Seriously Handicapping Orthodontic Conditions (1976)

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SERIOUSLY HANDICAPPING ORTHODONTIC CONDITIONS

COMMITTEE ON HANDICAPPING
ORTHODONTIC CONDITIONS
Assembly of Life Sciences
National Research Council

National Academy of Sciences
WASHINGTON, D.C. 1976

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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PREFACE

In December 1973, the Office of The Surgeon General, Department of the Army, asked the National Academy of Sciences–National Research Council to recommend for use in military health care programs a definition of orthodontic conditions that are seriously handicapping and to recommend objective clinical criteria for characterizing those conditions.

The Army's need for such advice arises from the language and directives that provide authorization for orthodontic care for eligible military dependents only if the condition being treated is seriously physically handicapping. There are no professionally recognized criteria for seriously handicapping orthodontic conditions that have broad general acceptance. The Army, however, needs authoritative and professionally acceptable criteria that may be followed in determining eligibility for orthodontic care.

The civilian-care portion of the Uniformed Services Health Benefits Program (USHBP) has been designated the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). It became fully effective on January 1, 1967, as a result of the Military Medical Benefits Amendments of 1966 (Public Law 89-614), which essentially rewrote the program for the medical care of dependents of active-duty personnel. The amendments were preceded by the Dependents' Medical Care Act of June 7, 1956 (Public Law 569), which provided the basis for a

limited program of short-time hospitalization in civilian medical facilities for dependents of active-duty personnel of the uniformed services (Army, Navy, Air Force, Marine Corps, Coast Guard, Public Health Service, and Coast and Geodetic Survey). CHAMPUS provides for extensive outpatient care, expands the inpatient benefits by removing many of the restrictions that were embodied in the original law, and, for the first time, extends benefits to retired personnel and to dependents of retired or deceased personnel for medical care received from civilian sources. CHAMPUS is a cost-sharing plan under which the government pays a share of the reasonable charges for authorized health care in compliance with a required claim system.

A CHAMPUS benefit not usually available through uniformed services facilities is the Program for the Handicapped. This program provides reimbursement (under a cost-sharing arrangement) for a variety of specialized treatment and care services and is restricted to active-duty dependents who are moderately to severely mentally retarded or seriously physically handicapped. Care under this program requires specific approval by CHAMPUS authorities. From its beginning, the Program for the Handicapped under CHAMPUS included treatment for some orthodontic conditions, such as severe malocclusion, and related care needed to correct the defect or to aid the patient in adjusting to a condition that was classified as a serious physical handicap.

Before September 1974, inclusion of a person in the orthodontic program required submission of a CHAMPUS Form 161 ("Handicapping Labio-Lingual Deviations") completed by the sponsor and the orthodontist. This form was intended to document the severity of the person's malocclusion largely on the basis of weighted measurements developed by the examining orthodontist in accordance with a scoring system known as the Draker Index. The Draker Index was used by CHAMPUS for some years, despite widespread disagreement as to its effectiveness in establishing an accurate assessment of degree of handicap. Like all other current systems, it is limited to physical measurements and does not include functional assessment or evaluation of the psychosocial implications of a dentofacial abnormality.

As of September 1, 1974, newly proposed orthodontic care under the CHAMPUS Program for the Handicapped may not be approved solely on the basis of a dental condition for which orthodontic treatment is appropriate. Dental care, including orthodontic treatment, as a necessary adjunct of medical or surgical treatment will remain eligible for CHAMPUS cost-sharing under the basic program.

In the summer of 1974, a Committee on Handicapping Orthodontic Conditions was established by the National Research Council. The Com-

mittee—with representation from dental specialties, developmental biology, behavioral sciences, and health care delivery—began its deliberations in September 1974.

The Committee acknowledges its indebtedness to all who responded to requests for assistance and thereby contributed to this report.

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INTRODUCTION

The incidence and prevalence of diseases affecting the oral cavity surpass those of any other disease in a population group served by a comprehensive health care program. Although they are primarily chronic, dental illnesses are characterized by frequent episodes that are acute, debilitating, and possibly life-threatening. With no potential for self-correction or even self-amelioration, they pursue a continuously destructive course while the cost of ultimate treatment rises. In the absence of treatment, dental illness adversely affects systemic health and complicates the course of systemic diseases. An increasing burden is placed on a patient's emotional well-being, as his comfort, self-image, and social acceptance deteriorate as a result of pain, disfigurement, and impaired function. The nature of orofacial disease is such that one can predict that its management will present administrative problems in any comprehensive health care program, because of the uncertainty with respect to eligibility for payment.

Charge to the Committee

The question that inevitably arises in administering a health care plan is: "Which diseases in which patients will receive treatment?" The answer has two separable components. One emerges from the judgment of

health professionals who must diagnose diseases and assess their seriousness and significance. The other depends on administrative, financial, and even political considerations. Discipline is required if confusion of the two components is to be avoided. The process of identifying people with health problems must not be confused by the complexities of providing health care.

In the implementation of the orthodontic program under CHAMPUS, difficulty was encountered throughout the uniformed services as efforts were made to determine eligibility for orthodontic care. It became apparent that procedures based on entitlement were inadequate owing to the lack of professionally accepted criteria for handicapping orthodontic conditions. It was in response to this problem that the Department of the Army asked the National Academy of Sciences–National Research Council to assist in *defining seriously handicapping orthodontic conditions and to recommend objective criteria for characterizing them.*

Approach of the Committee

In defining seriously handicapping orthodontic conditions and the criteria for their clinical assessment, the Committee on Handicapping Orthodontic Conditions steadfastly limited itself to the identification of the conditions and to the development of guidelines for identifying the most handicapped patients. The primary focus of the Committee was on the recognition of an existing oral health problem, and not on which or how many patients would or should receive treatment. This approach, dictated by the Committee's charge, made it necessary to ignore the interrelationship between malocclusion and other oral conditions. For example, the fact that destructive periodontal disease may result from an untreated malocclusion is not addressed by the Committee. This omission was not due to a lack of sensitivity to the problem: such considerations were outside the Committee's scope. Similarly, no recognition was given to the fact that some orthodontic conditions, if left untreated, may develop into conditions that are seriously handicapping, such as temporomandibular joint dysfunction.

It must be emphasized that the Committee was asked to respond to a narrowly defined and highly specific question. The temptation to expand its efforts beyond the charge was resisted. Thus, the Committee's first sets of recommendations do not refer to such matters as the provision of orthodontic care, the implications of partial treatment or lack of treatment, or the need for research. Only after completion of the primary charge were those related considerations addressed, under the title

of "Further Recommendations on Implementation, Development, and Research" (page 27).

The Committee immediately found itself in need of a better understanding of the terms "handicapping" and "orthodontic condition." The precise definition of "handicapping" is of such importance that it is addressed separately. A working understanding of "orthodontic condition" was established. For the purpose of this report, the Committee agreed that, in general, orthodontic conditions are physical abnormalities of tooth and/or jaw relationships. The correction or improvement of such relationships may best be achieved through orthodontic therapy, with or without concomitant surgical or prosthetic procedures.

After reaching an understanding of its charge, the Committee engaged in an in-depth review of the pertinent literature. In addition, representatives of the Committee attended meetings sponsored by the Fédération Dentaire Internationale and the National Institute of Dental Research that were particularly germane to its task. These efforts led to the conclusion that answers to the questions asked of the Committee are not to be found in the literature or in the possession of any professional faculties, groups, or organizations in this country or abroad. The state of the art is such that definitive answers do not exist.

The Committee's tendency at that point was to digress and to ask whether the right questions had been asked or to deny that answers were possible. Circumspection ultimately led to acceptance of the view that the questions were in fact practical, rational, and justified and were couched in language in common use today among both the lay public and the dental profession. These considerations are discussed later in this report. Those responsible for the administration of health care programs have every right to expect answers. It became apparent that the answers must be derived from the judgment of the Committee.

Report in Perspective

The report of the Committee must be interpreted in proper perspective. The recommendations represent judgments, many of which unavoidably are subjective, that were made on the basis of awareness of existing knowledge and on the basis of the collective expertise of the Committee. The answers to the questions posed to the Committee are viewed as having immediate usefulness. Obviously, much research is needed to validate prevailing clinical judgments. The results of such research would make it possible to revise and improve the Committee's recommendations.

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Definitions

In the search for a precise definition of "seriously handicapping orthodontic condition," difficulties quickly arose with the perception of "handicapping." Although often used, the word has not been precisely defined. Even more difficulty was encountered in interpreting how it might be applied to any condition of the oral cavity.

Definitions of "handicapping" that have been or are in use were examined. The National Institute on Rehabilitation and Labor Health Services defined a "handicapped person" as one who, because of the existence of a disability, is hampered in attaining the fullest physical, mental, social, vocational, and economic usefulness of which he is capable.[1] The staff of the Office for the Handicapped, Rehabilitation Services Administration, Social and Rehabilitation Service, Department of Health, Education, and Welfare, has suggested the following shorter, but hardly less restricted, definition: "An individual who, because of a physical or mental disability, is at a disadvantage in performing one or more major life activities" (Social and Rehabilitation Service, personal communication). The Rehabilitation Act of 1973 (PL 93-112) defines "handicapped individual" as one who has a physical or mental disability that, for such person, constitutes or results in a substantial handicap to employment.[2]

One is pressed for a clearer understanding of "disability," which appears in each of the above definitions. Those engaged in rehabilitation planning in Nevada developed the following clarification:[3]

Impairment: The actual physical or mental deviation from a theoretically normal condition.

Disability: The decrease in functional ability that results from the impairment.

Handicap: The way in which the disability decreases functional activity.

The regulations developed for the implementation of the Military Medical Benefits Amendments of 1966 defined a "serious physical handicap" as a condition markedly limiting functional capabilities, in comparison with those of one's peers.[4] An interpretative memorandum from the office of the Assistant Secretary of Defense stated that, "in our opinion, the use of a serious physical handicap in the law is intended to . . . convey the concept that qualifying for benefits under the Handicapped Program requires a confirmed diagnosis of disease, injury or other impairment of such a severity as to make a person substantially incapable of engaging in the usual and customary or normal activities expected of unimpaired persons in his age group."[5]

It is far from obvious how these definitions might be extrapolated to

the oral cavity in assessing deviation from normal. In developing a "rehabilitation program for the dentally physically handicapped child," the Bureau of Dental Health of New York State[6] acknowledged that "it became essential to define a handicapping malocclusion and to establish a mechanism for determining the eligibility of cases for state aid"; but "it was not possible to arrive at any definition which included simple objective criteria for evaluating the psychological as well as physical factors that create a physical handicap."

In developing an index for assessing the degree of handicapping malocclusion to be used in establishing treatment priority, those engaged in the Burlington Orthodontic Research Project of the University of Toronto considered what constitutes a handicapping anomaly with respect to both professional and lay standards and then agreed on prerequisites for determining a handicap.[7] These workers avoided the problem of definition and went directly to a description of clinical criteria, with a graded scale for expressing severity.

The New York and Toronto examples underscore the complexity of the definition problem, but they are most useful in highlighting the significance of the fact that the word "seriously" was included in the request made to this Committee. At issue in the present report is a definition of "*seriously* handicapping orthodontic conditions." Without such qualification, the task of the Committee would have been infinitely more difficult. The qualification permitted the Committee to avoid coming to grips with the philosophic conundrum inherent in the viewpoint that everyone with malocclusion is handicapped to some degree.

The following definitions, developed as a first priority of the Committee, are fundamental to all aspects of the report. Interpretation of these definitions and their utility requires that they be considered in the context of the complete report. A "handicapping orthodontic condition" is a clinically obvious physical abnormality of tooth and/or jaw relationships. This condition results in disability characterized by physical, emotional, and social dysfunction. The measure of a person's *degree* of handicap is the extent to which his disability affects him. Therefore, a "seriously handicapping orthodontic condition" is a dentofacial abnormality that *severely* compromises a person's physical or emotional health. Physical health is *severely* compromised if disability of the oral function of breathing, speaking, or eating accompanies the abnormality, especially if tissue destruction is occurring. Emotional health is *severely* compromised if the abnormality causes others to react negatively, so that a person is treated differently by his peers because of the abnormality, or if the abnormality causes his self-image and self-esteem to be affected to such an extent that his life adjustment is altered.

Abnormalities of the Mouth and Face

"Orthodontic condition," "dentofacial abnormality," and "dental malocclusion" are generic terms that embrace a wide spectrum of dental, oral, and facial variations and abnormalities. These have in common some malrelationships of the teeth, which, however, are frequently secondary to facial abnormality. These deviations from the "norm" or from the "usual" configuration range from minor malalignment of the teeth, at one end of the spectrum, to major developmental clefts and other facial deformities, at the other end. Between these extremes is a continuum of abnormalities that vary in severity. Tooth, jaw, and facial relationships can be distorted in any or all three planes of space. The resulting functional imbalances affect eating, breathing, and speaking. These deficiencies have a potential esthetic, emotional, behavioral, and social impact on the affected person.

Many of these disturbances can be described systematically (classified), and some can be identified as "syndromes." Our understanding of the etiology of these problems, as well as of their specific effects on a person's overall well-being, is limited. Aside from the poorly understood genetic and environmental influences that interact to mold dentofacial development, there are complex social forces that shape our concepts of dentofacial esthetics.

In this section, the physical abnormalities themselves and the reaction of others to them will be discussed. In the following sections, the impact of the abnormalities on the patient's physical and emotional health will be considered.

ESTIMATES OF THE INCIDENCE OF DENTOFACIAL ABNORMALITY

Attempting to establish criteria for evaluating the degree of severity of dentofacial abnormality or dental malrelationship (malocclusion) will continue to be difficult until there is full understanding of the problem from anatomic, physiologic, emotional, and social points of view. The lack of such criteria has complicated epidemiologic research. It is necessary, therefore, to seek universally acceptable data on the prevalence of problems related to occlusal disharmony, the criteria of need for treatment for these problems, and the determination of demand for such treatment on the part of the population.

The prevalence of malocclusion varies widely among different countries. In primitive and isolated societies, there is less variation in occlusal patterns than is observed in more heterogeneous populations.[8] Among Australian aborigines, for example, the prevalence of malocclusion is usually low.[9] Dental crowding and malalignment are rare in nearly all primitive populations. This implies that selective evolutionary pressure has eliminated dental malocclusion. However, such evolutionary pressure has sometimes not resulted in the imaginary "ideal" occlusion of western society. For example, among some Melanesian islanders, a condition commonly labeled as skeletal malocclusion coexists with good dental alignment.[10]

The reported rate of malocclusion is higher in developed than in primitive countries, and it may be higher in the United States than anywhere else.[11] It is difficult to escape the implication that the high rate of dental malocclusion in the United States is a price paid for genetic heterogeneity, although diet and other factors also play a role.[12] Variability in estimates of the prevalence of malocclusion in the United States can be related to nonstandardized definitions of normalcy and differences in sampling.[13]

Recently, the National Center for Health Statistics of the U.S. Public Health Service (USPHS) published a study of dental relationships in a sample of some 7,400 children 6–11 years old in the United States.[14] The sample was selected carefully to represent the 23.8 million American children of those ages, excluding only those on Indian reservations.

On the basis of the USPHS estimates, it appears that 75% of American children have some degree of dental occlusal disharmony. Thus, it seems

that occlusal disharmony is the usual finding, rather than a deviant finding. The extent of the disharmony determines whether there is a resulting "orthodontic condition." In the USPHS study, 37% of American children were judged to have handicapping malocclusion for which treatment was highly desirable. Of the total sample, 5% (included in the 37%) were judged to have such severely handicapping malocclusion that treatment was considered mandatory. In this study, 17% of the children had significant protrusion of maxillary incisors, and 25% had improper molar relationships (posterior bite). The prevalence of these conditions varied according to social, sexual, and regional groupings. Open bite was four times more common in blacks than in whites, for instance, and it was slightly more common in girls than in boys.

It is fair to say that, although we have some idea today about the prevalence of malocclusion in the United States and the need for orthodontic treatment, we have almost no information about the potential demand for treatment, because of the current constraints in financing health care. It is safe to assume, however, that orthodontics is a mandatory health service for at least 5% of American children.

DENTOFACIAL ESTHETICS

In every civilization and in every culture, there have been distinct, although different, standards of facial esthetics. These standards have ranged from the bizarre—such as the facial mutilation, tattooing, and scarification practiced by some tribes in Africa and Brazil—to the highly idealized concepts of facial beauty depicted in Classical sculpture. It is interesting that some uses of cosmetics, hairstyles, and facial adornments and jewelry have precedents among almost all ancient peoples.

The old adage that "beauty is in the eye of the beholder" is a profound statement in viewing concepts of facial esthetics historically or cross-culturally. Man's reaction to congenital facial deformity and disfigurement has not been uniform. Because of folklore and superstition, some societies have afforded the facially deformed special privileges and have even worshipped them, as among some pre-Columbian Indians in Mexico. In other societies, such people have been shunned or even put to death as newborns.[15]

Artists (e.g., Dürer, in the sixteenth century), anatomists, physical anthropologists (through the anthropometry of the eighteenth and nineteenth centuries), and orthodontists (through cephalometry and radiographic cephalometrics in the twentieth century) have attempted to measure the physical attributes of dentofacial esthetics. In spite of these attempts over the last four centuries to quantify facial charac-

teristics and scientifically assess facial esthetics, we still must use "reaction of others" to a face and dentition as the most valid criterion for judging dentofacial esthetics. Even if a mathematical formula could reliably measure these attributes, we would still have to measure the validity of the method by subjective criteria (response of others).

As MacGregor has shown, there is often a paradoxically greater response to mild deformities than there is to more severe handicaps.[16] People who are "different" in our society are often stigmatized, and this may result in psychosocial crippling.[17] The standards of facial esthetics in our society are generated largely by Hollywood and Madison Avenue and are constantly reinforced through the media of mass communication.

The following is MacGregor's classification[16] of patients according to degree of facial deformity:

Degree 1, Slight: A mild deviation which is neither conspicuous nor apt to attract attention; requires having attention called to it before it is noticed, but may be a source of distress for some individuals.

Degree 2, Moderate: Noticeable. May elicit remarks, teasing, questioning, or staring, but usually no violent reaction.

Degree 3, Marked: Definitely noticeable. Likely to evoke strong reactions from others: repulsion, jokes, pity, curiosity, deliberate avoidance, or undue staring.

Degree 4, Gross: Definitely shocking and repelling to others. Evokes violent reaction of horror, repulsion, pity.

CURRENT MALOCCLUSION INDEXES

The assumption in orthodontics is that morphologic deviations from "normal" dental occlusion compromise the functional adequacy of the natural dentition and mar the esthetic qualities of the teeth or face. There are at least three inherent difficulties in this premise.

The first is related to the lack of a comprehensive clinically significant definition of "normal occlusion" that encompasses orofacial considerations.[18] The currently accepted definition of "normal occlusion" is restricted to a highly arbitrary standard of "ideal occlusion" that is based on tooth interrelationships seldom seen in the general population (approximately 1–2%). This definition is so precise and self-limiting that it obviously cannot be clinically useful as a definition of "normal or adequate occlusion."[19] Until an acceptable definition of "normal occlusion" based on structural and functional components is developed, malocclusion will remain ill-defined. This lack of definitive criteria probably accounts for the wide variation in clinical judgment and opinions exhibited by dentists from different backgrounds. The orthodontist

is limited clinically by rigid adherence to the present concept of "ideal" or "normal" occlusion.

The second difficulty is related to the precise relationship between the morphology of the dental apparatus and its functions. It is axiomatic in science that form and function are inextricably linked.[20] Thus, the premise in orthodontics that variations in form might lead to variations in function is not unprecedented; however, scientific methods have not been developed that allow precise analysis of form–function relationships in the gnathostomatic system. Although some methods are available for measuring such relationships, the application has not yet been made.

The third difficulty lies in the theory that dental variations impair physical beauty and that the impairment leads to a variety of psychosocial problems. Although reasonable conceptually, this is unproved scientifically.

The major problem in defining these various interrelationships clinically is that dental occlusal function, oropharyngeal function, dentofacial esthetics, self-image, and social adjustment have not thus far been subjected to precise quantification.

Because an understanding of dental occlusion and its variations is pivotal in resolving the other related issues, it is not surprising that attempts to quantify occlusal traits have preceded substantive research involving the related considerations. Thus, a number of indexes of separate occlusal traits and combinations and interrelationships of traits have been proposed. Such an index is a critical first step in solving the overall problem.

Indexes of malocclusion have been applied in two major ways–epidemiologically and to establish priorities for orthodontic treatment.[21] In epidemiologic applications, the nature and extent of occlusal variation are determined by a classification system. The goal of such an index is to determine the prevalence of defined malocclusion types in various populations. The critical factor in the epidemiologic use of indexes is reliability. Intrascorer and interscorer reproducibility of measurements is perhaps the most important criterion for assessing the value of an epidemiologic index. The results of this type of survey simply indicate the number of individuals in a population who have "ideal" occlusion and the types and degrees of deviations from the ideal in the rest of the population. The determination may be accomplished by simply adding a numerical scale to descriptive morphology. The purpose of devising malocclusion indexes for establishing orthodontic treatment need and priority is to attempt to measure the severity of the problem. In the past, attempts have been made to use these indexes for establishing whether a malocclusion is "handicapping." When

used in this fashion, the validity of an index is at least as important as its reliability. Does the index in fact measure degrees of severity? "Handicap" relates to degree of disability and cannot be quantified on the basis of morphologic traits alone. The impact of structural variation on function and behavior would have to be determined by additional criteria. In an attempt to define severity for treatment priority, the ability to rank-order becomes important.

The only method that can now be used for testing the validity of a treatment priority index is to compare the results derived from the index with the subjective evaluations of a group of experienced clinicians. Of course, this procedure in itself is invalid, in that the clinician is using the same criteria, albeit unconsciously, as are used in the index. A truly valid index would have to measure by objective means only the criteria included in the definition of "handicapping orthodontic condition" proposed by this Committee. No single index has been developed that even comes close to doing this.

Until such an index is developed, it will not be possible to measure the extent to which orthodontic treatment may overcome disabilities presumed to be related to occlusal disorders. Thus, the degree of effectiveness of the treatment has to be determined, as well as the validity of the device used to measure or assign priority to seriously handicapping orthodontic conditions.

Numerous dental or occlusal indexes have been proposed and used during the last 30-odd years. The index that comprises the most comprehensive morphologic criteria and that has been used most widely as an epidemiologic tool is the Treatment Priority Index (TPI) of Grainger (used in the USPHS survey previously cited[14]). This index attempts to correlate the variations in occlusal traits and integrate them into a number of discrete syndromes. It has considerable appeal to the orthodontist, because it uses clinical measurements, although it has not been demonstrated to have overall biologic validity.

The index with which there has been the greatest administrative experience is the Handicapping Labio-Lingual Deviations (HLD) Index of Draker (used previously for CHAMPUS).[22] It has been popular with orthodontists for the same reason as the TPI and because of its simplicity. Dental administrators, however, have found that the Draker HLD Index is subject to widely variable interpretations by the scorers because of its categoric, as opposed to continuous, rating scale. Furthermore, the less severe the malocclusion, the greater the variation in intrascorer and interscorer reliability.[23] When the same subjects are rated by both the TPI and the HLD Index, complete disagreement between the indexes has been observed in 7.7% of a sample.[24]

Summers devised an Occlusal Index,[13] a modified version of

Grainger's TPI, using weighting factors. The American Association of Orthodontists has endorsed the use of the Salzmann Index for establishing treatment priority.[25] To date, neither the Occlusal Index nor the Salzmann Index has been rigorously field-tested, and there are no published reports of their practical usefulness. The same is true of the new Fédération Dentaire Internationale (FDI) Index,[26] which was developed by one of the working groups of the FDI Commission on Classification and Statistics for Oral Conditions. The FDI Index attempts to synthesize the best qualities of other indexes by combining an epidemiologic method with an administrative method, but its efficacy has yet to be demonstrated.

All the various indexes continue to be used, in spite of the general recognition of their inadequacy and lack of validity. Some practitioners have attempted to supplement these indexes with esthetic indexes, such as the Eastman Esthetic Index[27] (the supplement to the Salzmann Index) and the index developed by Banack *et al.*[24] Unfortunately, much research is needed before any of the current methods can be accepted for use with any degree of confidence.

In short, there is no scientifically or clinically valid basis for accepting any of the current indexes of occlusal traits as the sole criterion for establishing the degree of orthodontic handicap or treatment priority. It is possible that some of them could be used as objective screening methods to identify smaller groups for more subjective scrutiny. Although current dental indexes alone are not well suited for ranking and determining severely handicapping physical conditions, their present unsuitability should not prevent attempts to establish other criteria for determining treatment needs.

One of the hazards in adopting too scientific an attitude in regard to this problem is that the universally accepted fact that malocclusion conditions themselves are "handicapping" to some degree will be ignored until a proven index is developed. It is possible—before a demonstrated, valid, and reliable scientific method becomes available—to assess the degree of severity of handicapping orthodontic conditions by somewhat subjective and perhaps even arbitrary clinical criteria. For now, this assessment must be based on the clinician's judgment of the biologic and sociologic severity of the problem, determined by his observations and experience concerning the effects of gross orofacial anomalies on the well-being of the patient.

Impairment of Physical Health

There are two basic ways to assess and categorize dentofacial abnormality. The first is in terms of anatomic deviations from the normal or

ideal, as described in the preceding section. This is the usual approach in orthodontics. It has been used for many years in classification and was used previously in CHAMPUS and similar programs. The second approach is to view the patient's reactions to his deviations from his concept of anatomic normality, focusing on subjective, rather than objective, characteristics. The patient's reactions may be psychologic (see page 16); they may be physiologic, expressed as more or less successful functional adaptations; or they may be pathologic, expressed as progressive deterioration.

PHYSIOLOGIC COMPENSATION

The oral cavity has three major functions: breathing, eating, and speaking. All three may be affected by disturbed morphology. Respiration is the primary function of the oronasal complex. Without it, nothing else matters. Bosma has called attention to the positioning of the head, jaw, and pharynx that is required to enable an infant to take his first breath.[28] The same effect of respiratory demands can be observed thereafter when anatomic relationships are changed surgically, as in an operation to correct mandibular prognathism.[29] In this case, prompt physiologic response is observed, with changes in postural relationships of the jaws and pharynx to facilitate breathing. These adaptations are so vital that they will be achieved even at the cost of distorting other functions and anatomic relationships.

The jaws and the dentition constitute but one part of the aural–oral–facial–pharyngeal–laryngeal–respiratory system for oral communication, mastication, deglutition, and respiration.[30] Thus, anomalies of jaws and teeth may disturb postural and functional interactions with contiguous structures. For example, a micrognathic mandible can threaten the patency of the airway. To survive, compensatory head–neck–jaw positioning becomes mandatory. This has been demonstrated in the Robin anomaly,[31] Still's disease,[32] and mandibulofacial dysostosis.[33] Maxillary hypoplasia can so restrict nasopharyngeal airflow as to induce pulmonary hypertension, resulting in cor pulmonale.[34]

Eating is the complex process in which a person ingests food, passing solid or liquid material through the mouth opening, the oral cavity, and the oral pharynx and hypopharynx and into the esophagus. To do this, a person must possess coordinated muscular activity of lips, cheeks, tongue, and pharynx, so that the food bolus can pass from the mouth into the esophagus without compromising the airway. Jaw function during eating also involves a coordinated muscular activity that allows for incising, tearing, and crushing food without conscious effort. For

survival, jaw function during eating must not be destructive of the jaw itself, the covering soft tissues, or the teeth.

In accordance with cultural heritage, eating ordinarily takes place in a social environment. To the individual, the social environment and its contacts may be as important as the nutritional aspects of the eating process. Muscular function of all involved parts must be so coordinated that he can interact in the social environment while eating. Speech and facial expression, particularly, should not be impaired.

Examples of handicap during eating are obvious. They range from the severe handicap of a cleft-palate patient who regurgitates food through his nose to the milder (but nevertheless significant) handicap of a child with an anterior open bite who is unable to get the lettuce out of the sandwich. Eating handicaps are observed in adults whose jaw function is such that it creates temporomandibular joint pain or periodontal breakdown. Teeth that are too prominent for proper coverage by the lips may make socially acceptable chewing and swallowing very difficult.[35]

Speech, evolutionarily the most recent function of the oral cavity, sometimes can be satisfactory despite bizarre anatomic malformations. Acceptable articulation of speech sounds is observed on occasion in a patient who has lost most of his tongue or who cannot approximate his lips.[36] Nevertheless, connected speech and overall communicative ability tend to suffer in such people, although single sounds and simple utterances can be handled. Some children with minimal anatomic deviation limited to misplaced incisor teeth are unable to make the necessary adaptations, and their speech defects are directly attributable to the dentition.[37]

TISSUE DAMAGE

If a person's ability to compensate physiologically is exceeded, function can continue only at the cost of tissue damage and destruction. Under these circumstances, the symptoms related to anatomic abnormality are the classic signs of tissue damage—pain, inflammation, swelling, or degenerative changes—and the altered function that was there before the other symptoms appeared.

Relating the symptoms of tissue damage directly to dentofacial abnormality is difficult, for several reasons. First, multiple causative factors are the rule, rather than the exception, in most pathologic situations. The dentofacial abnormality may therefore be a predisposing factor, rather than a sole cause. Second, pathology related to an anatomic abnormality may appear late. Perhaps the most common example of this is degenerative temporomandibular joint lesions, which tend to show up

after years of abuse of the joint. But judgments for an individual patient must be made at one time, on the basis of available information. Finally, particularly in growing children, there are feedback relationships between form and function, so that disturbed form leads to adaptive function, which leads to further alterations in form. These progressive alterations in form represent developmental tissue damage in one sense, but not in the usual sense of pathologic lesions.[38]

ASSESSMENT OF SYMPTOMS OF MALOCCLUSION

Objective quantification of the symptoms of malocclusion, outlined here as successful or unsuccessful physiologic adaptations, is difficult, particularly when no tissue damage has occurred. "Successful adaptation" implies that no pathologic changes have ensued; "unsuccessful adaptation," that tissue damage is resulting from the adaptive function. Even the successful adaptations, however, can be detected by a professional observer who is looking for them.

Tissue damage from mouth breathing may be detected in two ways: Most obviously, there are inflammatory and degenerative changes in the attached gingivae about the incisor teeth; in addition, the open mouth and low tongue posture result in secondary compression of maxillary buccal segments, owing to unopposed buccinator muscle force.

Impairment of eating is expressed more directly by symptoms that dentists are trained to observe, such as temporomandibular joint symptoms related to occlusal interference and damage to the dental supporting tissues from masticatory activity. The social aspects of eating and behavior can be explored by direct observation of the patient or of the reactions of family and friends of the patient.

Speech impairment related to dentofacial abnormality is detected, as a rule, in school speech evaluation programs.

The Committee's recommendations for detecting serious dentofacial handicaps by their symptoms of physiologic alterations are presented in the chapter on recommendations.

Psychosocial Aspects

Studies related to the psychosocial aspects of dental and orthodontic care in general appear to have been carried out mainly by two research methods. One is based on the so-called case-study method, focusing on careful study of one case (or of a few cases) in an individual (or culture).[39–41] The other method of study is the survey, here commonly

carried out on relatively small samples of clinic patients, dental hygiene students, or private orthodontic patients—all highly selected populations and recognized as such by the researchers.[42-47] Questions asked of these populations have concerned, for example, their attitudes toward their dental appearance, their reasons for seeking orthodontic care, and the attitudes of others toward their dental appearance. There have been few experimental studies relating orthodontic treatment to psychosocial factors—a fact that has brought criticism from some who are involved with these problems.[48-50]

The case-study method does not lend itself readily to quantification. A major advantage of this approach lies in the possibility of rich insights, growing out of intensive study of case material over a long period.[51] In research, this method is favored by many clinicians and practitioners who work directly with people in the office or in the field. This section will refer to psychoanalytic, sociologic, and anthropologic concepts developed primarily through case studies, on the assumption that clinical observations may be valid, even though not quantifiable.

Some observers have described our society as orally oriented.[52,53] When we socialize, we commonly drink together and eat together. When we conduct business, we rely on our ability to speak effectively. Whatever courtship rituals may characterize other cultures, people in the United States place a considerable value on an adequate-appearing dentition that bears some conformity to the rest of the countenance. Culturally, a highly significant role is assigned to the mouth from birth. Thus, any handicapping orthodontic condition must be viewed, not as an isolated problem, but within this cultural context. Before we can understand the implications of a seriously handicapping orthodontic condition for the patient's emotional life, it is necessary to appreciate the role played by the oral cavity in psychosocial development.

The infant first becomes acquainted with the outside world, has his basic needs for survival met, and obtains his earliest experiences with others through the oral cavity.[54,55] Thus, the infant's socialization begins with the oral cavity, and observable personality development begins in the oral stages of infancy.[56] "Through his mouth, . . . the infant is able to establish his identify as an individual and to set up his first social relationship—that with his mother. Through the mouth the infant develops intake and output roles that clarify his relationship with the outside world."[57]

Recent psychiatric research has emphasized that the child's basic ability to relate to others in a trustful way begins during the so-called oral stages of development.[58,59] The significance of the mouth in per-

sonality development is a keystone of contemporary psychologic thought, as are the roles of feeding, teething, and weaning.[52] The developing person's view of himself is also a direct function of the view held of him by the outside world, particularly by those closest to him. In other words, the person's view of himself—his so-called self-image or self-esteem—is preconditioned by the view of himself that he finds in others.[60,61] There is evidence that facial deformities that set a person apart from others may have serious sociopsychologic consequences.[62] These consequences range from humiliation caused by withdrawal of or ridicule from the onlooker, for example, to failure to obtain jobs, sexual partners, and friends.[17,62,63]

It has been deduced that the degree of self-esteem is directly relevant to the strength of one's belief that he is able to get what he wishes from life.[64] Thus, the social productivity of a person may be directly related to his expectations of himself, his image of himself, and his perception of others' opinions of him. From this perspective, many orthodontic case studies emphasize the emotional gains for patients through orthodontic correction of malocclusion. Through correction of an unsightly malocclusion, the orthodontist can open up to the patient avenues of work and social opportunity that may have been inaccessible to him previously, thereby making it possible for him to achieve his social and psychologic potential.

Many orthodontic surveys and epidemiologic estimates are concerned not with emotional or psychosocial factors, but with the physiologic aspects of malocclusion. The psychologic factors in orthodontic care that seem to have received the most attention appear to be directly related to general attitudes toward dental appearance and dental alignment and to patient attitudes toward orthodontic treatment. In other words, the researchers have sought, as a rule, specific answers to a few practical questions, rather than to questions of broader social, psychologic, or cultural import.

Understandably, several studies have pointed to the significance of dentofacial characteristics in determining the response of others to the individual and have reported that dentofacial conditions were important in forming stereotype judgments about the personality of the person being rated.[65] For example, straight teeth were linearly related to judgments about intelligence, sincerity, and conscientiousness.[53] The evidence is persuasive that personality characteristics are attributed to others on the basis of facial traits—a conclusion that the results of plastic surgery would support.[62,66,67] One survey concerning the meaning of dental appearance found that the adult population is highly aware of such appearance.[65] Another study called attention to the fact that treat-

ment is sought for a greater percentage of girls than boys; thus, it seems that in our society straight, even teeth are more important for girls than for boys.[68]

In developing understanding of the impact of an unsightly or unesthetic trait on the onlooker, it is instructive to look at related works[62,66,67] on psychosocial problems associated with more severe facial deformity. One widely quoted investigator writes that

> the severity of the disfigurement had no direct proportional relationship to the degree of psychic distress it engendered nor the kinds of adjustment made to it. . . . Regardless of the differences, either of degree of deformity or personality structure and environmental factors, the group had many common problems. These centered mainly around society's attitude toward the atypical face, the negative values it places upon it, and around the concept of self, which is largely derived through social interaction with others.[62]

Other researchers[17] similarly have called attention to the "spoiled identity" that may derive from a stigmatized person's perception of the reaction of others to his affliction and of their consequent withdrawal from him. Here, again, is evidence that contemporary social scientists recognize how closely related to the response of others is a person's view of himself.

Despite the importance assigned to the self-concept in sociologic and psychologic studies, there are no published reports of longitudinal self-concept studies of orthodontic patients. The long-term self-concept studies that do exist are concerned primarily with the changing self-concepts of children and adolescents (the latter population is often associated with orthodontic care) and, not surprisingly, show some changes in the adolescent's self-concept.[64,69,70] In a study[42] conducted at a university orthodontic clinic and designed to follow the patients from before orthodontic treatment to "retention," no significant changes in attitude of child patients or of their parents were observed during the course of treatment. However, a standardized and formal objective self-concept test was not used to evaluate the patients, and this inevitably leaves the validity and reliability of the report open to question.

Another study, reported recently in abstract form,[71] described a 10-month longitudinal study of 17 patients who had begun orthodontic treatment. This study "revealed that thirteen of the seventeen patients had a more positive self-concept after ten months"; thus, orthodontic treatment may have a positive influence on the patient's self-image within the first year of treatment. The study also reported that "a low family–self score [on the Tennessee Self-Concept Test] is a valid pre-

dictor of poor [patient] cooperation"; this finding is consistent with those of other studies.[72] Hence, it is questionable whether family approval of the orthodontic treatment could contribute to a patient's enhanced self-concept or whether this more positive self-image could be attributed to the relationship with the orthodontist or to the interest displayed in the patient through the treatment.

A number of investigators have been interested in the relationship between self-perceived and objectively assessed orthodontic conditions. Several studies[27,73,74] that attempted to correlate self-perceived orthodontic conditions with objective orthodontic conditions were inconclusive, in that these relationships were found to be only of "moderate" significance, with dissatisfaction found even among patients with reasonably attractive dentition. In a 1971 study[46] of the relationship between objective and subjective assessment of malocclusion, patients were divided into three groups: those who needed treatment, those who received treatment, and those who needed no treatment. The group needing treatment had the highest dissatisfaction with their teeth; but even in this group, 36% were satisfied with their teeth. In examining the relationship between self-perceived and objectively determined occlusal relations, the researchers have concluded that some people bring to their physical problems (here, orthodontic problems) an evaluation stemming from other subjective needs.[46] Where such subjective needs predetermine self-evaluation, these investigators see evaluation of the underlying psychologic problem as important in assessing treatment priorities.

As can be seen from the above discussion, patient perception of the orthodontic problem is closely related to motivation in seeking orthodontic care. It is interesting to note here one report[73] that children with severe malocclusion have the greatest desire for orthodontic treatment, but that there is no difference in desire for treatment between children with moderate malocclusion and those with good occlusion. However, it has been noted[43] that, among clinic families, the mother was usually the deciding and motivating family member. Additional reports suggest that, because the mother is the motivating factor in obtaining orthodontic care for her child, she may have considerable influence on the selection of occlusal conditions presented for treatment.[44,66] Parental evaluation of malocclusion was seen as related more to social factors (such as status strivings) than to objective evidence of severity of the problem.

We cannot leave this discussion without noting the emphasis on patient cooperation in the literature, probably because of its importance to the practitioner. The problem of patient cooperation is important

also in any third-party payment plan.[75] Some sociopsychologic studies in this area have dealt with such questions as the possible relationship between a patient's personality profile and his degree of cooperation during orthodontic treatment.[76] One widely cited report concludes that almost all the children studied saw orthodontic treatment as a stress situation, which corresponded less to the discomfort or pain faced in the treatment than to the child's emotional state.[77] This, in turn, was seen as the end product of the parents' projection of their fears into the child's treatment situation. These investigators, interested in maximizing cooperation, emphasized the importance of establishing a calm, firm, sincere attitude toward the child patient, thus recognizing the critical roles both of the parents in the patient's response to treatment and of the child's relationship with the orthodontist.

In another widely cited investigation of patient cooperation,[78] the composite picture of a cooperative patient was one who was under 14, enthusiastic, and trusting—again implying the capacity for establishing a positive relationship with the orthodontist, as well as a positive orientation toward the treatment itself.

The above brief review makes clear some basic problems in designing and carrying out "clean" behavioral research in this field. It is difficult to separate the patient's reaction to his malocclusion from the reaction of others around him—for example, the mother, who seems to play a major role in the selection of the orthodontic patient population. The interdependence of parental and personal evaluation of occlusion leaves open to question the validity of the distinction, occasionally found in the literature, between self-evaluation of occlusion and reaction of others. These provocative studies give the impression of having sought answers to important questions through highly selected populations by means of measurements of ill-defined variables. The orthodontic practitioner, faced with a specific patient problem, whether in the clinic or in the private office, is apt to find little here to help him to assess the psychosocial impact of a given malocclusion on his patient.

RECOMMENDATIONS

The Committee's first set of recommendations represents a response limited to the U.S. Army's specific and narrowly defined request for advice on definition and characterization, i.e., identification of seriously handicapping orthodontic conditions. A second set of recommendations is concerned with implementation of a program for identifying patients with these seriously handicapping conditions. A third group relates to implementation, development, and research. The Committee suggests that its recommendations for identifying seriously handicapping malocclusion not be regarded as final and conclusive; they should be field-tested to determine their reliability and reproducibility.

Recommendations on Identification

The following basic definition is recommended by the Committee: A *handicapping orthodontic condition* is a clinically obvious physical abnormality of tooth and/or jaw relationships. It results in disability characterized by physical, emotional, and social dysfunction. The measure of a person's *degree of handicap* is the extent to which his disability affects him. Thus, a *seriously* handicapping orthodontic condition is a dentofacial abnormality that *severely* compromises a person's physical or emotional health. Physical health is *severely* compromised if dis-

ability of the oral function of breathing, speaking, or eating accompanies the abnormality, especially if tissue destruction is occurring. Emotional health is *severely* compromised if the abnormality causes others to react negatively, so that the person is treated differently by his peers because of the abnormality, or if the abnormality causes his self-image and self-esteem to be affected to such an extent that his life adjustment is altered.

The Committee recommends that the following symptoms of seriously handicapping orthodontic conditions be recognized as characteristic:

- Definitely noticeable dentofacial abnormality that limits potential for vocational, educational, and social choices and that is manifested by such reactions of others as repulsion, jokes, pity, curiosity, deliberate avoidance, and undue staring. Examples of orthodontic conditions that might evoke such reactions are extremely irregular front teeth, excessive space between front teeth, markedly protruding upper jaw and teeth, protruding lower jaw and teeth, such protrusion of upper and lower teeth that lips cannot be brought together, underdeveloped lower jaw and receding chin, marked asymmetry of lower face, and clefts of lip or face.
- Severe negative effect on personality development and self-image related to dentofacial abnormality, such as social withdrawal; covering of face and mouth with hand; lack of smiling because of embarrassment at revealing teeth; lowering of head or averting of face to distract others' attention from one's mouth and face; low educational, vocational, or social aspiration because of low self-esteem and poor self-image; and avoidance of occupations or situations that require free social interchange.
- Obvious tissue damage in the mouth related to bad bite (malocclusion), as indicated by bleeding gums, marked recession of gums, palatal tissue abrasions or lacerations, loosened permanent teeth, and an occlusal relationship with serious adverse effects on dentofacial growth patterns.
- Obvious difficulty in eating because of the malocclusion, such as to require liquid or semisolid (soft) diet or to cause pain in jaw joints during eating, extreme grimacing or excessive motions of the orofacial muscles during swallowing, or socially unacceptable behavior during eating because of necessary compensation for anatomic deviations.
- Obvious severe breathing difficulties related to the malocclusion, such as unusually long lower face with downward rotation of the mandible and with lips that cannot be brought together, postural abnor-

malities related to breathing difficulty (head forward and extended and "round-shouldered" appearance), and chronic mouth breathing.

- Lisping or other speech articulation errors in children 9 years old or older that are directly related to orofacial abnormality (including deviations of tooth position).

Because the symptoms outlined above may also arise from causes other than orthodontic conditions, the Committee recommends that a seriously handicapping orthodontic condition be considered to exist only when two criteria are met simultaneously: (a) there is a noticeable deviation from normal anatomic relationships of the teeth and jaws, quantified as outlined in the Appendix; and (b) there are symptoms of physical, psychosocial, or functional disability related to the malocclusion. Malocclusion without symptoms would not classify a person as seriously handicapped. Oral symptoms not accompanied by malocclusion might require treatment but would not constitute a handicapping orthodontic condition.

Recommendations on Implementation

In view of the lack of demonstrated, valid, definitive criteria, a three-step evaluation process is proposed that relies on the judgment of more than one examiner and has a built-in control mechanism for identifying patients who are seriously handicapped. The system should virtually eliminate "false positives"—patients who have malocclusion but who do not meet the previously defined criteria for a seriously handicapping orthodontic condition.

The main steps in the evaluation process are as follows:

Step 1. The patient's dentist, physician, or school health personnel recognizes and (at the request or with the consent of the parent) reports handicapping symptoms of the orthodontic condition.

Step 2. Professionals evaluate and document symptoms and their relevance to morphologic and physiologic signs of the orthodontic problem.

Step 3. A professional panel validates clinical findings and authorizes treatment.

In the first step the symptoms related to the condition should be evaluated with a questionnaire prepared for this purpose that is available through the third-party agent. In the case of the military, this form could be obtained from the dental department of a military base. To carry out the first step, the appropriate person completes a stan-

dard referral form, directing attention to pertinent symptoms of the handicapping orthodontic condition. Appropriate persons to complete this report and submit it for orthodontic validation would be school health personnel or the patient's physician or dentist (at the request of the parent or teacher). Because the handicap is defined largely as a decrease in the patient's ability to function in society, it is important that this initial evaluation by nonspecialists not be bypassed. The confidentiality of such reports should be protected.

Professional evaluation of the patient's orthodontic problem constitutes the second and third steps of the process. The second step involves clinical examination of the patient and documentation of his clinical symptoms and physical characteristics. The third step is review of the diagnostic records and clinical findings by a professional panel, which will make the final determination. Because the panel, representing the final step in authorization of treatment, will not examine the patient in person, those who (in Step 2) provide diagnostic materials to the panel have two functions to perform. First, with a checklist provided for this purpose, it is their responsibility to identify items on the original problem list that are related to handicapping malocclusion and to indicate the clinical severity of problems. Suggested clinical examination criteria for this purpose are presented in the Appendix. Second, they are to provide diagnostic records to document the clinical findings. Completed forms and records will be submitted to the appropriate agency for evaluation by the panel that will provide final confirmation. In the military, the orthodontist or service dental clinic supervisor could serve as the coordinator of this overall process. The forms used for these purposes should be designed to allow for electronic data processing to facilitate storage, retrieval, and analysis of accumulated information.

The diagnostic records should be of two types. First, traditional orthodontic diagnostic records should be obtained. Minimal records should consist of dental casts that accurately indicate the occlusal relationships of the teeth and a panoramic or full-mouth dental radiograph. Four facial photos should be provided: full face, profile with lips relaxed, profile with lips together, and three-quarter view smiling. In the case of other or unusual problems, supplemental orthodontic records should be submitted; these may include intraoral color photographs. For example, in the case of temporomandibular joint (TMJ) pain, TMJ radiographs might appropriately be submitted. A head film providing cephalometric evidence of respiratory or postural compensations or extreme skeletal problems would be highly desirable.

Second, psychologic test results or interview findings should be provided, if needed to document disability. Psychologic test results must be

submitted by a qualified professional or certified testing program. Because of the complexity of assessing a "seriously handicapping orthodontic condition" and because of the inevitable and acknowledged stresses on the patient in complex long-term treatment, interdisciplinary evaluation of the patient's response to his orthodontic problem and of his ability to tolerate treatment is recommended. Interdisciplinary evaluation of the patient's attitude toward his condition and toward the proposed treatment is a long-established procedure in the approach to treatment of other complex illnesses, such as epilepsy and gastric ulcer. A similar approach should be taken in the evaluation of the prospective orthodontic patient.

If the person asked to carry out the clinical evaluation recognizes that the patient's orthodontic problems are not severe enough to qualify for treatment under the program, it would be appropriate for him to advise the patient accordingly at that point and not send material to the panel.

Under all circumstances, the orthodontist who does the clinical examination should be responsible for obtaining the necessary consultations and coordinating the submission of appropriate diagnostic records to substantiate the clinical findings. If psychosocial symptoms are a major part of the overall condition, a psychologic interview should be arranged for the patient. A psychologic consultation form, "Psychosocial Evaluation Criteria" (see Appendix), should be sent to the consultant (psychologist, psychiatrist, or psychiatric social worker) before the interview. In essence, the consultant is being asked to confirm and elaborate on the orthodontist's findings. Information may be obtained by the consultant by any techniques with which he is familiar and that he believes to be reliable. Information on school achievement or psychologic tests may be obtained if it is indicated and if appropriate approval is secured. The consultant's report, which should be a narrative statement, is to be transmitted to the referring orthodontist and submitted by him to the appropriate agency with the orthodontic evaluation.

If a patient has the "worst" rating for morphologic description of facial proportions/esthetics and occlusion (a rating of 10) and is also judged to cause the most adverse reaction in others (MacGregor's degree 4), it would probably be superfluous to have a psychologic evaluation as part of the documentation of need for treatment. However, if all the ratings are in the "moderate" category, but the major symptom is a self-image problem, it might be necessary to document the patient's need further for the panel. The panel, in this situation, must ultimately decide, on balance, when orthodontics (as opposed to psychologic counseling) is the appropriate mode of therapy.

Material submitted for panel review should consist of the referral

evaluation form prepared by the patient's dentist, physician, or school health worker; an orthodontic clinical evaluation form; whatever orthodontic diagnostic records are needed to confirm the clinical findings; and appropriate consultant's reports (psychologic and others if indicated).

The function of the panel (Step 3) should be to review the diagnostic records to ascertain that morphologic signs are related to the reported symptoms and to validate the clinical quantification of all characteristics of the problem. It is recommended that the panel consist of five members: three orthodontists, a general dentist or oral surgeon, and a clinical practitioner in psychology, psychiatry, or social work. Members of the panel should be appointed by the Department of Defense or appropriate agency (or other third-party agency), but the membership should not include people affiliated with the agency. A single national panel might be able to handle the case load; if not, regional panels should be established.

The review panel will certify that a seriously handicapping orthodontic condition exists when the basic diagnostic criteria are met. These criteria consist of the presence of definite physical or psychologic symptoms related to malocclusion, as documented by clinical examination, and the presence of severe anatomic dentofacial deviation, as judged by the use of a subjective rating scale of 1–10.* Under no circumstances would a high score for the morphologic description of the dentofacial abnormality by itself qualify a patient for treatment.

The panel could establish three categories of treatment priority: urgent need for treatment; treatment mandatory but not urgent; and treatment highly desirable, but not mandatory. The patient and consulting orthodontist would be informed of the treatment priority assigned. A clear statement about actual payment for treatment on the basis of the funds available should be included. Any disclaimer about future liability of the funding agency for cases not funded should also be included.

The Committee estimates that about one-third of the patients with high scores on the morphologic ratings (not necessarily only those with the highest scores) would show symptoms that would lead to a judgment that a seriously handicapping orthodontic condition exists. The methods proposed here would probably select about 5% of all children for consideration for treatment in the program.

The recommended process of evaluation can be understood more

*The Committee hesitates to imply that any scale is ideal or superior, but there is evidence that subjective methods are as valid as if not more valid than the currently available so-called objective measures.[23,79,80]

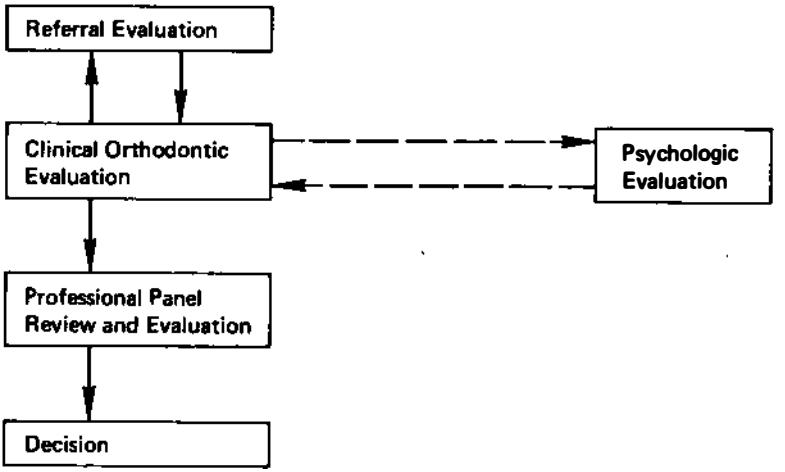

FIGURE 1 Flow Chart: Evaluation of Seriously Handicapping Orthodontic Conditions.

clearly from a flow chart (Figure 1) and from an examination of the forms in the Appendix.

Further Recommendations on Implementation, Development, and Research

The cost of initial clinical evaluation and diagnostic documentation should be borne by the patient. If a patient is qualified for treatment under the indemnification program, the payment for records should be credited against whatever deductible amount the program requires or should be refunded to the payee if 100% of costs is covered. For military dependents, there would be several possibilities for obtaining the necessary clinical evaluation in Step 2: obtaining records from private practitioners both in orthodontics and in psychologic evaluation,* obtaining all records at a university medical center or similar facility having both professional dental services and psychologic testing capabilities, or obtaining all records at a military medical center that has orthodontic and psychologic testing capabilities.

If the beginning costs for a program covering treatment for seriously handicapping orthodontic conditions of patients up to 21 years old are prohibitive, an indemnified care program with an incremental 10-year phase-in period should be considered. For example, because orthodontic

*It should *not* be permissible for the orthodontist to administer the psychologic test as well.

treatment is initiated only once for each person, if in the initial start-up year all patients up to the age of 11 could be made eligible and in the second year all patients up to the age of 12 could become eligible, and so on, then by the end of a 10-year period all qualified patients up to the age of 21 could become eligible. The cost for the program, if done this way, would not increase significantly over the 10-year period. However, if patients of all ages were eligible initially, the costs would presumably be higher in the first few years and gradually decline over the 10-year period.

The criteria suggested in this report will probably identify approximately 5% of any population of children in this country as having seriously handicapping orthodontic conditions. We know from the USPHS survey,[14] however, that approximately an additional 9% of children in this country have handicapping orthodontic conditions for which orthodontic treatment is highly desirable, if not mandatory. In designing any third-party funding program based on need, at least these two groups (a total of 14% of the child population) should be covered in some way. Perhaps the more seriously handicapped should have full coverage, and the less seriously handicapped, partial coverage. Partial treatment might under some circumstances be considered as an alternative to no treatment at all.

Because cooperation between orthodontic practitioners and clinical behavioral practitioners has not been routine in the past, it is recommended that, where necessary, a multidisciplinary approach be taken in the evaluation and treatment of seriously handicapped patients. "Multidisciplinary" implies a clinical evaluation of the patient's emotional health and self-image, ability to understand and cooperate with the necessary treatment procedures, and the impact of the orthodontic condition on the patient's social, vocational, and economic life. Such careful study and documentation of individual cases would enhance our clinical understanding of patient response to handicapping orthodontic conditions and to their treatment. It is also recommended that these evaluations be continued longitudinally at specific points of treatment time, with an eye toward developing fully documented longitudinal clinical studies. These longitudinal in-depth studies would supply needed information concerning the impact of orthodontic therapy on the seriously handicapped patient.

Multidisciplinary studies and documentation must precede the formulation of a valid and useful "index of malocclusion and self-image." An index formulated without careful longitudinal study of the specific target population will inevitably be based on observations of and tests de-

vised for other populations and other purposes and only secondarily adapted to the complex orthodontic evaluation and treatment task. Therefore, the Committee recommends that the Army or any other agency that supports orthodontic care provide research funds for careful, in-depth, longitudinal, multidisciplinary case studies of this patient population. Thus may the groundwork be laid for the ultimate formulation of a useful and relevant index.

APPENDIX: EVALUATION CRITERIA FOR SERIOUSLY HANDICAPPING ORTHODONTIC CONDITIONS

Although these criteria are listed in chartlike format, they should not be construed to represent recommended clinical forms. These lists of criteria are simply meant to serve as a guide in developing forms that can be field-tested and then finally redesigned. These forms should ultimately be personalized with identification data concerning the patient and the respondents. They should also include pertinent dental and medical histories of the patient under evaluation. Standard forms are available for this purpose.

REFERRAL EVALUATION CRITERIA

(Check the symptoms and signs of physical or psychologic conditions that you observe in this patient.)

Definitely noticeable dentofacial abnormality that evokes strong reactions from others: repulsion, jokes, pity, curiosity, deliberate avoidance, or undue staring. Examples of abnormalities that might be severe enough to evoke such reactions are:

_____ extremely "crooked" front teeth

_____ excessively spaced front teeth

_____ markedly protruding upper jaw and teeth

_____ markedly protruding lower jaw and teeth

_____ upper and lower teeth protruding so much that lips cannot be brought together

_____ underdeveloped lower jaw and teeth, receding chin

_____ marked asymmetry of lower face

_____ clefts of lip or face

_____ other (explain on other side of page)

Severe personality maldevelopment and deficient self-image related to dentofacial abnormality. Examples of such negative effects are:

_____ social withdrawal

_____ covering of face and mouth with hand, self-consciousness

_____ lack of smiling due to embarrassment at revealing teeth

_____ averting or lowering head while speaking

_____ other (explain on other side of page)

Obvious tissue damage in the mouth *related to bad bite*

_____ bleeding gums

_____ marked recession of gums

_____ loosened permanent teeth

_____ other (explain on other side of page)

Obvious difficulty in eating

_____ liquid or semisolid (soft) diet required

_____ pain in jaw joints when eating

_____ extreme grimacing or excessive motions of the oral–facial muscles during swallowing

_____ socially unacceptable behavior during eating because of *necessary* compensation for anatomic facial deviations

_____ other (explain on other side of page)

Obvious breathing difficulties

_____ chronic mouth breathing due to malocclusion or form of jaws

_____ unusually long lower face with lips that cannot be brought together

_____ postural abnormalities with breathing difficulty (head forward and extended, "round-shouldered" appearance)

_____ other (explain on other side of page)

Obvious speech defect

_____ lisping or other speech articulation errors in children 9 years old or older that might be directly related to oral–facial abnormality (including deviations of tooth position)

_____ other (explain on other side of page)

CLINICAL EVALUATION CRITERIA

I. Morphologic Description of Dentofacial Abnormality

A. *Facial Proportions/Esthetics* (circle one)

1	2	3	4	5	6	7	8	9	10
Best				Moderate					Worst

B. *Dental Occlusion* (circle one)

1	2	3	4	5	6	7	8	9	10
Best				Moderate					Worst

II. Physical Symptoms Related to Malocclusion

A. *Breathing Difficulties*	*Present*	*Comment* (if any)
Chronic mouth breathing	_____	_____
Long lower face, lips cannot meet	_____	_____
Postural changes for respiratory compensation	_____	_____
Adenoid hypertrophy	_____	_____
Nasal obstruction	_____	_____

B. *Difficulty in Eating*		
Liquid or semisolid diet required	_____	_____
Pain in temporomandibular joints on mastication	_____	_____
Extreme grimacing and motions during swallowing	_____	_____
Socially unacceptable necessary compensation for anatomic facial abnormalities	_____	_____

C. *Temporomandibular Joint Pain-Dysfunction Syndrome*

	Present	*Comment* (if any)
Limitation in opening	_____	_____
Chronic dislocation	_____	_____
Clicking	_____	_____
Muscle pain in preauricular, masseteric area	_____	_____
Shift on closure	_____	_____

D. *Lisping, Other Speech Articulation Error, or Compensatory Behavior during Speech* _____ _____

E. *Evaluation of Dysfunction*

1. Are there shifts in jaw position on closure? If so, describe_____
_____
_____

2. Restricted or limited ability to separate the jaws functionally and chew? Describe and indicate in mm measurements the degree of limitation or function_____
_____

3. Persistence of deleterious oral habits (tongue thrust, finger-sucking, etc.)
_____
_____

4. Lip competency, tonicity, function_____
_____

F. *Obvious Tissue Damage Related to Malocclusion*

	Mild	*Moderate*	*Severe*
Bleeding gingiva	_____	_____	_____
Recession of gingiva	_____	_____	_____
Mobile permanent teeth	_____	_____	_____
Irritation of cheeks, lips, or tongue	_____	_____	_____

Indicate location and describe in more clinical detail _____

_____

_____

III. Psychosocial Signs and Symptoms Related to Malocclusion

A. *Reaction of Others (MacGregor's Index)* (check one)

☐ *Degree 1, Slight:* A mild deviation that is neither conspicuous nor apt to attract attention; requires having attention called to it before it is noticed, but may be a source of distress for some people.

☐ *Degree 2, Moderate:* Noticeable. May elicit remarks, teasing, questioning, or staring, but usually no violent negative reaction.

☐ *Degree 3, Marked:* Definitely noticeable. Likely to evoke strong reactions from others: repulsion, jokes, pity, curiosity, deliberate avoidance, or undue staring.

☐ *Degree 4, Gross:* Definitely shocking and repelling to others. Evokes violent reaction of horror, repulsion, or pity.

B. *Negative Effect on Personality Development and Self-Image*

Is there any evidence from direct observation or reports from others to suggest that the patient is self-conscious or uneasy about his/her mouth or teeth? Check evidence below.

☐ Covering of mouth and face with hand

☐ Averting or lowering head while speaking

☐ Lack of smiling due to embarrassment at revealing teeth

☐ Other (explain) _____

_____

Is there any evidence from direct observation or reports from others to suggest that the patient is self-conscious or uneasy about his/her appearance?

☐ Socially withdrawn and uneasy about new situations

☐ Personal behavior that suggests poor opinion of physical facial appearance

☐ Choice of activity that avoids other people

☐ Other (explain) _____

_____

Who has informed you of the above? _____

Relationship of informant to the patient _____

C. *Psychosocial Consultant's Interview May Be Included* (if needed).

PSYCHOSOCIAL EVALUATION CRITERIA

(Information is to be obtained only by a qualified psychosocial consultant, at the request of the orthodontist, and related to the areas enumerated below, which should be covered in one or two paragraphs.)

1. Level of aspiration, adjusted according to age
   a. Vocational aspiration or activity having value for the person, with attention to significance of appearance
   b. Educational aspiration, including type and extent of schooling planned by applicant and role of appearance
   c. Social aspirations, including play, friendships, interpersonal relationships, and marriage
   d. Dental aspiration, including cultural attitudes to dentistry, dentition, and dentures

2. Self-image
   a. Satisfaction or dissatisfaction with face, teeth, and smile
   b. Satisfaction or dissatisfaction with body, physique, and general appearance
   c. Satisfaction with social milieu and role in society

3. Family constellation–relationships with parents and siblings, including cooperation and rebellion

4. Gross deficiencies in level of intellectual development or of emotional stability that could interfere with treatment

Evaluations Below Must Be Checked

1. On the basis of the above information, what is the degree of psychologic handicap in this person's orthodontic condition?

   ☐ Slight ☐ Moderate ☐ Marked ☐ Gross

2. How certain are you about the above evaluation?

   ☐ Very certain ☐ Somewhat certain

   ☐ Somewhat uncertain ☐ Very uncertain

NOTE: It is considered desirable, where possible, to use both objective and subjective clinical material–that is, a standardized test (such as the Minnesota Multiphasic Personality Inventory) and a personal interview. However, the consultant is expected to use whatever techniques he knows best, to schedule as much time as is needed for the evaluation, and to supplement with information from outside sources (such as school psychologist), unless the procedure is unacceptable to the patient or family. If the consultant believes that an additional interview at a later date would be valuable, the panel should be so informed.

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