

CHARITY JOHANSSON | SUSAN A. CHINWORTH

# MOBILITY IN CONTEXT

SECOND  
EDITION

Principles of Patient Care Skills



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# Mobility in Context

Principles of Patient Care Skills

Second Edition







# Mobility in Context

## Principles of Patient Care Skills

**Second Edition**

**Charity Johansson, PT, PhD**

*Geriatric Clinical Specialist*

*Professor*

*Elon University*

*Elon, North Carolina*

**Susan A. Chinworth, PT, PhD**

*Associate Professor*

*Department of Physical Therapy*

*Education*

*Elon University*

*Elon, North Carolina*



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*Senior Acquisitions Editor:* Melissa Duffield  
*Director of Content Development:* George Lang  
*Developmental Editor:* Laura Horowitz  
*Art and Design Manager:* Carolyn O'Brien

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*To my children, Reed, Annika, and Lux, for all their love and  
patience.*

—CJ

*To JC Swanner for putting up with everything and to Alvin Sparks  
for his inspiration and knowledge.*

—SAC



# Preface

**F**or most, if not all, students in the rehabilitation professions, patient-care skills serve as their entry into clinical training. And rightly so. Not only must students master basic skills of patient safety and mobility before attempting more complex interventions, but also mobility—whether blood moving effectively through vessels or bodies locomoting between desired locations—lies at the heart of the rehabilitation process.

## Patient-Care Skills: The Basis of Rehabilitation

Traditionally taught as a procedural or “techniques” course, we believe that patient-care skills can serve as the foundation for far more than mere motor skills. When presented within a larger context, the subject matter provides an ideal opportunity to ground students in fundamental rehabilitation principles, establish a culture of patient-centered care, and foster habits of clinical problem-solving and critical thinking.

Linking patient-care skills to basic principles of patient interaction and mobility, examining the evidence related to the skills, and navigating the decision-making process leading to patient-care choices will equip practitioners to excel in their ability to care for patients today while also positioning them for ongoing success in an evolving world of healthcare that will demand the highest levels of critical thinking and professional judgment.

From the outset, *Mobility in Context* has sought to do just that. The organizational structure of the book parallels the progression of patient intervention, starting with what needs to happen before the patient encounter begins, addressing the clinicians’ mental and social mind-sets, emphasizing awareness of how to move themselves, and demonstrating creation of a safe environment in which to care for patients. From there, the content progresses from care in which the patient is minimally mobile and a more passive participant to mobility tasks in which the patient is more active, upright, and mobile, such as independent stair climbing with an assistive device. Patient application

of each chapter’s content is embodied in the ongoing “Thelma” case at the end of each chapter.

Several continua are embedded in the rehabilitation process: progression from dependence to independence, from passive to active movements, from stability to mobility, and from simplicity to complexity. These progressions are woven throughout the text, some implicitly as in the structuring and ordering of content material, and some explicitly through written content, thematic features, and representative icons. Complications of postsurgical movement precautions are added once basic bed mobility tasks are mastered. Assistive gait devices are presented in order of increasing mobility and decreasing stability with tips for recognizing when a patient needs to progress from one device to another.

## Changes in the Second Edition

This second edition reflects several ongoing changes in healthcare practices and terminologies with updated content and references. Chapter 1, Establishing the Therapeutic Alliance, expands the discussion of healthcare bias to include immigrant bias and provides suggestions for providing culturally competent care for transgender patients. The revised chapter also addresses issues of inappropriate patient sexual behavior and compassion fatigue.

In response to the large and growing body of evidence regarding the effectiveness of early mobility in intensive care, we expanded the coverage of this area in Chapter 3, Special Environments. A sample mobility rating scale and team protocol for patients in intensive care and specific guidelines for approaching the complexity of the environment in a systematic way are among the chapter additions.

In Chapter 4, Keeping It Clean, improved diagrams and illustrations serve to clarify donning and doffing procedures for personal protective equipment and enteric precautions, frequently being used in health-care facilities, in the coverage of transmission-based precautions.



Terminology has been updated where indicated in the new edition. For example, in April 2016, the National Pressure Ulcer Advisory Panel changed the term *pressure ulcer* to *pressure injury* and made several changes to the staging system for pressure injuries, which are now reflected in Chapter 7, Positioning Your Patient for Mobility.

Chapter 8, which previously addressed dependent transfers through manual and mechanical means, has been revised to more closely match the classroom reality. Although both of these transfer techniques represent similar levels of patient participation, teaching manual dependent transfers in conjunction with maximum-, moderate-, and minimal-assistance transfers is more efficient and follows a natural motor learning progression. The manual dependent transfer portion of Chapter 8, therefore, was moved to Chapter 11.

In an effort to make lengthy Chapter 14 less cumbersome, and to emphasize both the basic principles of assisted ambulation and the decision-making process of selecting, using, and progressing gait assistive devices, we divided its content. Chapter 14, Navigating the Challenges of Ambulating, now covers the fundamentals of gait, an introduction to assistive devices, principles of guarding during ambulation, and functional tasks such as walking over uneven surfaces and opening doors. The new Chapter 15, Implementing Device-Specific Gait, addresses the selection, fitting, and therapeutic use of each device, along with instruction on other aspects such as guarding, turning, and recognizing when patients are in need of a more stable device or are ready to progress to a more mobile one.

Other, more global enhancements throughout this edition include new and revised photographic illustrations of principles and techniques and the broadening of tasks and language to be more inclusive of patient-care skills provided by occupational therapists and occupational therapy assistants. Clinical decision-making has been further emphasized through the addition of review questions at the end of each chapter applying new concepts to clinical scenarios.

## Features to Emphasize the Most Important Skills

A unique feature of *Mobility in Context* is the repeated use of icons to reinforce important principles of patient-care skills throughout the progression of care.

**Person/task/environment (PTE):** Keying into dynamic systems theory, the PTE icon alerts students to the dynamic and interactive nature of their efforts with patients. On the one hand, a change in any one area—an alteration in a *person's* mental status, a restriction in permitted trunk rotation during the

*task* of sitting up, or the addition of multiple lines and tubes in the treatment *environment*—will necessitate adaptations in other areas of the process. An awareness of PTE can also facilitate problem-solving; when an obstacle in one area prevents accomplishment of a mobility goal, modifications in either of the other areas may be used to create a solution. For example, if a patient using crutches is too unstable to climb (task) a set of stairs (environment) because of repeated episodes of dizziness (person), the environment may be altered by creating a ramp or by relocating the upstairs items to ground level or the task may be altered through use of a wheelchair or by having the patient go up and down the stairs in a seated position.

## As Much As Possible, As Normally As Possible

### AMAP/ANAP

Fundamental to rehabilitation is the encouragement of patient independence and the use of functional movement that most closely approximates normal movement patterns. The **AMAP** portion of the icon, frequently highlighted in descriptions of mobility procedures, reminds the student to invite maximum patient participation even at the most dependent levels. Rolling in the bed with maximum assistance, for example, the patient can still be encouraged to turn the head or even just the eyes to participate in the activity. The **ANAP** reminder to choose normal movement patterns guides students in designing movement tasks. For example, patients in the hospital or skilled nursing facilities often pull on the bed rail to move from supine into a sidelying position. Initiating rolling through scapular retraction and elbow flexion, however, is not representative of typical rolling movement. Instead, lowering the bed rail and encouraging the patient to reach across and out with the uppermost arm facilitates scapular protraction followed by trunk rotation. The **ANAP** choice is always made within the larger context of the patient's needs, however. Pulling on the bed rail may be the best choice if the patient is using a hospital bed at home, for example, and pulling on the bed rail makes the difference between dependence (**AMAP**) and independence.



## Control Centrally, Direct Distally (CCDD)

One of the challenges that students face as they engage in patient-care tasks is how to facilitate desired movements on the one hand and prevent undesired movements on the other. The principle of controlling

movements with more proximal contact is expressed as **CC**, control centrally. To limit unwanted movement, such as a fall during ambulation, the clinician guards centrally at the shoulders and hips. The same principle applies when attempting to create a controlled movement. When rolling a dependent patient to his or her side for bedpan placement, for example, contact at the hips and behind the scapula will give the clinician the greatest ability to control the movement.

Attempting to elicit movement from the patient using central control, however, is rarely effective and almost never a satisfying experience for either the patient or the clinician. Patient-initiated movements are best elicited by directing the patient's most distal parts (**DD**). To encourage a patient to lean forward in sitting prior to standing up, for example, the clinician does not push the trunk forward, an action that, paradoxically, will often result in trunk extension. Instead, the patient is directed to bring the head forward to touch the clinician's hand or to bring the "nose over toes."

## Stability-Mobility

The relationship between stability and mobility affects many areas of decision-making and intervention in patient care. The  icon reminds students that patient stability typically precedes mobility. When engaging patients in mobility tasks, it is important for students to understand that patients are typically able to *maintain* (**S**) a position before they are able to *attain* (**M**) it. Furthermore, patients must be able to stabilize themselves in a position before they can be expected to superimpose mobility tasks. For example, a patient who is unable to maintain sitting balance independently on the edge of the bed is not likely to be able to move from supine into sitting without considerable assistance, and the patient cannot be expected to perform upper-body grooming tasks (**M**) before mastering stable sitting (**S**). The  icon

also represents the inverse relationship between stability and mobility: gains in one typically come with losses in the other. When selecting assistive devices for ambulation, for example, the more stability a device provides, the less mobile the patient is likely to be when using it. Similarly, when choosing the most appropriate wheelchair for a patient, the trade-off between stability and mobility must always be considered.

Other important elements are highlighted within design features of the text. Students are alerted to important safety reminders in the **Watch Out!** feature. **Keeping Current** draws attention to recent research or ongoing clinical debates that may affect their decision-making, and **Clinical Tips** offer students pointers for increasing effectiveness and efficiency in the clinic.

Themed, stand-alone boxes—**Try This**, **Clinical Reality Check**, **Thinking It Through**, and **Pathophysiology**—throughout the text provide additional learning enhancements.

## Conclusion

In revising *Mobility in Context*, our commitment to rooting patient-care skills in the underlying principles of rehabilitation and developing them within the context of the best available evidence has, if anything, only deepened.

This second edition of *Mobility in Context*, like the first, is intended to be a textbook that goes beyond "textbook" situations to facilitate the thinking and doing skills essential to quality care and to the advancement of healthcare professions. The commitment to promoting care and mobility skills that are shaped by sound principles, evolve with our expanding knowledge, and reflect ultimate respect and compassion for the patient remains the central focus.

We are excited by the updates and enhancements in this edition and hope that it will serve you well.



# Reviewers

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**Cynthia S. Bell, PhD, OTR/L**  
Associate Professor  
Occupational Therapy  
Winston-Salem State University  
Winston-Salem, North Carolina

**Jill Dungey, PT, DPT, MS, GCS**  
Assistant Clinical Professor  
PT Education  
Upstate Medical University  
Syracuse, New York

**Elizabeth A. Fain, EdD, OTR/L**  
Assistant Professor  
Occupational Therapy  
Winston-Salem State University  
Winston-Salem, North Carolina

**Nancy Green, MHA, OTR/L**  
OTA Program Chair, Associate Professor  
Occupational Therapy  
Cabarrus College of Health Sciences  
Concord, North Carolina

**Jane Worley, PT, MS**  
Director  
Physical Therapist Assistant Program  
Lake Superior College  
Duluth, Minnesota





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## The Fundamentals of Progressive Mobility

Movement is central to life. This book is about teaching you to maximize the mobility skills of people who, for some reason, have lost their ability to move effectively. As a healthcare professional working to improve patients' mobility, you have a tremendous opportunity to affect people's quality of life every day.

In some cases, you will be helping patients regain old skills, and in other cases, you will be teaching them new ways to get around or perform activities of daily living (ADLs). No matter what you are teaching them, there are certain principles and practices that will increase your effectiveness. What follows in this book is a working knowledge of these principles and practices. Applying them will serve you in common "textbook" conditions as well as in the unique and unexpected situations that make up clinical reality (see Fig. 1).

Although you will be learning some of these techniques and approaches for the first time, you may

already employ many of them intuitively. Analyzing the techniques you already use will allow you to use them with increasing levels of success and will contribute to more advanced clinical judgment. Because each individual you work with is unique, every patient interaction will require that you make clinical decisions regarding that patient's mobility needs.

Understanding the contexts in which your patient interactions occur, decision-making abilities you must develop to be proficient in mobility tasks, and the various movement techniques utilized as your patients progress in mobility skills will allow you to customize your mobility approaches to the needs of each patient. These keys will also expand the usefulness of your skills to a wide range of situations so that you can navigate confidently in complex and challenging clinical situations. Just as there is a progression in the development of



**FIGURE 1** Increasing mobility has the potential to contribute significantly to an individual's overall quality of life. (Thinkstock.)

clinical skills for the therapist, there is a natural progression in movement and rehabilitation for the patient. Because this progression is inherent in the facilitation of mobility, it is interwoven throughout this book. Rather than repeat the explanation of each continuum in every section of the book, we describe them individually here and present a representative icon or catchword for each for you to keep in mind while developing your skills. These “shortcuts” are not standard symbols or abbreviations; they are simply teaching and learning tools. After you have considered a principle and applied it in a few patient-care situations, you will be able to recall the shortcut and tap into that understanding later in more complex decision-making situations.

## Contexts

### Patient-Centered Care

The patient’s well-being should always be the central focus of your care. Although that may seem obvious, it can be challenging to maintain a patient-centered approach when multiple clinicians become involved in a patient’s care and complex healthcare systems must be navigated. To the extent that it serves the patient’s well-being, this focus should be expanded to include the patient’s family—people to whom the patient is biologically, legally, or emotionally related.

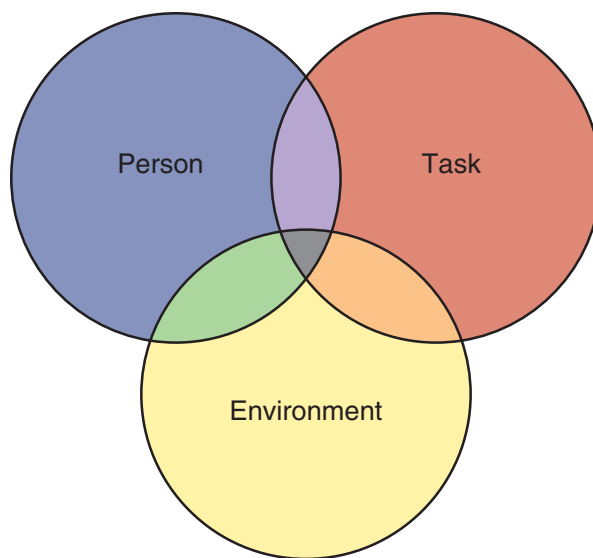
In this book, a patient case introduces each chapter to help reinforce the patient-centered concept in mobility skills. Reflecting on the challenges presented in the case and using anticipatory reasoning will help you develop critical-thinking skills.

In addition, we include a progressive case that threads through each chapter. Starting in Chapter 2, you will meet Thelma, a 50-year-old woman with cancer who is trying to regain enough skills to return home after having chemotherapy. The case of Thelma will provide an opportunity for you to apply your newly learned skills. As your knowledge increases from chapter to chapter, Thelma’s mobility needs also progress, requiring you to integrate previously learned skills with newly applied principles and techniques.



### Dynamic Systems

Several years ago, Thelen and colleagues<sup>1,2</sup> proposed a dynamic functional perspective on motor development,



**FIGURE 2** Dynamic systems interaction represented by overlapping spheres of person, task, and environment.

highlighting the way in which internal and external factors work together to achieve a desired outcome. According to their theory, the outcome of a specific functional behavior or task is determined by the way in which different variables, particularly the person and the environment, work together. There is no such thing as ambulation, a transfer, or any other mobility task without a person and a corresponding environment. Figure 2 shows the interaction of the dynamic system and is used throughout the text as the dynamic systems are discussed. Because changes in one realm affect the other two, we can intentionally influence these variables to achieve significant changes in patient function.

Using this approach for patient mobility skills will help you:

1. Identify ways to connect with and appropriately engage the person performing the task.
2. Clarify and delineate the functional task, breaking down complex movements into manageable components.
3. Assess the environment and create optimal settings for mobility success.

### Professionalism

An overarching theme of this book is the clinician’s commitment to professionalism. Interacting with

### Box 1 Professionalism in Physical Therapy: Core Values

The APTA offers seven core values for the physical therapy profession:

- **Accountability**—Responding to patients’ needs and acknowledging and accepting the consequences of one’s own behavior
- **Compassion and Caring**—Understanding and respecting patients’ individual perspectives and being an advocate for patients
- **Altruism**—Placing patients’ needs above one’s own needs, providing services that exceed the minimum standards, and including pro bono services in one’s overall professional plan
- **Excellence**—Using multiple sources of quality evidence to support one’s professional practice and striving to develop expertise
- **Integrity**—Abiding by legal and ethical guidelines, making honest self-assessments, and adhering overall to the profession’s standards
- **Professional Duty**—Facilitating achievement of patients’ goals, mentoring others, and being involved in and promoting the profession
- **Social Responsibility**—Promoting cultural competence within the profession and the larger community, promoting social policy that promotes wellness, and working to ensure social justice

Further details, definitions, and sample indicators are presented in the APTA document *Professionalism in Physical Therapy: Core Values*.<sup>3</sup> Refer also to the *APTA Code of Ethics*.<sup>4</sup> Both documents are available online.

others as a professional increases your ability to have a positive influence on their lives. At the same time, along with that power comes an increased level of responsibility, including an obligation to put the needs of your patient above your personal preferences and feelings. Certainly, you would not refuse to transfer a patient, for example, because that person has a hairstyle you don’t like. The same principle applies, however, if your patient is unkempt, engages in religious or cultural practices you disagree with, or even has been convicted of heinous crimes. All your interactions with and about that patient are carried

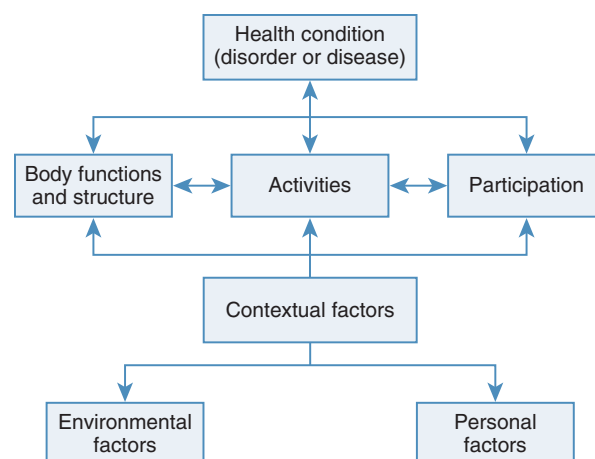
out with respect—respect for that person’s feelings, values, goals, and needs, even when their values or priorities differ greatly from yours. As a professional, it is your job to enter the patient’s world respectfully so that you can allow that person to benefit from your world of specialized knowledge. *Respect is the foundation of all therapeutic interventions.*

At the same time, maintaining appropriate boundaries with patients demonstrates respect for oneself as well. Knowing when to say “no” and where to draw the lines between personal and professional obligations is essential to maintaining a healthy approach to patient care.

Core professional values center on the demonstration of compassion and respect, striving for excellence, and using your skills to serve others. The American Physical Therapy Association (APTA) has identified seven core values that characterize professional conduct (see Box 1).<sup>3</sup> Most patient-care professions have a similar set of values. Conducting patient mobility activities within this context of professionalism brings the power of the larger context to each interaction.

### Health and Wellness

Just as the model of dynamic systems helps us identify the variables that influence mobility activities, the World Health Organization’s health schematic<sup>5</sup> helps us understand how mobility tasks fit into a person’s overall health (see Fig. 3). Constructed with efforts



**FIGURE 3** World Health Organization (WHO) model of functioning and disability representing the interactions among biological, social, and personal factors.

to develop neutral, nonjudgmental terminology and an appreciation of the many facets of health, the International Classification of Function, Disability and Health (ICF) model provides a context within which to consider all our interventions. Any activity, such as getting out of bed or walking with crutches, is affected by the person's health condition, the state of different body systems, the extent to which the person is able and willing to engage in activities, the environment in which the activity takes place, and the personal beliefs and attitudes of that person. The more aspects and relationships we identify related to a patient's mobility activities, the more opportunities we have to influence patient outcomes in a positive way.

## Decision-Making Guides

One of the most fundamental rehabilitation progressions is *from dependence toward independence*. Independent function is valued highly by most people, and when conditions threaten that independence, people often seek the assistance of rehabilitation professionals. The purpose of rehabilitation centers upon function and can be summarized as *enabling patients to engage as fully as possible in the life activities they find meaningful*. Although this principle of progressive independence may seem so obvious that it need not be mentioned, it informs a multitude of clinical decisions regarding the techniques and resources that make up a functional task. Even a simple task such as rolling to one side in the bed can be achieved in multiple ways. Asking yourself, "Which method will further this person's independence now and in the future?" can help you choose the movement technique you employ, the equipment you use, and the amount of assistance you provide. The same consideration applies to methods of transferring from one surface to another, choosing an assistive device for ambulation, and selecting options regarding a wheelchair.

Despite our best efforts, the nature of some health conditions causes some patients to become increasingly dependent. Even in these cases, however, the principle of maximizing independence and minimizing dependence still applies. At any

given time in this person's health experience, the person's abilities, the environment, and the task can be manipulated to gain maximum meaningful mobility.



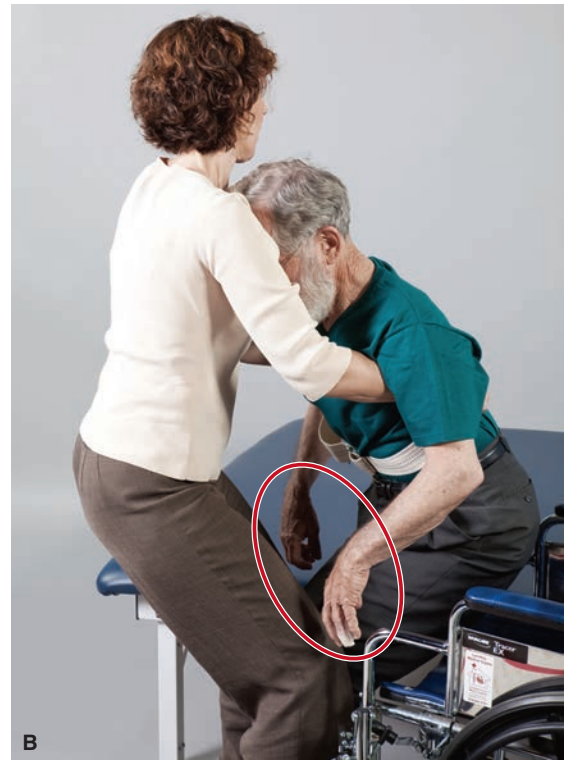
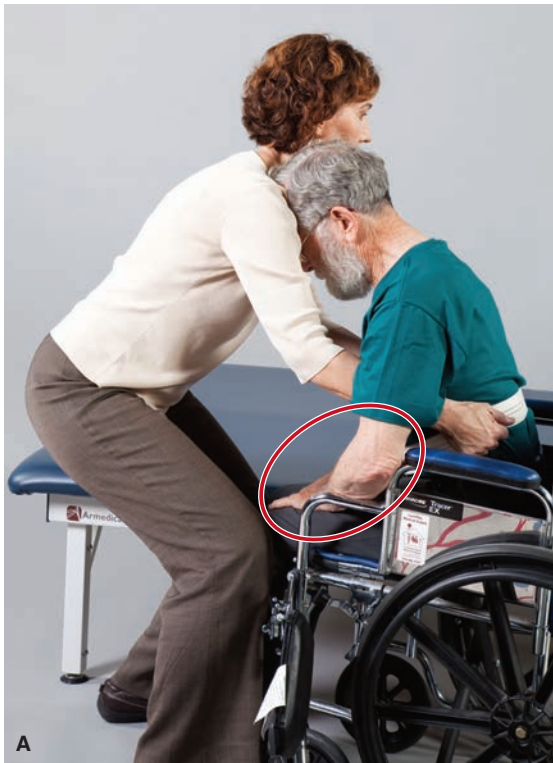
### As Much as Possible, as Normally as Possible (AMAP/ANAP)

In the initial stages of rehabilitation, it is common for patients to be more dependent and for the clinician to perform most of the work to accomplish a task. Encouraging patient independence requires additional time and energy, making it easy to fall into the "efficiency" trap of providing too much or the wrong kind of assistance to your patient (see Fig. 4). Because the goal is to facilitate independence even at the most dependent level, the best mobility instruction is based on a plan for progressively shifting that ability and responsibility to the patient. This principle is to have the patient do **as much as possible, as normally as possible (AMAP/ANAP)** at every level of mobility, building the framework for increasing independence. Figure 5 shows the same transfer as Figure 4 with the clinician using the principle of **AMAP/ANAP**.

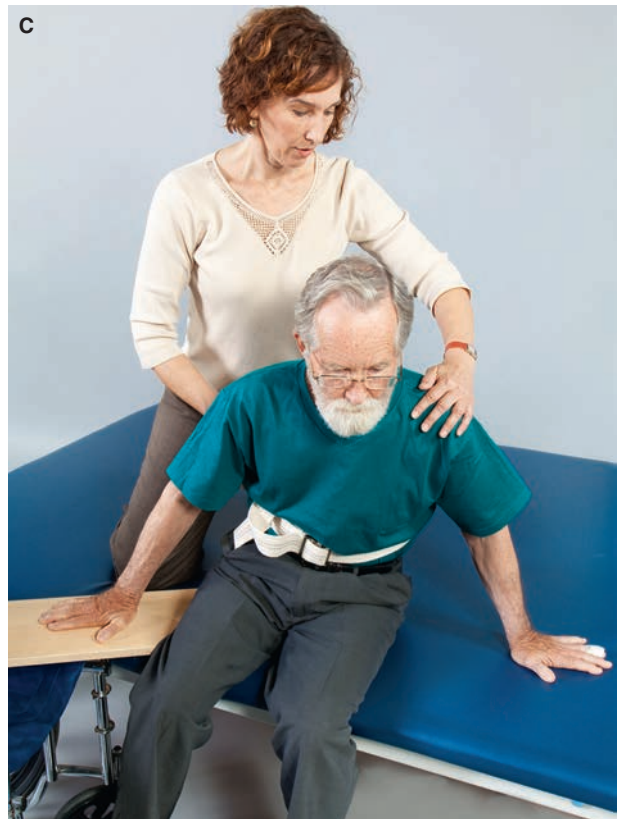
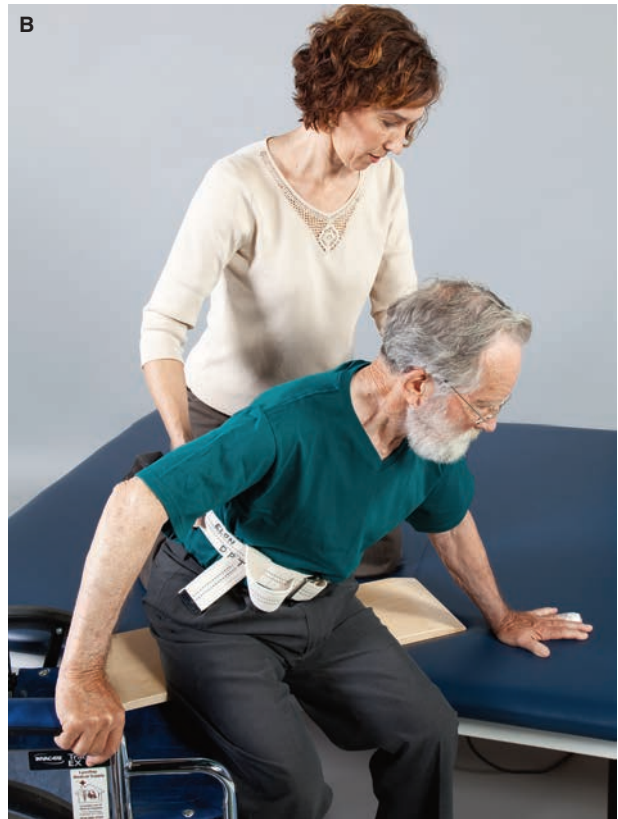
Although a patient's efforts may not result in an immediate increase in mobility, having the patient do as much as possible is an investment in the patient's future performance of the task. Engaging the patient at whatever level is possible is a critical part of the teaching and learning process and essential to the patient's long-term mobility success.

Designing patients' movements to be as normal as possible, even in early mobility attempts, facilitates patient success. Typical movement patterns tend to be more efficient and less destructive to the body. When typical movement patterns are not possible or reasonable, the clinician selects the best approximation with an eye toward energy efficiency and minimized long-term stress on the patient's body. The clinician who understands typical movement patterns of people of different ages and ability levels can streamline the patient's progression to independence by encouraging these movement patterns early on. Throughout this text, every time you see **AMAP/ANAP**, it's a reminder to have your patient do as much as possible as normally as possible.

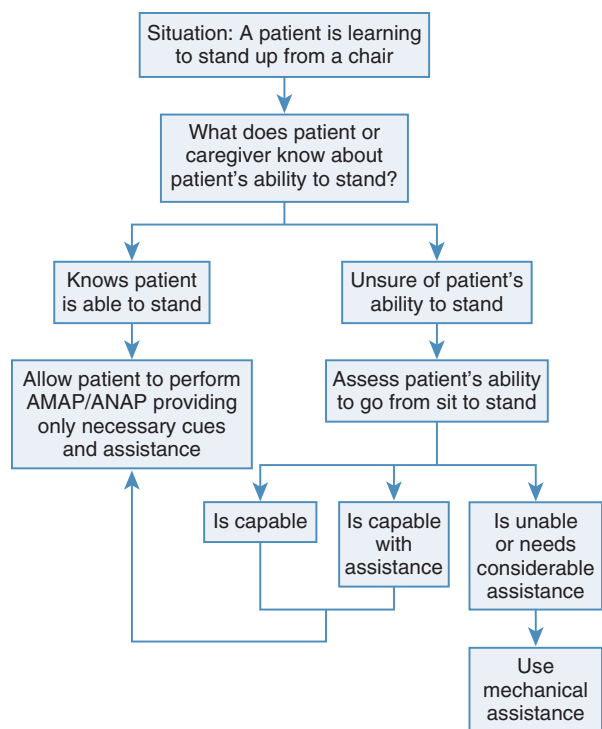




**FIGURE 4** Ignoring the **AMAP/ANAP** principle. (A) The therapist initiates the transfer with little-to-no help from the patient, even though the patient may be able to assist. (B) The patient can feel particularly vulnerable when not engaged in the task. (C) The patient is not encouraged to use his hands to guide himself in sitting.



**FIGURE 5** Using the **AMAP/ANAP** principle. The clinician facilitates independence in the transfer by using a sliding board and allowing the patient to do as much of the transfer as possible himself. (A) The clinician encourages the patient to use his upper extremities (UEs) in the transfer process. (B) The clinician guards the patient as he moves across the sliding board. (C) The patient has successfully moved from the wheelchair to the mat.



**FIGURE 6** Decision tree for helping a patient learn to stand up from a chair using the principle of **AMAP/ANAP**.

Figure 6 shows a decision tree for helping a patient learn to stand up from a chair using the principle of **AMAP/ANAP**.

### Control Centrally, Direct Distally (CCDD)

Controlling movements and directing movements call for different assistance techniques. Controlling a patient's movement—moving the patient (or preventing a patient's movement) from one position or surface to another—is achieved most effectively when the clinician is close to the center of the patient's mass, so that you *control centrally*. Most of the body's mass typically lies between the shoulders and the pelvis, so movement of the body is most easily controlled there. In fact, the shoulders and hips are often referred to as the “points of control” (see Fig. 7).

Picture a person who has slid forward on a couch and is unable to assist in repositioning. Her legs are extended out in front of her, her hips are at the front edge of the couch, and her head is resting on the back cushion. You are not likely to be successful in repositioning her by pushing on her feet or pulling on her hands, the most distal parts of her body. The most effective attempt to move this patient is to reach under her arms and hips and lift her torso up and back.



**FIGURE 7** Controlling centrally. As the patient attempts to roll onto his left side, the clinician provides assistance at the shoulders and pelvis for best control.

The most effective positioning occurs proximally. Even if it is the poor positioning of the head, arms, and legs that is most noticeable, look first to the placement of the pelvis, the center of the patient's mass, for correction. Position the pelvis correctly in the chair, and control of the legs, arms, and head often takes care of itself.

**CLINICAL TIP:** “As the pelvis goes, so goes the body.” Positioning the pelvis can have a chain-reaction effect, improving the posture of the entire spine, head, and extremities.

Not all control, however, involves moving from one place to another. Sometimes controlling movement is about *not* moving. If a patient standing beside you becomes unsteady, for example, you will be in a much better position to keep him from falling if you have a firm grip on the shoulders or around the waist than if you are holding tightly to the person's hands. Patient guarding is therefore typically performed close to the patient's shoulders and hips.

If your goal is to direct someone's movement, on the other hand—someone who is more independent and requires less assistance in a particular mobility task—cues to movement are most effective when *directed distally* (see Fig. 8).

The distal component of the body is the part that is farthest from the trunk. As the distal component leads the movement, the rest of the body tends to follow. Suppose you are directing someone's movement from sitting to standing. One of the initial components of the task is to lean the trunk forward in the chair. For the patient who is struggling to relearn the sit-to-stand procedure—with the addition of two crutches or the absence of sensory input from one leg, for example—it





**FIGURE 8** Direct distally. Because this patient is physically able to roll onto his right side, the clinician directs his movements distally, instructing him in directing his gaze and providing him with visual targets for the movement of his hands and knee.

is usually not very effective to say, “Flex the trunk,” or even, “Lean forward,” even though that is exactly what you want to happen. Patients generally respond better to more distal cues, both verbal and tactile, for directed movement. Therefore, during sit-to-stand activities, clinicians often say things such as, “Bring your nose over your toes” or “Put your head on my shoulder,” or they might place a hand in front of the patient and ask the patient to touch the clinician’s hand with the forehead (see Box 2).

Directing your patient’s line of sight, such as instructing a patient to look in the direction the body is turning, is another means of directing distally. Because it is a natural component of the mobility task, it can also be a way of engaging a patient in a very dependent task (see Box 3).

As patients are increasingly able to control their movements in a particular task, your role will tend to progress from that of controlling to directing.

### Box 2 Try This

Instruct a classmate in standing on tiptoes *without* talking about distal body parts—hands, feet, arms, or head. What do you say? “Lift your hips up?” “Elongate your trunk?” “Lift your body up as high as you can?” True, the shoulders and pelvis do move superiorly, but instructing a patient by using centrally oriented cues is often confusing and ineffective. It is much easier to say, “Stand on your tiptoes” or even, “Reach your *hands* up over your *head* as far as you can” and the person will naturally go up on his or her tiptoes.

### Box 3 Try This

Look to the left while turning your head to the right. It takes effort and attention. Now look to the right and notice how the head naturally turns to follow the sight line. The body wants to follow the head. “Where the eyes go, the head will follow. Where the head goes, the body will follow.”

Even when patients’ physical abilities are severely limited, directing them in small components of the mobility task builds a foundation for the progression toward functional independence. Look for the **CCDD** icon throughout the text to remind you to **control centrally and direct distally**.

### Biomechanics

A basic understanding of biomechanics is necessary to determine the optimal means of assisting a patient in a mobility task. This textbook explains fundamental biomechanical principles and demonstrates their application to patient mobility tasks in Chapter 2. Understanding the way in which the human body is affected by gravity, inertia, momentum, and levers, for example, allows the clinician and patient to achieve mobility goals with greater ease and less risk of injury. Knowledge of pressure and its effects on the body can inform patient-positioning decisions, especially for the more immobile patient. The biomechanics icon is repeated throughout the text as a reminder that the safe and effective performance of certain mobility tasks depends on proper use of biomechanics.

### Stability to Mobility

Another progression in functional mobility is from stability to mobility—the progression from less mobile to more mobile or from being still to moving. A dependent patient may begin rehabilitation with very little ability to initiate any movement. As rehabilitation progresses, the aim is for the patient to be able to engage safely in more complex and challenging functional movements.

To be stable while still, a patient with impaired motor control needs a low center of mass (CoM) with a broad base of support beneath it. As mobility skills increase, a person becomes able to move purposefully with a higher CoM over a smaller base of support (BoS). Consider the typical movement patterns of infants and toddlers as they progress from positions of stability to increasingly mobile activities:

- Prone or supine
- Rolling

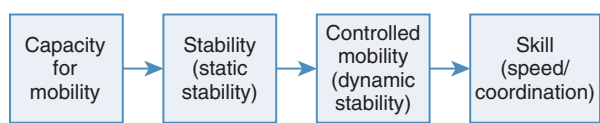


- On hands and knees, rocking
- Crawling, first slowly and then more quickly
- Pulling up and standing
- Walking, first slowly and then with increasing speed and coordination
- Running

For each activity, notice the relationship between the child's CoM and BoS.

Just as human movement development typically progresses from stationary to mobile, or static to dynamic activities, functional activities in physical rehabilitation tend to progress through a stability-mobility continuum (see Fig. 9).<sup>6-8</sup> Generally speaking, success in mobile tasks is predicated on success in stable tasks, and the most effective patient-care techniques build up mobility activities from stable to mobile. The sequence of stability to mobility is described next:

- **Capacity for mobility:** For movement to occur, there must first be capacity for mobility. In other words, there must be sufficient flexibility to allow movement and adequate muscle activity to act on the skeletal system. If, for example, a patient wishes to reach into an overhead cabinet, the possibility of completing that task will be limited if the person's shoulder joint is too stiff to allow the arm to be raised, if the muscles acting on the arm are weak because of disuse, or if innervation of the shoulder muscles has been impaired.
- **Stability**, also known as *static stability*, is the ability to maintain a steady position against gravity or in a weight-bearing position.<sup>6-8</sup> Patients are usually able to *maintain* a given position before they are able to *attain* it. For example, a patient is likely to be able to briefly maintain a steady position seated at the edge of the bed before he or she is able to move into that seated position from lying down. Similarly, one would expect a patient to be able to master the task of standing still in the controlled environment of a rehabilitation gym before being able to maintain an upright position while being jostled in a large crowd.



**FIGURE 9** The sequence of stability to mobility.

#### Box 4 Thinking It Through: Clinical Question

A factory employee works at a station that requires repetitive arm movement while sitting. The worker has developed elbow pain that is aggravated by certain positions of the repetitive movements. What additional underlying stabilization may be lacking and thus contributing to the worker's elbow pain? *Hint: CCDD*

- **Controlled mobility** can be viewed as superimposing a purposeful movement on a stable base. In controlled mobility, the patient is able to move intentionally with respect to the environment. Walking, for example, requires the patient to advance one leg in the desired direction while moving the trunk and body forward in an upright position over the opposite leg and foot. This dynamic stability—the ability to maintain one's CoM over the base of support with motion—is the prerequisite for many functional ADLs (see Box 4).
- **Skill:** Beyond controlled mobility is skill—intentional movement carried out with advanced speed and coordination. Skilled mobility tends to progress from movement in an unchanging environment to responses in a rapidly changing, unpredictable environment. The tennis player makes a powerful and accurate backhand stroke while crossing the court at high speed in a wheelchair. The toddler begins to run. The pedestrian slips on a patch of ice but quickly and safely recovers her balance.

In the process of facilitating a patient's mobility, clinicians tend to follow the same stability-mobility progression inherent in typical movement patterns, engaging patients initially in more stable activities and increasing their mobility challenges as appropriate (see Fig. 10).

When a patient is unable to perform a complex task in a timely manner, examining the elements of the task along the continuum can help clarify appropriate interventions. If a patient walks very slowly with a stooped posture, for example, a clinician might be tempted to work initially on gait speed (skill), urging the patient to take larger or more frequent steps. But if hip joint and muscle stiffness are limiting the patient's ability to extend the hips fully (capacity for mobility), working on gait speed will be of minimal benefit.