip as adjunctive therapy to scaling and root planing with a newly developed ultrasonic device in supportive periodontal therapy. The target sites were randomly treated with either a newly developed piezo-driven ultrasonic device Vector or ultrasonic system (VUS) + Chlorhexidine chip or Vector or ultrasonic system alone without adjunctive antimicrobial treatment. The average reduction of Probing depth and improvement in Clinical attachment level was greater in the Vector or ultrasonic system + Chlorhexidine chip sites than in sites treated with the Vector or ultrasonic alone at 1, 3 and 6 months. These data suggest that the Chlorhexidine chip application

following Supportive periodontal therapy with the tested ultrasonic device is beneficial in improving periodontal parameters in patients on Supportive periodontal therapy.

Minocycline is a bacteriostatic, antimicrobial agent, which is available in a gel and microsphere formulation for local application within periodontal pockets. A case-control study comparing the efficacy of a 2% minocycline gel versus scaling and root planing (SRP) alone, in treating sites with pocket depths greater than or equal to 5 mm, with bleeding on probing during a 12- month period of maintenance care, resulted in similar clinical outcome.

Similar results have been found with the adjunctive use of a 25% metronidazole gel in combination with SRP.

Systemic antibiotic:

The use of antibiotics during Supportive periodontal therapy should be reserved for patients experiencing periodontal breakdown and recurrence of the disease.

Nakajima *et al* 2016 examined the short-term and long-term microbiological and clinical effects of systemic sitofloxacin and azithromycin (AZM) on active periodontal pockets during supportive periodontal therapy. These results indicate that monotherapy of systemic Sitofloxacin and Azithromycin could be an alternative treatment during supportive periodontal therapy.

Use of antimicrobials for personal Supportive periodontal therapy:

Mouth rinses

Sangeetha *et al.* 2015 Patients who, as a result of therapy, have only shallow periodontal pockets should concentrate on supragingival plaque control and elimination of pathogenic bacteria from the oral reservoir**.**

Chlorhexidine rinses for 8 days may be recommended after each Supportive periodontal therapy appointment, to ensure prevention of re-infection during the 3–4-month interval between Supportive periodontal therapy appointments.

Irrigation:

Braun and Ciancio (1992) the daily use of supragingival irrigation with antimicrobial agents may partially benefit patients with deep periodontal pockets during Supportive periodontal therapy, and the use of subgingival tips for selected deep pockets may augment the effect of irrigation due to deeper penetration properties.

Disadvantages:

The manual complexity of personal subgingival irrigation

 Low compliance

 Cost and possible side-effects (risk for abscess formation and bacteremia)

Toothpaste:

Using a toothbrush as a delivery device, it was found that toothpastes can penetrate only up to 0.9 mm into the periodontal pockets. No recommendation can be concluded for use of specific toothpaste during Supportive periodontal therapy for periodontitis patients.

Polishing, fluorides, determination of recall interval*:*

The recall hour is concluded with polishing the entire dentition to remove all remaining soft deposits and stains. Following polishing, fluorides should be applied in high concentration in order to replace the fluorides which might have been removed by instrumentation from superficial layers of the teeth. Fluoride or chlorhexidine varnishes may be applied to prevent root surface caries in areas of gingival recession. The determination of future Supportive periodontal therapy visits must be based on the patient's risk assessment.

Therefore, current evidence supports the adjunctive use of antimicrobial agents during maintenance care. In addition to the superior clinical outcomes reported with their use, adjunctive agents can offer further benefits like shorter clinical time and post-operative patient sensitivity as they reduce the requirement for repeated sub-gingival debridement.

Disadvantages: Expensive, Risk of bacterial resistance (on repeated use).

Therefore used only for the maintenance care of patients with good plaque control in residual pockets of 5 mm or greater. Non-responding sites, or those with persistent bleeding, should be specially targeted.

Application of topical fluorides:

Gingival recession and exposure of the root surface is a common side-effect of periodontal disease or periodontal disease therapy. Gingival recession increases the risk for root caries and predisposes to cervical sensitivity. In one study, 82% of patients on periodontal supportive care had evidence of root caries (either treated or untreated) and the number of root lesions in an individual was related to his/her plaque score.[27] In these cases regular application of

topical fluoride will help to prevent root caries and may relieve some of the symptoms of sensitivity.

General guidelines for dental treatment planning have been published based on five treatment phases.
I. Systemic II. Acute III. Cause-related IV. Surgical V. Corrective and VI. Maintenance.

Systemic phase:

A. Consultation with patients" physician

B. Pre-medication

C. Stress/fear management

D. Any necessary treatment considerations for systemic disease.

Acute phase:

A. Emergency treatment for pain and infection

B. Addressing the urgent chief complaint.

Cause-related phase:

A. Oral hygiene education, patient motivation, and risk assessment

B. Mutual goal-setting for acceptable outcomes/end-points of therapy

- Implementation of strategies for risk reduction

C. Excavation of deep carious lesions

- determine restorability

D. Extraction of hopeless teeth along with non-surgical periodontal debridement

E. Removal of plaque retentive factors

F. Necessary endodontic and occlusal therapy

G. Post-treatment re-evaluation

- Objective assessment of endpoints of therapy.

Surgical corrective phase

A. Resective/regenerative and implant surgical procedures

B. Post-surgical re-Evaluation

- Objective assessment of endpoints of therapy

C. Definitive prosthodontic restoration.

Maintenance phase

A. periodic professional supportive care

B. Reinforcement of oral hygiene instruction and motivation

C. Annual multi-pronged periodontal stability and risk re-assessment

D. Comprehensive professional supra- and subgingival plaque removal

E. Radiographic updates and therapeutic interventions. (As needed)
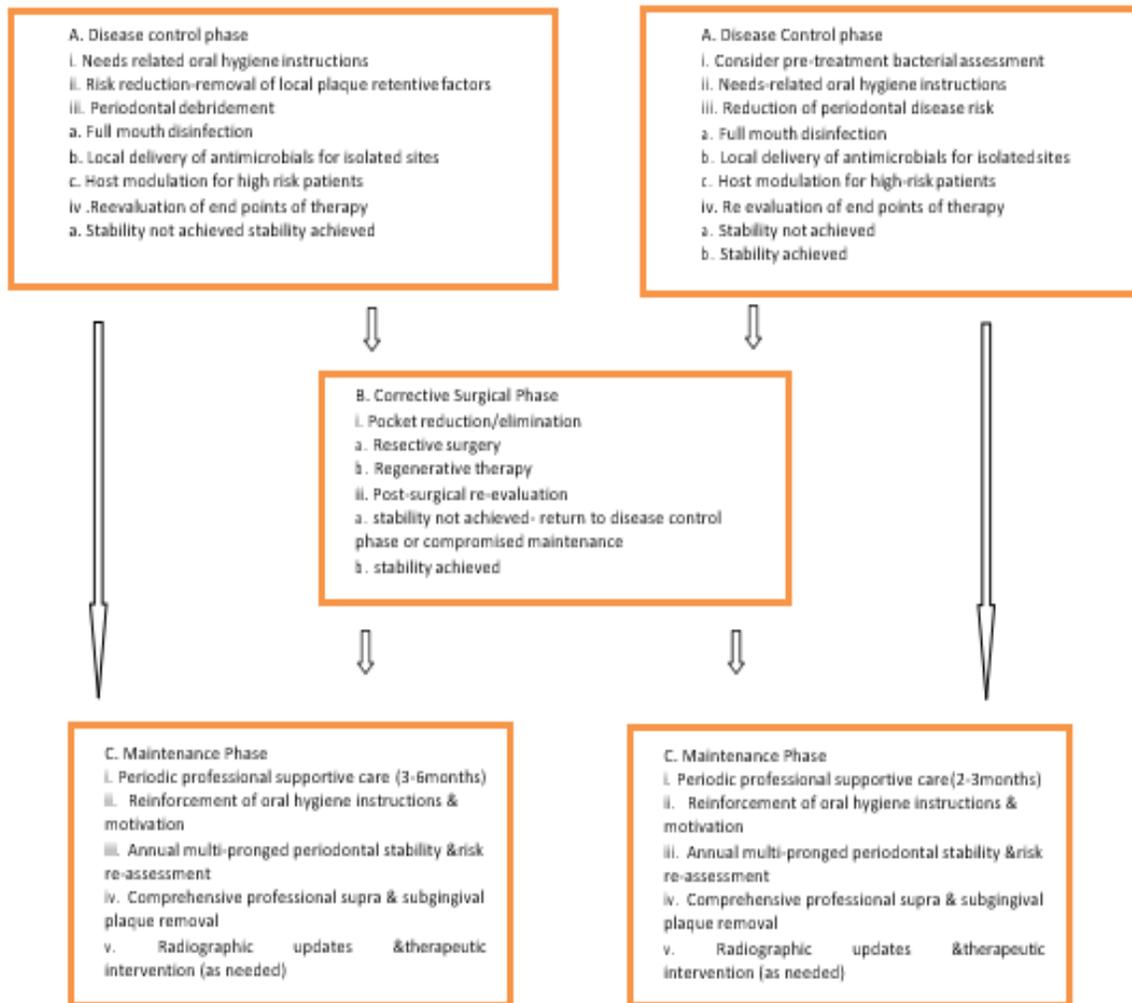
Figure 6: Comparison of active treatment strategies for chronic and aggressive periodontitis (Adapted from Dentino et al., 2013).

Frequency and the time allotted for periodontal maintenance:

Many patients presenting with recurrent gingivitis without additional attachment loss after definitive periodontal therapy may be adequately maintained with Periodontal Maintenance performed semi-annually and for patients with a history of periodontitis, numerous clinical studies suggest that Periodontal Maintenance should be performed at intervals of less than 6 months.

Intervals of 2 weeks, 2-3 months, 3 months, 3-4 months, 3-6 months, 4-6 months, and up to 18 months have been evaluated in general data suggest that most patients with a previous history of periodontitis should obtain Periodontal Maintenance at least 4 times per year, since that interval will result in a decreased likelihood of progressive disease, compared to patients receiving Periodontal Maintenance on a less frequent basis. Finally, it can be concluded that the periodontal maintenance schedules should be individualized, with the Periodontal Maintenance intervals tailored to the needs of each patient.

Although pocket debridement suppresses components of the subgingival microflora associated with periodontitis, periodontal pathogens may return to baseline levels within days or months. The return of pathogens to pretreatment levels generally occurs in approximately 9- 11 weeks but can vary dramatically among patients. The time required for periodontal maintenance appointments should be dictated by factors such as the number of teeth or implants, patient cooperation, oral hygiene efficacy and compliance, systemic health, the previous frequency of periodontal maintenance, instrumentation access, history of disease or complications, and the distribution and depth of the Sulcus.

The following items may be included in a periodontal maintenance visit, subject to previous examination, history and the judgment of the clinician:

A. Review and update of medical and dental history

B. Clinical examination (to be compared with previous baseline measurements)

 1.Extraoral and intraoral examination and recording of results

 2.Dental examination and recording of results

    a) Tooth mobility, fremitus, and occlusal factors

    b) Coronal and root caries assessment

    c) Restorative and prosthetic factors, such as defective restorations

    d) Other tooth-related problems, such as open contacts or malpositioned teeth

3.Periodontal examination and recording of results: Probing depth, bleeding on probing, general levels of plaque and calculus, evaluation of furcations. exudate, other signs of disease progression, microbial testing if indicated gingival recession, and attachment level if indicated.

4.Examination of dental implants and peri-implant tissues and recording of results: Probing depths, bleeding on probing, examination of prosthesis/abutment components, evaluation of implant stability, occlusal examination, other signs and symptoms of disease activity Example: Pain and suppuration.

C. Radiographic examination

1.Radiographs should be current, based on the diagnostic needs of the patient, and should permit appropriate evaluation and interpretation of the status of the oral structures, including teeth, periodontium, and dental implants.

2.The frequency and the number of radiographs needed is decided based on individual patient needs.

3.Radiographic abnormality should be noted.

D. Assessment of disease status or changes by reviewing the clinical and radiographic examination findings, compared to baseline

E. Assessment of personal oral hygiene

To assess the individual oral Hygiene patients should perform their hygiene regimen immediately before the recall appointment. Plaque control must be reviewed and corrected until the patient demonstrates the necessary proficiency.

F. Treatment

1.Subgingival and supragingival plaque and calculus removal.

2.Behavioral modification:

   a) Oral hygiene re-instruction

   b) Adherence to suggested Periodontal Maintenance intervals

   c) Counselling on control of risk factors e.g. Smoking, nutrition, stress

3.Selective scaling or root planing if indicated

4.Occlusal adjustment, if indicated

5.Use of systemic antibiotics, local antimicrobial agents, or irrigation procedures as necessary

6.Root desensitization, if indicated

7.Surgical therapy (or discontinuation of periodontal maintenance and treatment of recurrent disease), if indicated.

G. Communication

 1.Informing the patient regarding the current status of oral condition and need for additional treatment if indicated

2.Consultation with other health care practitioners who may be providing additional therapy or participating in the Periodontal Maintenance program.

H. Planning

1.For most patients with a history of periodontitis, recall intervals should be planed according to individual needs.

2.Based on the evaluation of clinical findings and assessment of disease status, PM frequency may remain the same, be modified, or the patient may return to mechanical, chemical, surgical and/or nonsurgical treatment.

RETREATMENT

Treatment implies "some procedure used to relieve or cure a disease" and Retreatment simply means treating "again, anew or once more". As periodontal disease tends to be chronic and "episodic", the retreatment aspect of patient care becomes a significant part of the maintenance program.[28]

Even after long periods of maintenance, there is a tendency for periodontal disease to recur. Good oral hygiene and adequate supportive care reduce the rate of relapse but do not eliminate it. Unfortunately, no available clinical tests can predict if or where the recurrent disease will occur.

Can the recurrent periodontal disease be totally prevented?

Not with present knowledge, but the occurrence and severity can be lessened with proper supportive periodontal treatment. All complex periodontal cases should have a thorough evaluation at regular intervals, the frequency being determined by the individual situation. This examination may take place once a year for a poor response patient and 2- 3 years for a stable case. The appointment for thorough evaluation should be scheduled at 2-3 weeks after a regular supportive periodontal treatment visit.

The regular, short "check" by the periodontist in typical supportive periodontal treatment is all too often too superficial to be of much value.

Reasons for Regression

- The most common cause of failure is the inability of the patient to keep the bacterial population of the crevicular areas at a permissible level. The first step to take in retreatment is to review the patient's oral hygiene regimen.
- Failure to smooth the involved roots during the original treatment is often a cause of pocket recurrence. Even a good brushing and flossing technique will not keep incompletely treated roots free of significant amounts of bacterial irritants.
- The choice of an improper surgical technique will usually result in a relative failure.

- Certain types of periodontal disease appear to have an occlusal factor that must be controlled. Equilibration, the control of bruxism, and possibly splinting must be accomplished in such cases before considering additional surgery.
- Further surgery performed before the occlusal factor is controlled and before the supporting tissue has had time to respond to occlusal therapy will accelerate the disease process.[21]

Criteria for Failure

A treated case that is failing, either generally or in certain areas, is characterized by one or all of the following symptoms:

1. Sulcus that bleed when probed. This probing should be done 1 to 2 weeks after a preventive treatment.
2. Sulcus get progressively deeper. This can be determined by comparing sulcus depth with the previous probing.
3. Bone loss. This can be determined by comparing old and new radiographs that have been properly taken with the paralleling technique.
4. Increased tooth mobility. Gradual increases in tooth mobility values should alert the therapist that the periodontium is undergoing destructive changes.

The recurrence of disease occurs due to the inadequacy of the original treatment or sometimes the clinician will encounter a new disease in a previously healthy area. Most problems occur, however, in previously treated sites. The clinical signs of breakdown are the same as those encountered before the original treatment. They are:

1. Periodontal pockets that bleed or show exudate when gently probed
2. Periodontal pockets that get progressively deeper
3. Alveolar bone loss (diagnosed by comparing radiographs obtained at different times)
4. Increased tooth mobility, and
5. Presence of plaque, gingivitis and subgingival calculus.[27]

According to Chace 1996 criteria for SPT are:

1.If clinical signs of recurring disease are slight, it is prudent not to make an immediate decision as to whether or not the patient needs retreatment.

The patient may be having a lapse in oral hygiene or perhaps be behind in supportive periodontal treatment visits. In such a case, the patient should be given an appointment in 2-3 weeks to see whether the clinical signs of breakdown are still present. Another session of oral hygiene efforts is all that is needed.

2.If the patient's oral hygiene is inadequate and, the original therapy was less than ideal.

The recurrent periodontitis is generally associated with mild gingival inflammation and edema, as well as a moderate increase of probing depth. Then only the oral hygiene maintenance by the patient is may not sufficient, i.e. after the second session the examination of the patient if the situation has not markedly improved, the patient may be referred for debridement and root planing in conjunction with access periodontal surgery.

3.If the patient's oral hygiene and general oral health are good but who present one or two isolated areas in which probing depths have increased 2 mm or more and gentle probing produces bleeding or exudate. The first step in the treatment of this type of breakdown is to debride the pocket with a fine, sharp current, irrigate the pocket and, in some instances, pack the area with a tetracycline hydrochloride fiber. If healing is incomplete and a surgical procedure is indicated, but the redebridement procedure is a valuable first step.

4.Recurrent disease in a segment of the dentition rather is another type of breakdown encountered in supportive periodontal treatment. If improved oral hygiene and additional scaling and root planing do not return the probing depths to an acceptable level, surgical flaps should be raised for access to more definitive debridement.

The optimal way to decide when to retreat would be to use a method that accurately predicts future attachment loss. Unfortunately, this sort of test does not exist.Two measurements are used: changes in clinical attachment loss (probing depth plus gingival recession) or probing depth alone and tissue signs, especially bleeding upon probing and suppuration.

Based on research work done by Lang and Tonetti 2003 guidelines for specific therapy decisions can be used for patients on supportive periodontal treatment. This approach has improved the communication between the dental hygienist and periodontist in one office for many years and is used as a basis for retreatment and instituting supportive periodontal treatment intervals.

Therapy Decisions Based on Probing Depths or Clinical attachment loss Changes For Patients With Plaque Associated Gingivitis or Chronic Periodontitis: [10]

Wilson & kornman.,1996
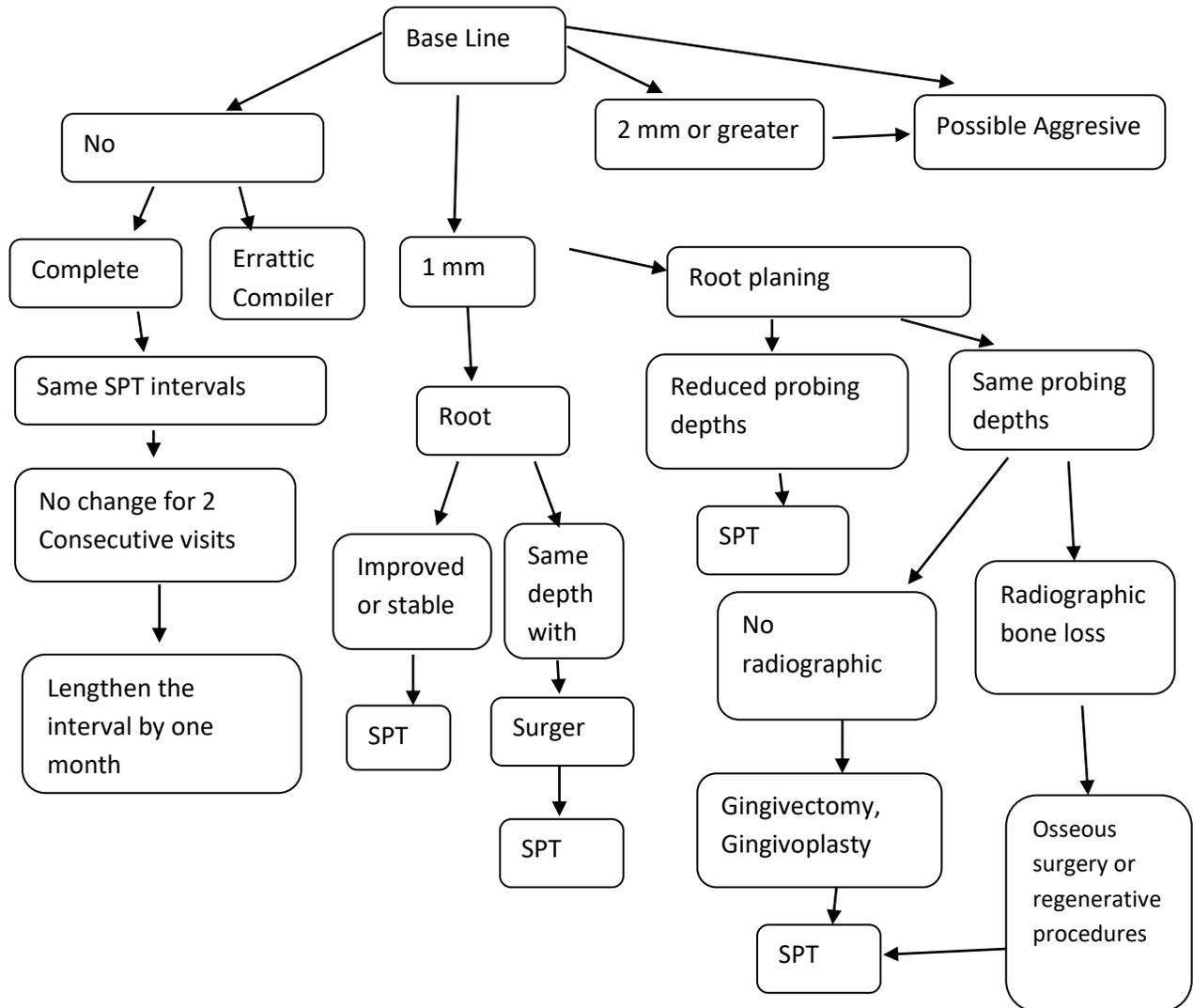
1. Baseline probing means:

 - The probing depths found at initial examination if no periodontal therapy is done; or
 - The probing depths found at least 1 year after periodontal therapy.

2. Surgery assumes that   :

 - Probing depths are 6mm or greater and there are signs
 - Root surface has been root planned as thoroughly as possible using closed methods;

- The patient is a good surgical candidate; and
- The patient is maintaining reasonable plaque control.

3. Gingivectomy/gingivoplasty assumes that:
- Through root planing will be done at surgery; and
- Soft tissues only are removed.

Therapy decisions For supportive Periodontal Treatment Patients Based On Bleeding upon Probing For Complete And Erratic Compliers (Assumes No Negative Probing Depth Changes) Wilson & kornman 1996
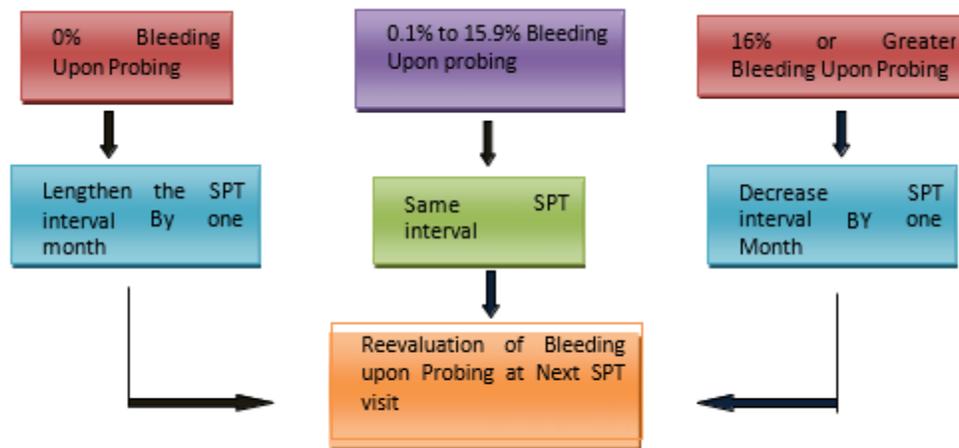
Root planing for patients with increased probing depths at maintenance:

Once the decision has been made to root plane in a setting other than at a routine supportive periodontal treatment visit, the following outline should be followed:
- Perform root planing with local anesthesia.
- Allow time for thorough cleaning (an hour per quadrant is average).
- Reinforce oral hygiene.
- Eliminate any fremitus on the involved teeth.
- If clinically or microbiologically appropriate, place the patient on an appropriate antibiotic (for up to 3 weeks) and chlorhexidine rinse (for at least 30 days).

Evaluate therapy at 30 days.[21]

Important clinical parameters for monitoring periodontal health during supportive periodontal treatment are:

- Loss of attachment of 2 mm or more and the associated deepening of the periodontal pocket or gingival recession
- Bleeding on probing
- Suppuration or exudate and
- Including the gingival recession, furcation involvement, caries, open contacts and status of occlusion and arch relationship, including any anomalies.

Less objective parameters to consider in determining whether retreatment is appropriate. The subjective parameters often incorporate the therapist's experience, emotions, and clinical savvy or intuition.

Included in this group of parameters are:

clinical history; loss of alveolar bone; crown-root ratio; increase in mobility; changes in the patient's immune system and response; effectiveness in daily removal of bacterial plaque; smoking; patient's age; root surface smoothness; evidence of calculus or root surface accretions; patient systemic disease or complications; patient medicines; patient compliance with treatment recommendations, including scheduling of supportive periodontal treatment visits; new clinical procedures; and ability to pay for professional services (either with insurance coverage, co-payment or fee for service).[10]

SUPPORTIVE CARE OF DENTAL IMPLANTS

All dental implants are at risk of developing peri-implant diseases as they are placed in the microbe-laden oral environment. Patients who have undergone successful implant therapy should receive individualized, systematic and continuous supportive care of the peri-implant tissues. Patients at higher risk for peri-implantitis, such as those with partially edentulous and pre-existing chronic periodontitis, should be identified and monitored closely.[29]

Following the restoration of an implant, the patient should be re-evaluated regularly (i.e., every 3 to 4 months) during the first year. After the first year, the response of the peri-implant tissues should be assessed, at which time the appropriate frequency of periodontal maintenance should be determined.

Assessment:

Updating of Medical and Dental Histories:

The assessment begins with updating the patient's medical and dental histories, to ensure that all concomitant conditions and therapies are known and to identify patients in high-risk categories.

1.Soft-Tissue Assessment:

Signs of gingival inflammation, such as redness, swelling, alterations of contour and consistency, aberrant gingival form or the presence of a fistula.

2.Plaque Index:

Plaque monitoring is performed and documented at every maintenance visit, to allow longitudinal assessment of oral hygiene.

Plaque indices commonly used for evaluating plaque on implants: [30]

O' Leary colleagues

% score = no. tooth surfaces with the plaque/ no. of tooth surface present b 100

Lindquist and colleagues

0=no visible plaque

1= local plaque accumulation

2= general plaque accumulation>25%

Mombelli and colleagues

0 = no visible plaque

1= plaque recognized by running probe over the smooth margin of the implant

2= visible plaque

3= abundance of soft matter

Rough-surfaced implants accumulate greater amounts of plaque than smooth-surfaced implants, which may increase the risk for peri-implantitis. Bacterial adhesion has also been shown to be influenced by surface roughness *in vitro*, with higher subgingival bacterial load occurring on rough surfaces.

3.Clinical Probing Depth:

Probing is an important and reliable diagnostic parameter in the longitudinal monitoring of peri-implant soft tissues

4.Bleeding on Probing:

A prospective study of implants confirmed that, similar to the situation for natural teeth, absence of bleeding on probing had high negative predictive value and thus can be interpreted to represent stability of the peri-implant soft tissues.

Gerber and colleagues demonstrated that 0.15 N of pressure might represent the threshold (i.e., minimum pressure) to avoid false-positive readings for bleeding on probing around oral implants.

5.Stability of the Soft-Tissue Margins:

Any apical migration of the gingival margin should be noted and monitored, even though there is no evidence that gingival stability is important for implant survival over the long term.

6.Mobility:

Mobility should be assessed either manually or by automated means such as the Periotest dental measuring instrument (Siemens, Bensheim, Germany) or the Ostell instrument (Ostell, Gothenburg, Sweden). If only one implant in a multiunit splinted prosthesis has mobility, the mobility may be masked. Therefore, it has been suggested that fixed, multiunit, retrievable

implant-retained prostheses be removed periodically to assess mobility, gingival health and hygiene status.

The cause of any mobility should always be ascertained, specifically whether it is due to failure of the prosthesis or failure of osseointegration. If the implant as a whole becomes mobile, it is deemed to have failed and should be removed.

7.Occlusion:

Eccentric guidance should be used to ensure optimal distribution of the potentially destructive effects of excursive occlusal parafunction. If technical complications occur, they should be treated accordingly. Parafunctional habits should be documented and treated since the application of excessive concentrated force can cause rapid and substantial peri-implant bone loss.

8.Bone Level:

If clinical signs suggest the presence of peri-implantitis, radiography of the site should be performed to confirm the diagnosis.

To facilitate the accurate reading of radiographs (should they be needed in the future), it is important to establish baseline bone levels after implant placement and again after insertion of the prosthesis.[30]

The precise interventions provided during supportive implant therapy visits will be determined by the findings obtained following a thorough examination of the peri-implant tissues and a careful assessment of the risk factors for peri-implantitis. A complete examination of the status of dental implants includes the same general steps performed during a routine examination of the natural dentition.

It is clear that biofilm forms rapidly on both smooth and rough implant surfaces.

It is critically important that a patient-specific program of professional care be established to prevent the development of microbe-associated peri-implant diseases.

The program should include:

Individual oral hygiene instructions; Control of relevant risk factors; and

Provision of professional preventive interventions, including maintenance care.

The primary goal of a program of supportive implant therapy is to prevent the development of peri-implantitis. This is especially important because once peri-implantitis occurs it is extremely difficult to treat. Indeed, there is no reliable evidence on the best way to treat this condition. It has generally been assumed that the best way to keep peri-implant tissues healthy is to place affected patients on a well-designed supportive implant therapy program that stresses excellent oral hygiene and periodic recall visits for professional removal of biofilm deposits from implant surfaces.

This approach has also been advocated for reversing the course of peri-implant mucositis. Several protocols have been proposed for supportive implant therapy programs but there is no consensus on what specific interventions are required for the best results.[29] The indication for the appropriate treatment strategy has been demonstrated in patient studies leading to the development of the "cumulative interceptive supportive therapy (CIST)" concept.[31,32]
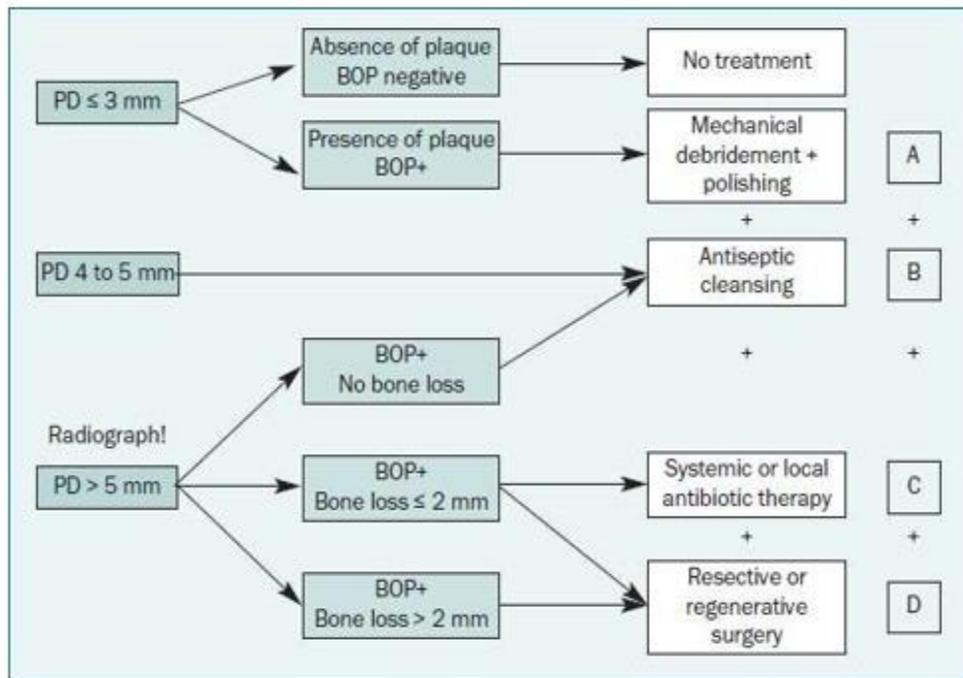
- In part A of the CIST protocol, typically initiated when plaque and BOP are present but PDs are 3mm or less, patients are re-instructed in oral hygiene and motivated to initiate and continue maintenance;
  Mechanical debridement is performed using non-metallic curettes; and polishing is done by using a rubber cup and nonabrasive polishing paste.
- Part B, when PDs of 4 to 5 mm are found, consists of antiseptic treatment. Here, chemical plaque control is performed using chlorhexidine digluconate, typically as mouthrinses with 0.1% to 0.2% chlorhexidine for 30sec using approximately 10ml, application of local chlorhexidine gel (0.2%), and/or local irrigation with chlorhexidine(0.2%), 2 times a day for 3 to 4 weeks.
- Protocol C, systemic or local antibiotic treatment, is initiated when PDs are greater than 5mm. in addition, radiography should be used to supplement clinical findings. Typical systemic treatment is with Ornidazole (1000mg, OD) or metronidazole (250mg, TID) for 10 days, or a combination of amoxicillin (375mg TID) and metronidazole (250mg TID) for 10 days.

Local treatment might include local application of antibiotics using a controlled-release device for 10 days, e.g: tetracycline fibers and minocycline microspheres.

Once treatment modalities A, B, and C have been completed, a surgical approach (D) may be considered. Surgical therapy for peri-implantitis should be performed in conjunction with systemic antibiotics and implant surface decontamination. If regenerative treatment is chosen, a barrier membrane technique alone or in combination with autogenous grafts and/or bone substitutes may be considered. Respective surgery may be considered when the peri-implant defect is not suitable for regenerative techniques.[33]

In 2004 it was modified and called AKUT-concept by Lang *et al*.[33] The basis of this concept is a regular recall of the implanted patient and repeated assessment of plaque, bleeding, suppuration, pockets and radiological evidence of bone loss.[34]

AKUT- Protocol by Lang *et al.*,2004 [33]		
Stage	Result	Therapy
	Pocket depth (PD) <3mm, no plaque or bleeding.	No therapy
A	PD<3mm, plaque and/or bleeding on probing.	Mechanical cleaning, polishing. Oral hygienic instructions
B	PD 4-5mm, radiographically no bone loss.	Mechanically cleaning, polishing, oral hygienic instructions plus local anti infective therapy(eg:CHX)
C	PD>5mm, radiographically bone loss<2mm.	Mechanically cleaning, polishing, microbiological test, local and systemic anti infective therapy.
D	PD>5mm, radiographically bone loss>2mm.	Resective or regenerative surgery.

SUMMARY

Supportive Periodontal Treatment is the group of procedures performed at selected intervals to assist the periodontal patient in maintaining oral health. Formerly referred to as recall maintenance, preventive maintenance or supportive periodontal therapy, this periodic assessment is established following the initial active periodontal therapy and it includes an update of the medical and dental histories, extra-oral and intra-oral soft tissue examination, dental examination, periodontal evaluation, radiographic review, removal of the bacterial flora deposits from crevicular and pocket areas, scaling and root planing where indicated, polishing of the teeth and a review of the patient's plaque control efficacy. These procedures aim to prevent the recurrence and progression of periodontal disease and to prevent or reduce the incidence of tooth loss.1

Several investigations have indicated that only a minority of periodontal patients comply with the prescribed supportive periodontal care. Wilson & crouch 1987 indicated that a complete compiler group retained more teeth than did erratic compliers. Miyamoto *et al* 2006 suggested that the progress and recurrence of periodontal disease can be prevented in complete compliers by using SPT whereas Ramfjord *et al* 1982 suggested that periodic SPT can prevent the recurrence of periodontal disease even in patients with poor oral hygiene.

Paramount to the success of the supportive periodontal treatment program is communication with the patient about the state of his or her periodontal health. Assessment of disease status by reviewing the current clinical and radiographic examination findings compared with baseline is important. The word "care" must always be an integral part of the health care profession. It has been stated that the "C" in "care" stands for concern, the "A" for availability, the "R" for 62 being responsive to the needs of the patient and the "E" for equitable. A service or treatment (such as the supportive periodontal treatment visit) must be performed in such a way that the cost is equitable to the patient and the health care provider.

To improve compliance, the demands on patients can be simplified by pre appointing the next supportive periodontal treatment visit before the patient leaves the office, seeking out the patient''s concerns and acting upon them, maintaining good records and communication with the patient and others involved health care professionals, informing the patient of the consequences of noncompliance, attempting to identify noncompliers before corrective treatment is necessary

and continuing to offer positive reinforcement and support to the patient on their periodontal status. In short, excellence is the goal of a supportive periodontal treatment program: taking exceptional care of patients and constantly innovating treatment care with new ideas and services.

A successful long-term maintenance program is based on semantics and good communication. This involves: 1) informing the patients of their current periodontal status and any alterations in treatment, if indicated; 2) consultation with other health care providers who will be providing additional dental care or participating in the supportive periodontal treatment program, and 3) future planning. For patients with a history of active periodontitis, visits at 3-month intervals are recommended. However, the scheduling of future patient supportive periodontal treatment visits should be based on the evaluation of clinical findings and assessment of disease status. Supportive periodontal treatment visit frequency may be modified, or the patient may be returned to active treatment. The success of any supportive periodontal treatment program is based on periodic evaluation and appropriate retreatment if indicated. The ultimate goal of treatment is the preservation of the dentition in health and function.

Dental implants require constant maintenance and monitoring, which further involves assessment of the patient's general and oral health, professional implant maintenance, and diligent patient home care as critical factors that will ensure the long-term success of implants and a predictable replacement for natural teeth.

CONCLUSION

Periodontal disease has a greater tendency to recur for which careful maintenance is as important as skilful original treatment. Active and supportive periodontal treatments are the two faces of the same coin. All complex periodontal cases should have a thorough evaluation at regular intervals, the frequency being determined by the individual situation. Adequate steps should be taken to ensure that the patients understand their disease, the treatment options available, and the consequences if appropriate treatment is not done.

A serious limitation in the clinical application of adjunctive therapy or different time intervals in Supportive periodontal therapy is the lack of clear guidelines and protocols, as pointed out by many authors. Further knowledge regarding susceptibility and progression of periodontal disease in a specific site, based on individual patient risk factors will ensure optimal outcomes and cost-effective institution of a Supportive periodontal therapy regime.

Greater attention should be given to the methodology used to assess Supportive periodontal therapy. Duration of follow-up is of paramount importance when adding adjunctive treatments to Supportive periodontal therapy, as many adjuncts demonstrate short-term effectiveness but fail to demonstrate long-term improvement in clinical outcomes. Studies should focus on the clinical significance of results, in order to place the effectiveness of adjunctive therapy in perspective.

So it can be concluded from clinical studies in dental institutions and private practices, that periodontal therapeutic success is underpinned by an ongoing program of Supportive periodontal therapy. This encompasses systematic and regular monitoring of periodontal parameters in order to detect and intercept any new or recurrent disease. Individual variations to disease susceptibility will determine the frequency and level of professional input required.

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