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## Introduction

The aging population faces a number of challenges due to changes in anatomy, physiology, and cognition as well as varying availability of social and financial support. Events that would have limited effects on younger patients are magnified in older patients. A common example is a ground level fall, which is a relatively minor event for a young person but, in an older individual is more likely to result in serious pathologies with high mortality rates, such as hip fracture [1]. A number of factors are contributory. Muscle tone and coordination decrease with age. Memory and judgment are affected negatively as is cognitive functioning. Decreased visual and hearing acuity, balance, and response time affect the ability to operate vehicles increasing the risk of a motor vehicle crash (MVC) [2]. The older patient is also more prone to depression, delirium, and dementia. These conditions are not only more common in the geriatric population but are increasingly diagnosed when they are hospitalized [3].

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## Rehabilitation and Functional Restoration

Many patients in the aging population require rehabilitation as a result of injuries incurred during routine activities that they had performed for many years, but which have become more difficult as they develop more intrinsic barriers. As

society has become less “nuclear,” fewer intergenerational families cohabitate and the elderly have less support and supervision making them more prone to injury. Furthermore, as a result of this deterioration of multigenerational households, once injury has been sustained, there are fewer family members readily available to assist in functional activities and/or supervision. Seniors generally desire to maintain as much independence as possible, sometimes to their detriment and that of the immediate caregiver groups. With longer and active lifestyles becoming more common, it is likely that the incidence of injury in the elderly will increase resulting in more demand for rehabilitation services for this special population.

It is safe to assume that one of the most important goals of any hospital admission is to discharge the patient safely to a functional environment. For many patients, being able to return to their homes represents the final destination when recovered. Furthermore, length of stay is a quality indicator at many facilities. For the elderly patient, returning to their home, while psychologically fulfilling, may not address the needs for therapies and more intensive rehabilitation after injury.

Discharge planning should optimally begin at the time of admission. Frequently a social worker or case manager evaluates the patient’s pre-injury state of wellness at an early stage to consider all of the options available to the patient and to assist the team with discharge plans. Early on, the team uses assessment and prognostic tools in order to establish the likely level of independence at the time of discharge for each patient. All members of the team are responsible for assessing the need for assistance based upon their expertise and experience with the disease and injuries and for communicating it to the admitting service. A viable discharge from the acute inpatient setting is typically contingent upon meeting certain medical criteria and on ensuring that the patient will not require readmission to the hospital due to discharge to an unsafe environment and/or inability to follow through with the treatments prescribed. In the future, it is anticipated that the Centers for

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Medicare and Medicaid Services (CMS) will track these results and adjust (i.e., decrease) reimbursement to treating facilities based upon readmissions of any type within 1 month of discharge.

The aging patient frequently has multiple challenges specific to the injury and comorbidities that prevent successful independent living. For example, hypertension and diabetes tend to have higher prevalence in this population, and both are linked to microvascular disease that, when manifest in the brain, contributes to dementia. Patients may seem relatively functional in known environments where many tasks are automatic, but demonstrate severe cognitive deficits when removed from their usual environment. Additionally, the cortical atrophy of the brain reduces the volume of the brain relative to the calvarium and can lead to indolent subdural hemorrhages, which, coupled with the increased incidence of falls, lead to devastating injuries from a minor injury. Not infrequently, financial burdens limit the extent to which the patient is able to obtain assistance for activities of daily living. Family or other designated caregivers may be unwilling or unable to provide 24-h supervision. Available evidence and common sense would suggest that well-developed, actively involved family networks are linked to decreased rates of institutionalization [4]. This is true for those family members and/or caregivers willing and able to offer ongoing, reliable, hands-on assistance to their loved ones. In many cases, however, the patient's primary support system is not readily available or is not located close to the patient's preferred residence, thereby creating a dilemma for the patient and their family potentially delaying discharge. These challenges should be identified early and options presented to the patient or designated decision maker(s), such as the healthcare power of attorney.

## Rehabilitation Assessment

There are a number of discharge environments available for the patient to transition to prior to returning to their home. Criteria for admission are largely based upon expected functional outcomes as well as funding availability. The Centers for Medicare and Medicaid Services (CMS) designates the diagnoses that they accept as appropriate for rehabilitation. This changes as CMS reviews the claims made on an annual basis, which is to say that admission criteria incur potentially significant changes annually for acute inpatient rehabilitation facilities (IRF), subacute and skilled nursing facilities (SNF), and long-term acute care (LTAC) facilities. Although helpful, it is not expected that non-rehabilitation physicians understand the subtleties of this system. This necessitates a strong working relationship with rehabilitation specialists to assure timely discharge of the injured patient. To further complicate the matter, not all insurance policies cover the

gamut of rehabilitation services, such as inpatient, subacute or skilled nursing facility, or even outpatient therapies. For example, patients on Medicaid in South Carolina are often surprised to learn that their policy does not provide outpatient physical therapy (PT). Clearly, the patient with good resources will have the most options available. Later in this chapter, we will provide an overview of the different rehabilitation settings.

As the patient's condition progresses during the hospitalization, there is increased involvement of the interdisciplinary functional restoration team. Early involvement of the physiatrist facilitates care and communication with the patient and the caregivers regarding the options for discharge. Physical medicine and rehabilitation (PM&R) specialists can suggest the best setting for continued care and facilitate the transition to those destinations. However, if the goal is for eventual discharge to home or another permanent living arrangement, it is the responsibility of every member of the entire medical team to be part of that plan to discuss potential barriers with the patient and/or caregivers.

Patients can be assessed for function in the following manner [5]:

1. Identify the diseases and injuries and their sequelae that are affecting activities of daily living (ADLs) to include eating, grooming, dressing, voiding/evacuating, mobility, and cognition. Are there range of motion or weight-bearing restrictions that will impact the patient's ability to do those activities? Do they have appropriate mentation to attend to tasks safely? (Functional Independence Measure (FIM™))
2. Identify barriers to performing ADLs and their completion, such as meal preparation, safety awareness, and entering/exiting the home or rooms in the home. What assistive devices may improve adaptive function and is it financially feasible to obtain them?
3. Identify need for caregivers, especially if relative independence is not expected at the time of discharge. At what level of care will the patient's caregivers be willing to take them home?
4. Identify additional education and training needs. Is additional training or therapy indicated prior to discharge to their previous living situation?

For the patient with significant impairments or disabilities, a consultation from PM&R services may be indicated to delineate the subtleties of progress and recovery. Brain injuries, strokes, and spinal cord injuries involve complex functional issues for the patient, significant educational and physical assistance commitments for the caregivers, and community resource requirements that the interdisciplinary team will need to navigate.

Function is measured in a number of ways. Most inpatient therapists and physiatrists will use elements of the FIM™ or Functional Independence Measure. The full FIM consists of

**Table 35.1** Functional Independence Measure Instrument™: developed by the University of Buffalo, a proprietary, subscription-based instrument to measure and document function

Contains 18 items composed of:

13 motor tasks

5 cognitive tasks (considered basic activities of daily living)

Dimensions assessed include:

Eating

Grooming

Bathing

Upper body dressing

Lower body dressing

Toileting

Bladder management

Bowel management

Bed to chair transfer

Toilet transfer

Shower transfer

Locomotion (ambulatory or wheelchair level)

Stairs

Cognitive comprehension

Expression

Social interaction

Problem solving

Memory

Tasks are rated on a 7-point ordinal scale:

7 – Independent: able to perform task independently

6 – Modified independent: able to perform task independently, but requires extra time

5 – Supervised: able to perform task with setup, may need verbal cues for safety and sequencing

4 – Minimal assistance: Requires assistance for up to 25 % of the task

3 – Moderate assistance: Requires assistance for 26–50 % of the task

2 – Maximal assistance: Requires assistance for 51–75 % of the task

1 – Total assistance: Requires assistance for greater than 76 % of the task

Scores range from 18 (lowest) to 126 (highest) indicating level of function

Scores are generally rated at admission and discharge

18 items measured on a 7-point scale (see Table 35.1 and Fig. 35.1). Other measurement systems exist, but CMS has adopted FIM as the primary tool determining the patient's functional level in the rehabilitation setting.

## The Interdisciplinary Functional Restoration Team

There are a number of allied health members who are active in the functional restoration process. Each has their own scope of practice and may make suggestions to the primary team based upon their specialty.

## Occupational Therapist (OT)

Occupational therapists work with therapeutic use of everyday life activities to participate in the home, school, work, and community settings, addressing physical, cognitive, psychosocial, and other aspects of performance that affect health, well-being, and quality of life. These professionals include:

- Occupational therapy aide/assistant (OTA): Aides are frequently trained on the job, while assistants have an associate-level degree; in some states, the latter clinician is required to have licensure in order to practice.
- Occupational therapist (OT): A baccalaureate- or masters-level degree in an occupational therapy course of study.
- Doctor of Occupational Therapy (Dr. OT): Possess a doctorate-level degree with a dissertation defense in occupational therapy.

## Physical Therapist (PT)

Physical therapists examine functional limitation, disability, or other health-related conditions to determine a diagnosis, prognosis, and intervention in order to alleviate impairment through use of exercise, manual therapies, adaptive measures, and modalities. These professionals include:

- Physical therapy aide/assistant (PTA): Aides are frequently trained on the job, while assistants have an associate-level degree; in some states, the latter is required to have licensure in order to practice.
- Physical therapist (PT): This individual has obtained a baccalaureate- or masters-level degree in physical therapy.
- Doctor of Physical Therapy (DPT): The doctorate-level degree is awarded after defending a dissertation in physical therapy.

## Physiatrist

A physician (M.D., D.O.) with graduate medical education in Physical Medicine and Rehabilitation. Their educational focus is on function and independence in treating nerve, bone, and muscle injuries and illness. They are interdisciplinary team leaders, considering a broad range of medical, socioeconomic, neuropsychological, and cultural factors and barriers that affect a patient's ability to recover and function independently. There are subspecialty designations in Traumatic Brain Injury (TBI), Spinal Cord Injury (SCI), Electrodiagnostics (EMG) and Neuromuscular Medicine, Pain Medicine, Palliative Care, and Sports Medicine. Not all physiatrists participate in acute/subacute inpatient rehabilitation, as many maintain pure outpatient, procedural-based

# FIM™ instrument

<b>LEVELS</b>	7 Complete Independence (Timely, Safely) 6 Modified Independence (Device)	<b>NO HELPER</b>		
	<b>Modified Dependence</b> 5 Supervision (Subject = 100%+) 4 Minimal Assist (Subject = 75%+) 3 Moderate Assist (Subject = 50%+) <b>Complete Dependence</b> 2 Maximal Assist (Subject = 25%+) 1 Total Assist (Subject = less than 25%)	<b>HELPER</b>		
		<b>ADMISSION</b>	<b>DISCHARGE</b>	<b>FOLLOW-UP</b>
<b>Self-Care</b>				
A. Eating		<input type="text"/>	<input type="text"/>	<input type="text"/>
B. Grooming		<input type="text"/>	<input type="text"/>	<input type="text"/>
C. Bathing		<input type="text"/>	<input type="text"/>	<input type="text"/>
D. Dressing - Upper Body		<input type="text"/>	<input type="text"/>	<input type="text"/>
E. Dressing - Lower Body		<input type="text"/>	<input type="text"/>	<input type="text"/>
F. Toileting		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Sphincter Control</b>				
G. Bladder Management		<input type="text"/>	<input type="text"/>	<input type="text"/>
H. Bowel Management		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Transfers</b>				
I. Bed, Chair, Wheelchair		<input type="text"/>	<input type="text"/>	<input type="text"/>
J. Toilet		<input type="text"/>	<input type="text"/>	<input type="text"/>
K. Tub, Shower		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Locomotion</b>				
L. Walk/Wheelchair		<input type="text"/> <input type="text"/> <input type="text"/> W Walk C Wheelchair B Both	<input type="text"/> <input type="text"/> <input type="text"/> W Walk C Wheelchair B Both	<input type="text"/> <input type="text"/> <input type="text"/> W Walk C Wheelchair B Both
M. Stairs		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Motor Subtotal Score</b>		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Communication</b>				
N. Comprehension		<input type="text"/> <input type="text"/> <input type="text"/> A Auditory V Visual B Both	<input type="text"/> <input type="text"/> <input type="text"/> A Auditory V Visual B Both	<input type="text"/> <input type="text"/> <input type="text"/> A Auditory V Visual B Both
O. Expression		<input type="text"/> <input type="text"/> <input type="text"/> V Vocal N Nonverbal B Both	<input type="text"/> <input type="text"/> <input type="text"/> V Vocal N Nonverbal B Both	<input type="text"/> <input type="text"/> <input type="text"/> V Vocal N Nonverbal B Both
<b>Social Cognition</b>				
P. Social Interaction		<input type="text"/>	<input type="text"/>	<input type="text"/>
Q. Problem Solving		<input type="text"/>	<input type="text"/>	<input type="text"/>
R. Memory		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Cognitive Subtotal Score</b>		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>TOTAL FIM Score</b>		<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>NOTE:</b> Leave no blanks. Enter 1 if patient not testable due to risk				

FIM™ Instrument. Copyright ©1997 Uniform Data System for Medical Rehabilitation, a division of U B Foundation Activities, Inc. Reprinted with the permission of UDMSR, University at Buffalo, 232 Parker Hall, 3435 Main Street, Buffalo, NY 14214.

Fig. 35.1 FIM instrument

practices. Practitioners who typically interface with hospital-based teams are in general rehabilitation and are available on a consultative basis.

### **Medical Social Worker (MSW)**

Medical social workers have an in-depth understanding of the resources available to the patient based upon available funding, area (e.g., county) of residence, and related factors. They communicate those options to the patient and the team. They are frequently expert communicators who gather environmental and contextual information, explain the barriers and challenges to patients and their caregivers, and confirm the final discharge plan.

### **Speech-Language Pathologist (SLP)**

These individuals have a graduate-level degree with clinical certification to treat patients with speech, swallowing, and cognitive deficits through use of therapeutic exercises, adaptive strategies, and devices.

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### **Special Considerations in the Geriatric Population**

The aging population is typically injured by lower energy force [5–9]. For example, falls are usually from standing or sitting, and compression fractures may occur after sneezing, coughing, or other normal physiologic activities. This occurs because of the effect of aging on bone metabolism resulting in osteoporosis. Furthermore, aging may be responsible for degenerative changes in various organs that will limit the patient's potential for rehabilitation. Changes to the central nervous system that occur in the geriatric patient include a decline in cognition, gait instability, and incontinence/urgency with poor skin integrity. These preexisting conditions amplify the challenges that lead to successful community reentry once the patient recovers from an injury.

### **Cognitive Decline**

Cognitive deficits in the aging population typically involve memory, orientation, and/or judgment [10, 11]. Memory deficits can result from primary progressive diseases, such as Alzheimer disease, or cumulative processes, such as small vessel brain disease or multiple traumatic or anoxic events.

Cognitive declines are magnified with each additional injury to the head. A communication challenge to families and caregivers is to convey the idea that while the patient may seem to be independent performing routine daily activities, they may have had a decline in cognition for many years. It is important to note that short-term memory is primarily affected, while long-term memory is maintained, even with dementia.

Unfortunately, with impairment of short-term memory, new tasks taught to enforce safety in mobility may only be learned through repetition and supervision. The rehabilitation team frequently engages in scheduled tasks that are in keeping with the patient's baseline activities and teaches safe strategies to avoid future injuries. It is not uncommon that patients perform better upon discharge home, as familiar environments can provide reminders for activities and precautions.

### **Gait Instability and Balance**

One of the hallmarks of aging is the phenomenon of falling [13–16]. The rising incidence of idiopathic falls in the elderly is still a medical enigma and is likely multifactorial. Not uncommonly, older people fall while performing routine activities, such as getting to the bathroom or transferring while bathing. Prevention of falls includes assessing the home for loose rugs, items close to the ground (e.g., grandchildren toys, pets) that may not be seen easily in dim lighting or with a decline in vision, and smooth flooring that can lead to slippery surfaces when wet, such as tile or wood floors.

Trauma in the aging population typically occurs at lower speeds and heights. Falls from standing due to decreased balance can cause multiple fractures due to loss of bone density. Hip fractures are associated mortality rates of 50 % over 1 year. Degenerative spondylosis increases with age and contributes to a number of conditions associated with increased risk for falling. Cervical myelopathy due to stenosis or vertebral fractures can contribute to falling and result in spinal cord injury. Central cord syndrome is common and can occur with minimal injury. Atrophy of brain mass potentiates tears of bridging veins in the subdural space, which leads to further decline in mentation that can then contribute to falling. Prevention of falls and known contributing factors can help to prevent related injuries.

Prior to discharge, it behooves the clinical team to discuss with patients some of the abovementioned barriers. As quality benchmarks are predicated on decreasing readmissions to the hospital, it becomes essential to limit the ways that

patients might incur further injuries in their home through prevention and preemptive preparation. Currently, the literature is equivocal on Tai Chi and other exercises for fall prevention, although it is largely accepted that the patient who stays the most active and mindful is typically less prone to fall. For patients with frequent falls, balance and proprioceptive therapies might be suggested [17, 18]. There are PTs who specialize in this complex process and can be of tremendous benefit to the patient and their families.

## Continence and Urgency

Another phenomenon that is more prevalent with advancing age is that of urinary urgency. For men, prostatic hypertrophy and/or malignancy can lead to incomplete bladder emptying with the subjective sensation of urgency and frequency. For women, especially those who have had children and/or gynecological surgery, the integrity of the perineum and external sphincters may have been disrupted, leading to stress and urge incontinence [19, 20]. Additionally, many aging patients are on diuretics and other medications that alter ability to hold or excrete urine. Careful consideration to the time of day when those medications are taken will also improve duration of uninterrupted sleep at night. For example, it is not uncommon for furosemide to be prescribed as multiple doses each day. Knowing that its pharmacokinetics occurs within 6 h, the last dose each day should be taken at least 6 h before bedtime to promote good sleep hygiene. It should not be surprising that with declining dexterity in clothing management and nocturnal frequency are factors that make the bathroom one of the more dangerous rooms in the home for the elderly.

When approaching a patient with continence issues, it is important to identify whether the patient has a spastic bladder, detrusor atony, sphincter incompetency/dysnergia, or outlet obstruction. This can be identified during the inpatient setting by performing bladder scans to determine the bladder volume index and/or post-void residuals. If bladder volumes are consistently low with frequency, then the patient may benefit from an anticholinergic medication. If the bladder volumes are high post-void, it may be that the patient needs to decompress the bladder for a time and use medications that either promotes detrusor tone (e.g., bethanechol) or maintains an open sphincter to allow complete emptying (e.g., tamsulosin). A urology consult should be obtained for the patient with an enlarged prostate or intrapelvic organ prolapse. For most patients, performing bladder scans is a non-invasive way to identify and potentially treat continence problems for the aging patient.

Timed voiding is an easy way for many patients and their caregivers to manage continence. One simple way to avoid incontinence is to offer the aging patient regular times for elimination such as upon awakening, after each meal, and at

bedtime. This allows for the opportunity to void and evacuate at least four times a day and is concurrent with activities already requiring supervision, set up, or assistance.

## Skin Integrity

Aging is associated with a loss of subcutaneous adipose tissue. This in combination with certain medications that are commonly prescribed for the geriatric patient with concomitant cardiopulmonary disease such as anticoagulants and inhaled steroids increases the risk for skin breakdown, particularly in the sedentary patient [21]. Additionally, incontinence and widespread use of impermeable briefs trap moisture against the skin over bony prominences such as the sacrum and ischial tuberosities leading to an increased incidence of decubitus ulcers. Timed voiding, as described above, is one way to limit the use of briefs by allowing regular micturition and evacuation. For those patients with limited cognition and mobility, a condom or indwelling catheter may be considered, although these are associated with higher risks of urinary tract infections, which can also exacerbate preexisting cognitive dysfunction. It is important to counsel the patient and caregivers on the importance of checking the skin and minimizing the use of impermeable briefs when possible.

## Social Structure and Support

As mentioned earlier, more and more children are opting to move away from their parents in the course of seeking educational and employment opportunities. Thus, it is not uncommon that the aging patient lives without siblings and/or children in the same community. Even when children do reside in the same neighborhood, they are not available for constant supervision or assistance of their parents. Americans are living longer because of improved medical care, but it does not necessarily mean that their quality of life or independence is preserved. Independent and assisted living communities have become more commonplace to address this sense of isolation. These facilities are not without substantial cost, however. It is not uncommon for independent living apartments to cost thousands of dollars in monthly rent. The cost escalates with additional services. To avoid leaving their home, friends and neighbors or even extended families that have remained in the area assist the elderly with ADL. However, varying levels of commitment from these individuals over the long term should be expected and clarified by a team representative.

A word should be mentioned about bereavement as a chronic condition. It is not uncommon for the aging patient to experience a slow erosion of their social support, including that from their spouse. Depression can adversely affect one's motivation and willingness to participate. There may be a

profound desire to not continue living, and efforts should be made to address the psychological barriers to successful rehabilitation. These conditions are commonly magnified by decreased metabolic and endocrine function. If psychiatry or neuropsychology services are available, consultation can be beneficial both to address the psychological issues and identify potential endocrine and/or neurophysiological contributors to the depression and dysthymia.

## Consulting Rehabilitation

An appropriate rehabilitation consultation request should have the following elements:

1. Primary and secondary diagnoses
2. Weight-bearing restrictions and/or other restriction with their duration (e.g., sternal precautions for 6 weeks (post CABG) or NWB for 8 weeks (lower extremity fractures))
3. Comorbidities and contraindications to relatively physically demanding activities
4. At least one discharge plan and setting with caregivers identified as indicated

Any rehabilitation request should be accompanied with at least one viable discharge plan. Rehabilitation is what patients do when temporarily discharge to a therapy providing facility prior to transitioning to the final destination of home. Even amongst the most experienced physicians, rehabilitation can represent a “black box” where a patient is admitted and after improvement are discharged to home. Additionally, while patients can make significant functional improvements, they may not reach complete independence, especially if they have not been independent for quite some time. Consistent conveyance and communication of realistic goals and expectations is the responsibility of the physiatrist and the multidisciplinary team.

## Rehabilitation Settings and Criteria for Services

There are different levels of care for rehabilitation services, just as there are different levels of care in hospitals. After admission to a rehabilitation facility, patients may require intensive therapies on a daily basis or may only tolerate a few sessions a week. The patient’s insurance carrier will frequently dictate the setting of the post-acute rehabilitation based upon the coverage provided in the insured’s policy (see Fig. 35.2). Additionally, it may be helpful to think of the different levels of rehabilitation as a continuum of care; in reality, it is common for a patient to start at an acute inpatient rehabilitation center, transition to a skilled nursing facility, then be discharged to home with home-based therapy, and transitioned to outpatient therapies. This treatment



Fig. 35.2 Patient being considered for further therapies

course may require several months after the index acute illness (see Table 35.2).

## Acute Inpatient Rehabilitation Facility (IRF)

Those who are able to tolerate intensity therapies and demonstrate a high likelihood of significant functional improvements are referred to an IRF. The requirements for admissions to rehabilitation hospitals are strict, and the costs are high (see below). Cost per day varies geographically. For the uninsured, the average cost is approximately \$3,500 per day but may be negotiable.

## Skilled Nursing Facilities (SNF)

Those who have limited tolerance for therapy, such as those with poor endurance, pain management difficulties, and/or limited ability to learn skills compatible with safe, independent living, are referred to nursing homes. An example of a typical situation where this is appropriate would be for a patient who’s weight-bearing status will not change for at least 6–12 weeks after a fracture. Once there is adequate healing, the patient would then begin either inpatient or outpatient therapy. Some SNFs have *subacute therapies services* available, so that the patient will be able to get *at least 180 min of therapies a week*. Many subacute facilities strive

**Table 35.2** Overview of typical settings for continued rehabilitation efforts

Rehabilitation option	Typical length of stay	Services/requirements	Insurance coverage
Inpatient rehabilitation facility (IRF)	~10–14 days on average; model systems* (see below) can provide longer stays	Require and are able to tolerate high-intensity therapies at the rate of at least 3 h/day or 15 h/week Must require at least two therapy modalities: PT, OT, and/or SLP Must require rehab nursing Must have completed all medical and surgical procedures, are medically stable, and require continued medical supervision Demonstrate high likelihood of significant functional improvements Must have viable discharge plan upon completion of IRF stay	Medicare: covers 14 CMS diagnoses Commercial: varies by plan; requires pre-authorization Medicaid: no
Model systems IRF	Individually assessed during stay	National Institute on Disability and Rehabilitation Research (NIDRR) funded facilities that receive funding for establishing models for treatment of certain diagnoses (i.e., TBI, SCI) Maintain databases on patient treatments and outcomes for the purposes of research and innovative outcomes	Medicare: covers typical diagnoses Commercial: varies Medicaid: no
Skilled nursing (SNF)/ Subacute rehabilitation	~20 days, but can be up to 100 days	Require and are able to tolerate some therapies up to 180 min/week Many SNFs will work more with patients who are preparing for IRF stay PT, OT, +/- SLP usually available at most facilities	Medicare: covers most diagnoses Commercial: varies by plan; requires pre-authorization Medicaid: varies by state
Long-term acute care (LTAC)	Depends on pathology; most take ventilated patients	No therapy requirements, although many offer it in preparation for IRF/SNF Requires continued physician supervision with 24 h nursing	Medicare: covers most diagnoses Commercial: varies by plan; requires pre-authorization Medicaid: typically no
Home health	Depends on progress and prognosis	Patients must be home bound and willing to receive care and/or therapies in their home	Medicare: covers most diagnoses Commercial: varies Medicaid: typically covers
Outpatient therapies	Depends on progress	Goal is to restore function to baseline including requirements for employment	Medicare: covers Commercial: varies Medicaid: no

Coverage for each option vary by state and by specific insurance plan

to offer patients who are making progress more therapies in order to prepare them for acute IRF admissions, but they are not obligated to do so. Others are able to do less intense therapies over longer periods of time for those patients who are otherwise sedentary at home or live with assistance. Again, the cost varies geographically by location. For those individuals without coverage, the average cost is approximately \$500 per day.

### Long-Term Acute Care (LTAC)

Certain patients require specific acute needs, but less intensity of care than provided at an acute care hospital. The typical patient who requires the services of a LTAC facility is

medically “stable” but ventilator dependent or requires long-term antibiotic therapy or protracted nutrition supplementation. There is no requirement to offer rehabilitative therapies, although many LTAC facilities will have limited therapy services to prepare patients for discharge to an IRF. The cost for these services varies by facility.

### Home Health Services

These are skilled services provided in the patient’s home. Requirements for these services are that the patient is home-bound and must be willing to receive the services in their home. Skilled services include PT, OT, SLP (not available in all areas), nursing care, wound care (not available in all



areas), social worker, and/or aide services. Typically, services are provided up to 3 days a week. There is geographical variation in the cost for these services.

## Outpatient Therapies

For patients who are mobile and not restricted to their residency, many services are available as an outpatient. They are typically more intense than home health services and offer a greater variety of therapeutic modalities. Patients will frequently incur a co-payment even with insurance coverage.

## Hospice

Occasionally, a patient will be assessed to be within 6 months of his/her expected life span. In this case, it is appropriate to consult palliative care services to see if the patient qualifies for hospice services either in their own home, a caregiver's home, or at a hospice facility. A patient can enter and exit a hospice arrangement as their disease process declares itself, and it would be important to communicate this to the patient and their family members. Palliative care service specialists are now versed in such diverse topics as chronic pain management and end-of-life care.

## Therapy Prescription and Insurance Coverage

For patients fortunate enough to be discharged home successfully with good support systems while requiring continued therapy, a well-written therapy prescription can be very beneficial to bringing the patient back to their functional status or better. While it is not uncommon for therapists to see prescriptions that say nothing more than "Evaluate and treat," a proper therapy prescription should have the following elements:

1. Specific diagnosis and ICD-9 code to assist with authorization.
2. Frequency and duration of each treatment; most Medicare prescriptions need to be updated monthly.
3. Limitations (e.g., ROM, weight-bearing), precautions, and contraindications to exercise and activity.
4. Specific protocols or treatments desired (if known).
5. Physician signature and date.

The aging patient who has sustained an injury frequently will need to "qualify" for inpatient rehabilitation. There are many rules and regulations that govern IRFs, not to mention misconceptions about their capabilities and logistics on the part of the referring physician as well as the patient and their family. The aging patient will typically have Medicare

coverage and qualify for most options including admission to an inpatient rehabilitation facility. However, a patient who requests an IRF referral must still meet the criteria and be able to tolerate the rigorous treatment plan. CMS has identified policies regarding intensive, inpatient rehabilitation services [22]. The services must be reasonable and necessary for the treatment of the patient's condition. In addition, it must be reasonable and necessary to provide these services on an inpatient basis, rather than in a less intensive setting. There are eight specific criteria that the patient must satisfy:

1. *Medically stable, having completed all interventions and workups, and requiring close medical supervision by a physician with experience in PM&R:* The process of inpatient rehabilitation is rigorous and is very different from the acute hospital stay. Patients are asked to have energy expenditures of 3–7 metabolic equivalents (METs) in their evaluation. For reference, each metabolic equivalent is defined as the amount of oxygen consumed for a particular activity, where 1 MET = 3.5 mL O<sub>2</sub> per kg body weight. Three METs is equivalent to walking at a slow pace, and 7 METs would correlate with hiking. As such, it is highly advisable that older patients have adequate hemoglobin and hematocrit levels to support exercise at this level to avoid any risk for cardiac ischemia. They should be able to consume enough nutrition to account for the activity. Additionally, they should have the fewest number of impediments to therapy, such as intravenous lines, catheters, drains, and or continuous feeding tubes so that they will be able to manage their clothing and equipment with minimal risk of injury.
2. *24 hours a day need for rehabilitation nursing:* These patients are typically medically stable, but require careful monitoring of vital signs, oxygen saturation, intake and output, etc., as they adapt to daily activities from a state of relative recumbence. Rehabilitation nurses are also the first line of defense for safety awareness and the patient's pain management needs.
3. *Be able to tolerate an intense level of rehabilitation service (3 h a day, at least 5 days a week, or 15 h per week):* Many patients who have had a long inpatient stay would appear to be ideal candidates for intense inpatient rehabilitation. In fact, such patients are frequently unable to tolerate the intense level of activity delivered at these centers because of muscle deconditioning, residual injuries that are still incompletely healed, residual cognitive dysfunction from brain injury, exacerbation of preexisting physical or cognitive impairments, and other commonly encountered residua of multiple trauma. This is especially relevant in the geriatric population. It is a common misconception that patients undergoing outpatient procedures are immediately ready for rehabilitation in all cases. Many of the patients who are discharged home the same day of a surgical procedure will be at relative bed

rest for several days, and performing a relatively high level of activity may interrupt their healing process. Furthermore, many elderly patients led very sedentary lifestyles at pre-injury baseline and may not tolerate an intense activity regardless of their medical condition.

4. *A multidisciplinary team approach to delivery of the program*: The patient requires at least two therapeutic modalities, to include PT, OT, and/or SLP. Although there are other members of the rehabilitation team, such as recreational therapists and neuropsychologists who are not infrequently involved, the services they provide do not count toward the “3 h a day” rule.
5. *A coordinated program of care*: A daily schedule that outlines their activities and weekly goals must be documented.
6. *A significant practical improvement must be likely* (e.g., an increase in FIM score): Inpatient rehabilitation is a costly but effective way to restore function, teach adaptive strategies, and patient/caregiver safety. Patients referred to IRFs should have significantly declined from baseline functional status and demonstrate potential for improvement. Psychiatrists have training and experience assessing these prognostic indicators and can be a very helpful resource to determining long-term outcome. If a patient is not expected to make any improvements, they should not be referred for this expensive resource.
7. *The rehabilitation goals must be realistic*: Most intensive rehabilitation occurs in a very short amount of time. Patients should have enough physical and cognitive ability, endurance, social support, and desire to participate actively to make the most out of this experience. The end goals have to be achievable and commensurate with all of the supporting factors.
8. *A reasonable length of stay (LOS)*: Average LOS for most rehabilitation centers is around 2 weeks. For some injuries and diseases, this can be longer. However, it may be helpful to know that Medicare usually has to make exceptions for stays longer than 20 days.

The CMS also specified diagnoses that qualify a patient for admission to an IRF. Currently, there is a mandate that at least 60 % of the patients admitted for care into an IRF will have one of the following diagnoses:

1. Stroke
2. Congenital deformity
3. Spinal cord injury
4. Amputation
5. Brain injury
6. Major multiple trauma (with internal organ damage)
7. Hip fracture
8. Burns
9. Neurological disorders
10. Active polyarticular arthritis with multiple joint involvement which limits functional activities that cannot be addressed adequately on an outpatient basis

11. Systemic vasculidities refractory to aggressive, sustained treatment with declining function
12. Severe advanced osteoarthritis involving two or more joints (excluding replaced joints) that significantly impairs function in mobility and/or self-care, which has failed conservative therapies and the patient is not a candidate for other treatments
13. Knee and/or hip replacement if one or more of the following are met:
  - (a) Bilateral joint replacement
  - (b) Morbid obesity (BMI >50)
  - (c) Age  $\geq$ 85 years old

Since the 60 % rule is for all of the admissions over 1 year, it is not uncommon for an IRF to limit admissions that do not fall into the above categories at times of the year, usually just prior to the end of the fiscal year, in order to maintain compliance with CMS rules. Should CMS decide to increase that percentage to 75 % as has been proposed recently [22], there may be even more restrictions on trauma patient admission into IRFs.

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## Challenges and Future Directions

Many of the challenges in assessing the aging patient for rehabilitative care are related to the ever-changing guidelines, rules, and regulations. The CMS has specific rules regarding the various settings for rehabilitation which may be changed annually as they continue to assess the efficiency and efficacy of services. Additionally, insurance companies frequently change their coverage as laws and negotiations with providers change. In addition to dealing with the challenges in providing the standard of care, the rehabilitation team is limited by reimbursement rules and regulations. The functional restoration resources available to the patients are largely dictated by nonphysician entities with which the patient has to interface unless they have access to large cash reserves. While there are some facilities that have funding provided by the National Institute on Disability and Rehabilitation Research (NIDRR) who provide models for optimal care, only the most financially viable pieces trickle through to the vast majority of general IRFs, SNFs, and other settings. These layers of barriers are seldom encountered by acute clinicians, making the process of selecting the ideal environment for rehabilitation even more frustrating for the admitting physicians. It may help to keep in mind that the rehabilitation process is largely optional, even though the functional benefits are potentially immense.

The members of the rehabilitation team have experience with the most devastating impairments and disabilities and are able to establish realistic functional goals based upon established prognostic indicators. This can be complicated in the elderly patient as they may have baseline deficits due to

the effects of aging on various organs function. For example, posttraumatic amnesia is a common indicator for potential recovery after brain injury. For the patient with preexisting symptoms of memory loss or dementia, this becomes even more difficult to assess. It is safe to assume that the patient will, at best, return to their baseline and should not be expected to exceed it. However, family member expectations are frequently unrealistic, such as their loved one will improve dramatically with prolonged therapy. It is important to communicate realistic and manageable goals with the patient and their caregivers. Rehabilitation team goals are typically conservative, as it is easier to have less assistance than to require more resources.

Using 2012 prices, 1 week of inpatient rehabilitation care is approximately \$25,000 depending upon facility and geographic location; 1 week at a subacute is approximately \$5,000; each hour of home health and/or outpatient skilled care is between \$100 and 150; privately hired aides are between \$15 and 20/h. The insurance coverage varies by state and by carrier, and acceptance is largely dictated by authorization of the payer. These are relative costs and may vary by region and payer source.

Generally, the most common cause of frustration is due to the referring physician and case manager not understanding the meaning of "Medical Necessity." PM&R is a specialty that is based upon evidence and research, with predictable outcomes, despite working within the constraints of rules and regulations that vary from state to state. Part of the training involves understanding the criteria set forth by government agencies for admission into more intensive therapies, in addition to addressing the functional needs of each individual patient. Ideally, the rehabilitation potential of the patient should be assessed by a physiatrist through formal consultation, just as any patient needing treatment should be evaluated by the appropriate specialist. The intensity, duration, and final program specifics are determined after the patient is admitted to the rehabilitation center. It is generally inappropriate for a non-physiatrist to promise functional outcomes or determine the length of stay at a rehabilitation facility as that would set up unrealistic expectations by the patient and potential caregivers who may make firm plans based upon faulty information.

Another area of dissonance between the trauma team and the PM&R consultants is the tendency for the former to treat the latter as administrative adjuncts rather than colleagues. Appropriate reasons to consult psychiatry include assessing rehabilitation potential and/or the setting in which to perform functional restoration. Psychiatrists can assess a patient's expected level of function within a specified length of time and training as a function of the injuries and disease processes at work, limited by the patient's motivation and social support. For example, the American Spinal Injury Association (ASIA) guidelines state that a patient with spinal cord injury

(SCI) at the C5 level will be dependent on care unless motor function recovery to at least the C6 level is seen in the first days and weeks after the initial injury. No amount of rehabilitation will change that prognosis with current technology. Furthermore, although C6 is the highest level at which a person with SCI can expect to be somewhat independent [23], it takes someone of tremendous motivation and intelligence to become independent with that level of impairment. As such, part of the rehabilitation consultation is to assess the potential for successful discharge from a coordinated program given the patient's baseline capabilities. The case manager usually has to clarify the specific benefits and settings that are available to the patient, and is indispensable to discharge planning.

Not infrequently, information gathered during the consultation is either incomplete or changes as the discharge approaches. For example, a patient with bilateral lower limb fractures limited to touchdown weight-bearing on both legs and is also non-weight-bearing on one upper extremity cannot perform enough activities with the remaining limb for meaningful rehabilitation 3 h a day (as required for admission to an IRF), but may be able to do some activity for up to 3 h a week (at a subacute facility). When healing allows for weight-bearing, the patient would then become a better candidate for an IRF.

In conclusion, for the aging patient, discharge often requires information and resources outside those typically encountered by the medical professional. Having a knowledgeable social worker and a working relationship with a physiatrist improves the odds of a successful discharge that anticipates barriers and prevents potential readmissions.

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## Case Scenarios

1. The patient is a 77-year-old male with a history of hypertension and heart disease on aspirin and Plavix who slipped and fell in the kitchen. Initially, he could move his arms and legs, but after crawling to the sofa, he experienced profound weakness of all limbs and loss of sensation. He was found to have a vertebral body fracture at C5 and a small subdural hematoma. A rigid collar was used to keep his cervical spine stable, which he was to wear for at least 6 weeks. His lower limbs regained some activity, much greater than his upper limbs, which were limited to biceps movement only, although not enough for meaningful mobility. His wife is in reasonably good health and very motivated to assist her husband in any way possible.

*What are his coexisting diagnoses?* He has a central cord syndrome presentation with better function in his lower limbs than in the upper limbs. This would suggest a diagnosis of C5 ASIA C SCI with associated neurogenic bladder. His past medical history includes hypertension and heart disease.

*What changes in his medications may be needed?* As indicated, the treating team appropriately held anticoagulation. He may now have a significantly reduced need for antihypertensive medication as most patients sustaining a spinal cord injury become relatively hypotensive. There are arguments to be made for using either heparin for VTE prophylaxis in this patient as it is reversible and/or placing an inferior vena cava filter.

*What rehabilitation options may be appropriate and why?* This patient would receive the greatest intensity of rehabilitation at a model systems SCI unit. Many general rehabilitation facilities may consider a course for caregiver training, to include transfers, bladder/bowel/skin management, and general SCI care education. Another option would be to initially be admitted to a subacute rehabilitation facility until the cervical collar is no longer needed and there is clearance for general rehabilitation on a more productive basis. Home health does not provide the intensity of training or education, but can assist with home safety evaluations and limited caregiver training due to time constraints. It can focus on the essentials to prevent further complications from bladder infections due to the need for catheterization and decubitus formation and aspiration due to limited neck mobility in the rigid collar, as well as provide ongoing assessment for spasticity and other entities that limit future functional training.

2. An 82-year-old female was a loosely restrained passenger in an older model car that drove off the side of the interstate when her husband fell asleep at the wheel. She sustained a right proximal humeral fracture, multiple fractured ribs, right comminuted tibial plateau fracture, left tib-fib fracture, and a splenic laceration. There were no neurovascular injuries. She was assessed and stabilized by the trauma and orthopedic teams. The lower extremity fractures were surgically stabilized and the proximal humeral fracture will be managed conservatively. Her husband sustained minor injuries and was discharged home after observation. He wants to know when she will be discharged and “look after the home” again.

*What are her medical and functional issues?* She is likely to be limited weight-bearing, if any, on the bilateral lower limbs for several weeks, depending upon her bone health. The right upper limb will also be limited to progressive range of motion exercises after the fracture is healed. Voiding and evacuating will be performed either on a bedpan or on a commode via assisted (e.g., Hoyer Lift) transfers. She is at risk for VTE formation due to the lower limb injuries and operations. She is also at risk for limb contractures unless non-weight-bearing range of motion exercises are commenced.

*What rehabilitation settings might be appropriate for her?* Given that she has one unrestricted limb, referral to a skilled nursing facility with subacute rehabilitation services

would be appropriate. She will benefit from some active, non-weight-bearing exercises, has need for nursing and assistance, but clearly does not have enough therapy requirements initially to fill up 3 h on a daily basis. Although home health is technically available, several considerations make it impractical. She had been the primary caretaker of her home, and being unable to perform tasks that were part of her domestic culture could add to either frustration or lead to adverse outcomes were she to attempt them before completing her healing process. Some long-term acute care facility may consider her as a candidate, but therapy services may not be offered which may limit her functional recovery after fracture healing.

3. A 69-year-old female slipped in her bathroom and had exquisite pain in the left hip. She was found to have a left femoral neck fracture which was stabilize with pins and allowed to weight-bear as tolerated. She has military medical benefits with limited income and lives with her daughter who is available at all times.

*What would be the most cost-effective rehabilitation course?* Home health can provide a safety evaluation, education in the home to prevent future injuries, and the skilled therapies this patient needs. She has a caregiver available at all times and will be in an environment that is familiar to her. She may consider transitioning to an outpatient program as her mobility and pain management improves.

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