

Methodology for Determining Periodontal Needs

by

SIGURD P. RAMFJORD, L.D.S., PH.D.

PERIODONTAL NEEDS refer to: (1) Number of individuals needing treatment for periodontal disease. (2) Type and extent of treatment. (3) Number of individuals needing preventive procedures and education in periodontal health care. (4) Type and extent of preventive procedures and health care education. (5) Number and educational qualifications of personnel needed for treatment, prevention and educational programs.

Obviously, at present it is impossible even to make an educated guess at the magnitude of these needs, and the main purpose of this paper is to stimulate interest in the accumulation of meaningful data for the assessment of periodontal needs through:

1. Survey programs of periodontal status that can be used as a basis for estimate of specific needs for therapy.
2. Pilot programs and clinical trials for therapy and prevention.
3. Testing of motivational and educational programs.

The American Academy of Periodontology is keenly aware of a tremendous unmet need for periodontal treatment and health care everywhere in the world. We have therefore initiated a drive for serious, in depth recognition of the public needs for periodontal care and how these needs eventually may be met. The first official step was an Academy sponsored workshop (supported by U.S.P.H.S.) in 1967 on "The Periodontal Needs of the United States Population." The proceedings from this workshop have been compiled by the chairman, Dr. Timothy J. O'Leary,¹ and a limited number of copies are available through the office of the American Academy of Periodontology. Recent workshops at Michigan and Pennsylvania Universities also have stimulated a widespread interest in clinical research and periodontal health.

Although surveys conducted by the U.S. Public Health Service,²⁻⁴ the American Dental Association⁵ and other institutions, as well as clinical observation and experience, all indicate an overwhelming unmet need for periodontal care, there are several reasons why it is impossible at present to express these needs

realistically in figures that can serve as the basis for treatment, preventive and educational programs. These reasons are:

1. The data from epidemiological surveys were not collected primarily for the purpose of assessing the need for treatment, and it has not been proven, so far, that they can serve as an adequate basis for determining clinical needs.

2. Treatment and preventive procedures in periodontics are empirical without a scientifically established basis for choice between a variety of techniques, methods and procedures.

3. The degree of effectiveness of current methods of periodontal treatment and prevention in terms of periodontal health maintenance over prolonged periods of time is not known.

4. Relationships between performance standards and periodontal health maintenance, both for periodontal therapy and oral hygiene, are unknown.

5. Relationship between time spent and result obtained for various procedures in periodontal treatment and prevention is unknown.

6. Type and extent of education needed for persons to assume responsibility for the various therapeutic, preventive and educational programs have not been established.

With such a lack of basic information, the obvious next questions are:

Do we have methods for scientific assessment of periodontal needs?

How can the needs be assessed in the most reliable and practical manner?

If the needs can be assessed, what can be done to meet them effectively?

This paper will be concerned mainly with problems of assessing the periodontal needs.

ASSESSING PERIODONTAL NEEDS

A. Can periodontal needs be determined with methods currently available?

Without even having generally accepted standards for what constitutes adequate fulfillment of periodontal needs, it becomes confusing to measure or express these needs in figures. A number of methods are available for mathematical assessment of periodontal status. Some place the main accent on epidemiological surveys,⁶ others⁷ provide more therapeutic orientation.⁸ The information that can be obtained by these methods is

¹Presented before the American Academy of Periodontology, October 1968.

²Department of Periodontics, University of Michigan, School of Dentistry, Ann Arbor, Michigan 48104.

related to a number of parameters of periodontal health or disease.

We have tools to determine:

1. The relationship between the bottom of the epithelial attachment and the C-E junction in millimeters or other units.⁷⁻⁹ Thus, loss or gain of marginal connective tissue periodontal attachment can be recorded clinically.¹⁰ This is the periodontal parameter that clinically can be recorded most accurately since the recording is based on the use of a millimeter scale. The recorder can be trained to use this scale with an established degree of accuracy. It appears that for recording of clinical status germane to therapeutic needs and for longitudinal evaluation of clinical trials this would be the most essential information. Total crevice or pocket depth can also be expressed in millimeters or other units of a graded scale.^{8, 10}
2. Gingivitis,^{6, 7} plaque,^{7, 11} and calculus^{7, 11} can be recorded on several numerical scales with fairly high reproducibility. For most of the current methods, the numerical scales are related to fairly similar clinical conditions.
3. Methods for assessment of periodontal parameters from roentgenograms are available,¹² although not refined to high reproducibility,¹⁰ under regular clinical conditions. The relationships between the bottom of the epithelial attachment and the alveolar crest seems to be fairly constant with a variation level usually under 1 millimeter.¹³
4. Tools to measure mobility¹⁴⁻¹⁶ are available for various degrees of reproducible accuracy.
5. For evaluation of occlusion and for inadequate dental restorations, no generally acceptable parameters are available.
6. Elaborate sampling techniques and methods for analysis of results are available.^{1, 2, 17} Stratified multistage probability samples of the United States population, as used in the Health Examination Survey,¹⁷ make it possible to collect information applicable to the entire U.S. population from examination of only a few thousand individuals (for example 7,710 people from a total enumerated population of approximately 111 million). With these techniques one individual can, with statistical validity, represent as many as 16 or 17 thousand persons.

Such sampling techniques are, of course, very complicated and expensive, but it has been proven that they can be carried out and provide valid information. Therefore, it is possible both to survey periodontal

status and do clinical trials on a selected, relatively small sample and obtain information applicable to large populations.

Periodontal status thus can be evaluated with acceptable sampling techniques according to a variety of parameters. Unfortunately the goals for treatment and prevention have not been established in numerical values which can be related realistically to the periodontal status. In other words we do not know or we do not agree upon how success or failure of periodontal treatment or prevention should be expressed by the parameters that are used in the various periodontal indices. Thus, in spite of tools we do not have a mathematical base for estimating treatment and preventive needs, and consequently no base for estimating personnel problems.

One may categorically say that everybody with periodontal disease needs some form of therapy, preventive procedures and education (which means practically every adult person with natural teeth left and most children). However, before one can determine how much a person needs one must have well defined goals of therapy and prevention, as well as probability figures with regard to reaching these goals.

Technically it is possible to determine periodontal status and needs with the tools that are available today, but the goals of therapy and prevention will have to be defined before the magnitude of the needs can be determined.

B. What information, besides periodontal status, must be available before the total periodontal needs can be assessed in a scientifically reliable manner?

1. The effectiveness of the various current therapeutic and preventive procedures in periodontics has to be established by extensive clinical trials. During these trials, the various periodontal parameters should be scored in order to establish realistic goals for periodontal therapy and prevention. It is, for example, totally unrealistic to assume that with current therapeutic and preventive means, the gingivitis, plaque and calculus scores can be kept on zero level for any length of time. The best we can hope for is to keep the attachment level constant or possibly gain attachment after therapy.

It is possible that there exists a "permissible" gingivitis level, a plaque level, and a calculus level, or even a pocket depth level, that is compatible with maintenance of intact connective tissue attachment. The interrelationships between these parameters, therefore, have to be established in long-term clinical trials with the periodontal attachment level (related to the C-E junction or any other fixed point on the surface of the

tooth) as the common and most important reference point since the main purpose of treatment and preventive procedures is to maintain the attachment apparatus of the teeth intact throughout life. Also, since the attachment level related to the C-E junction is directly measurable on a calibrated scale it provides a more reliable basis for mathematical comparisons than numerical scores of gingivitis, plaque and calculus.

Possibly beyond the "permissible" level there is a gingivitis, plaque and calculus level that signals danger to the attachment apparatus. A difference in score of, for example, 1.1 to 1.3, although not statistically significant, may be biologically and clinically significant since 1.3 may be a threat to the attachment level while 1.1 may be "permissible." A statistically significant difference in plaque score of 0.3 to 0.9 may be of no clinical significance since the attachment level will not be affected in either case.

If such "permissible" and attainable levels exist (possibly related to frequency of recall programs) they are extremely important for clinical patient care.

2. Relationships between scores of periodontal status and choice of therapeutic and preventive procedures have to be established by clinical trials and longitudinal studies over extended periods of time.
3. Duration of treatment should be related to periodontal status scores. There may be a relationship between calculus score and time required for calculus removal, plaque score and time required for instruction in oral hygiene, loss of attachment and root planing and methods for surgery, pocket depth and methods of surgery, etc.
4. Probably the most complicated problem, not only from a scientific standpoint but also because of sensitive political and economic considerations, is to determine the desirable education level for the personnel needed to implement whatever procedures are proven to give the optimal results in periodontal therapy and health care, and to determine the time-related patterns for various personnel levels and type of procedures, equipment, facilities, logistics, etc. all the way to insurance rates and regulations.

C. Where do we go from here?

Long Term Approach

Obviously, the questions I have raised could not be answered for many years even if a sizable task force and unlimited funds were made available. It may sound Utopian even to dream about such an all-out war against periodontal disease.

However, the magnitude of this problem which in-

volves the most common disease in the world is such that one has to think big, plan big and make big demands if real progress is to be made. Even if researchers should materialize some of the current pipe-dreams of immunization, plaque solvents, mechanization of instruments for calculus removal and home care, etc., we would still face the problem of periodontal disease, although hopefully to a lesser extent. Thus information gained from research of the type outlined in this paper would be of basic importance for periodontal health care even though significant progress is made relative to prevention and treatment.

Very high priority is needed for large multiphased, well planned and well coordinated clinical research programs that would study in depth over a 5 to 10 year period the relative merits of various clinical and health care procedures in periodontics, and make attempts to streamline current procedures with regard to both manpower and time.

At the same time a stratified multistage population survey should be conducted with as accurate clinical assessments of the periodontal status as possible and utilizing as many parameters as possible. It is essential that the same parameters be used both for surveys and clinical trials.

Immediate Approach

Before conclusive information from extensive research of comprehensive dimensions becomes available—and I am afraid that will take more than my life time—what should be done immediately and with a more modest approach?

We have a large accumulation of data available concerning the distribution and severity of periodontal disease in the United States.^{3,5} As periodontists we are suspicious that these data may under-represent the total severity of periodontal disease, but it is very possible that clinical trials could establish approximate conversion factors from the epidemiological data to clinical situations of, for example, need for treatment and extent of treatment.

The data that are available, although probably underscored, indicate an almost 100% morbidity rate of some type of periodontal disease in adults with natural teeth in the United States, and over 50% in children.

Quoting in summary, Russell,¹ who is our greatest expert on epidemiology of periodontal disease: "About 13 million women and 11½ million men may be amendable to treatment by simple prophylaxis—maybe by auxiliary personnel. About 8 million men and 7 million women have the disease in early stages, and 8.9 million men and 6 million women in more advanced

stages requiring highly skilled and elaborate periodontal treatment. While 3 million men and 2 million women have periodontal destruction so far advanced that extraction seems indicated." This of course is more than enough to keep us all busy without making a dent in the need. However, it appears that an attempt should be made to establish, if it is possible and practical, to extrapolate periodontal needs from epidemiological data already available. Such research would also necessitate a large scale clinical trial program, and inclusion of other parameters such as distance of attachment level from C-E junction for comparison of results.

NEEDS VERSUS DEMANDS

The last but not least important problem is how to transfer needs to demands for service. Research on how to motivate people to seek periodontal care is also a need that requires serious consideration. One must admit that so far no great efforts have been made to educate and motivate the American people in periodontal health care. The "being close" hazards of poor oral hygiene as illustrated on television can hardly be characterized as health education, although it may provide some motivation. Methodology for motivational research is not well established. It is an exciting field to talk about, but as a science it is not very applicable to our aims. Motivation is more on the public relations level than related to measurable controlled changes in attitudes.

What can we as periodontists do to promote more attention to periodontal treatment and health care?

1. Expand educational programs for dental students, dentists in general practice, specialists and for auxiliary personnel.
2. Encourage large scale educational programs for the public.
3. Do research (basic, basic with clinical application, clinical, educational and motivational). The most glaring need is for a large series of clinical trials to establish the effectiveness of our clinical and preventive procedures. At present, only small projects for selected population groups and selected procedures are struggling along more or less on a pilot basis. Clinical research is time-consuming and difficult since human beings are not gnotobiotic, not pair fed and not always littermates. The human life span is long and the natural history of periodontal disease usually indicates a very slow progress, and not necessarily a linear progress. Thus, accurate measurements are needed to detect differences from year to year, and preferably a large number of subjects, to include the human variations in response and behavior. Unfortunately, this is not the type of

research that our basic scientists are trained to perform and the clinicians lack training in the scientific approach to problem solving. Therefore, progress in clinical research has been very slow and will remain slow until sufficient support is provided to train and maintain clinicians for clinical research.

What can the American Academy of Periodontology do to promote recognition of the needs for periodontal health care?

More than any other organization the Academy is concerned with periodontal disease and periodontal health care. All of its members have dedicated themselves to combating this disease, with treatment, research and educational programs.

But in spite of great progress in the science and art of periodontology and individual successes both in treatment and prevention of periodontal disease, the management of periodontal disease as a health problem is far too great a task for a group of specialists alone. We can only hope to create an awareness of the magnitude of the problem, support all broad-based approaches toward improvement in periodontal health, and treat as many patients as possible.

A most encouraging happening at the Academy workshop last fall¹ was an expression from the U.S. Public Health Service Dental Health Division that they were very much aware of the great periodontal needs of the American people and that they were considering expanded efforts in organization and support of research and educational programs along the lines that have been indicated in the present paper.

Anything we can do in our organization and as individual periodontists to support such endeavors should have the highest priority.

The clinical research programs and surveys to determine periodontal needs would take long and extensive planning and the execution of the programs would require staggering sums of money. Time and effort of human beings will always be worth quite a bit more than the price and maintenance of rats and mice. Since clinical research has to be done on humans to provide results applicable to humans, such research will always be expensive. However, I do not think this is as much a problem of cost as it is a problem of information and education of people who are directing research projects and distributing governmental and other sources of funds.

Here, the members of the Academy, both as a group and individually, have a tremendous mission. I do not think we should wait for the government to do it for us. We should take the initiative to make the government

aware of periodontal disease as a health problem and what action is needed to attain periodontal health for the American people.

Present Status

1. An almost 100% morbidity rate of some type of periodontal disease has been found in adults and the rate in children is over 50%.
2. Periodontal disease is the leading cause of loss of teeth beyond early middle age.
3. Epidemiological studies have established a very high correlation between plaque and calculus on the teeth and periodontal disease.
4. No planned large-scale attempt has been made to assess the periodontal needs of the American population in spite of the overwhelmingly high prevalence rate of periodontal disease.
5. Methods for recording of periodontal status, suitable for large-scale investigation and mathematical evaluation, are available.
6. A recording of needs becomes meaningful as part of health care when estimates can be made of what it requires to meet these needs and to what degree they can be met by available methods for treatment and prevention.
7. There is an urgent need for controlled clinical trials of all phases of periodontal therapy and preventive practices. Tools are available for such investigations.
8. Conversion factors should be established between recording of periodontal health status and need for therapy, both related to time and to effectiveness.

CONCLUSIONS

1. Methods are available for clinical recording of a number of parameters for periodontal status.
2. The effectiveness of current therapeutic and preventive procedures in periodontics has not been scientifically established. However, this can be done with present methods of sampling, scoring and analysis of results.
3. The American Academy of Periodontology and

we as individual periodontists should work for the establishment of a large multiphased program to determine the various aspects of periodontal needs.

REFERENCES

1. O'Leary, T. J.: Workshop Report "The Periodontal Needs of the United States Population." Am. Acad. Perio., Chicago, 1967.
2. Johnson, E. S., Kelly, J. E. and Van Kirk, L. E.: Selected Dental Findings for Adults. National Center for Health Statistics. Series 11, No. 7, Washington, D. C., U. S. Public Health Service, 1965.
3. Kelly, J. E. and Van Kirk, L. E.: Periodontal Disease in Adults. National Center for Health Statistics. Series 11, No. 12, Washington, D. C., U. S. Public Health Service, 1965.
4. Kelly, J. E., Van Kirk, L. E. and Garst, C. E.: Oral Hygiene in Adults. National Center for Health Statistics. Series 11, No. 16, Washington, D. C., U. S. Public Health Service, 1966.
5. Bureau of Economic Research and Statistics. A.D.A.: Survey of Needs for Dental Care, II. Dental Needs According to Age and Sex of Patients. J.A.D.A., 46:200, 1953.
6. Russell, A. L.: A System of Classification and Scoring for Prevalence Surveys of Periodontal Disease. J. Dent. Res., 35:350, 1956.
7. Ramfjord, S. P.: Indices for Prevalence and Incidence of Periodontal Disease. J. Periodont., 30:51, 1959.
8. Ramfjord, S. P.: The Periodontal Disease Index (PDI). J. Periodont., 38:602, 1967.
9. Smith, W. A. and Ash, M. M., Jr.: A Clinical Evaluation of an Electric Toothbrush, J. Periodont., 35:127, 1964.
10. Ramfjord, S. P., et al.: Subgingival Curettage Versus Surgical Elimination of Periodontal Pockets. J. Periodont., 39:167, 1968.
11. Greene, J. C. and Vermillion, J. R.: The Simplified Oral Hygiene Index. J.A.D.A., 68:7, 1964.
12. Schei, O., et al.: Alveolar Bone Loss as Related to Oral Hygiene and Age. J. Periodont., 30:7, 1959.
13. Stanley, H. R., Jr.: The Value of Step-Serial Sectioning in Morphologic Study of Human Periodontal Disease. J. Periodont., 28:248, 1957.
14. Mühlemann, H. R.: Ten Years of Tooth Mobility Measurements. J. Periodont., 31:110, 1960.
15. O'Leary, T. J.: Instrument for Measuring Horizontal Tooth Mobility. Periodontics, 1:249, 1963.
16. Parfitt, G. J.: Measurement of the Physiologic Mobility of Individual Teeth in an Axial Direction. J. Dent. Res., 39:608, 1960.
17. National Center for Health Statistics: Plan and Initial Program of the Health Examination Survey. Vital and Health Statistics. P.H.S. Pub. No. 1000, Series 1. No. 4, Washington, D. C., U. S. Public Health Service, U. S. Government Printing Office, 1965.

Abstract

CORRELATION OF SALIVARY SUGAR AND BLOOD SUGAR WITH PERIODONTAL HEALTH AND ORAL HYGIENE STATUS AMONG DIABETICS AND NONDIABETICS

Mehrotra, K. K., Chawla, T. N. and Kumar, A.
J. Indian Dent. A. 40:287-294, November, 1968

Clinical evaluation of 50 diabetic and 50 nondiabetic patients was made using the Oral Hygiene Index (Green and Vermillion)

and the Periodontal Index (Russell). Blood sugar analysis and saliva glucose content were made on samples taken one hour after the morning meal. No correlation in either diabetic or nondiabetic was found between salivary sugar and periodontal or oral hygiene scores. Differences in the oral hygiene and periodontal indices between the diabetics and nondiabetics were highly significant. The diabetics showed more severe periodontal involvement and higher oral hygiene scores. *Dental College and Hospital, Lucknow, India.*