

Treatment Planning in Restorative Dentistry
and Implant Prosthodontics



To my wife, Doris, my children, Lucas and Ana Clara, and my parents, Zelia and Henrique



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TREATMENT PLANNING

in Restorative Dentistry and
Implant Prosthodontics



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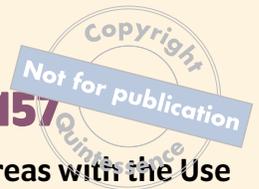
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Preface



Treatment planning is commonly considered one of the most important phases of any dental treatment and vital for achieving successful long-term results. Despite its importance, the process of planning a treatment, particularly in restorative dentistry, can be somewhat confusing and divisive. There are multiple reasons for this. First of all, most dental schools do not offer courses exclusively designed for comprehensive planning. In predoctoral and postdoctoral programs alike, treatment planning is commonly taught as a part or content of a specific discipline, such as prosthodontics, periodontics, occlusion, orthodontics, or oral surgery. Second, there is a lack of proper literature on the subject. Much has been written about treatment planning, but on close examination nearly all articles and texts fail to be as objective, clear, comprehensive, and clinically oriented as they claim to be. Although nearly every author attempts to discuss the subject in a comprehensive fashion, in the end they all tend to concentrate their considerations more heavily toward their individual area of expertise. Consequently, when the dental student or the practitioner is faced with treatment planning for the total individual, especially complex full-mouth reconstruction cases, he or she is forced to consult multiple textbooks and articles, each of which explores only a portion of the totality. Eventually, there is always doubt about how to put all the information together and determine what needs to be done first.

For the reasons mentioned above, planning for the total individual has turned out to be a great challenge. Not only can it be a vague goal but also a difficult skill for dental students and dentists to acquire. Moreover, comprehensive planning is rarely discussed in scientific meetings and conferences because participants (according to most meeting organizers) are expected to have attained information on the subject during their training in dental school, given that treatment planning is commonly regarded as a basic topic. Without proper knowledge and with very few options left to learn the subject, practitioners are forced to use their intuition to solve problems, which is highly unpredictable.

The demand for a philosophy of total care in treatment planning is higher than ever with our current emphasis on predictability, reliability, and successful long-term results. The frustration and looks of despair on the faces of my students and the difficulties encountered by so many dentists when faced with the necessity to solve complicated cases without having a clue as to what to do or which direction to go inspired me to write this book. In it, I present clinical guidelines for planning treatments in restorative dentistry and outline a clear, objective, and simple thinking process that can be easily applied in daily practice. The book is intended to assist the student of dentistry at every level as well as the general practitioner and restorative dentist in the development of a comprehensive and accurate plan of care for the adult patient. With particular attention given to the interrelationship between different specialties to enhance data correlation and collaboration, all specialists have something to gain as well. A philosophy for a systematic and consistent manner to diagnose and solve clinical problems is presented, and the methodology is so simple that any practitioner can follow along. The text includes the entire planning process with its most important phases. All planning phases are presented in an easy-to-follow, step-by-step format, providing the reader with a roadmap to be used as a reference from the very initial procedures until final restorative treatment. Each phase is carefully described, and the most important topics are listed and discussed, always following scientifically sound evidence-based data and in accordance with ethical and legal principles. Special emphasis is placed on planning procedures for implant dentistry, particularly on the examination of edentulous areas and proper selection of prosthetic modalities for replacing missing dentition.

The contents of the book are presented in three parts, starting with the introduction of the methodology and extending from the first appointment all the way to the stage in which treatment plans are presented and informed consent is obtained from the patient. All stages are progressively covered in a sequence that facilitates clinical application. The introductory

chapter provides the rationale for developing a philosophy of total care and the potential benefits of devising a protocol for the establishment of a comprehensive and efficient plan of care. It also details how the method works, highlighting its principles, planning phases, and clinical application.

Part One describes how to identify existing problems by gathering, organizing, and analyzing information obtained during clinical examination. Special emphasis is placed on the methodology developed for diagnosing procedures that will, to a great extent, facilitate diagnosis and treatment plan development. A reliable and organized protocol to collect and record clinical data is presented, and examination checklists and forms are included for all stages of data gathering to ensure that no important information is left out during the evaluation process. This scheme increases predictability and the chances of reaching a complete and precise problem list (diagnosis) and plan of treatment.

Part Two focuses on providing solutions to identified problems via restorative treatment options, highlighting the use of implant-supported restorations in the treatment of both partially and completely edentulous arches. It also addresses ideal and alternative plans of treatment for patients with both partially and completely edentulous situations.

Part Three details how to present treatment options to the patient and includes aspects related to patient education, treatment plan presentation, and obtaining informed consent from the patient. In contemporary dentistry, the role of the dentist in presenting the treatment plan is changing from that of final authority in all decisions to that of a content expert, educator, and advisor to the patient. Therefore, it is

of paramount importance that the clinician be prepared to fully inform the patient about his or her condition and potential treatment options.

Making a diagnosis and planning a treatment plan implies the professional responsibility to omit nothing of consequence for the patient; deviation from this line of thought has become unacceptable and is no longer tolerated. Therefore, there is a distinct need to teach dental students and all professionals involved with restorative procedures to fulfill their responsibility in the management of a comprehensive treatment plan for the patient, and there has long been a need for an efficient method to successfully address this issue. A philosophy providing a thought process to be used in all situations, combined with a consistent and methodical approach, would definitely increase both reliability and predictability of long-term results of the treatment as a whole. While new technology and techniques can certainly make treatment easier to execute or more efficient, the fact remains that diagnosis and treatment planning are still the primary determinants for long-term success.

I hope that this book will contribute to minimize the usual doubts concerning treatment planning. It will provide teachers, students, and practicing dentists with the fundamentals for the establishment of an effective global treatment plan, avoiding the usual pitfalls frequently encountered during this process. The scarcity of material on the topic has made writing this book a great challenge, but I hope the final product will steer you in the right direction and lead to better treatment plans for you and your patients.





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A Rationale for Developing a Philosophy of Total Care

Controversies and Uncertainties Related to the Planning Process

Dental therapies can be divided into three phases regardless of their area and/or level of complexity: (1) diagnosis and treatment planning, (2) treatment delivery, and (3) control and maintenance.¹ The initial phase—diagnosis and treatment planning—is generally considered the most important phase of any dental treatment and is vital for achieving successful long-term results.¹ However, planning treatment in restorative dentistry can be confusing and difficult. Controversies and uncertainties related to the planning process have made it not only a vague goal but also a difficult skill for dental students and dentists to acquire.

In the initial phase, it is not uncommon for dentists to become puzzled and lose track of what to do to develop a comprehensive and reliable plan of care. The immense number of findings that arise when evaluating a difficult dental case (Fig 1-1) may overwhelm inexperienced practitioners to such an extent that they do not even know where to start or what to do first. Even with experienced dentists, questions such as “Now what am I supposed to do?” or “How can I be sure that all the necessary information has been properly assessed?” are quite common in this phase of treatment. Furthermore, quite frequently there is disagreement as to which specialty

or professional should assume the role of organizing and conducting the complete planning process.

One reason underlying this confusion is the manner in which treatment planning is addressed in dental schools. Most schools do not offer courses exclusively designed for comprehensive planning. In predoctoral programs, treatment planning is commonly taught as a part of a specific discipline, such as prosthodontics, periodontics, occlusion, orthodontics, or oral surgery. Postdoctoral courses tend to follow the same segmented format. Because of this deficiency, there are no set guidelines to be followed by the clinician throughout the entire planning procedure, and there is a lack of understanding of what objectives need to be achieved in the complete planning process. Without a comprehensive and effective philosophy providing a course of action to be followed, dentists have been forced to rely on their own intuition to create an approach for diagnosis and treatment planning.

Many dentists tend to develop a specific method to diagnose and treat each single case. Because each patient is unique, every case must be planned considering the specific individual characteristics of that patient. Thus, the dentist is faced with the challenge of devising a specific planning method for each and every patient presenting for treatment. Furthermore, because the dentist is working without understanding what goals need to be achieved at the end of the planning process,

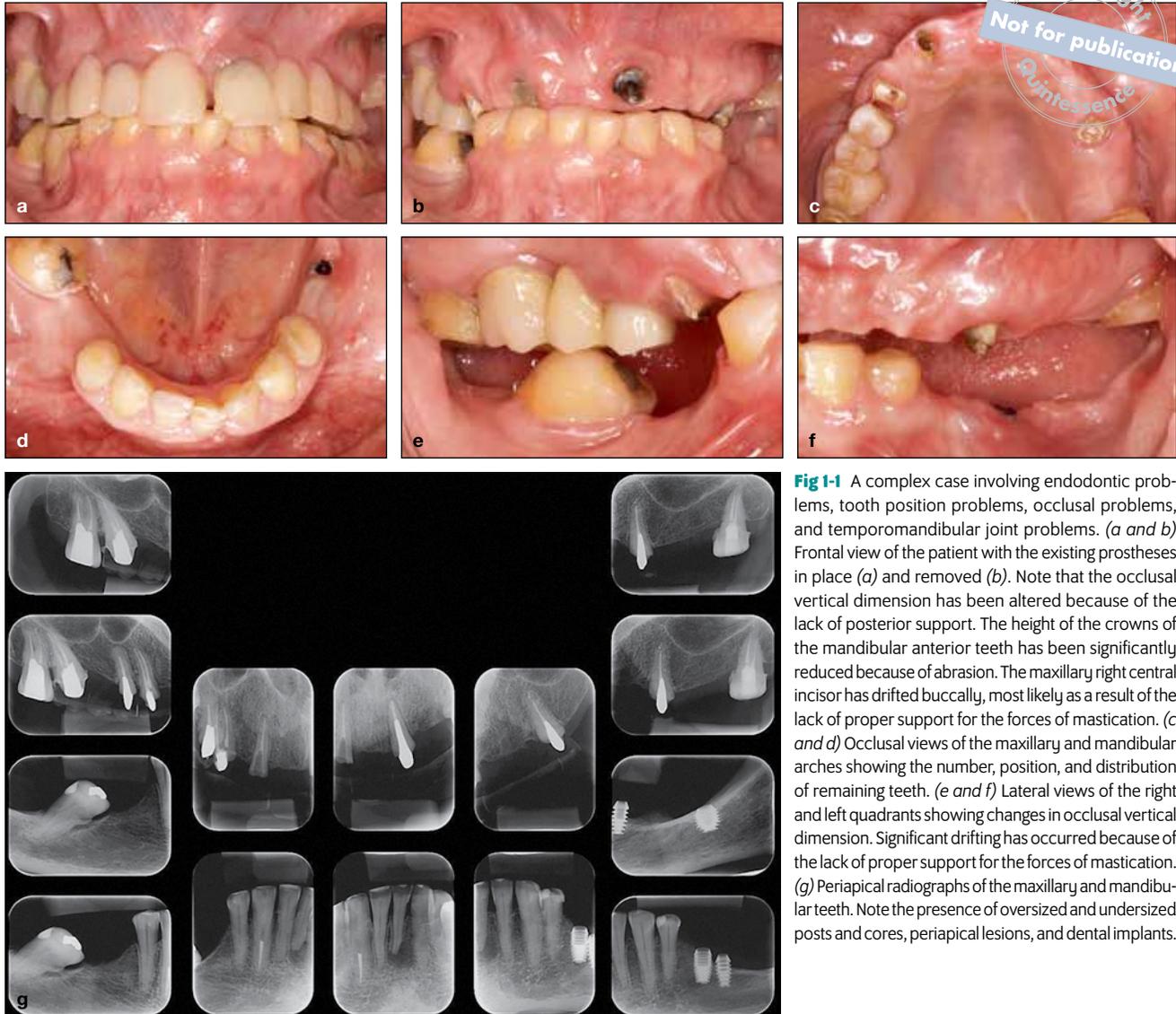


Fig 1-1 A complex case involving endodontic problems, tooth position problems, occlusal problems, and temporomandibular joint problems. (a and b) Frontal view of the patient with the existing prostheses in place (a) and removed (b). Note that the occlusal vertical dimension has been altered because of the lack of posterior support. The height of the crowns of the mandibular anterior teeth has been significantly reduced because of abrasion. The maxillary right central incisor has drifted buccally, most likely as a result of the lack of proper support for the forces of mastication. (c and d) Occlusal views of the maxillary and mandibular arches showing the number, position, and distribution of remaining teeth. (e and f) Lateral views of the right and left quadrants showing changes in occlusal vertical dimension. Significant drifting has occurred because of the lack of proper support for the forces of mastication. (g) Periapical radiographs of the maxillary and mandibular teeth. Note the presence of oversized and undersized posts and cores, periapical lesions, and dental implants.

it is impossible to know whether these goals have been achieved or not. This line of thought can be very confusing and misleading. It would be much easier to use the same thought process in all situations. This would certainly facilitate treatment planning procedures because the same protocol could be used for every patient irrespective of his or her clinical condition. It would also improve the communication between dental professionals when discussing any given case.

Another concern points to the lack of proper literature on the subject. Much has been written about treatment planning, but despite most authors' efforts to address the topic in a complete manner, on close examination nearly all articles and texts fail to be as objective, clear, comprehensive, and clinically oriented as they claim to be. Although nearly every author attempts to discuss the subject in a comprehensive

fashion, in the end they all tend to concentrate their considerations more heavily toward their individual area of expertise. Even the establishment of an interrelationship between different topics within the same specialty is frequently overlooked. For example, consider the examination of articulated casts in restorative dentistry. In general, students know that it is important to mount study casts on an articulator; but once this has been accomplished, occlusion tends to be the center of attention, and other areas of similar importance such as the evaluation of edentulous areas are left without proper consideration, and a complete examination of the mounted casts is frequently not conducted. Similarly, textbooks on occlusion, fixed partial dentures, removable partial dentures, and complete dentures tend to discuss treatment planning on the basis of each individual subject without associating



Box 1-1**Factors that contribute to controversy and confusion in treatment planning**

- Lack of guidelines to use as a reference throughout the entire planning process
- Lack of set objectives to accomplish
- Massive amount of information to assess
- Inadequate organization of collected data
- Question as to who should be responsible for the entire planning process

these individual discussions with the specialty at large. Consequently, when the dental student or the practitioner is faced with treatment planning for the total individual, especially complex full-mouth reconstruction cases, he or she is forced to consult multiple textbooks and articles, each of which explores only a portion of the totality. Eventually, there is always doubt about how to put all the information together and determine what needs to be done first.

Moreover, comprehensive planning is rarely discussed at scientific meetings and conferences because participants (according to most meeting organizers) are expected to have attained information on the subject during their training in dental school, given that treatment planning is commonly regarded as a basic topic.

Without a doubt, dentists' inability to precisely determine what objectives need to be achieved in the complete treatment planning process can be considered a major setback. Box 1-1 outlines the factors that contribute to this problem.

Historical Overview of Planning Methods

To better understand current treatment planning concepts, one should become familiar with how treatment planning decisions have been made in the past, the apparent limitations of that process, and how clinical decision-making was affected by traditional models. Box 1-2 summarizes the main differences between traditional and contemporary planning concepts.

Traditional planning concept

In the past, dental treatment consisted of the relief of pain, the resolution of esthetic issues, or the replacement of missing teeth.² The treatment was performed with the intent to solve a specific problem or by focusing on a specific area commonly related to the problem described by the patient. Typically,

Box 1-2**Traditional versus contemporary planning concepts****Traditional concept**

- *Empirically based*
- Treatment focused on solving a specific problem
- Segmented care
- Poor long-term prognosis

Contemporary concept

- *Evidence based*
- Treatment focused on the patient as a whole
- Comprehensive care
- Good long-term prognosis

a specific tooth condition or problem was evaluated, and an immediate recommendation was then made about what should be done to solve that problem. This was all it took for the practitioner to gain a measure of consent from the patient to begin treatment. The solution to the given problem was generally quite simple. Treatments were performed based on the diagnostic capabilities and limited to the therapeutic modalities available at the time. Treatment decisions were made in an environment of uncertainty, and treatment recommendations were usually based on the dentist's experience, which was most often empirically based, without solid scientific foundation. This concept of treatment proved to be inefficient and, at times, detrimental to the patient, especially on a long-term basis, when it simply offered a segmented type of care in which only one tooth, quadrant, or arch was treated without any concern for the patient as a whole. Also, it was not unusual for the patient to pass on treatment decisions to the dentist, expressing sentiments such as "Just do what you think best" or "What would you do if I were your father or mother?"

In this kind of scenario, dentists were the only ones to decide the type of treatment to be delivered to the patient, and often a clearly articulated diagnosis was hard to reach. Even in those cases in which the dentist made a mental judgment on the treatment rationale, the diagnosis might not have been stated to the patient. As a result, it was highly unlikely that patients would be presented with treatment options; even when options were presented, the offerings tended to be unthinking, with the patient given minimum information with which to make a thoughtful decision. Therefore, in these circumstances, the treatment plan essentially served as (1) a means of collecting fees (formal document) and (2) a general orientation for delivering therapeutic measures.

Traditional models also do not lead to successful outcomes because of the manner in which the information is assessed



Fig 1-2 (a) Frontal view showing the maxillary arch with a removable partial denture replacing anterior teeth. (b) Frontal view showing vertical prosthetic space and implants in the anterior maxilla. (c and d) Lateral views of the right and left posterior quadrants showing missing posterior teeth as well as extrusion of teeth opposing the edentulous spaces. Altered occlusal vertical dimension can also be noted.

and organized in different stages of treatment planning. Generally, the primary planning steps include initial consultation with patient interview, initial clinical examination, preliminary impressions for study casts, and assessment of diagnostic aids (radiographic examination and evaluation of articulated casts). After data gathering, the collected information is assessed, and the treatment plan is finalized. In theory, this process appears to be adequate, but when it comes to clinical application, it seems not to work. The system by itself does not offer guidelines for managing diagnosis and treatment planning procedures in a comprehensive manner, particularly in more complex cases, and it does not encourage a discussion correlating findings from different areas of expertise either. As a result, the evaluation procedures become segmented and fail to be comprehensive. Figures 1-2 and 1-3 illustrate clinical situations in which emphasis was given to resolving a specific problem without paying attention to other important issues, potentially resulting in compromised treatment longevity.

Case 1

The patient in Fig 1-2 presented for initial examination to a different dentist complaining about the poor esthetics and function of his maxillary removable partial denture and asked to have it replaced by an implant-supported restoration (see Fig 1-2a). In an attempt to meet the patient's expectations, this dentist placed two implants in the anterior maxilla (see Fig 1-2b). However, this dentist did not pay attention to other important considerations, such as the reduced vertical prosthetic space in the anterior maxilla, the reduced number of posterior teeth, the altered plane of occlusion, and the altered occlusal vertical dimension (see Figs 1-2c and 1-2d), which may explain the loss of the previous dentition. Unless

a complete examination is carried out and all existing additional problems are resolved, the future implant-supported prosthesis replacing the missing anterior teeth may be subjected to excessive occlusal forces and fail just like the previous dentition did.

Case 2

The patient in Fig 1-3 presented for examination complaining about the mobility of the implant-supported restoration installed in the maxillary left posterior quadrant. During the initial consultation with the previous treating clinician, the patient had requested implant treatment for the rehabilitation of this edentulous segment. That was all it took for the previous dentist to schedule surgery and place the implants. Again, treatment was provided to solve a specific patient request without conducting a more complete analysis to investigate other potential problems.

The patient's crossbite (see Fig 1-3a) and the extrusion of the mandibular left second molar (see Fig 1-3d) were not taken into consideration by the previous dentist. As a result of the patient's occlusal scheme, during function transverse forces are applied to the implant prosthetics, causing screw loosening and instability of the restoration. This is another clear example of how factors other than those directly related to the patient's chief complaint and expectations may adversely interfere with or affect treatment prognosis as a whole. Ideally, a comprehensive investigation should have been carried out. The extrusion of the mandibular second molar should have been corrected before fabrication of the implant prosthetics. This would have allowed for the development of a proper occlusal plane. As a result, occlusal forces could have been better distributed, minimizing chances of biomechanical complications and failure.



Fig 1-3 (a) Frontal view of maxillary and mandibular arches showing a crossbite on the patient's right side. (b and c) Lateral views of the left and right posterior quadrants. Note that significant extrusion has occurred on the mandibular left second molar. (d) Lateral view of the mandibular left posterior quadrant showing significant extrusion of the mandibular left second molar. (e) Lateral view of the maxillary left posterior quadrant showing significant alteration of the occlusal plane caused by the extrusion of the mandibular left second molar. (f) Left bitewing radiograph showing the implant-supported crowns in the maxillary arch and the extruded mandibular second molar. (g) Frontal view of articulated study casts showing lateral excursion (left working and right balancing sides). Note the pattern of the lateral excursive movement on the right balancing side. The lack of canine guidance (because of the crossbite) causes lateral interferences to occur, affecting particularly the implant-supported restorations. This situation is made worse because of the extruded mandibular second molar. (h) Lingual lateral view of articulated study casts showing the extruded mandibular second molar in contact with the implant-supported restorations.

Contemporary planning concept

In modern dentistry, however, this specific problem-solving type of treatment has been replaced by a complete form of case analysis, with a singular focus on comprehensive patient care.² Currently, making a diagnosis and planning a treatment implies the professional responsibility to omit nothing of consequence; deviation from this line of thought has become unacceptable and is no longer tolerated. Several technologic developments in the form of new diagnostic instruments have improved the diagnostic accuracy and predictability of treatment planning. Advances made by research have made available a vast array of sophisticated treatment options improving function, esthetics, and longevity of the final treatment. Furthermore, present-day dentistry has incorporated the concept of evidence-based decision-making as an essential part of the entire treatment planning process. Such a concept entails the view

that clinical decisions should be based on scientific principles and that treatment regimens must be tried, tested, and proven worthy by accurate, substantiated, and reproducible studies.

As a result of this new perspective, to date dentists are expected to be able to provide patients with thorough information about their individual problems, making available a whole range of treatment options. Patients should be prepared to make an informed treatment decision; to achieve this, first dentists should identify all existing problems or factors that may predispose to problems. The development of a problem list is an essential part of this initial procedure. After this has been achieved, the clinician should think of all possible treatment alternatives and filter the best alternatives for each individual patient among a list of realistic choices, always considering the patient as a whole. The dentist is expected to evaluate the pros and cons of each alternative, weighing the relative benefits of the various treatment options.

Following such an analysis, the prognosis for each of the options must be thoroughly disclosed to the patient. This can be done during the treatment plan presentation and should also include other issues such as total cost, time and number of visits required, expected discomfort, possible adverse events, esthetic limitations during treatment, and potential limitations of the final treatment. An understanding of the prognosis for each treatment option can be extremely helpful in assisting the patient in making a definitive treatment selection. Whenever possible, the dentist should share important information from the dental literature with the patient and augment that information with outcomes from his or her practice.

Once the patient has been presented with the options and given the necessary scientific and/or clinical information to assess them, he or she can more reliably and appropriately select the treatment that is in his or her personal best interests. A customized consent can then be devised and obtained, including more than an understanding of the diagnosis but also the relative advantages of the various treatment options and the costs of the treatment to be rendered. Consent also encompasses a wider explanation of the prognosis of both the disease and treatment as well as relevant information about the expected outcome of the treatment.

Dental treatment planning has definitely moved away from the traditional approach, in which the norm was a limited discussion with the patient of a few treatment possibilities, to the present open format characterized by further discussions involving a vast number of increasingly sophisticated options. A greater number of elaborated diagnostic tools and procedures are currently available to address common dental problems, and these technologic advances have equally influenced dentists and patients.

The Philosophy of Comprehensive Care

The philosophy of comprehensive care incorporates the modern planning concepts described previously and considers the patient as a whole during the planning of restorative treatment. It involves three major concepts: (1) a comprehensive approach to treatment planning, (2) restorative planning principles, and (3) the planning process.

A comprehensive approach to treatment planning

Planning restorative treatment generally involves the assessment of a vast amount of data, and this task should be performed with the entirety of the patient in mind.² According to this philosophy, the examination process should consider the patient as a whole and provide a complete view of the patient's dental needs as opposed to focusing primarily on the contents of each specialty. As mentioned previously, many dentists tend to concentrate their attention on a specific area of expertise, quite often related to the patient's chief complaint or expectations, which may leave some other significant problems unrecognized or ignored. To avoid missing important information for the patient's final plan of care, a complete treatment plan should be formulated and then the individual types of specialty plans considered. With this approach, the dentist will be able to address all of the patient's needs without overlooking essential aspects related to other areas. This will greatly contribute to the success and longevity of the entire therapy.

Planning principles

To successfully conduct a comprehensive analysis, the clinician must consider three basic principles:

1. The condition in which the patient presents for examination
2. The patient's original healthy state
3. The projection of the ideal situation for the patient

The first principle refers to the ability to envision the patient's current dental situation (ie, make a diagnosis). Any variations from the normal healthy condition should be detected, identifying all existing problems or factors that may lead to problems. At this stage it is essential to understand that, in the context of restorative dentistry, the word *problem* is used to define variations from normal, because the term *disease* may become vague or even pointless when describing conditions such as abfractions, changes in the occlusal vertical dimension, and tooth abrasion. These situations and many others illustrate mere deviations from a normal condition and should not be considered as diseases.

The second principle refers to visualizing the patient's original condition before the development of dental problems. This will be used as a reference for returning the patient's existing dental condition to the original healthy state or condition that existed before the acquired problems occurred. At this stage, a distinction should be made between *acquired problems*

and *growth and development problems*. Acquired problems include caries, ill-fitting restorations (fixed and/or removable), sequelae of the extraction with nonreplacement of a tooth or teeth, and many other conditions of similar nature. Growth and development problems include inherited and congenital conditions, such as malocclusion, discrepancies in jaw or tooth size, and cleft palate. These two categories should be considered as separate entities and require different types of treatment.

The third principle refers to the development of a plan of treatment that will return the patient to the original healthy state or normal situation for that patient. By comparing the patient's existing condition with the visualization of the original healthy condition, the clinician can determine the treatment objectives. Once these treatment objectives are established, an ideal treatment plan can be formulated. Additional plans can be elaborated to treat any congenital defects after the patient's dental condition is returned to the original healthy state. Treatment can be initiated once a realistic dental treatment plan is selected.

The planning process and its methodology

To pursue the principles described in the previous section, a particular methodology is mandatory. This methodology also involves the understanding of basic terms associated with the planning process. It defines the meaning of treatment planning, outlines objectives to achieve at the end of planning procedures, and determines the type of professional to conduct the planning course. Finally, it presents a protocol to be used as a reference during the entire course of action. These key elements are referred to as the “what, who, and how” in the development of a planning process and are a major prerequisite for predictability. Planning any given treatment without a clear understanding of these basic elements will most likely lead to less-than-optimal treatment results.

Understanding what treatment planning means

Much of the confusion associated with the development of a plan of care is the dentist's misunderstanding of the meaning of treatment planning. If the practitioner does not have a clear notion of what this term means, then how can he or she expect to fully accomplish the task? How can one expect to successfully plan a treatment without even knowing what it means?

In this text, treatment planning is defined as giving a solution to a previously identified problem. In restorative dentistry, the term *solution* refers to a restorative treatment modality (or type of prosthesis) used to treat a given restorative problem. Identified problems in most instances

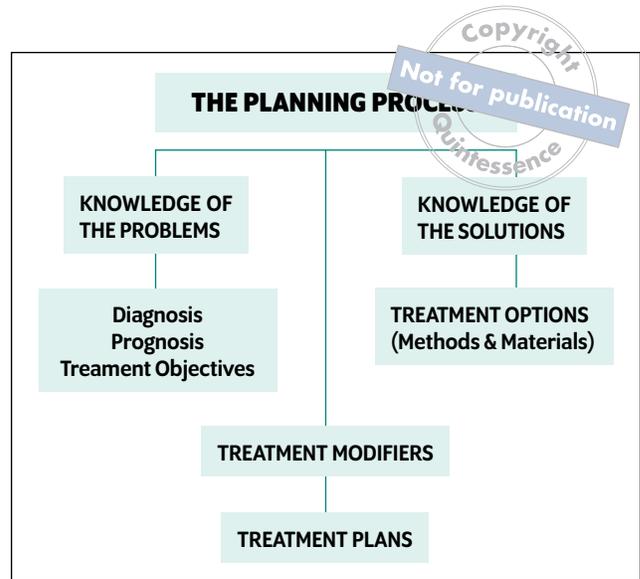


Fig 1-4 Elements involved in the planning process.

can be thought of as diagnosis. According to the Glossary of Prosthodontic Terms,³ *treatment plan* can be defined as a sequence of procedures planned for the treatment of a patient after diagnosis. The treatment plan must be elaborated so that the identified problems can be solved. More than one treatment option is often possible. In light of contemporary dentistry, making a diagnosis and planning a treatment implies the professional responsibility to omit nothing of consequence for the patient. To omit nothing of consequence means giving the patient thorough information about his or her oral condition, mandating a precise and comprehensive diagnosis. In other words, diagnosis dictates treatment.

Thus, to successfully plan a treatment, two categories of knowledge are required: (1) knowledge of the problem(s) and (2) knowledge of the solution(s). A deficiency in either one of these areas may result in inadequate care for the patient. A third element, treatment modifiers, also plays an important role in the planning process (see chapter 13). With sound knowledge of these three elements, a successful treatment plan can be elaborated. Figure 1-4 illustrates the relationship between these three elements.

Defining what objectives should be achieved at the end of the planning process

To achieve successful results in treatment planning, dental professionals should understand the objectives of planning a treatment and clearly visualize what needs to be accomplished in a global planning procedure. Such objectives should meet the expectations of today's patients and reflect concepts of modern-day dentistry.

Conventionally, the desired outcome of the treatment planning procedure was simply to arrive at a treatment

plan.² In the past, treatment plans served the mere purpose of providing guidance for delivering treatment and as a means of estimating the expenses involved in the treatment to be rendered. At present, however, treatment plans are also used to prepare patients for making an ideal treatment choice, focusing on comprehensive patient care. Patients should be informed about their clinical condition and the methods available for the treatment of their individual problems.⁴ Thus, treatment plans can be a valuable tool in patient education and in obtaining informed consent from the patient. Patients have the right and may wish to inspect whether the treatment is being conducted accordingly. That being the case, the plan of care allows for a clear visualization of the treatment already rendered as well as the current stage and future procedures to be performed.

Therefore, the objectives of contemporary treatment planning are as follows:

- Develop a total treatment plan
- Promote patient education
- Obtain informed consent from the patient

Determining the professional to conduct the planning course

According to the method suggested here, the restorative dentist or the general practitioner who delivers restorative therapy is expected to assume the central and leading responsibility to plan treatment with the aim of preparing patients for an optimal treatment choice.⁵ Special emphasis is also placed on fully obtaining informed consent from the patient. Patients must be asked to sign an acknowledgment that they have received all necessary information on their treatment. Patients must be examined as a whole particularly in complex cases, and it is the dentist's duty to establish a total treatment plan together with consultations and necessary referrals to different specialties. The restorative dentist or the general practitioner who delivers restorative therapy has a unique role and carries the responsibility of devising and managing the treatment of the patient from beginning to end. Additionally, he or she must gather and record all relevant information in a clear and organized manner, setting the stage for an efficient team approach. After identifying the patient's problems in a comprehensive manner, the dentist is expected to present possible treatment options and evaluate the pros and cons of each alternative, comparing and weighing their respective relative benefits. Treatment recommendations should be made based on an overall patient assessment. That being done, patients are given an opportunity to select the preferred treatment option, based on rational and predictable factors, in

their best personal interests. They are then better prepared to judge and allow informed consent, insure that they comprehend the diagnosis, relative advantages, and costs of the different treatment options offered.

The Planning Protocol

Other procedures in dentistry such as tooth preparation or implant surgery have recommended sequence protocols that ensure their accomplishment and predictability. Treatment planning in restorative dentistry lacks similar principles. Note that the term *protocol* does not imply a set of rigid rules for the development of a treatment plan. Its contents are continuously modified to accommodate new information as the dentist becomes more experienced. In the method suggested here, guidelines are offered to assist in planning procedures from initial consultation to treatment plan presentation and informed consent.

Planning phases and goals to achieve in each phase

The treatment planning protocol can be divided into four phases (Fig 1-5):

1. Gathering and organization of clinical data and development of the problem list
2. Interpretation of the gathered data and determination of the diagnosis, prognosis, and treatment objectives
3. Analysis of the treatment options and development of the treatment plan
4. Patient education, treatment plan presentation, and informed consent

Table 1-1 outlines tasks performed in each of these phases as well as the estimated number of visits required to complete the planning process. This information is intended to provide an estimate of what it takes to collect and organize information on more complex cases.

Proper phasing and sequencing of planning procedures is critical to obtaining efficiency and dependability. Staying focused on each phase and being careful to achieve the goals of that phase assist in the development of an accurate plan of care. This section describes the protocol and the sequence for examination procedures in general. More detailed explanation of each phase can be found in later chapters.

The very first step of the treatment planning protocol (phase 1) consists of recognizing the situation in which the patient presents for examination; in other words, detecting

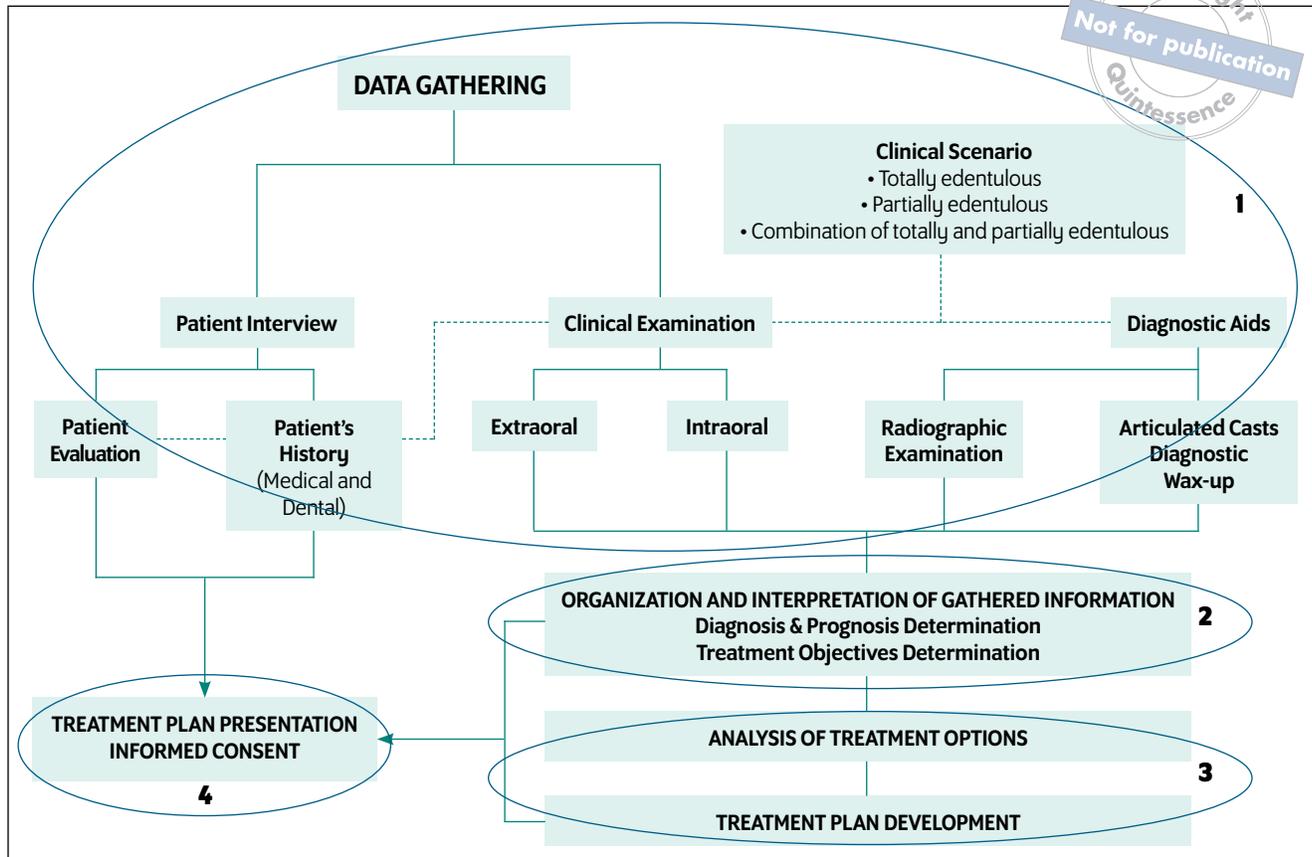


Fig 1-5 Phases of the treatment planning protocol and their requisite procedures: (1) gathering and organization of clinical data and development of the problem list; (2) interpretation of the gathered data and determination of the diagnosis, prognosis, and treatment objectives; (3) analysis of the treatment options and development of the treatment plan; and (4) patient education, treatment plan presentation, and informed consent.

existing variations from the normal healthy condition. Relevant findings should be gathered and recorded. Properly recorded data is a must for efficiency in diagnosis. In this initial phase, the dentist should become familiar with the patient as an individual as well as his or her complaints and expectations. Clinical examination can then proceed.

To ensure that no important information is left out during evaluation procedures, examination forms (eg, checklists, examination questionnaires) are offered to serve as an orientation throughout the entire data-gathering phase. This method will make the identification of all existing problems significantly easier and more predictable. This will facilitate the assessment and interpretation of all collected data, allowing a clear and complete visualization of the problems of each individual specialty. The correlations between problems can then be addressed to transform a series of disconnected findings into a comprehensive diagnosis. After recording the

collected data, a problem list can be elaborated for each area, and a diagnosis and prognosis can be determined. Treatment objectives can also be established. These procedures correspond to phase 2 of the planning process.

Phase 3 involves analyzing the treatment options and assessing possible solutions to specific needs. The pros and cons of each alternative along with their relative benefits are evaluated. After this has been achieved, modifying factors are then taken into consideration. At this point, an ideal treatment plan can be conceived along with potential alternative plans.

The final phase of the treatment planning protocol (phase 4) starts with patient education followed by treatment plan presentation. After providing the patient with complete information concerning his or her dental condition and deciding on a realistic plan of treatment, informed consent is obtained from the patient.



Table 1-1 Phases of treatment planning and their respective tasks



VISIT NO.*	TASKS TO PERFORM	POSSIBLE ADDITIONAL TASKS
Phase 1: Gathering and organization of clinical data and development of the problem list		
1	1. Initial consultation: patient interview, overall clinical examination, examination of existing diagnostic aids, radiograph prescription (if applicable), and informing patient about treatment planning fees	Laboratory procedures: <ul style="list-style-type: none"> • Obtain study casts • Duplicate study casts • Fabricate acrylic jig for occlusal registration • Fabricate acrylic base for occlusal registration • Mount casts on articulator (if applicable) • Diagnostic wax-up • Fabrication of radiographic stent (if applicable)
2	<i>(continuation of visit #1: clinical examination)</i> <ol style="list-style-type: none"> 2. Preliminary impressions for study casts 3. Facebow registration (transfer) 4. Occlusal registration (If applicable) 5. Radiograph examination 6. Problem list development 	
3	<i>(continuation of visits #1 and #2: clinical examination, facebow registration, and occlusal registration)</i> <ol style="list-style-type: none"> 7. Examination of articulated casts (if applicable) 8. Try-in of radiographic stent (if applicable/implant cases) 9. Imaging prescription (if applicable/implant cases) 10. Completion of problem list 	
Phase 2: Interpretation of the gathered data and determination of the diagnosis, prognosis, and treatment objectives		
	<ol style="list-style-type: none"> 1. Analysis of data gathered from all specialties: analysis of problem lists concerning all areas, including data provided by other sources (reports from other specialists; analysis of all diagnostic aids) 2. Diagnosis development: list every specific problem or factor that may predispose to problems; describe the stage of existing problems; describe what adverse effects each problem can cause; determine whether the active problems can be eliminated or controlled; be prepared to inform the patient about what might happen if no treatment is performed 3. Prognosis determination: determine the prognosis for all problems listed 4. Treatment objectives determination: determine what needs to be accomplished to return the abnormal existing condition to a normal situation 	<ul style="list-style-type: none"> • Arrange for consultations with other specialists, dental technicians, etc • Schedule additional appointments for patient examination (if applicable)
Phase 3: Analysis of the treatment options and development of the treatment plan		
	<ol style="list-style-type: none"> 1. Outline the complete range of treatment options available to address existing problems; be prepared to inform the patient about the advantages and disadvantages of carrying out each treatment as well as no treatment 2. Be prepared to inform the patient about the different types of techniques and materials that can be used in a given option 3. Be prepared to describe the expected outcome from the many possible treatment options, highlighting their potential limitations 4. Evaluate the pros and cons of each alternative and consider the relative benefits of the various treatment options 5. Identify the potential modifying factors 6. Select treatment possibilities that may satisfy the patient's expectations 7. Develop a treatment plan for the patient along with its respective fees and informed consent forms 	
Phase 4: Patient education, treatment plan presentation, and informed consent		
4	<ol style="list-style-type: none"> 1. Promote patient education and prepare the patient to make an optimal treatment choice (see phase 2, point 2) 2. Inform the patient about all specialties involved in the treatment 3. Obtain informed consent from the patient 	Use diagnostic aids for patient education: <ul style="list-style-type: none"> • Articulated casts • Diagnostic wax-up • Radiographs • Clinical and laboratory photographs



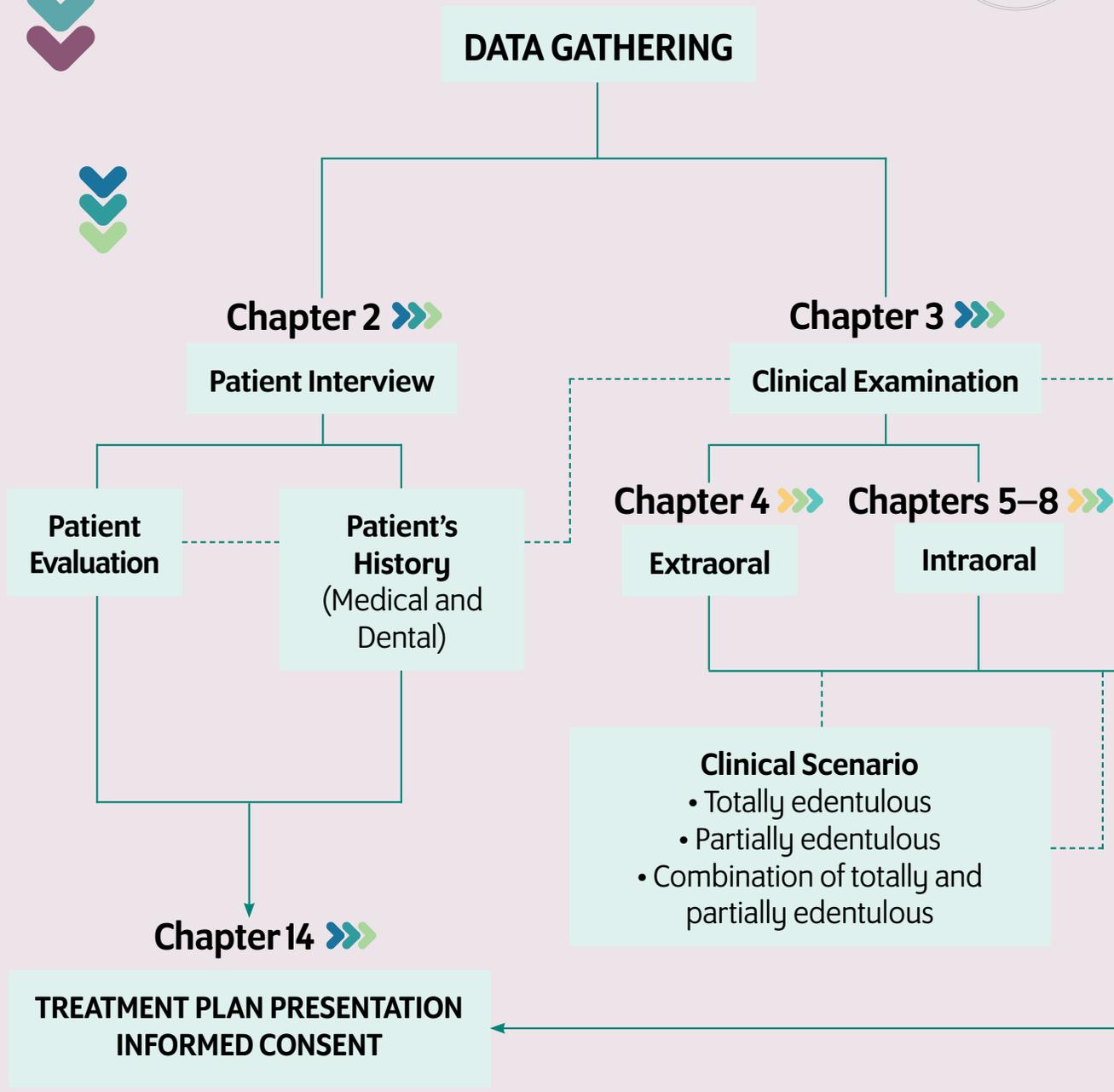
Conclusion

The restorative dentist should become familiar with problems associated with all areas of the mouth as well as solutions to these problems; clinical observations have demonstrated that overlooking obvious and simple concepts at the start of a restorative therapy may lead to severe complications and treatment failures in the short term. A systematic approach to data gathering and interpretation sets the stage for treatment plan presentation and patient education and is a major requirement for developing a well-elaborated informed consent form. The following chapters describe the phases of treatment planning in more detail. A sequence for conducting planning procedures is also presented.

References

1. Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics, ed 4. St Louis: Mosby, 2006.
2. Morris RB. Strategies in dental diagnosis and treatment planning, ed 1. London: Martin Dunitz, 1999.
3. The Glossary of Prosthodontic Terms. J Prosthet Dent 2005;94:38–39,68.
4. Cristensen GJ. Informing patients about treatment alternatives. J Am Dent Assoc 1999;130:730–732.
5. Zarb GA, Bolender CL, Eckert SE, Jacob RF, Fenton AH, Mericske-Stern R. Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-Supported Prosthodontics, ed 12. St Louis: Elsevier, 2003:268–296.







Chapter 3 >>>

Diagnostic Aids

Radiographic Examination

Articulated Casts
Diagnostic Wax-up

Chapter 9 >>>

ORGANIZATION AND INTERPRETATION OF GATHERED INFORMATION
Diagnosis & Prognosis Determination
Treatment Objectives Determination

Chapters 10–13 >>>

ANALYSIS OF TREATMENT OPTIONS

TREATMENT PLAN DEVELOPMENT



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