Dental Risk and Disease Assessment

Good dental health can be described as the absence of disease, disorder, and injury from the teeth and its supporting structures. The two most common dental diseases are caries (e.g., decay or cavity) and periodontal disease (e.g., gingivitis and periodontitis). The former affects the teeth and the latter affects the supporting structures of the teeth (e.g., jaw bone) where symptoms for each entity include pain and swelling. Nearly all tooth loss is attributable to caries and periodontal disease\(^1\)\(^2\). In addition to these two diseases, developmental aberrations, trauma, disease effects, and habits may cause abnormal jaw dimensions, tooth position, or tooth wear resulting in dysfunction or an unattractive appearance. Diagnosis describes the current status as health, disease, or other abnormality whereas risk describes the likelihood that a disease or abnormality will occur when there is health or worsen when a disease or abnormality exists. Treatment interventions are determined from and correlate to the diagnosis and risk where the intervention can be categorized as reparative or preventative or both. In addition to the professional evaluation of dental health, a patient can describe their oral status in terms of comfort, function, and appearance (e.g., Oral Health Quality of Life). Hence, oral health status is multidimensional resulting in many ways to assess and describe it. A highly efficient means to describe oral health status is with numbers, especially when blood pressure, BMI, blood sugar, cholesterol, T score, and other scores are commonly used and easily understood. These measures of health status have a range of values where sub-ranges can be defined as normal, higher than normal that is indicative or predictive of a pathologic medical condition, and lower than normal that is indicative or predictive of a pathologic medical condition. For example Figure 1A lists the blood pressure ranges for normal, prehypertension, stage I hypertension, and stage II hypertension. Hypotension is not as clearly defined, but may be exist when systolic <90 mmHG or diastolic < 60 mmHG. Figure 1B illustrates the correlation of treatment interventions to hypertension. Another example is BMI, which is a measure of body fat where the categories
listed in Figure 2 include underweight, normal, overweight, and three categories of obese. Obesity predisposes to various diseases including cardiovascular diseases, diabetes, sleep apnea and osteoarthritis. The third example is blood sugar, which is used to diagnose diabetes, impaired fasting glucose (IFG), and impaired glucose tolerance (IGT). (Figure 3A) Blood sugar measured as plasma glucose and HbA1c values is used to determine the effectiveness of treatment interventions. (Figure 3B) The multidimensionality of oral status indicates that several scores would be required. The desirable characteristics of each score should include: accurate and consistent, understandable, indicative of treatment needs, indicative of improved or worsened status, indicative of treatment effectiveness, differentiate a normal never-diseased from an ever diseased individual, and categorization of the severity of the illness. PreViser has developed scores that fulfill these characteristics for the dentition and periodontium with scores for the occlusion (e.g., function) and oral health quality of life in development. The scores are components of the patent protected Oral Health Information Suite (OHIS™).

The Dentition and the Optimal Number of Teeth
Teeth first appear in the mouth around the sixth month of life. By the third year all of the primary teeth have erupted where twenty primary teeth comprise the dentition. (Figure 4) Between six months and three years the number of visible teeth increases from 1 to 20. At approximately the age of six years the permanent first molars erupt behind (e.g., distal) the primary second molars increasing the number of visible teeth to twenty-four. (Figure 5) Between the age of six and twelve years the primary teeth are shed with the permanent teeth erupting into the vacated space. During this period the dentition is comprised of a decreasing number of primary teeth and an increasing number of permanent teeth. During the process of shedding and eruption, the number of visible teeth will fall and rise. By the age of 13 years, all of the primary teeth have been replaced with permanent teeth and the permanent second molars have erupted bringing the total number of teeth in an adult dentition to 28. The four permanent
third molars (e.g., wisdom teeth) may be congenitally absent, they may fail to erupt (e.g., remain impacted), or they may erupt into the dentition. These four teeth typically are not needed and they are frequently extracted. Sometimes the teeth are too large for the size of the jaw resulting in crowding and misalignment, which may be treated with a combination of selectively extracting certain teeth (e.g., all four first premolars) and aligning the remaining teeth with orthodontic appliances. Hence the optimal number of teeth for a specific patient’s dentition varies with patient age and jaw size. While the optimal number of teeth for most adults is 28, 24 or fewer are optimal for some adults.

**Caries**
Upon eruption of a tooth into the mouth, dental caries becomes possible. Dental caries is a disease that affects a tooth, which is repaired by restorative treatment, when possible. When the loss of tooth structure is severe because of caries or fracture, the tooth may be extracted. Caries may cause tooth loss at any age. Other causes of tooth loss include periodontitis and traumatic injuries. Periodontitis accounts for a large percentage of lost teeth, but not until age 40 years. Traumatic injuries account for a small percentage of lost teeth and can occur at any age. Prosthetic tooth replacement is indicated when the number of visible teeth is less than the number of teeth that are necessary. Prosthetic tooth replacement increases with age but accounts for a low percentage of treatment interventions prior to age 19 years. Therefore a description of a dentition requires independent descriptions of the status of the individual teeth and the collective group of teeth with the former needed for all ages and the latter by age 19 years.

**A Dentition Score**
Various descriptions of a dentition that have been used in dental research include DMFT, DMFS, SiC, and ECSI. DMFT, the most widely used index, describes the prevalence of teeth affected by dental caries in an individual. It is calculated by adding the number of decayed (D), missing (M), and filled (F) teeth
The score range is 0 to 28. The score and its component measures are used by public health organizations to determine dental status and treatment needs for a population. DMFT does not decrease with treatment. The only direction it can move is higher as the index increases with each tooth newly decayed or missing or filled. DMFT and the other indices were not intended and do not have clinical applicability for the individual patient. And no index exists for missing teeth that has clinical applicability for the individual patient.

Dental caries is site-specific, which means that a dentition may have multiple independent sites of disease and multiple independent treatment interventions. Severity is a term that can be used to describe the linear extension from the enamel surface to the pulp chamber (Figure 6) or the configuration of a carious lesion in three dimensions. While dentists use severity to plan treatment, no standard clinical method exists to measure severity and documentation is typically lacking. Extent is the term used to describe the number of carious lesions in a dentition. However, dentists typically describe the status of the patient’s dentition merely by the number of teeth with caries and the number of teeth that need to be replaced. While these numbers decrease to zero when treatment is applied they do not have the scope of meaning and utility that exists for blood pressure, blood sugar, BMI, cholesterol, and T score. The values associated with these entities are used to describe health status, treatment needs, and the effectiveness of treatment interventions. A dentition score with similar attributes would be expected to improve the patient’s understanding of their oral health condition, to enhance the patient’s participation in the management of their oral health, and in the dentist’s management of oral health services resulting in better health outcomes. PreViser’s dentition score consists of a caries score and a prosthetic score making it similar to blood pressure, which is comprised of systolic and diastolic measures. The caries score describes the dentition by the status of the individual teeth (e.g., caries and restored teeth) and the prosthetic score describes the dentition by the status of the collective group of teeth (e.g., missing, natural, and prosthetic teeth). Both
scores are calculated using the clinical observations of a dentist made during the examination of a patient. (Table 1)

The PreViser Caries Score, a Component of PreViser’s Dentition Score
The caries score is a measure of extent and does not include a measure of severity. A restored tooth is a tooth that has a filling or cap (crown). A score of 1 means that the visible teeth have never had decay or been restored. Scores from 2 to 9 mean that all of the visible teeth that had decay have been restored and where higher scores correlate to a larger percentage of restored teeth. Scores within the range of 10 to 100 mean that decay exists and restorative treatment is needed where higher scores correspond to more severe conditions and higher restorative treatment need. For scores 10 to 99 the ten's digit reflects the increasing percentage of carious teeth and the unit's digit is the increasing percentage of restored teeth. A score of 100 represents the most severe condition and highest need. The caries score will decrease upon the completion of all needed treatment to a score in the 2 to 9 range based on the percentage of restored teeth. Furthermore, a tooth that is extracted as an alternative to restorative or periodontal treatment will be captured in the prosthetic score. By using both caries and prosthetic scores to describe a dentition’s status a decrease in the caries score that results from tooth extraction will result in an increase in the prosthetic score.

The PreViser Prosthetic Score, a Component of PreViser’s Dentition Score
The prosthetic score describes the status of the dentition in terms of prosthetic tooth replacement. Tooth replacement methods include removable appliances (e.g., partial and full dentures), non-removable appliances (e.g., bridge), and single tooth replacement implants. The score 1 means that the dentition has the optimal number of natural teeth. Scores from 2 to 9 mean that the dentition has been completely repaired with higher scores indicative of a larger percentage of teeth that needed to be replaced to achieve a dentition that is optimal for the patient. Scores within the range of 10 to 100 mean that prosthetic treatment is
needed. Higher prosthetic scores correspond to more severe conditions and higher prosthetic treatment need. For scores 10 to 99, the ten’s digit reflects the increasing severity of tooth loss and the unit’s digit is the increasing magnitude of current tooth replacement need. A score of 100 represents the most severe condition and highest need. The prosthetic score will decrease upon the completion of all needed treatment to a score in the 2 to 9 range based on the percentage of teeth that needed to be replaced.

**Dentition Score Examples**
Table 2 includes 14 examples for 5 fictitious patients.

**Patient A**
Example 1 describes the dental conditions at an initial examination for patient A, a 52-year old male. At this examination there are 27 visible teeth in jaws that optimally could accommodate 28. 5 of the visible teeth have a restoration where 2 teeth are restored with a crown that serve as abutments for a bridge and 3 teeth have a filling. The filled teeth include the upper left second molar, the upper left first premolar, and the lower right first premolar. Caries exists for the upper left second molar and lower right first premolar. The missing tooth has been replaced with a 3-unit fixed bridge (e.g., 1 fixed prosthetic tooth). In this example the caries score is 13 and the prosthetic score is 2. Patient A is subsequently treated, which consisted of extraction of the upper left second molar and a new restoration for the lower right first premolar. The new values and scores following treatment are: 28 optimal teeth, 26 visible teeth (e.g., the upper second molar was extracted reducing the number of visible teeth from 27 to 26), 4 restored teeth (e.g., the restored upper second molar was extracted reducing the number of restored teeth from 5 to 4 and the re-restoration of the lower right first premolar results in no net change in restored teeth), 0 carious teeth (e.g., all carious lesions were treated), 1 fixed prosthetic tooth, and 0 removable prosthetic teeth. As a result of treatment the caries score is reduced from 10 to 3, which is indicative of a fully restored condition. The prosthetic
score is 10, which is indicative that prosthetic tooth replacement for the extracted upper second molar is needed. In example 2 the optimal number of teeth is 28. When the upper second molar is not needed, as may occur for some patients, then the number of optimal teeth would be 27 instead of 28. Hence if patient A did not need the upper second molar, then the prosthetic score would be 2 as shown in example 3. In this situation the dentition is repaired to an optimal state and no prosthetic treatment is needed.

Patient B
Sometimes the teeth are too large for the size of the jaw resulting in crowding and misalignment. This situation describes patient B who had four first premolars extracted for orthodontic treatment. In example 4, there are 24 visible teeth, 8 teeth have been restored, and no tooth has caries. In this example the caries score is 4 and the prosthetic score is 1. During a subsequent examination, patient B is found to have developed caries in 2 un-restored teeth and 1 restored tooth, as shown in example 5. The three new carious lesions results in an increase in the caries score from 4 to 24, indicative of treatment need. When restorative treatment is completed, as shown in example 6, the caries score will decrease to 5. Since treatment included restoring two teeth previously not restored, the number of restored teeth increased from 8 to 10 resulting in the caries score to increase from 4 to 5 as can be seen by comparing example 4 with example 6.

Patient C
Prosthetic tooth replacement may be categorized as removable, non-removable, and single tooth replacement implants. Removable prostheses include partial and full dentures. While an abutment tooth for a removable partial denture may be utilized, the tooth may or may not be restored. However, a bridge, which is a non-removable prosthesis, commonly requires a crown (e.g., restoration) for each abutment tooth. The replacement of a single missing tooth with a bridge typically includes a crown for each of two abutment teeth and one (fixed)
prosthetic tooth. The replacement of a single missing tooth can be accomplished without the need for a crown for any visible teeth by utilizing a single tooth replacement implant. The combination of caries and prosthetic scores can capture the difference between a bridge and implant as exemplified by patient C. Example 7 is the situation where each of two missing teeth is replaced with a 3-unit fixed bridge, which includes a crown for each of the 4 abutment teeth and 2 prosthetic teeth. This results in 3 for the caries score and 2 for the prosthetic score. These scores can be contrasted with example 8 where the two missing teeth are replaced using the single tooth replacement method (e.g., 2 single implants each restored with a crown). Since no natural teeth need to be restored for this method, the caries and prosthetic scores are 1 and 2, respectively. In both situations the dentition is repaired to an equivalent optimal status. However, the use of crowns in example 7 by virtue of four crowns is not equivalent to the never diseased or restored dentition in example 8. While the caries and prosthetic scores cannot differentiate between fixed and removable prosthetic teeth, these independent observations could be used as a means of differentiation of prosthetically repaired dentitions.

**Patient D**
A patient may have many restored teeth and continue to be at very high risk for caries, as represented by patient D. Example 9 describes the situation where all 28 teeth needed for an optimal dentition are present, 22 teeth have been restored, and 6 of the restorations are defective with caries. The caries and prosthetic scores for this situation are 29 and 1, respectively. Should the patient elect to extract the 6 teeth with caries, the caries score would reduce to 8 but the prosthetic score would increase to 39, as shown in example 10. However, replacement of the 6 extracted teeth with a removable partial denture would reduce the prosthetic score to 3, as shown in example 11. Examples 9, 10, and 11, highlight the use of the scores to document treatment need where the examples include 29 for a caries score and 39 for prosthetic score, completion of needed treatment where the examples include a reduction in the caries score
from 29 to 8 and prosthetic score from 39 to 3. This set of examples also shows that merely extracting teeth to reduce the caries score (e.g., 29 to 8) will result in an increase in the prosthetic score (e.g., 1 to 39 or 3).

Patient E
An adolescent may be temporarily missing teeth as permanent teeth do not instantaneously erupt to take the place of primary teeth as they are shed. Prosthetic tooth replacement increases with age but accounts for a low percentage of treatment interventions prior to age 19 years making the prosthetic score unnecessary until the age of 19 years is attained. The caries score describes the dentition in terms of the visible teeth affected by decay and therefore is applicable when the dentition is comprised of only primary teeth, primary and permanent teeth, and only permanent teeth. An example of this situation is patient E, a 10-year-old female who has 10 primary and 14 permanent teeth. At the initial examination, listed in example 12, six of the primary teeth have a restoration and two of the permanent teeth have caries, which results in a caries score of 14. Immediately following treatment where both carious lesions are restored, the caries score reduces to 4. Two years later when the natural eruptive process results in replacement of the six restored primary teeth with never-curious and never-restored permanent teeth the caries score reduces to 2.

The PreViser Caries Risk Score
The caries risk score predicts the potential for caries at a future time. Risk, which is distinct from disease including its signs and symptoms, is determined by risk factors. Caries risk is described on a three-point scale where low risk is 1, moderate risk is 2, and high risk is 3. Preventing caries requires treatment that reduces the influence of the patient’s risk factors for caries and negates the potential. Furthermore, higher risk requires more powerful and/or more frequent preventative treatment interventions to prevent caries. For example, treatment interventions for a patient with high risk might include professional fluoride
application, nutritional counseling, sealants, oral hygiene instruction, and 3-month recall. A patient with low caries risk may only need recall at a 12 month or longer interval. The recall interval can be determined from the risk and dentition scores. For example:

- A low risk patient that never had caries or lost a tooth may be managed using a recall interval range of 12 to 18 months.
- A low risk patient with a caries score 2 and that never lost a tooth may be managed using a recall interval range of 9 to 18 months.
- A moderate risk patient that never had caries or lost a tooth may be managed using a recall interval range of 6 to 12 months.
- A moderate risk patient with a caries score 2 and that has lost a tooth may be managed using a recall interval range of 3 to 9 months.
- A high risk patient regardless of dentition score may be managed using a recall interval range of 3 to 6 months.

Caries risk is determined from one of seven algorithms where the appropriate algorithm is selected based on tooth eruption and age. Requisite information is dependant on the algorithm and includes one or more of status of the tooth type most recently exposed to saliva for 12 months, months caries free, oral hygiene status, fluoride exposure, snack frequency, fixed orthodontics, dry mouth, and major health changes.

In the context of caries, risk predicts caries and caries precedes tooth loss. The risk, caries, and prosthetic scores accurately describe their respective condition, which can be used to plan appropriate treatment and measure the effects of treatment. The three scores provide a means to monitor oral health, manage restorative, prosthetic and preventative treatment needs, and engage the patient in their care. In addition to these three scores, two report versions are produced, which includes the scores and a list of treatment interventions to aid the dentist and patient in selecting the desired course of action. Only the patient version includes an explanation of the scores. (Report 1) Only the dentist version
includes the input data. (Report 2) A practice analysis report (PAR) is also available that describes the collective conditions and restorative and prosthetic needs for the patients of a dental practice. (Report 3) This report includes the mean scores, the restorative and prosthetic needs by number and dollars, and the distribution of patients by risk score and dentition score. The PAR can also be utilized to measure the effectiveness of treatment for the same group of patients for a range of dates by calculating the change in value for each measured entity.

**Periodontal Disease**

Upon eruption of a tooth into the mouth, periodontal disease becomes possible. The most common types of periodontal disease are gingivitis and chronic and aggressive periodontitis. Gingivitis and periodontitis are inflammatory diseases caused by specific bacteria, where the most common sign of inflammation is bleeding on probing. These two diseases are distinguished by the loss of attachment, which is a histologic characteristic that is denoted by the pathologic detachment of the collagen fibers from cementum, apical migration of the junctional epithelium, and bone loss. The diagnosis of periodontal disease is based almost entirely on clinical and radiographic assessments where the most common include probing pocket depth (PPD), clinical attachment level (CAL), radiographic pattern and extent of alveolar bone loss (RB), and bleeding on probing (BOP). PPD is the distance from the gingival margin to the base of the gingival sulcus or periodontal pocket. CAL is the distance from the cemento-enamel junction (CEJ) or another distinct landmark to the base of the sulcus or periodontal pocket. (Figure 7) CAL is a more accurate indicator of the attachment level and hence the history of disease, disease progression, and treatment effects than PPD. Furthermore, the American Academy of Periodontology (AAP) defines periodontitis severity on the basis of the amount of clinical attachment loss and it is the gold standard for research. However, probing pocket depth and the radiographic pattern and extent of alveolar bone loss, but not clinical attachment level, are predictors for disease progression and
indicators for treatment in addition to determining current disease activity. Because it is cumbersome and time consuming to measure and is not a criterion of risk assessment or treatment planning, CAL is rarely used in clinical practice. Unfortunately while clinicians measure PPD and not CAL the substitution of PPD for CAL cannot be done as PPD does not correlate to CAL past middle age. Also, clinicians typically have radiographs, which can be used to measure bone height. While bone height is generally accepted as a more accurate measure of periodontitis severity than pocket depth it does not correlate well to CAL. This is because 30% to 50% demineralization must have occurred to be observed on a radiograph, which may result in an under-estimate of the amount of bone loss, especially during active disease progression\textsuperscript{7,8,9}. However, the quantification of a dentition’s periodontal status using PPD and RB has been shown to correlate accurately to actual status and therefore the combination could be used as a surrogate to CAL to describe the dentition’s loss of attachment\textsuperscript{10}.

**Measurement Variation**

A diagnosis is made and treatment determined from CAL, PPD, and RB measured in 1 mm increments. However, the measurement of CAL and PPD has been shown to only be accurate to within a 2 mm range of +1 mm to -1 mm 90% of the time when done by calibrated and experienced clinicians\textsuperscript{7}. Since the average clinician is not calibrated a greater variation when measuring CAL and PPD would be expected. The causes for the inaccuracy and variation in measurements include probe design, probing force, probing position, probing angulation, pocket depth, and inflammation\textsuperscript{11}. While the distance from the cemento-enamel junction to crestal bone can be measured on a radiograph, the true condition may not be accurately revealed because a radiograph is a 2-dimensional image of a 3-dimensional entity and demineralized bone is below the threshold of radiographic sensitivity. Because of the inaccuracy and variation of clinical measurements for CAL and PPD and the limitation of radiographic images, evidence of disease progression typically requires a change of 2-3 mm. Therefore, diagnostic categorization and decision making would be more
consistent and accurate when they are based on a 2mm instead of a 1mm increment.

**Current Terminology**

In contrast to gingivitis, periodontitis is characterized by severity and extent. Severity for periodontitis is more easily determined than caries severity. The American Academy of Periodontology defines severity on the basis of the amount of clinical attachment loss (CAL) at a site where mild is 1-2mm CAL, moderate is 3-4mm CAL, and severe is greater than or equal to 5mm CAL. Extent is not defined the same for periodontitis and caries. Extent for caries is the number of carious lesions or teeth. Extent for periodontitis is the proportion of sites with disease and can more specifically describe the proportion of sites with each severity category. Hence periodontal status can be described as localized or generalized for extent along with health, gingivitis, mild, moderate, and severe periodontitis to describe severity. A representative list of descriptions for periodontal status is shown in Table 3.

The description of periodontal status (e.g., diagnosis including severity and extent) is extraordinarily complicated and a mathematical nightmare since periodontal disease is a multi-site condition (e.g., 6 sites per tooth yields 168 sites for a 28-tooth dentition). Hence periodontal status is the collective diagnoses for 168 sites. A single tooth, which typically includes measurements of CAL at six sites, serves as an example of the challenge to unambiguously describe periodontal status. Application of the AAP definition yields an accurate description when CAL is 3mm for all 6 sites (e.g. generalized moderate periodontitis). However, another tooth where CAL is 3mm at 2 sites and CAL is 0mm at 4 sites is also generalized moderate periodontitis. Alternative methods including average and maximum CAL cannot distinguish a tooth where CAL at 5 sites is 0mm and CAL at 1 site is 6mm from a second tooth where CAL at 4 sites is 0mm and CAL at 2 sites is 3mm from a third tooth where CAL at 6 sites is 1 mm. All three teeth have an average CAL of 1mm, which is associated with mild
periodontitis. Using the maximum value of CAL, the first tooth would be described using the term severe periodontitis, moderate periodontitis for the second tooth, and mild periodontitis for the third tooth.

A limitation of the current convention is further exemplified by the tooth with 1 healthy site, 1 site with gingivitis, 1 site with mild periodontitis, 2 sites with moderate periodontitis, and 1 site with severe periodontitis. Of the seventeen choices in Table 3 none is a perfect match and clinicians may use one of four as a close approximation (e.g. localized mild and severe periodontitis, localized severe periodontitis, generalized moderate to severe periodontitis, and generalized moderate and localized severe periodontitis). Expanding the text terminology list becomes impractical and of no utility since 210 different combinations of severity exists for a single tooth. Another example of a limitation of the current convention is an individual with an initial diagnosis where in spite of subsequent improvement or deterioration may have no accompanying change in diagnosis. The complexity of this issue is magnified by the possibility that a deteriorated periodontal disease state may have occurred due to advancing disease at existing disease sites or additional sites that have become diseased or some combination of these two situations. While these examples use a tooth, they apply equally to a six-sextant dentition, as each is comprised of six portions.

A score that describes the severity and extent of periodontal disease that meets the score characteristics described previously would be expected to improve the patient’s understanding of their oral health condition, to enhance the patient’s participation in the management of their oral health, and in the dentist’s management of oral health services resulting in better health outcomes. PreViser’s periodontal disease score fulfills these characteristics.

PreViser’s Periodontal Disease Score

The periodontal disease score is an expression of the proportion of sextants with each possible severity diagnosis (e.g., health, gingivitis, mild, moderate, and
severe periodontitis) that accurately describes periodontal status by the collective contribution of the sextants. PreViser’s disease score was shown to be accurate and valid by the statistical strength of agreement with actual periodontal status determined using values of alveolar bone height obtained from digitized radiographs. The disease score ranges from 1 to 100 where a score of 1 means every sextant is healthy and a score of 100 means that every sextant has severe periodontitis. The disease scores are not equally allocated amongst severity categories due to the method of calculation. For example, health has a score of 1, gingivitis 2-3, mild periodontitis 4-10, moderate periodontitis 11-36, and severe periodontitis 37-100. Since the disease score incorporates a count of sextants with a specific disease severity, these 5 basic categories can be doubled to 10 as shown in Table 4.

The disease score is determined by bleeding on probing, pocket depth, and bone loss, as they are routinely assessed and used to plan treatment. Measurements for pocket depth and radiographic bone height utilize categories in three levels for clinical efficiency and accuracy of measurement, for their precision to determine treatment needs, their sensitivity to change and accuracy to describe the clinical situation. For example, pocket depth categories are <5mm, 5-7mm, and >7mm. While a 3mm probing depth is considered normal, 4mm falls within the measurement variation described previously and therefore a 4mm pocket may be healthy whereas a pocket 5mm is probably diseased. The next greater measurement that is clearly worse than 5mm is >7mm as the pocket depth is more than 2mm deeper. Bone height categories are <2mm, 2-4mm, and >4mm. Similar to pocket depth, the normal distance of the bone crest from the CEJ is 1 to 2 mm. When the distance is greater than 2mm bone loss is likely to have occurred and when the distance is >4mm the loss of bone is definitively worse compared to when it was at the 2mm level.
PreViser’s Periodontal Risk Score

PreViser’s periodontal risk score predicts the potential for future periodontitis (e.g., loss of attachment) including tooth loss due to periodontitis. The risk score was determined to be valid and accurate by comparing the risk prediction to bone loss and tooth loss during a 15 year period\textsuperscript{12,13}. Risk, which is distinct from disease, is determined by risk factors. The information that is required to calculate the risk and disease scores includes: patient age, frequency of dental visits, smoking history, diabetes status, oral hygiene status, history of pocket-reducing periodontal surgery, pocket depth, bleeding on probing, restorations below the gingival margin, root calculus below the gingival margin, radiographic bone height, furcation involvements, and vertical bone lesions\textsuperscript{12,13,14,15}. (Table 5) The risk score ranges from 1 to 5 where 1 is very low risk, 2 is low risk, 3 is moderate risk, 4 is high risk, and 5 is very high risk. Preventing periodontal disease requires treatment that reduces the influence of the patient’s risk factors and negates the potential. Furthermore, higher risk requires more potent treatment interventions and preventative interventions that are more powerful and more frequent to manage and/or prevent periodontal disease.

An Example of Periodontal Risk and Disease Scores

An example of the scores can be illustrated for a 39-year-old patient who smokes a pack a day. (Figure 8) At the initial examination 6mm pockets were observed for the maxillary right and left posterior sextants. Bleeding occurred on probing for every sextant except the maxillary anterior. Bone loss was limited to the sites where deep pockets were found. At these sites the crestal bone was 3mm from the CEJ. Subgingival calculus was prevalent and the margins of several restorations were subgingival and contributed to the inflammation. Oral hygiene was unacceptable. The risk and disease scores were 4 and 21, respectively. While the patient declined periodontal therapy, the subgingival calculus was removed during the recall visits, which occurred every 6 months. One year later a new assessment revealed the risk and disease scores were 4 and 25. The increase in disease score was due to the deepening of the pockets in the
mandibular right sextant to 5mm. While the risk remained high and unchanged, the disease score increased consistent with progressive worsening of periodontitis. At this time the patient commits to treatment. Scaling and root planing was performed and several restorations were replaced. However, some sites did not respond satisfactorily to the non-surgical treatment and periodontal surgery was done. The reparative periodontal treatment is followed with periodontal maintenance every 3 months. Three years later the risk and disease scores were 4 and 6. While treatment resolved the pockets and defective restorations, the patient continued to smoke a pack a day. However by the next year the patient quits smoking, which reduced the risk to 3.

This example can be used to illustrate the influence of risk on treatment selection. Scaling and root planing plus surgery were needed for this high-risk patient. Had the patient been low risk, it is less likely that surgery would have been needed. The recall interval is also dependent on risk. By having moderate periodontitis (e.g., disease score 25) and high risk (e.g., risk score 4), the preferred recall interval is 3 months. However by reducing risk to moderate (e.g., risk score 3) and the disease score to 6, a recall interval between 4 and 6 months might be selected.

**Patient and Practice Management**

In the context of periodontitis, risk predicts periodontitis and periodontitis may result in tooth loss. The periodontal risk and disease scores accurately describe their respective condition, which can be used to:

1. Create consistency within a practice to accurately identify patients with periodontitis. PreViser requires that the collection and measurement of clinical observations follows a standard method where the information is objectively translated into a score that has the same meaning for every patient with a similar set of clinical conditions. By using a three-level categorization of PPD and BH consistently accurate measurements are
made minimizing variation that would result in some risk assessments and diagnoses being erroneous.

2. Establish a protocol for patient flow. A sample protocol is provided in Figures 9A-D.

3. Plan appropriate treatment. Two report versions are produced to aid the dentist and patient in selecting the desired course of action. The reports are a concise summary of a patient’s periodontal status, which is not easily derived from a comprehensive periodontal charting as illustrated in Figures 10A-B. The reports include a list of reparative and preventative treatment interventions categorized by condition and ranked by expected level of effectiveness to aid the dentist and patient in the selection of treatment. (Reports 4 and 5) Treatment of periodontal disease includes repair and prevention where a treatment intervention may have characteristics of both. Periodontal treatment need is based on the patient’s unique combination of clinical conditions and risk level where clinical conditions (e.g., pockets, bone loss, furcation involvements, etc.) are the target of reparative treatment interventions and risk factors (bacterial plaque, smoking, diabetes, pockets, bone loss, furcations, etc.) are the target of preventative interventions. Treatment that reduces the depth of pockets is reparative and preventative. Improvement in periodontal status can result in lower disease and risk scores, as pocket depth is used to determine both scores. The lowest disease score for a patient who has bone loss will range from 4 to 10 since bone loss is typically permanent. Hence, the two scores provide a means to monitor oral health, manage periodontal status, and engage the patient in their care. Since the disease score only describes the severity and extent of periodontal disease, it cannot be substituted for a diagnosis. (Attachment) Only the patient version includes an explanation of the scores. (Report 4) Only the dentist version includes the input data. (Report 5)

4. Establish a protocol for referral to a periodontist. Report 6 is an example of the correlation of the disease and risk scores to the guidelines for
periodontal patient management published by the American Academy of Periodontology. The recommendation in the report is based on the current scores or the change in scores when a history exists. Each practice could create their own protocol based on current scores or the change in scores.

5. Measure the effects of treatment (or lack of treatment) by tracking a patient’s change in periodontal status. This is exemplified in Figure 8.

6. Establish a protocol for comprehensive charting. An example is provided in Report 5 and a sample protocol is provided in Figure 11.

7. Establish a protocol for radiographs. An example is provided in Report 5 and a sample protocol is provided in Figure 11.

8. Analyze practice performance. A practice analysis report (PAR) is available that describes the collective conditions and periodontal needs for the patients of a dental practice. (Report 7) This report includes the mean scores, the periodontal treatment needs by number and dollars, and the distribution of patients by risk score and disease score. The PAR can also be utilized to measure the effectiveness of care management for the same group of patients for a range of dates by calculating the change in value for each measured entity.
References


**Table 1. Classification and management of blood pressure for adults**

<table>
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<tr>
<th>BP Classification</th>
<th>SBP* mm Hg</th>
<th>DBP* mm Hg</th>
<th>Lifestyle Modification</th>
<th>Initial Drug Therapy</th>
<th>With Compelling Indications (See Table 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>&lt;80</td>
<td>Encourage</td>
<td>No antihypertensive drug indicated.</td>
<td>Drug(s) for compelling indications.*</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120–139</td>
<td>80–89</td>
<td>Yes</td>
<td>Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.</td>
<td>Drug(s) for the compelling indications.* Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.</td>
</tr>
<tr>
<td>Stage 1 Hypertension</td>
<td>140–159</td>
<td>90–99</td>
<td>Yes</td>
<td>Two-drug combination for most† (usually thiazide-type diuretic and ACEI or ARB or BB or CCB).</td>
<td></td>
</tr>
<tr>
<td>Stage 2 Hypertension</td>
<td>160</td>
<td>100</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DBP, diastolic blood pressure; SBP, systolic blood pressure.

Drug abbreviations: ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB, beta-blocker; CCB, calcium channel blocker.

US Department of Health and Human Services
National Institutes of Health
National Heart, Lung, and Blood Institute
National High Blood Pressure Education Program
NIH Publication No. 03-5233
May 2003
Figure 1B – Hypertension treatment

**Treatment**

**Principles of Hypertension Treatment**
- Treat to BP <140/90 mmHg or BP <120/80 mmHg in patients with diabetes or chronic kidney disease.
- Majority of patients will require two medications to reach goal.

**Algorithm for Treatment of Hypertension**

**Lifestyle Modifications**

Not at Goal Blood Pressure (<140/90 mmHg)  
(<130/80 mmHg for patients with diabetes or chronic kidney disease)  
See Strategies for Improving Adherence to Therapy

**Initial Drug Choices**

Without Compelling Indications

Stage 1 Hypertension  
(SBP 140-159 or DBP 90-99 mmHg)  
Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.

Stage 2 Hypertension  
(SBP 160 or DBP 100 mmHg)  
2-drug combination for most (usually thiazide-type diuretics and ACEI, or ARB, or BB, or CCB).

With Compelling Indications

Drug(s) for the compelling indications  
See Competing Indications for Individual Drug Classes  
Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.

**Not at Goal Blood Pressure**

Optimize dosages or add additional drugs until goal blood pressure is achieved. Consider consultation with hypertension specialist.  
See Strategies for Improving Adherence to Therapy

US Department of Health and Human Services  
National Institutes of Health  
National Heart, Lung, and Blood Institute  
National High Blood Pressure Education Program  
NIH Publication No. 03-5231  
May 2003
Figure 2 – Body Mass Index

**Body Mass Index (BMI)**

Body mass index, or BMI, is a new term to most people. However, it is the measurement of choice for many physicians and researchers studying obesity. BMI uses a mathematical formula that takes into account both a person’s height and weight. BMI equals a person’s weight in kilograms divided by height in meters squared. \( BMI = \frac{kg}{m^2} \).

<table>
<thead>
<tr>
<th>BMI</th>
<th>Waist less than or equal to 40 in. (men) or 35 in. (women)</th>
<th>Waist greater than 40 in. (men) or 35 in. (women)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.5 or less</td>
<td>Underweight</td>
<td>N/A</td>
</tr>
<tr>
<td>18.5 - 24.9</td>
<td>Normal</td>
<td>N/A</td>
</tr>
<tr>
<td>25.0 - 29.9</td>
<td>Overweight</td>
<td>High</td>
</tr>
<tr>
<td>30.0 - 34.9</td>
<td>Obese</td>
<td>Very High</td>
</tr>
<tr>
<td>35.0 - 39.9</td>
<td>Obese</td>
<td>Very High</td>
</tr>
<tr>
<td>40 or greater</td>
<td>Extremely Obese</td>
<td>Extremely High</td>
</tr>
</tbody>
</table>


Accessed 3/15/2008
Figure 3A – Diabetes Diagnosis

Table 2—Criteria for the diagnosis of diabetes

<table>
<thead>
<tr>
<th>Normoglycemia</th>
<th>IFG or IGT</th>
<th>Diabetes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG &lt; 110 mg/dl</td>
<td>FPG ≥110 and &lt; 126 mg/dl (IFG)</td>
<td>FPG ≥126 mg/dl</td>
</tr>
<tr>
<td>2-h PG† &lt; 140 mg/dl</td>
<td>2-h PG† ≥140 and &lt; 200 mg/dl (IGT)</td>
<td>2-h PG† ≥200 mg/dl</td>
</tr>
<tr>
<td>Symptons of diabetes and casual plasma glucose concentration ≥200 mg/dl</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*A diagnosis of diabetes must be confirmed, on a subsequent day, by measurement of FPG, 2-h PG, or random plasma glucose (if symptoms are present). The FPG test is greatly preferred because of ease of administration, convenience, acceptability to patients, and lower cost. Fasting is defined as no caloric intake for at least 8 h. †This test requires the use of a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water. 2-h PG, 2-h postload glucose.

FPG = fasting plasma glucose
IFG = impaired fasting glucose
IGT = impaired glucose tolerance
PG = plasma glucose

Standards of Medical Care for Patients with Diabetes Mellitus
Position Statement
American Diabetes Association
Diabetes Care (Supplement 1) 2002; 25:S33-S49.

Figure 3B – Diabetes Goals

<table>
<thead>
<tr>
<th>Goals of Glycemic Control for People with Diabetes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemical Index</td>
</tr>
<tr>
<td>Average Fasting Plasma Glucose (mg/dl) or Preprandial</td>
</tr>
<tr>
<td>Average Postprandial 2 hours (mg/dl)</td>
</tr>
<tr>
<td>Average Bedtime Glucose (mg/dl)</td>
</tr>
<tr>
<td>A1C (%) - sustained</td>
</tr>
</tbody>
</table>

Joslin Diabetes Center & Joslin Clinic
Clinical Guideline for Pharmacological Management of Type 2 Diabetes 2/20/04
Tooth eruption: The primary teeth
American Dental Association
JADA 2005; 136:1619

And this chart can also be found at:
Accessed 3/15/2008
Figure 5 – Permanent Dentition

Accessed 3/15/2008
FIG. 6 – Dental Caries


Figure 7 – PPD and CAL measurements

Gingival margin

CEJ

Base of pocket
Figure 8 – Risk and Disease Score Historical Graph

This graph shows the change in scores over time. At the initial assessment in 2002, the patient had moderate periodontitis and was at high risk. One year later periodontal status worsened, as the patient elected to decline periodontal treatment. However, during the next 3-year period periodontal and restorative treatment was provided, which lowered the disease score. It took another year for the patient to quit smoking, which lowered the risk score.
Figure 9A – Protocol for a patient with history of previous periodontal treatment

1. **Patient With History of Previous Periodontal Treatment (D4341 or D4342)**
   - **New Patient**
   - Use Code D0150 including PreViser™ Risk Assessment for Caries, Oral Cancer and Periodontal Disease

2. **Existing Patient**
   - OR
   - Previously Non-Compliant Patient
   - D0180 - Comprehensive Periodontal Evaluation, PreViser™ Risk Assessment, Return to Treatment or Determine Recall Frequency

3. Disease Score of >3
   - Doctor Recommends Periodontal Re-Treatment or Periodontal Maintenance

4. **Periodontal Treatment**
   - D4341 or D4342 performed or referral to Periodontist
   - After Recommended Healing Period
   - D0180 - Comprehensive Periodontal Evaluation, PreViser™ Risk Assessment, Return to Treatment or Determine Recall Frequency

5. **Periodontal Maintenance**
   - D4910 is used for Periodontal Maintenance Appointments

6. Refer to existing patient flowchart for future visits.
Figure 9B – Protocol for a new patient or existing patient that has not had a comprehensive exam within 3 years

New Patient Visit or Existing Patient That Has Not Had A Comprehensive Exam Within Three Years

Is There A Gross Amount of Plaque or Calculus Present That Prevents You From Completing a Comprehensive Exam?

YES

USE CODE D4355 TO REMOVE BARRIERS TO PERFORMING A COMPREHENSIVE EXAMINATION

NO

USE CODE D0150 INCLUDING PREVISER™ RISK ASSESSMENT FOR CARIES, ORAL CANCER AND PERIODONTAL DISEASE

DOCTOR RECOMMENDS EITHER PERIODONTAL TREATMENT OR PROPHYLAXIS

Disease Score of >3

D4341 OR D4342 PERFORMED -OR- REFERRAL TO PERIODONTIST

After Recommended Healing Period

D0180 - COMPREHENSIVE PERIODONTAL EVALUATION, PREVISER™ RISK ASSESSMENT, RETURN TO TREATMENT OR DETERMINE RECALL FREQUENCY

Disease Score of 1-3

PROPHYLAXIS PERFORMED USE CODE D1110 - PATIENT IS PLACED ON REGULAR INTERVAL RECALL PROGRAM

PERIODIC EXAM CODE D0120 - ALTERNATE ANNUALLY WITH PERIODONTAL CODE D0180 WHEN DOCTOR PERFORMS PREVISER™ ASSESSMENT

REFER TO EXISTING PATIENT FLOWCHART FOR FUTURE VISITS
Figure 9C – Protocol for a non-periodontitis existing patient

- **If no PreVisor™ assessment is on record, perform code D0180 with new PreVisor™ assessment.**

- **Is PreVisor™ disease score >3?**
  - **NO**
    - Continue with code D1110.
    - Periodic exam code D0120 — alternate annually with periodontal code D0180 when PreVisor™ risk assessment is performed.
  - **YES**
    - Doctor recommends periodontal treatment.
    - D4341 or D4342 performed — or — referral to periodontist.

**After Recommended Healing Time**

- Disease is Stable
  - Code D0180 — comprehensive periodontal evaluation, PreVisor™ risk assessment, return to treatment or determine recall frequency.
  - If disease score worsens to >3
    - D4910 is used for periodontal maintenance appointments.
    - Code D0120 for periodic exam alternating with code D0180 as recommended.

- Disease is Stable
  - D4910 is used for periodontal maintenance appointments.
  - Code D0120 for periodic exam alternating with code D0180 as recommended.

- Disease is Stable (Continued)
  - D4910 is used for periodontal maintenance appointments.
  - Code D0120 for periodic exam alternating with code D0180 as recommended.

- Disease is Stable (Continued)
  - D4910 is used for periodontal maintenance appointments.
  - Code D0120 for periodic exam alternating with code D0180 as recommended.

- Disease is Stable (Continued)
  - D4910 is used for periodontal maintenance appointments.
  - Code D0120 for periodic exam alternating with code D0180 as recommended.

- Disease is Stable (Continued)
  - D4910 is used for periodontal maintenance appointments.
  - Code D0120 for periodic exam alternating with code D0180 as recommended.

- Disease is Stable (Continued)
  - D4910 is used for periodontal maintenance appointments.
  - Code D0120 for periodic exam alternating with code D0180 as recommended.

- Disease is Stable (Continued)
  - D4910 is used for periodontal maintenance appointments.
  - Code D0120 for periodic exam alternating with code D0180 as recommended.
Figure 9D – Protocol for an existing patient

- **PREVISER™ Disease Score > 3 and score has increased or patient is not on maintenance**
  - Doctor recommends periodontal treatment
    - D4341 or D4342 performed - or - referral to periodontist
      - D0180 - Comprehensive periodontal evaluation, PREVISER™ risk assessment, return to treatment or determine recall frequency after recommended healing period
        - Continue with code D1110
          - Periodic exam code D0120 -- alternate annually with periodontal code D0180 when doctor performs PREVISER™ assessment
        - D4910 is used for periodontal maintenance appointments
          - Periodic exam code D0120 -- alternate annually with periodontal code D0180 when doctor performs PREVISER™ assessment
The 598 observations are 570 more than required by PreViser, which as shown in Table 5 requires only 28. Even pocket depth observations exceed PreViser by 140. The comprehensive periodontal charting shown in figure 10B is illustrative of the magnitude of the problem to distill the information into an accurate and concise summary of a patient’s periodontal status.

Figure 10B – Comprehensive periodontal charting

<table>
<thead>
<tr>
<th>Clinical Condition</th>
<th>Number of teeth</th>
<th>Measurements per tooth</th>
<th>Total Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pocket depth</td>
<td>28</td>
<td>6</td>
<td>168</td>
</tr>
<tr>
<td>Tooth mobility</td>
<td>28</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>Recession</td>
<td>28</td>
<td>2</td>
<td>56</td>
</tr>
<tr>
<td>Furcation involvements</td>
<td>10</td>
<td>2 or 3</td>
<td>24</td>
</tr>
<tr>
<td>Attached gingiva</td>
<td>28</td>
<td>1 or 2</td>
<td>42</td>
</tr>
<tr>
<td>Plaque score</td>
<td>28</td>
<td>4</td>
<td>112</td>
</tr>
<tr>
<td>Bleeding points</td>
<td>28</td>
<td>4</td>
<td>112</td>
</tr>
<tr>
<td>Radiographic bone loss</td>
<td>28</td>
<td>2</td>
<td>56</td>
</tr>
</tbody>
</table>

Total Observations for a 28-tooth dentition 598
<table>
<thead>
<tr>
<th>Description</th>
<th>Radiographic Image Recommendation</th>
<th>Comprehensive Periodontal Charting Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial screening exam Health or gingivitis: score range 1-3</td>
<td>Posterior bitewings</td>
<td>Not needed at this time</td>
</tr>
<tr>
<td>Initial screening exam Mild periodontitis: score range 4-10</td>
<td>Posterior bitewings plus anterior bitewings or periapicals</td>
<td>Needed to document baseline status, if it has not already been recorded</td>
</tr>
<tr>
<td>Initial screening exam Moderate to severe periodontitis: score range 11-100</td>
<td>Full mouth images</td>
<td>Needed to document baseline status, if it has not already been recorded</td>
</tr>
<tr>
<td>Post-initial screening exam Health or gingivitis: score range 1-3 Low risk: score = 1</td>
<td>Posterior bitewings every year</td>
<td>Not needed at this time</td>
</tr>
<tr>
<td>Post-initial screening exam Health or gingivitis: score range 1-3 Previous health or gingivitis</td>
<td>Posterior bitewings every year</td>
<td>Needed to document the changes in status, unless this is documented in the current charting</td>
</tr>
<tr>
<td>Post-initial screening exam Health or gingivitis: score range 1-3 Previous periodontitis</td>
<td>Posterior bitewings every year</td>
<td>Not needed at this time</td>
</tr>
<tr>
<td>Post-initial screening exam Health or gingivitis: score range 1-3 Previous periodontitis</td>
<td>Posterior bitewings every year</td>
<td>Needed to document the changes in status, unless this is documented in the current charting</td>
</tr>
<tr>
<td>Post-initial screening exam Mild periodontitis: score range 4-10 Low risk: score = 1 Status is stable or improved</td>
<td>Posterior bitewings every year Anterior bitewings or perapicals every 1-3 years</td>
<td>Needed to document status every 1-3 years</td>
</tr>
<tr>
<td>Post-initial screening exam Mild periodontitis: score range 4-10 Low risk: score = 1 Status has worsened</td>
<td>Posterior bitewings and anterior bitewings or perapicals taken within the last 12 months</td>
<td>Needed to document the changes in status, unless this is documented in the current charting</td>
</tr>
<tr>
<td>Post-initial screening exam Mild periodontitis: score range 4-10 Moderate to high risk: score = 2, 3 Status is stable or improved</td>
<td>Posterior bitewings every year Anterior bitewings or perapicals every 1-3 years</td>
<td>Needed to document status every 1-3 years</td>
</tr>
<tr>
<td>Post-initial screening exam Mild periodontitis: score range 4-10 Moderate to high risk: score = 2, 3 Status has worsened</td>
<td>Posterior bitewings and anterior bitewings or perapicals taken within the last 12 months</td>
<td>Needed to document the changes in status, unless this is documented in the current charting</td>
</tr>
<tr>
<td>Post-initial screening exam Moderate to severe periodontitis: score range 11-100 Low risk: score = 1 Status is stable or improved</td>
<td>Posterior bitewings every year Full mouth images every 3-5 years</td>
<td>Needed to document status every year</td>
</tr>
<tr>
<td>Post-initial screening exam Moderate to severe periodontitis: score range 11-100 Low risk: score = 1 Status has worsened</td>
<td>Full mouth images taken within the last 12 months</td>
<td>Needed to document the changes in status, unless this is documented in the current charting</td>
</tr>
<tr>
<td>Post-initial screening exam Moderate to severe periodontitis: score range 11-100 Moderate to high risk: score = 2, 3 Status is stable or improved</td>
<td>Posterior bitewings every year Full mouth images every 3-5 years</td>
<td>Needed to document status every year</td>
</tr>
<tr>
<td>Post-initial screening exam Moderate to severe periodontitis: score range 11-100 Moderate to high risk: score = 2, 3 Status has worsened</td>
<td>Full mouth images taken within the last 12 months</td>
<td>Needed to document the changes in status, unless this is documented in the current charting</td>
</tr>
</tbody>
</table>
Table 1 – Dentist Observations and Input Data for the Dentition Score

<table>
<thead>
<tr>
<th>How many teeth are optimal for the patient, excluding third molars?</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many natural teeth are visible, excluding third molars?</td>
</tr>
<tr>
<td>How many teeth have any type of restoration, including crowns and veneers?</td>
</tr>
<tr>
<td>How many teeth have caries or defective restoration?</td>
</tr>
<tr>
<td>For the teeth that have been replaced how many are not removable (fixed, permanent) by the patient?</td>
</tr>
<tr>
<td>For the teeth that have been replaced how many are removable by the patient?</td>
</tr>
</tbody>
</table>

Table 2 – Dentition Score Examples

<table>
<thead>
<tr>
<th>Patient</th>
<th>Example</th>
<th>Optimal Teeth</th>
<th>Visible Teeth</th>
<th>Restored</th>
<th>Caries</th>
<th>Fixed</th>
<th>Removable</th>
<th>Caries Score</th>
<th>Prosthetic Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>28</td>
<td>27</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>28</td>
<td>26</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>10</td>
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<td>6</td>
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<td>0</td>
<td>29</td>
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</tr>
<tr>
<td></td>
<td>10</td>
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<td>22</td>
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<td>0</td>
<td>8</td>
<td>39</td>
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<td></td>
<td>11</td>
<td>28</td>
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<td>16</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>E</td>
<td>12</td>
<td>24</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>N/A</td>
</tr>
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<td>13</td>
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<td></td>
<td>4</td>
<td>N/A</td>
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<tr>
<td></td>
<td>14</td>
<td>28</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>N/A</td>
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</tbody>
</table>
Table 3 – Periodontal Disease Diagnostic Terminology

<table>
<thead>
<tr>
<th>Representative Text Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
</tr>
<tr>
<td>Gingivitis</td>
</tr>
<tr>
<td>Localized Mild Periodontitis</td>
</tr>
<tr>
<td>Generalized Mild Periodontitis</td>
</tr>
<tr>
<td>Localized Mild and Moderate Periodontitis</td>
</tr>
<tr>
<td>Localized Moderate Periodontitis</td>
</tr>
<tr>
<td>Generalized Mild to Moderate Periodontitis</td>
</tr>
<tr>
<td>Generalized Mild and Localized Moderate Periodontitis</td>
</tr>
<tr>
<td>Generalized Moderate Periodontitis</td>
</tr>
<tr>
<td>Localized Mild and Severe Periodontitis</td>
</tr>
<tr>
<td>Localized Moderate and Severe Periodontitis</td>
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<tr>
<td>Localized Severe Periodontitis</td>
</tr>
<tr>
<td>Generalized Mild to Severe Periodontitis</td>
</tr>
<tr>
<td>Generalized Mild and Localized Severe Periodontitis</td>
</tr>
<tr>
<td>Generalized Moderate to Severe Periodontitis</td>
</tr>
<tr>
<td>Generalized Moderate and Localized Severe Periodontitis</td>
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<tr>
<td>Generalized Severe Periodontitis</td>
</tr>
</tbody>
</table>

Table 4 – Disease score categories

<table>
<thead>
<tr>
<th>Severity</th>
<th>Disease Score</th>
<th>Disease Score Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>1</td>
<td>1</td>
<td>No sextant has periodontal disease</td>
</tr>
<tr>
<td>Gingivitis</td>
<td>2-3</td>
<td>2</td>
<td>≥ 1 sextants has gingivitis</td>
</tr>
<tr>
<td>Mild periodontitis</td>
<td>4-7</td>
<td>3</td>
<td>≥ 1 sextants has mild periodontitis</td>
</tr>
<tr>
<td></td>
<td>8-10</td>
<td>4</td>
<td>≥ 40% of the sextants has mild periodontitis</td>
</tr>
<tr>
<td>Moderate periodontitis</td>
<td>11-26</td>
<td>5</td>
<td>≥ 1 sextants has moderate periodontitis</td>
</tr>
<tr>
<td></td>
<td>27-36</td>
<td>6</td>
<td>≥ 40% of sextants have moderate periodontitis</td>
</tr>
<tr>
<td>Severe periodontitis</td>
<td>37-64</td>
<td>7</td>
<td>1 sextant has severe periodontitis</td>
</tr>
<tr>
<td></td>
<td>65-82</td>
<td>8</td>
<td>≥ 20% of sextants have severe periodontitis</td>
</tr>
<tr>
<td></td>
<td>83-92</td>
<td>9</td>
<td>≥ 40% of sextants have severe periodontitis</td>
</tr>
<tr>
<td></td>
<td>93-100</td>
<td>10</td>
<td>&gt; 50% of sextants have severe periodontitis</td>
</tr>
</tbody>
</table>
Table 5 – Periodontal Risk and Disease Assessment Input Data

<table>
<thead>
<tr>
<th>Observation</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient age</td>
<td>1</td>
</tr>
<tr>
<td>Frequency of dental visits</td>
<td>1</td>
</tr>
<tr>
<td>Smoking history</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes status</td>
<td>1</td>
</tr>
<tr>
<td>Oral hygiene status</td>
<td>1</td>
</tr>
<tr>
<td>History of pocket-reducing periodontal surgery</td>
<td>1</td>
</tr>
<tr>
<td>Pocket depth</td>
<td>6</td>
</tr>
<tr>
<td>Bleeding on probing</td>
<td>6</td>
</tr>
<tr>
<td>Restorations below the gingival margin</td>
<td>1</td>
</tr>
<tr>
<td>Root calculus below the gingival margin</td>
<td>1</td>
</tr>
<tr>
<td>Radiographic bone height</td>
<td>6</td>
</tr>
<tr>
<td>Furcation involvement</td>
<td>1</td>
</tr>
<tr>
<td>Vertical bone lesions</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Observations</strong></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>
Report 1 – Patient version of Dentition Report

Dentition Risk and Disease Assessment

Prepared By
John A. Martin, DDS
2521 Carnegie Dr., State College, Pennsylvania, 16803
Phone: 814-234-4597
Email: johnm@example.com
Exam Date: 1/14/2008

Your Scores:

Caries Risk Score: 3
High

Carlos Score: 14
Visible teeth: 26
Restored teeth: 6
Caries teeth: 2

Prosthesis Score: 21
Optimal teeth: 26
Visible teeth: 26
Missing teeth: 3
Prosthetic teeth: 1
Unrestored teeth: 2

Risk predicts your future disease state. Risk is determined by risk factors, which are distinct from the signs and symptoms of disease. Preventing disease requires treatment that reduces your risk factors.

Low risk (1) means that you are unlikely to have a cavity whereas high risk (3) means that you are very likely to have a cavity within the next 5 years.

Prevention - Active Intervention

Prevention is based on risk and risk factors. This is treatment before disease is observed. Repair of the effects of disease early results in a condition as good as the original health state. Preventing disease eliminates tooth loss and restorative treatment.

- Fluoride
- Therapeutic oral rinses
- Occlusal Adjustment
- Bite guard
- Cavity for at risk teeth

Communication

Dental treatment cannot keep you healthy. Your participation is very important. The most common patient behaviors that influence health and treatment success are oral hygiene, nutrition, and smoking. You may receive advice, including readiness for you to change to health-promoting behaviors.

- Oral hygiene instruction
- Nutritional Counseling
- Oral health instruction

Visit the Dentist

Symptoms are warning signs that frequently appear too late in the disease process for the simplest, most predictable, least costly treatment. Regular visits to detect disease in the early stages can prevent more complex and expensive treatment. Better still are regular visits for preventive care targeted to your risk factors.

- 4 or more per year
- 3 x year
- 2 x year

Oral Hygiene

Oral Hygiene is of particular importance to you. You should learn improved methods of maintaining your teeth and gums.

- Generally most effective
- May be effective
- Less likely to be effective

The caries score describes the dentition in terms of decay and restored teeth. A restored tooth is a tooth that has a filling or cap (crown). A score of 1 means that the tooth has never had decay or been restored. Scores 2 to 9 mean that all of the teeth that had decay have been restored. Scores 10 to 100 mean that decay exists and restorative treatment is needed.

The prosthesis score describes the status of the dentition in terms of prosthodontic tooth replacement. Tooth replacement includes removable appliances (dentures), non-removable appliances (bridges), and single tooth replacement implants. A score of 1 means that the dentition has the optimal number of natural teeth. Scores 2 to 9 mean that the dentition has been completely restored. Scores 10 to 100 mean that prosthodontic treatment is needed.
Report 2 – Dentist version of Dentition Report

CLINICAL REPORT: Dentition Risk and Disease Assessment

Prepared By
John A. Martin, DDS
2521 Carnegie Dr., State College, Pennsylvania, 16803
Phone: 014-234-4997
Email: johnm@previax.com
Exam Date: 1/14/2000

Prepared By
John Doe
Age: 47
Risk Assessment ID:
Patient Prev/Max ID:

Background Information:

<table>
<thead>
<tr>
<th>Professional</th>
<th>Early decalcification or caries</th>
<th>Optimal teeth</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root surfaces</td>
<td>Visible and sound</td>
<td>Visible teeth</td>
<td>25</td>
</tr>
<tr>
<td>Root Surface Erosion/Abfraction</td>
<td>No</td>
<td>Restored teeth</td>
<td>6</td>
</tr>
<tr>
<td>A tooth that has been fractured (non-traumatic)</td>
<td>No</td>
<td>Carious teeth</td>
<td>2</td>
</tr>
<tr>
<td>Oral Hygiene</td>
<td>Acceptable</td>
<td>Fixed prosthetic teeth</td>
<td>1</td>
</tr>
<tr>
<td>Fluoride products used (fluoridated water, supplements, toothpaste, rinses, or gel)</td>
<td>No</td>
<td>Removable prosthetic teeth</td>
<td>0</td>
</tr>
<tr>
<td>Has fixed orthodontic appliances</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiences dry mouth</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruxes, grinds, or clench</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has pierced tongue or oral habit (eating ice, playing musical instrument with a mouthpiece, opening bottles)</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has had a major change in health (heart attack, stroke, etc.) during the past 12 months</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times per day snacks or beverages containing sugar are consumed between meals</td>
<td>5 or more</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Caries Risk Score: 3
Caries Score: 14
High
Visible teeth: 25
Restored teeth: 6
Carious teeth: 2
Prothetic Score: 21
Optimal teeth: 21
Visible teeth: 25
Missing teeth: 3
Unplucked teeth: 2

Prevention - Active Intervention
Prevention is based on risk and risk factors. This is treatment before disease is observed. Repair of the effects of disease rarely results in a condition as good as the original health state. Preventing disease eliminates tooth loss and reparative treatment.

Communications
Dental treatment cannot keep you healthy. Your participation is very important. The most common patient behaviors that influence health and treatment success are oral hygiene, nutrition, and smoking. You may receive advice, including resources for you to change to health-promoting behaviors.

Visit the Dentist
Symptoms are warning signs that frequently present too late in the disease process for the simplest, most predictable, least costly treatment. Regular visits to detect disease in the early stages can prevent more complex and expensive treatment. Better still are regular visits for preventive care targeted to your risk factors.

4 or more per year
A x year
Report 3 – Dentition Practice Analysis Report

Executive Summary

Based on the data you provided, your patient population is projected to exhibit the following characteristics and needs:

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Age &lt;19</th>
<th>Age 19+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size used to prepare report</td>
<td>187</td>
<td>73</td>
<td>114</td>
</tr>
<tr>
<td>Patient population</td>
<td>1,000</td>
<td>390</td>
<td>610</td>
</tr>
<tr>
<td>Percentage of age group to total</td>
<td>N/A</td>
<td>39%</td>
<td>61%</td>
</tr>
<tr>
<td>Mean caries risk</td>
<td>2.00</td>
<td>2.01</td>
<td>2.13</td>
</tr>
<tr>
<td>Mean caries score</td>
<td>6.75</td>
<td>9.25</td>
<td>5.17</td>
</tr>
<tr>
<td>Mean prosthetic score</td>
<td>N/A</td>
<td>N/A</td>
<td>5.34</td>
</tr>
<tr>
<td>Patients with restorative needs</td>
<td>270</td>
<td>110</td>
<td>160</td>
</tr>
<tr>
<td>Patients with prosthetic needs</td>
<td>N/A</td>
<td>N/A</td>
<td>289</td>
</tr>
<tr>
<td>Number of teeth to be restored</td>
<td>524</td>
<td>294</td>
<td>230</td>
</tr>
<tr>
<td>Number of teeth to be replaced</td>
<td>N/A</td>
<td>N/A</td>
<td>241</td>
</tr>
<tr>
<td>Number of patients needing sealants</td>
<td>N/A</td>
<td>70</td>
<td>N/A</td>
</tr>
<tr>
<td>Prophy appointments</td>
<td>2449</td>
<td>909</td>
<td>1540</td>
</tr>
</tbody>
</table>

Projected revenue for:

- Restorative treatment: $115,260
- Prosthetic tooth replacement: $580,820
- Sealants: $17,080
- Prophylaxis: $185,713
- Recall examination: $53,873

Total revenue: $952,775

Revenue of dentist: $749,973
Revenue of hygienist: $202,793

Projected revenue does not include exams for new patients, radiographs, cosmetic procedures, extractions and other surgical procedures, endodontic treatment, and periodontal treatment including maintenance. These categories historically account for more than 20% of total revenue. The Perio PAR estimates the potential revenue to manage the periodontal needs of patients.
### Patients Age <19

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Current Caries Score</th>
<th>Total of risk category</th>
<th>% of risk category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2-9</td>
<td>10-100</td>
</tr>
<tr>
<td>Description</td>
<td>Normal</td>
<td>Fully restored</td>
<td>Caries</td>
</tr>
<tr>
<td>Low</td>
<td>37</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Moderate</td>
<td>59</td>
<td>91</td>
<td>0</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>5</td>
<td>113</td>
</tr>
<tr>
<td>Total of disease category</td>
<td>116</td>
<td>176</td>
<td>113</td>
</tr>
<tr>
<td>% of disease category</td>
<td>25%</td>
<td>45%</td>
<td>30%</td>
</tr>
</tbody>
</table>

#### Number, Percent, Average

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible teeth</td>
<td>7,487</td>
<td>N/A</td>
<td>19.2</td>
</tr>
<tr>
<td>Restored teeth</td>
<td>1,230</td>
<td>16.4%</td>
<td>3.2</td>
</tr>
<tr>
<td>Carious teeth</td>
<td>294</td>
<td>3.9%</td>
<td>0.8</td>
</tr>
</tbody>
</table>

### Patients Age 19+

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Current Caries Score</th>
<th>Total of risk category</th>
<th>% of risk category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2-9</td>
<td>10-100</td>
</tr>
<tr>
<td>Description</td>
<td>Normal</td>
<td>Fully restored</td>
<td>Caries</td>
</tr>
<tr>
<td>Low</td>
<td>80</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Moderate</td>
<td>96</td>
<td>112</td>
<td>0</td>
</tr>
<tr>
<td>High</td>
<td>32</td>
<td>48</td>
<td>160</td>
</tr>
<tr>
<td>Total of disease category</td>
<td>208</td>
<td>240</td>
<td>160</td>
</tr>
<tr>
<td>% of disease category</td>
<td>34%</td>
<td>39%</td>
<td>28%</td>
</tr>
</tbody>
</table>

#### Number, Percent, Average

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible teeth</td>
<td>15,193</td>
<td>N/A</td>
<td>25.0</td>
</tr>
<tr>
<td>Restored teeth</td>
<td>2,107</td>
<td>13.9%</td>
<td>3.5</td>
</tr>
<tr>
<td>Carious teeth</td>
<td>230</td>
<td>1.5%</td>
<td>0.4</td>
</tr>
</tbody>
</table>
### Patients Age 19+

<table>
<thead>
<tr>
<th>Description</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score Range</td>
<td>1</td>
<td>2-9</td>
<td>10-100</td>
</tr>
<tr>
<td>Normal</td>
<td>64</td>
<td>144</td>
<td>112</td>
</tr>
<tr>
<td>Fully repaired</td>
<td>43</td>
<td>43</td>
<td>80</td>
</tr>
<tr>
<td>Missing teeth</td>
<td>48</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>Total of risk category</td>
<td>160</td>
<td>208</td>
<td>240</td>
</tr>
<tr>
<td>% of risk category</td>
<td>26%</td>
<td>34%</td>
<td>39%</td>
</tr>
<tr>
<td>Total of disease category</td>
<td>320</td>
<td>176</td>
<td>112</td>
</tr>
<tr>
<td>% of disease category</td>
<td>53%</td>
<td>29%</td>
<td>18%</td>
</tr>
</tbody>
</table>

---

### Number of Teeth

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
<th>Percent*</th>
<th>Average**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal teeth</td>
<td>16,267</td>
<td>N/A</td>
<td>26.8</td>
</tr>
<tr>
<td>Visible tooth</td>
<td>15,193</td>
<td>93.4%</td>
<td>25.0</td>
</tr>
<tr>
<td>Missing teeth</td>
<td>1,075</td>
<td>6.6%</td>
<td>1.8</td>
</tr>
<tr>
<td>Prosthetic teeth</td>
<td>834</td>
<td>5.2%</td>
<td>2.9</td>
</tr>
<tr>
<td>Fixed prosth tooth</td>
<td>321</td>
<td>38.5%</td>
<td>1.1</td>
</tr>
<tr>
<td>Removable prosth tooth</td>
<td>513</td>
<td>61.5%</td>
<td>1.8</td>
</tr>
<tr>
<td>Unreplaced missing tooth</td>
<td>241</td>
<td>22.4%</td>
<td>0.8</td>
</tr>
</tbody>
</table>

* Percent for prosthetic teeth based on the repaired dentition
** Average for prosthetic teeth based on patients with tooth loss

% patients age 19+ where optimal teeth =28 66%
% patients age 19+ where optimal teeth =24 24%
% patients age 19+ where optimal teeth =25-27 8%
% patients age 19+ where optimal teeth <24 3%
Periodontal (Gum Disease) Risk and Disease Assessment

Risk of Gum Disease: 3

Risk predicts your future disease state. Your risk is determined by risk factors, which are distinct from the signs and symptoms of disease. Preventing disease requires treatment that reduces your risk factors. With routine dental care, tooth loss is 10 times more likely for an individual who has very high (5) risk compared to an individual who has low (2) risk. However, when risk is used to guide the selection of special treatment, tooth loss can be reduced 50% to 100%. Your risk score of 3 is reflected against the chart to the left.

Disease State 42

Localized mild and severe periodontitis

Your disease state reflects the amount of damage caused by gum disease. As the disease state worsens, treatment increases in amount, complexity and cost. Tooth loss and the failure rate of repairs are greater for individuals with higher disease state scores. Treatment can repair the damage caused by disease, but tends not to help much in preventing new disease. Disease prevention requires treatment that reduces your risk factors. The best treatment incorporates both repair (where needed) and prevention.

What Changed

The information below shows the progression of your risk scores:
## Characteristics Of Health | Your Health | Analysis
---|---|---
No bleeding during exam or flossing | Bleeding during exam | Bacteria are causing an infection, which can worsen your disease state
X-Rays show no bone destruction | Moderate bone destruction | Significant bone destruction has occurred and additional bone destruction could cause you to have a tooth extracted
No tartar below the gumline | No tartar below the gumline | Best possible observation, which could be incorrect and misleading for pockets deeper than 5 mm or that bleed
No fillings are below the gumline | No fillings are below the gumline | Best possible condition
Not diabetic or under good control | Not diabetic | Best possible condition
Bone fully fills furcations | Bone fully fills furcations | Best possible condition
Minimal or no bacterial plaque | No bacterial plaque | Best possible condition
No pockets deeper than 5 mm | Deepest pocket is > 7 mm | Tooth cleaning tools cannot routinely clean bacteria from pockets this deep
Not a current smoker | Never smoked | Best possible situation
X-rays show bone level is flat | X-rays show bone level is flat | Best possible condition

### Active Intervention You May Need
- **Generally Most Effective**
- **May be Most Effective**
- **Less Likely to be Most Effective**

#### Reduce Pockets <5mm

- Prophylaxis or maintenance
- Host modulators

#### Reduce Pockets 5-7mm

- SRP with adjunctive therapy as indicated unless not expected to be effective
- Surgery when SRP with adjunctive therapy is indicated is not or is not expected to be effective
  - Osseous Surgery
  - Gingival Flap Surgery
  - Regenerative Therapy (Special Circumstances)
- Extraction (Special Circumstances)
- Prophylaxis or maintenance without SRP or surgery
- Medicaments alone (Special Circumstances)
  - Locally Applied Anti-microbials
  - Systemic Antibiotics
  - Host modulators
Reduce Pockets >7mm

Pockets deeper than 7 mm pose the greatest challenge to clean the bacteria and calculus. It's impossible to completely remove these disease-causing entities with routine cleaning methods. Retained bacteria will cause the disease to progress and the pocket to become deeper, making for a more complex treatment situation and possible tooth loss.

- Surgery when SRP with adjunctive therapy as indicated is not or is not expected to be effective
  - Osseous Surgery
  - Gingival Flap Surgery
- Regenerative Therapy (Special Circumstances)
- SRP with adjunctive therapy as indicated
- Extraction (Special Circumstances)
- Prophylaxis maintenance without SRP or surgery
- Medicaments alone (Special Circumstances)
  - Locally Applied Anti-microbials
  - Systemic Antibiotics
  - Host modulators

Prevention And Maintenance

Visit The Dentist

Symptoms are warning signs that frequently appear too late in the disease process for the simplest, most predictable, least costly treatment. Regular visits to detect disease in the early stages can prevent more complex and expensive treatment. Better still are regular visits for preventive care targeted to your risk factors.

- Every 4 months
- Every 6 months
- Every 3 months
Report 5 – Dentist version of Periodontal Report

CLINICAL REPORT: Periodontal Risk and Disease Assessment

Prepared By
John A. Martin, DDS
2521 Campogo Dr., State College, Pennsylvania, 16803,
Phone 814-234-4967
Email johnm@pennstate.com
Exam Date 11/10/2007

Prepared For
Report Eleven
Age 65
Risk Assessment ID
06:5b15c-7bf-8-4f74-0c412-46a2447d556
PreVisor Patient ID
105c0371-3933-4a2c-47a8-10996c0c4ac

Patient History
Dental Care >2 per year
Smoking History Never smoked
Diabetic Not diabetic

Dental History
Paras Surgery Or Poet No
Bleeding On Probing Yes
Fissure Involvements No
Subgingival Restorations No
Vertical Bone Lesion No
Calculi On Radiographs No
Gingival Margin
Oral Hygiene Excellent

Pocket Depths
<5mm <5mm <5mm
Bleeding Bleeding

Radiographic Bone Height
<2mm <2mm <2mm
<2mm

Risk Score 3
Disease State 42
Localized mild and severe periodontitis

What Changed What Changed?

Perio Risk

Disease State
Healthy
Gingivitis
Mild Gum Disease
Moderate Gum Disease
Severe Gum Disease

Disease State
Healthy
Gingivitis
Mild Gum Disease
Moderate Gum Disease
Severe Gum Disease


1

1

5

1

1

1

4

4

4

4

4

4
The recommendations in this section are based on periodontal assessment needs only.

Radiographic Image Recommendation

The recommendation for radiographic images is based on the patient’s current PreViser periodontal disease risk and severity/extent scores only or the changes in those scores over time:

- Posterior bitewings every year
- Full mouth images every 3-5 years

Comprehensive Periodontal Charting Recommendation

The recommendation for the recording of a comprehensive periodontal charting, including pocket depth measurements at 6 sites per tooth, bleeding on probing, furcation involvements, recession, and attached gingiva:

- Needed to document status every year

Patient Care & Consult Time Estimate

The needs description for patient care and consult time is based on PreViser scores or change in those scores:

- High needs
Report 6 – Correlation Report

Correlation Report

Prepared By:
John A. Martin, DDS
2521 Carnegie Dr, State College, Pennsylvania, 16803,
Phone: 814-234-6997,
Email: johnm@previser.com
Exam Date: 3/30/2007

Prepared For:
Correlation test Porio
Age 89
Risk Assessment ID:
08897b2-13e2-4e12-82e0-7ff71b883b41

To assist the clinician in effective and appropriate treatment planning, it is helpful to correlate PreViser Disease State and Risk scores to American Academy of Periodontology Guidelines for the Management of Patients with Periodontal Diseases, first published on September 16, 2006. While based on objective measurements of periodontal status and risk level, the referral and co-management recommendation offered should be interpreted in light of your clinical expertise and your fuller understanding of patient needs.

Based on these guidelines and this patient’s current periodontal status and risk level and the change (if any) of these states over time:

This patient should be treated by a periodontist

This recommendation is based on the following:

**Disease state** is 37, and has increased over time
**Risk** score is 3, and has increased over time

This recommendation is based on the patient’s PreViser calculated disease state and risk scores correlated by PreViser to Guidelines for the Management of Patients with Periodontal Diseases.* These scores do not take into account certain clinical factors that might affect your response to the recommendation offered. These factors include:

- Pregnancy
- Other systemic health problems (cardio vascular disease, chronic respiratory disease, etc.)
- Peri-implantitis
- Restorative treatment requirements that must precede specialized periodontal therapy
- Malocclusion or other tooth position abnormalities
- Tori or exostosis
- Gingival enlargement or recession
- Tooth mobility
- Endodontic lesions affecting the periodontium
- Habits that may provide continuing damage to the periodontium

*The American Academy of Periodontology does not endorse any specific product, but it does support the use of enhanced diagnostic tools that allow for rapid identification of patients that may be at greater risks for periodontal diseases. PreViser Risk and Disease scores correlate to the American Academy of Periodontology’s Guidelines for the Co-Management of Periodontal Diseases.
Executive Summary

Based on the data you provided, your total adult patient population >29 years of 2939 patients are projected to exhibit the following combinations of risk and disease severity:

<table>
<thead>
<tr>
<th>Severity Category</th>
<th>Current Disease Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-3</td>
</tr>
<tr>
<td>Current Risk Score</td>
<td>1,2</td>
</tr>
<tr>
<td>Score</td>
<td>3</td>
</tr>
</tbody>
</table>

% of disease category: 39% 32% 25% 4%

Patients sample size used to prepare this report: 350
The mean of all PreViser Risk Scores is: 2.07
The mean of all PreViser Disease Scores is: 12.28

From this distribution of disease risk and severity, we can estimate that your patients will require the following care over the next twelve months to optimize their periodontal health:

- Quadrants of Scaling and Root Planning: 2,108
- Prophylactic Appointments: 793
- Surgical procedures, assumed to be performed by specialist: 347
- Periodontal Maintenance Appointments: 4,230
- Patients who may be considered for referral to a periodontist: 311
- Full Time Equivalent Hygienists required for adult preventive care: 3.35
- Full Time Equivalent Hygienists required for scaling & root planing: 1.46
- Projected hours of review and management by dentist(s): 717
- Projected gross revenue for non-surgical procedures: $1,392,884
- Implied gross revenue per hour of dentist’s time: $1,943
- Implied revenue per hour of hygienist’s time: $173
Attachment

Excerpt from:

*Position Paper*

**Diagnosis of Periodontal Diseases**

This position paper on the diagnosis of periodontal diseases was prepared by the Research, Science and Therapy Committee of the American Academy of Periodontology. It is intended for the information of the dental profession and other interested parties. The purpose of the paper is to provide the reader with a general overview of the important issues related to the diagnosis of periodontal diseases. It is not intended as a comprehensive review of the subject. *J Periodontol* 2003;74:1237-1247.

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**TRADITIONAL APPROACH TO DIAGNOSIS**

Despite our increased understanding of the etiology and pathogenesis of periodontal infections, the diagnosis and classification of these diseases is still based almost entirely on traditional clinical assessments.\textsuperscript{16,17} To arrive at a periodontal diagnosis, the dentist must rely upon such factors as: 1) presence or absence of clinical signs of inflammation (e.g., bleeding upon probing); 2) probing depths; 3) extent and pattern of loss of clinical attachment and bone; 4) patient's medical and dental histories; and 5) presence or absence of miscellaneous signs and symptoms, including pain, ulceration, and amount of observable plaque and calculus.\textsuperscript{18-20}

Plaque-induced periodontal diseases have traditionally been divided into two general categories based on whether attachment loss has occurred: gingivitis and periodontitis. Gingivitis is the presence of gingival inflammation without loss of connective tissue attachment.\textsuperscript{16} Periodontitis can be defined as the presence of gingival inflammation at sites where there has been a pathological detachment of collagen fibers from cementum and the junctional epithelium has migrated apically. In addition, inflammatory events
associated with connective tissue attachment loss also lead to the resorption of coronal portions of tooth-supporting alveolar bone.\textsuperscript{16}

This simple separation of plaque-induced periodontal diseases into two categories is not as clear-cut as it first appears. For example, if sites that have been successfully treated for periodontitis develop some gingival inflammation at a later date, do those sites have recurrent periodontitis or gingivitis superimposed on a reduced but stable periodontium? There are currently no data to definitively answer this question. However, since not all sites with gingivitis necessarily develop loss of attachment and bone,\textsuperscript{17} it is reasonable to assume that gingivitis can occur on a reduced periodontium in which ongoing attachment loss is not occurring. A similar problem exists when the term “periodontitis” is assigned to sites with attachment loss and periodontal pockets in which ongoing periodontal destruction is not occurring.

Demonstration of the progression of periodontitis requires documentation of additional attachment loss occurring between at least two time points. Since this is not always possible, especially when a patient is examined for the first time, most clinicians assign the diagnosis of “periodontitis” to inflamed sites that also have loss of attachment and bone. This is a prudent practice since such sites may be either currently progressing or are at an increased risk for further periodontal destruction. Therefore, demonstration of progressive attachment loss is not generally considered to be a requirement for using “periodontitis” as a diagnostic label.