

Physical Rehabilitation:

Assessment and Treatment

Third Edition

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Preface

We have been gratified at the wide acceptance by both entry level physical therapy faculty and students of *Physical Rehabilitation: Assessment and Treatment*. Designed as a comprehensive text on the rehabilitation management of adult patients, it also serves as a valuable reference for practicing physical therapists inexperienced in the rehabilitation setting as well as for other rehabilitation professionals. This third edition recognizes the continuing growth of the field and strives to integrate current research in basic and clinical sciences with physical therapy assessment and treatment procedures.

The conceptual basis of *Physical Rehabilitation: Assessment and Treatment* is established at the outset with three chapters examining clinical decision making, psychosocial aspects of adjustment to physical disability, and the influence of values on patient care. Thus, the reader is directed early on to develop an understanding of the whole patient and to build effective problem-solving skills.

Chapters 4 through 12 focus on procedures used in assessment of patients with physical dysfunction. Chapters 13 and 14 outline general strategies for improving motor control and gait. Subsequent chapters, 15 through 29, examine common disabilities encountered in general clinical practice and appropriate assessment and treatment strategies. Chapters on special rehabilitation topics of prosthetics, orthotics, wheelchairs, and biofeedback are also included (Chapters 20, 30 through 32). New to the third edition are chapters on the rehabilitation management of chronic pulmonary dysfunction (chapter 15), on chronic pain (chapter 27), and on communication disorders (chapter 29).

This third edition has benefited from the input of numerous readers who have used this text in either an academic or a clinical setting and are dedicated to improve patient care. In response to their constructive criticisms, we have attempted to expand and update content, correct errors, rectify omissions, and delete material as deemed appropriate.

We continue to utilize a format designed to facilitate and reinforce the learning of key concepts. To that end, every chapter of *Physical Rehabilitation: Assessment and Treatment* includes an initial set of learning objectives, an introduction, summary, study questions for self-assessment, glossary, and extensive references. In addition, chapters provide supplemental reading lists and resources for further investigation of the theories and management strategies presented. Numerous photographs and illustrations have been included to reinforce the concepts and techniques presented in the text. Summary tables, assessment tools, and treatment protocols are provided to assist the learner in organizing vast amounts of information.

We recognize the primary strength of this text comes from the input from our talented contributors, recognized authorities from different clinical specialties

with unique perspectives, knowledge, and skills. Their integration of current research and clinical experience has immeasurably strengthened this text.

Because physical therapy is a growing profession with frequent and often rapid advances, we will always consider this book a “work in progress.” With this in mind, we welcome the continuing suggestions for improvement from our colleagues and students.

Susan B. O’Sullivan
Thomas J. Schmitz

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Clinical Decision Making: Planning Effective Treatments

Susan B. O'Sullivan

OBJECTIVES

1. Describe the key steps in the clinical decision-making process.
2. Define the major responsibilities of the therapist in planning effective treatments.
3. Identify potential problems that could adversely affect the therapist's planning and delineate remediation strategies.
4. Describe two different models currently applied to clinical decision making.

INTRODUCTION

Clinical decision making involves a series of interrelated steps that enable the physical therapist to plan an effective treatment compatible with the needs and goals of the patient and members of the health care team. These steps include (1) collection of data, (2) analysis of data and problem identification, (3) establishment of goals and priorities, (4) formulation of an appropriate treatment plan, (5) implementation of the treatment plan, and (6) evaluation of the patient and treatment outcome. Important components of each step of the process include appropriate knowledge and clinical skills, effective decision-making skills, accurate documentation, and effective communication with the patient and other members of the health care team (Fig. 1-1).

STEP 1. COLLECT DATA

This step involves recognizing and defining the patient's problem(s) and identifying the resources available for treatment. It includes the gathering of both subjective and objective data. Assessment begins with patient referral or initial entry and continues as an ongoing process throughout the course of rehabilitation. The medical record provides an important early source of information about the history of the patient's illness and the patient's present status. An understanding of disease processes, medical terminology, differential diagnosis using laboratory and other diagnostic tests, and medical

management, including pharmacology, is essential. This may require the use of resource material or professional consultation in order to ensure a complete understanding of the data. Effective use of the medical record should also include a review of the professional reports of other members of the health care team.

An interview is another preliminary measure that is used to obtain information about the patient. An interview reveals information about the patient's primary complaint, the history of the present illness or injury, premorbid lifestyle, personal goals and expectations, motivation, and knowledge of the medical condition. Health habits, including exercise likes and dislikes, and frequency and intensity of regular activity, will also prove helpful in planning an effective treatment program. Pertinent information about the patient's home and work environments also should be obtained. During the interview, listen carefully to what the patient says. Observe the patient closely, noting present mental and physical function. Finally, the interview can be used to establish rapport, effective communication, and mutual trust. Patient cooperation serves to make the therapist's observations more valid and becomes crucial to the success of the rehabilitation program.

Once this preliminary information is gathered, a determination of the pertinent assessment procedures needed can be made through the use of screening examinations. Screening exams allow the therapist to quickly scan through data from the body systems, noting areas of deficit. Screening exams indicate areas where more detailed assessments are warranted. More definitive assessments are then used to provide objective data to accurately determine the degree of specific function and

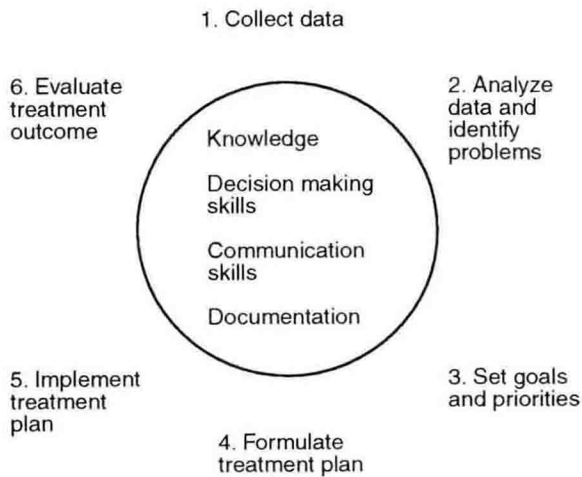


Figure 1-1. Steps in clinical decision making.

dysfunction (e.g., manual muscle test, range of motion test, oxygen consumption, and so forth). Adequate training and skill in performing these procedures is crucial in ensuring both validity and reliability of the tests. Failure to correctly perform a procedure can lead to the gathering of inaccurate data and the formation of an inappropriate treatment plan. Later chapters will focus on specific assessment procedures and will discuss issues of validity and reliability. Use of a standardized evaluation protocol can facilitate the process but may not always be appropriate for each individual patient. The unique problems of patients require the careful attention of the therapist and a determination of the appropriateness of a protocol. Therapists should resist the tendency to gather excessive and extraneous data under the mistaken belief that more information is better. Unnecessary data will only confuse the picture, rendering the clinical decision making more difficult while unnecessarily raising the cost of care. If the data are inconsistent, additional tests or assessment by another therapist may be warranted.

STEP 2. ANALYZE DATA AND IDENTIFY PROBLEMS

The assessment data must then be organized and analyzed. Terminology of the World Health Organization's *International Classification of Impairments, Disabilities, and Handicaps* (ICIDH)¹ provides an appropriate framework to categorize clinical observations systematically. **Impairments** are the result of pathology (disease or insult) and consist of the specific alterations in anatomic, physiologic, or psychologic structures or functions. For a patient with stroke, example of impairments that are the direct result of pathology might include sensory loss, motor loss, and abnormal motor planning and coordination. Schenkman and Butler² expand on this model with the addition of indirect and composite categories of impairments. **Indirect impairments** occur as

sequelae or secondary complications. They are the clinical manifestations of expanding multisystem dysfunction and result from prolonged inactivity, poor management, or lack of rehabilitation intervention. Examples of indirect impairments that might affect the same stroke patient include disuse atrophy, contracture, decubitus ulcers, or pneumonia. **Composite impairments** refer to those impairments that have multiple underlying causes, both direct and indirect. Faulty balance is an example of an impairment that can have both direct and indirect causes. Physical therapists routinely evaluate impairments. Analysis can be facilitated by the identification and classification of these impairments into direct, indirect, and composite categories. According to the ICIDH, **disability** is an inability to perform an activity in the manner or range considered normal for that individual, and results from an impairment. Four main categories of function are defined: (1) physical, (2) mental, (3) social, and (4) emotional. **Handicap** is used to describe the social disadvantage that results when an impairment or disability prevents an individual from fulfilling his or her normal role. An inability to return to work is an example of a handicap. Clinical applications and variations of this model are present in the literature.³⁻⁷

Therapeutic decisions must be based on a thorough understanding of pathology, the problems identified, the needs of the patient, and the services available. Impairments and disabilities must be analyzed to identify causal relationships. For example, shoulder pain in the patient with hemiplegia may be due to several factors, including hypotonicity and immobility (direct impairments) or soft tissue damage (an indirect impairment). Determining which of these factors is the primary cause of the problem can be a difficult yet critical step in determining an appropriate treatment and resolving the patient's pain. Some impairments may not be related to the patient's functional limitations and therefore need not become a focus of treatment.⁷ Treatment decisions must focus on the skills the patient will need to achieve maximum functional independence. Finally, not all impairments can be remediated by physical therapy. Some impairments are permanent, the direct result of unrelenting pathology. Therapists need to recognize the scope of physical therapy intervention. A primary emphasis on reducing the number and severity of indirect impairments and functional disabilities is a more realistic goal in these situations.⁶

The generation of an asset list is also an important part of the clinical decision-making process. The therapist analyzes the assessment data and determines patient strengths and abilities. These areas are then supported and emphasized during therapy, providing the patient with the opportunity for positive and successful learning experiences. Improved motivation and compliance are the natural outcomes of this planning.

The development of a classification scheme of diagnostic categories unique to physical therapy is a natural outcome of the evaluation process and has been the subject of increasing attention in physical therapy literature.⁸⁻¹¹ The use of diagnostic categories has the poten-

tial benefit of clarifying the body of knowledge in physical therapy and the role of physical therapists (PTs) in the health care system. In a market of increasingly direct access to physical therapy services, use of specific categories could also facilitate reimbursement. Sahrman⁸ suggests the focus of such a classification system should be on the primary dysfunction identified in the physical therapy evaluation. Jette¹⁰ suggests that diagnostic categories should include physical impairments and functional disabilities based on the ICDH classification. The American Physical Therapy Association has affirmed that “physical therapists may establish a diagnosis within the scope of their knowledge, experience, and expertise,”¹² and progress toward specific diagnostic categories is ongoing. Therapists should keep abreast of current developments in this area.

STEP 3. SET GOALS AND PRIORITIES

Determining appropriate treatment goals assists the therapist in planning, prioritizing, monitoring, and measuring the effectiveness of treatment. It is a difficult process, requiring skill in the interpretation of assessment data, professional judgment, and skill in facilitating patient participation in the process.

Involvement of the patient is critical in achieving patient compliance.¹³ Many rehabilitation plans have failed miserably simply because the patient did not see the relevance of the professionals' goals or because the patient had established a very different set of goals for themselves. Payton et al.¹⁴ address this issue in an excellent reference entitled *Patient Participation in Program Planning: A Manual for Therapists*, which assists in the mutual planning process. These authors suggest including such questions for the patient as:

- What are your concerns?
- What is your greatest concern?
- What do you want to see happen? What would make you feel that you are making progress?
- What are your goals (long-term goals)?
- What is your first goal (short-term goal)?

The therapist then integrates this information obtained from the patient with the objective and subjective assessment data. A goal statement is generated with the patient's full cooperation and understanding.

Long-term goals (LTGs) define the patient's expected level of performance at the end of the rehabilitation process. They describe the functional outcomes of therapy and should specify

1. Who will perform the behavior—for example, patient, family, or both.
2. What is the specific behavior—that is, what the person will do.
3. Under what conditions the behavior will be performed—for example, what help is needed to accomplish the behavior; the level of independence, assistance, or supervision involved; the type of assistive device or other equipment needed; the

type of environment needed (controlled or closed, open).

4. How the outcome (attainment of the goal) will be measured—for example, degrees of range of motion, manual muscle test grades, number of feet ambulated, number of repetitions performed, amount of time on task.^{15,16}

Long-term goals usually assume functional level at the time of discharge or, in instances of long-term care, are specified in terms of a specific time frame, generally 2 to 3 months. For example:

- The patient will be independent in ambulation using an ankle-foot orthosis and a quad cane on level surfaces for unlimited distances and for all daily activities.
- The patient will require close supervision in wheelchair propulsion and maximum assistance of one person in all transfer activities.

Long-term goals are established by the rehabilitation team and reflect mutual agreement that all members of the team will work toward assisting the patient to reach these goals. They become the focus of the discharge summary.

Once long-term goals have been established, the next step is to determine the component skills that will be needed to attain these goals. Each component skill then becomes the objective of a **short-term goal** (STG). The therapist should determine the appropriate sequence of subskills (STGs) and prioritize them accordingly. The written goal includes the same four elements, though they generally do not have the same functional emphasis. They also specify a shorter time span, i.e., generally 2 to 3 weeks, or a specific number of treatments. Examples of STGs related to an LTG appear following:

Long-term goal. The patient will be independent in ambulation with bilateral knee-ankle orthoses and Loftstrand crutches for unlimited distances on all surfaces.

Short-term goals.

1. The patient will increase strength in shoulder depressor muscles and elbow extensor muscles in both upper extremities from good to normal within 2 weeks.
2. The patient will increase range of motion 10 degrees in knee extension bilaterally to within normal limits within 2 weeks.
3. The patient will be independent in the application of lower extremity orthoses within 1 week.
4. The patient will perform sit-to-stand activities from wheelchair to crutches with moderate assistance of one person within 2 weeks.
5. The patient will ambulate with bilateral knee-ankle orthoses in parallel bars using a swing-through gait and supervision, for 25 ft within 2 weeks.
6. The patient will be independent in ambulation with bilateral knee-ankle orthoses and Loftstrand crutches using a swing-through gait for 50 ft on level surfaces within 3 weeks.

The patient advances through this sequence of STGs until he or she achieves the final end point or LTG. Each treatment plan usually has several LTGs, and a STG may

be part of more than one sequence. Thus STGs are often interrelated, and the final outcome of several LTGs may be dependent on the achievement of one component skill. In formulating a treatment plan, the therapist needs to accurately identify component skills and their relationship to treatment outcomes. Estimating outcome and the time frame needed to attain a goal is a skill that may be difficult at first for the inexperienced therapist. Consultation with experienced professionals can often assist in this process.

STEP 4. FORMULATE TREATMENT PLAN

Once appropriate goals have been formulated, the next step is to determine the therapeutic procedures that can be used to achieve each goal. The therapist may choose from a wide variety of procedures, many of which will be discussed in this text. It is important to identify all possible treatment alternatives, to carefully weigh those alternatives, and to decide on those procedures that have the best probability of success with that patient. Using a protocol approach—for example, exercises for the hip fracture patient—standardizes care but may not be suitable for the individual needs of the patient. Henry¹⁷ points out that protocols foster a separation of evaluation findings from the selection of treatments. In addition, an overdependence on the use of protocols may demonstrate a therapist's difficulty in problem solving. Therapists need to remain open to new treatment options and keep abreast of recent professional literature. An integrated treatment approach that provides multiple treatment options is often the one that has the greatest chance for success. Narrowly adhering to one treatment approach reduces the available options and may limit or preclude success. Available clinical information should be carefully assessed and additional information should be sought if needed. Watts¹⁸ suggests that clinical judgment “is clearly an elegant mixture of art and science.” Professional consultation with expert clinicians may be an effective means of helping a therapist sort through the complex issues involved in decision making, especially when the patient is chronically ill, or has multiple disease processes or complications.

Decisions need to be formulated on the basis of a number of considerations, such as the patient's general health, communication with the rehabilitation team, and financial costs and projected length of hospitalization. A general outline of the treatment plan can be constructed using the **FITT** (Frequency, Intensity, Time, Type) **equation**. An estimate should be made of the frequency (number of times per day or week treatment will be given), intensity (number of repetitions or activities), time (duration of the treatment session), and type. This last component includes specific modalities, therapeutic exercise procedures, gait training procedures, assistive devices, and other specialized equipment needs. The plan should also include the strategies selected to meet the educational needs of the patient and family. The

therapist is responsible for effective time management, and the treatment plan should include delegation of appropriate responsibilities of treatment to assistants or aides. The general outline may also consider potential discharge plans, including plans for a home visit, a home program, and home modifications or potential equipment needs.

Specific treatment procedures may then be outlined. A classification schema that identifies specific components of the treatment is often helpful, especially to the inexperienced therapist. For example, components of a therapeutic exercise procedure can be delineated by a description of the activity (specific posture and movement), the technique (type of contraction and mode of therapist intervention: guided, assisted, or resisted movement), and elements (verbal commands, sensory inputs).¹⁹ Procedures should be selected to reach individual STGs. The therapist should ideally choose procedures that accomplish more than one goal and should sequence the procedures effectively to address key problems first. Procedures should also be sequenced to achieve optimum motivational effects, interspersing the more difficult or uncomfortable procedures with easier ones. The therapist should include tasks that ensure success during the session and, whenever possible, should end each treatment session on a positive note. This helps the patient retain a positive feeling of success and look forward to the next treatment.

STEP 5. IMPLEMENT TREATMENT PLAN

The therapist must take into account a number of factors in structuring an effective treatment session. The treatment area should be properly arranged to respect the patient's privacy, with adequate draping and positioning. The environment should be structured to reduce distractions and focus attention on the task at hand. In applying exercise procedures the therapist should consider good body mechanics, effective use of gravity and position, and correct application of techniques and modalities. Equipment should be gathered prior to treatment and be in good working order. All safety precautions must be observed. The patient's pre-treatment level of function or initial central state should be carefully assessed. General state organization of the central nervous system and homeostatic balance of the somatic and autonomic systems are important determinants of how a patient may respond to treatment. Stockmeyer²⁰ points out that a wide range of influences, from emotional to cognitive to organic, may affect how a patient reacts to a particular treatment. Patients with altered homeostatic mechanisms cannot be expected to react to treatment in predictable ways. Responses to treatment should be carefully monitored. Treatment modifications should be implemented as soon as needed to ensure successful performance. Therapists develop the “art of clinical practice” by learning to adjust their input (voice commands, manual contacts, and so on) in response to the patient's movements.¹⁸

Treatment thus becomes a dynamic and interactive process between patient and therapist. Shaping of behavior can be further enhanced by careful orientation to the purpose of the tasks and how they meet the patient's needs, thereby ensuring optimal cooperation and motivation.

STEP 6. EVALUATE TREATMENT OUTCOME

This last step is ongoing and involves continuous reevaluation of the patient and efficacy of treatment. The patient's abilities are evaluated in terms of the specific goals set forth in the treatment plan. A determination as to whether a patient has achieved the desired level of competence for each skill must be made. Two outcomes are possible: the patient reaches the stated goal or the patient does not reach the goal. If the goal was reached, was it the result of the treatment intervention or the result of natural improvement? In either case, new STGs can be written and appropriate treatment procedures selected. When LTGs are reached or are close to being reached, discharge planning and plans for follow-up care can be initiated. If the goal has not been reached, the therapist must determine why this is so. Was the goal realistic, given the database? Was the treatment selected at an appropriate level to challenge the patient or was it too easy or too difficult? Was the patient sufficiently motivated? Were all the treatment uncertainties and constraining variables identified? With either outcome, the therapist must consider modification of the treatment plan. If the treatment was not appropriate, additional information may be sought, different treatment alternatives selected, and treatment goals modified. Long-term goals are revised if the patient progresses more rapidly or slowly than expected. Each modification in the program is evaluated in terms of its effect on the overall treatment plan. Thus the treatment plan becomes a fluid statement of how the patient is progressing and where he is going. Its overall success is dependent upon the therapist's clinical decision-making skills and on engaging the patient's cooperation and motivation. Wolf²¹ cautions against empiricism, that is, continuing to use a treatment simply because it has worked in the past. Rather therapists should strive to develop a concrete database through research on which the validity of treatment can be substantiated. Expansion of the body of knowledge with the continued development of sound theories of action and continued professional development are the responsibility of every therapist.

CLINICAL DECISION-MAKING MODELS

Models for clinical decision making assist the practitioner in identifying problems, recognizing relevant data, synthesizing material, and formulating conclusions. This chapter synthesizes several models, including a systems approach for treatment planning, the problem-oriented system, and clinical decision analysis.

Schematically, the **systems model** is represented by the flow chart shown in Figure 1–2. This model uses a step-by-step approach in which the solution at each step is dependent on the information derived from the preceding one.^{22–25}

In the problem-oriented system originally developed by Weed^{26–27} and adopted by many institutions, the patient-treatment process is divided into four phases:

Phase 1: The formation of a database, including history, physical examination, and laboratory and other assessment results.

Phase 2: The identification of a specific problem list from the interpretation of the database, including specific impairment of function (physical, psychologic, social, and vocational) resulting from the disease process or from secondary impairments.

Phase 3: The identification of a specific treatment plan for each of the problems described. Evaluative and progress notes are written for each problem (using a problem-oriented medical record or POMR).

Phase 4: The assessment of the effectiveness of each of the plans and subsequent changes in these plans as a result of patient progress.

Computerization of the POMR is available to store vast amounts of data and relate it to the range of possible diagnoses and the management options available. Computerization also serves to decrease the dependence on a memory-based system, and highlight the decision-making capabilities of clinicians.²⁸

The reader will recognize many similarities between the systems model and the problem-oriented model. Both represent an organized approach for gathering data and determining an appropriate treatment plan. A third model for consideration involves clinical decision analysis.

Decision analysis is a formal discipline that was developed by Howard Raiffa at the Harvard Business School.²⁹ Its application to operations research, management science, systems analysis, and medicine is widespread.^{29–32} It is designed to consider choice in the face of uncertainty, allowing the decision maker to integrate variables and calculate relevant probabilities and out-

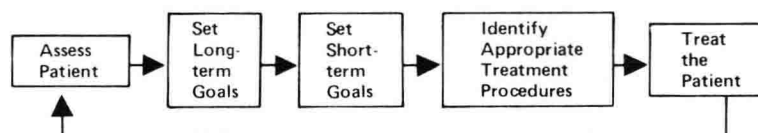


Figure 1–2. Flow chart illustrating the Systems Approach.

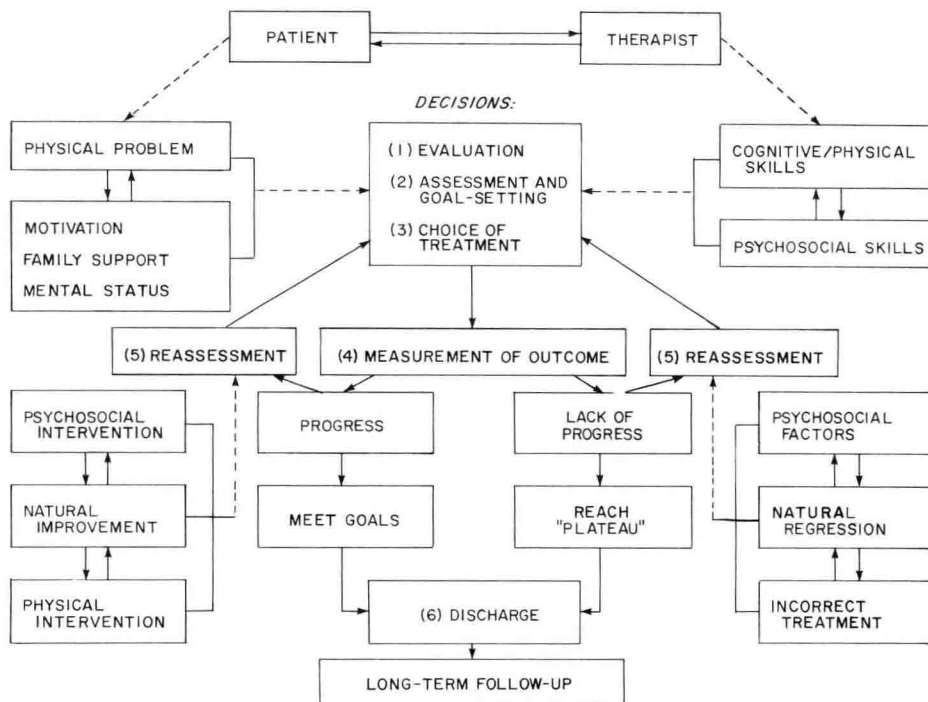


Figure 1-3. Flow chart illustrating the decision-making model. (From Wolf,²¹ p 172, with permission.)

comes. The key steps in decision analysis are (1) define or structure the decision problem, (2) define successful and unsuccessful outcomes, (3) determine alternative approaches and their consequences, (4) estimate and analyze probabilities, (5) estimate costs in terms of tangible and intangible resources, and (6) select a preferred strategy. Decision analysis recognizes a series of choices, the timing of these choices, the key uncertainties or risks, and the potential benefits of each strategy. The final outcome is arrived at only after a series of "if . . . then" decisions that allow the choices to be considered individually. Thus, the final decision best represents a realistic balance between the necessary resources and expected outcomes.³³

The generation of a **decision tree** or flow diagram allows the components of the decision process to be displayed in a sequence that embodies both temporal and logical structure. Each tree may have several branching pathways (strategies) that include decision points (interventions) and chance points (events that represent the consequences or results of an evaluative or therapeutic action). A tree is, therefore, progressively built from a database that includes the patient problem, alternative treatment paths, results of actions, and possible outcomes. Statistical probabilities of various possible outcomes, when known, are entered at appropriate points. Decisions can then be formed based on the probability of achieving a successful outcome. One of the drawbacks to using this system in physical therapy is that currently there are limited, reliable, standardized databases of outcomes on which to base decisions. Many of the decisions reached in physical therapy are based on the practical experience of individual therapists and are largely unpublished.³⁴ Decision trees do serve to highlight various different strategies without, as Weinstein et

al. point out, losing sight of the whole problem.³⁰ They also highlight the critical trade-offs between the benefits and risks of treatment, and potential biases, distortions, or omissions in planning³⁵ (Fig. 1-3). The final step in this quantitative analysis is the selection of an action most likely to lead to a successful outcome. The therapist needs to balance factors of both cost and effectiveness.

Watts³³ states that this is a time-consuming method, which should be used selectively. She suggests formal analyses for frequently made treatment decisions, those with important consequences, or those with significant controversy or uncertainty. Wolf's *Clinical Decision Making in Physical Therapy*²¹ and *Clinical Decision Analysis* by Weinstein et al.³⁰ are excellent references to aid in further understanding of this model. Several computer programs are also available to assist health professionals in constructing and analyzing decision trees and in probability calculations.³⁶⁻³⁸

DOCUMENTATION AND COMMUNICATION

Data included in the medical record should be meaningful (important, not just nice to have), accurate (valid and reliable), timely (recorded promptly), and systematic (regularly recorded).³⁹ Written documentation is formally done at the time of admission and at discharge from the program and at periodic intervals during the course of rehabilitation. The format and timing of notes may vary according to institutional policy or the needs of third party payers. In the POMR, the medical record is divided into four sections, representing each of the four phases. Each member of the health care team rec-