



REHABILITATION

Know and understand:

- Systematic approaches to assessment of the causes of disability
- Advantages and disadvantages of potential sites of rehabilitative care
- Role of interprofessional teams and care plans
- How to adapt care to comorbidities and disabilities
- Basic requirements for rehabilitation of common conditions

- Conceptual Model for Geriatric Rehabilitation
- Sites of Rehabilitation Care
- Teams and Roles
- Impact of Comorbid Conditions
- Rehabilitation Approaches and Interventions
- Comprehensive Assessment
- Common Conditions Requiring Rehabilitation
- Types of Rehabilitation
- Mobility Aids, Orthotics, Adaptive Methods, and Environmental Modifications

World Health Organization International Classification of Functioning, Disability, and Health (ICF)

- Describes health and health-related status not according to the medical model but according to the ability of an individual to participate in “living”
- Recognizes the functional aspects of a patient’s life as being as important as the diagnosis

Inpatient

- Rehabilitation hospital (freestanding or attached to acute hospital)
- Skilled nursing facility

Outpatient

- Hospital-based clinic
- Independent clinic
- Day-hospital settings
- Home

- **A certain percentage of patients:**
 - Must have at least 1 of 13 conditions (neurologic, musculoskeletal, burns, arthritic, morbid obesity, age > 85 years)
- **All patients must:**
 - Have 24-hour availability of a physician with expertise in rehabilitation
 - Have 24-hour nursing care
 - **Must receive 3 hours of therapy 5 days/week**
 - Be managed by an interprofessional team of skilled nurses and therapists
 - Have a reasonable expectation of improvement

SITES OF CARE: SKILLED-NURSING FACILITY

- 24-hour nursing care
- Dietary, pharmaceutical, dental, social services are available
- Therapy services available, and ideally, interprofessional coordination will occur
 - Patients have less intense therapy needs goal is for daily therapy (5 days/week) 1 hour/day or more, as tolerated by the patient
- Physicians must supervise patient care
 - Can visit the patient infrequently
 - Must be available 24 hours for emergency
- Maintenance of function without progress may be the goal of care

SITES OF CARE: HOME-BASED SERVICES

- Patient requires intermittent or part-time skilled nursing care and therapy services (<7 days per week or <8 hours per day)
- Patient is homebound (requires considerable effort to leave their home)
- Services must be prescribed and recertified by a physician every 60 days (number of 60-day episodes is unlimited)
- Initial certification for home health requires a documented face-to-face visit by the physician, or nonphysician practitioner within 90 days before the start of home-health care or within 30 days after the start of care
- There is no prior hospitalization requirement or limit on the number of visits a person may receive

SITES OF CARE: MEDICARE COVERAGE (1 of 2)

- Balanced Budget Act of 1997 mandated prospective payment systems rather than fee-for-service reimbursement
- **Skilled-nursing facilities:** Per diem prospective payment system covering all costs (routine, ancillary, and capital) related to the services provided to patients under Part A of the Medicare program
- **Home-health care:** Prospective payment system. Payment rates are based on relevant data from patient assessments conducted by clinicians using the Outcome and Assessment Information Set (OASIS)

SITES OF CARE: MEDICARE COVERAGE (2 of 2)

- **Independent and Hospital-Based Clinics:**
 - Provide less intensive rehabilitation services, including physical, occupational, and speech therapies
 - Claims-based system to collect data on the provision of outpatient therapy services to Medicare B beneficiaries
 - Functional information on the beneficiary is collected using the Activity Measure for Post-Acute Care, and reported using non-payable G-codes and complexity/severity modifiers

- Accumulating data show correlation between site of care and outcome (eg, outcome of patients with stroke or hip fracture is best after acute rehabilitation)
- Health care providers should consider:
 - Severity of impairments
 - Need for ongoing medical management
 - Functional status, ability to withstand active therapy
 - Social support, need for full-time caregiver
 - Insurance plan

TEAMS AND ROLES

- **Goal of Interprofessional team**—Ensure patients receive efficient and effective care consisting of comprehensive assessments and interventions for:
 - The disabling illness and comorbid conditions
 - The specific impairments and environmental factors that may affect activities and participation
- **The patient and family are core members of the team;** their expectations and preferences must be considered
- **Also on team:** Nursing, PT, OT, speech and language therapy, social work, psychology, nutrition services, prosthetics/orthotics, physicians, and NPs/PAs

IMPACT OF COMORBID CONDITIONS

- Comorbidities may interrupt or delay treatment and often require adaptations in the care plan
- Many of the illnesses that can interfere with rehabilitation of the older adult are predictable and potentially preventable
- A systematic approach to assessment, prevention, and management of comorbid conditions improves the chance of maximal benefit from rehabilitation

SPECIFIC COMORBID CONDITIONS

(1 of 3)

- **Reduced Mobility:** High risk of skin breakdown, resulting in pressure ulcers
 - Clinicians should monitor pressure and weight-bearing areas and modify footwear, wheelchairs, and bedding as needed
- **Thromboembolic events:** prophylaxis against should be part of routine care
- **Incontinence:** Structured approach to assessment and treatment of bladder problems should be incorporated into rehabilitation services
 - Indwelling catheters increase risk of infection and are rarely appropriate for the nonacute setting

SPECIFIC COMORBID CONDITIONS

(2 of 3)

- **Pneumonia:** Risk is increased by inactivity, disordered swallowing, and underlying lung disease
 - Clinicians should be aware of the risks of aspiration and modify diets as needed
- **Anemia:** Associated with adverse outcomes including functional impairment, decreased muscle strength, and poor quality of life
- **Cognitive function:** Mental functioning is critical for rehabilitation, which requires the ability to follow commands and learn
 - Clinicians should be alert for delirium and screen for mental status and easily reversible causes

SPECIFIC COMORBID CONDITIONS

(3 of 3)

- **Depression:** Endemic in newly disabled individuals. Can manifest as low motivation
 - Clinicians should screen for depression and intervene early with treatment
- **Seizures:** Can develop after stroke, spasticity can develop during stroke recovery
 - Interventions include physical therapy, muscle relaxants, or botulinum toxin can offer modest benefits. However, these benefits have not translated into improved function

- Diabetic patients are likely to experience changes in glucose levels and medication requirements
 - Activity level is a powerful factor in glucose metabolism
 - Increased caloric intake during recovery may also affect medication needs
- Therapy personnel should know how to assess diabetic control, use a glucometer, and intervene for hypoglycemia

CARDIOVASCULAR DISEASE AND REHABILITATION

- Patients with poor cardiac output may have extreme exercise limitations
- Abnormal gait in a patient with coronary artery disease may worsen coronary symptoms
- Patients with one vascular disease often have others; peripheral vascular disease is often associated with insensitve or painful feet and high risk of skin breakdown

- Restore function
- Help patient compensate for and adapt to functional losses
- Prevent secondary complications
- Maximize potential for participation in social, leisure, or work roles

- Therapeutic exercises to improve:
 - Flexibility
 - Muscle Strength
 - Motor control
 - Cardiovascular endurance
 - Balance
 - ADL and IADL retraining
- Speech and language therapy (for communication, swallowing, or cognitive problems)
- Environmental modifications
- Cognitive rehabilitation to improve alertness and attention

INTERVENTIONS (2 of 2)

- Fitting of mobility aids, orthotic and prosthetic devices, and splints
- Practice of task-specific activities such as bed mobility, transfers, and walking
- Retraining in activities such as grasp, reach, and fine manipulation
- Retraining in instrumental ADLs such as cooking, managing finances, or driving
- Massage, heat, cold, and ultrasound to decrease pain and muscle spasm

- Patient demographics
- Social support
- Home situation (eg, number of steps to entry, location of bathroom)
- Medical comorbidities
- Severity of current illness
- Prior functional status
- Medication reconciliation

- Deficits in range of motion and flexibility
- Strength
- Sensory functions
- Balance
- Cognition
- Depression
- Swallowing and language
- Quality of life

- People ≥ 55 years of age are at highest risk of morbidity and mortality from stroke
- Acute stroke occurs in $>700,000$ people per year in the US
- $\geq 80\%$ are likely to survive, many with residual neurologic difficulties
- Stroke-related deficits are severe in about one-third of survivors

- Recovery for older adults with stroke is complex because of the variability of causes, symptoms, severity, and recovery.
- Regaining Function
- Compensating for or Adapting to Functional Losses
- Preventing Secondary Complications
- Assisting the Patient in Reintegrating into the Community

STROKE: WHAT TO EXPECT FROM REHABILITATION

- Patients usually recover to some degree
- Recovery is most dramatic in first 30 days, may continue more gradually for months
- Number of deficits affects degree of initial recovery, time to maximal recovery
- Many patients with mild or moderate stroke become independent in ADLs, but other aspects of health status may be affected

STROKE: GUIDELINES FOR REHABILITATION

- Stroke severity should be assessed using the NIH Stroke Scale
- Federal guidelines for stroke rehabilitation: http://www.healthquality.va.gov/Management_of_Stroke_Rehabilitation.asp
- Outcomes are best with coordinated, interprofessional, stroke-specific care
- Therapy should start early, but later supplementary interventions may help

STROKE: APPROACHES TO REHABILITATION

- Neurophysiologic approaches
- Constraint-induced movement therapy (encourages patient to use the affected extremity)
- Treadmill walking with partial body weight support
- Speech and language therapy, cognitive retraining for attention or visual-spatial deficits, compensatory training for short-term memory deficits
- Medication for depression and emotional lability

STROKE: PREVENTING RECURRENCE

- Assess patient for significant carotid stenosis and atrial fibrillation
- Review indications for carotid endarterectomy and anticoagulation with warfarin, dabigatran, or rivaroxaban
- Consider antiplatelet medication, ACE inhibitor, or statin
- Target hypertension and smoking

- Affects ~300,000 people per year in US
- 90% are as a result of a fall
- Mortality: ~5% during initial hospital stay, ~25% in the year following fracture
- 75% of patients recover to prior level of function, but up to 50% of those require an assistive device
- About 50% of patients require transient long-term care, and about 25% of those remain in long-term care 1 year later

HIP FRACTURE: MEDICAL MANAGEMENT

- Includes interventions to relieve pain and restore bone alignment to allow fracture healing and prepare the older adult to return to their prior level of functioning
- Evidence that comanagement by geriatricians and orthopedic surgeons can result in improved outcomes
 - Reduced length of stay
 - Low complication rates
 - Low mortality
 - Reduced cost
- Comanagement services need to be interprofessional with shared decision making, equal responsibility for the patient, and daily communication

HIP FRACTURE: SURGICAL REPAIR

- Early repair (24–72 hours after fracture) reduces 1-year mortality and complications such as pressure ulcers and delirium
- Delay warranted for medically unstable patients
- Surgical approach is determined by:
 - Location of fracture
 - Presence or absence of displacement
 - Pre-fracture mobility

- **No displacement and intact blood supply:** Corrected with screws
- **Any degree of displacement and/or poor circulation:** Usually treated with prosthetic femoral head (hemiarthroplasty)
- **Displacement and significant underlying bony acetabular disease:** Complete hip arthroplasty may be warranted
- Immediate weight bearing usually OK, regardless of surgical technique

HIP FRACTURE: INTERTROCHANTERIC

- The treatment of choice is open reduction and internal fixation with compression screw or similar device
- If joint is unstable, full weight bearing is often not allowed for up to 6 weeks
- Mobility performance can be assessed with the Harris Hip Questionnaire and numerous other instruments

HIP FRACTURE: REHABILITATION

- **Goals:** Pain management, mobilization, and prevention of complications such as delirium and thromboembolic events
- **Key factors influencing recovery** are early mobilization and how frequently therapy is provided
- **Acute rehabilitation** after hospital discharge appears to result in superior outcomes

HIP FRACTURE: PREVENTION OF RECURRENCE

- Diagnose and treat osteoporosis and balance problems
- Hip protectors do not appear to decrease the incidence of hip fractures in community-living older adults

TOTAL HIP AND KNEE ARTHROPLASTY

- In US, joint arthroplasty is most common elective surgical procedure (~400,000 done annually)
- Primary indications are progressive pain and limitation of mobility despite conservative care
- Plain radiographs are the usual method for determining the severity of joint damage at both the hip and knee
- Long-term results with significant pain relief and improved function; success rates of 90% at 10–15 years after joint replacement
- Implant loosening is most common reason for failure

TOTAL HIP ARTHROPLASTY: TYPES OF SURGERY

- The prosthetic and approach used for total hip arthroplasty are determined by the surgeon and based on the condition of the joint and integrity of the bone
- **Anterolateral approach:**
 - Precautions: Avoid external rotation, adduction, and extension of the operated leg for ~ 6 weeks
- **Posterolateral approach:**
 - Precautions: Do not internally rotate or adduct the leg and not flex the hip beyond 90 degrees for ~ 6 weeks
- Many surgeons use a minimally invasive technique resulting in quicker recovery

- Various types of prosthetic knees are also the type used depends on the joint damage
- Typically, patients can begin bearing weight on the operated leg by the first day or two after surgery
- Precautions: Rotation or torsion at the knee should be avoided for up to 3 months
- Surgeons are using minimal incisions to achieve greater knee flexion, decrease blood loss and length of stay

- Anticoagulation with low-molecular-weight heparin, or adjusted-dose warfarin
- Pain control, often with opioids
- Early mobilization is the standard of care
- For patients at high risk (>70 years or having ≥ 2 comorbidities), inpatient rehabilitation improves function, decreases length of stay

- To decrease the risk of dislocation, patients should avoid motions such as bending over to tie shoes and crossing their legs
- A raised toilet seat and a tub bench are recommended for the first few postoperative months
- Rehabilitation focuses on muscle strengthening, especially the abductors

- **Recovery of range of motion** is key to return of function
- **Continuous passive motion machine (CPM)** may be used for manipulation; combined with physical therapy, it increases range of motion, decreases length of stay
- **To reduce swelling:** compression stockings, CPM, cryotherapy

LOWER-EXTREMITY AMPUTATION: EPIDEMIOLOGY

- Necessary for >75,000 people each year in US, most with systemic vascular disease
- Those with diabetes often have other end-organ disease (eg, blindness, end-stage renal disease, peripheral neuropathy)
- Mortality: ~50% at 2 years, ~70% at 5 years
- For up to 20% of patients, amputation of contralateral leg is needed within 2 years

LOWER-EXTREMITY AMPUTATION: ASSESSMENT

- **Prosthetic profile of the amputee** facilitates systematic assessment
- **Key factors to assess:**
 - Prior functional status
 - Stability of comorbid conditions
 - Cognition
 - Upper-extremity use
 - Condition of stump and other lower extremity

LOWER-EXTREMITY AMPUTATION: REHABILITATION

- **Preoperative:** strength and flexibility exercises, education about recovery process
- **Postoperative:**
 - Early mobilization if possible
 - Prevention of contractures
 - Wound healing
 - Edema control
 - Shaping of the stump
 - Psychosocial support
- **Phantom limb pain** occurs in 60%–80% of patients; treatment remains difficult

- An individualized, medically supervised exercise program combined with an interdisciplinary focus on psychosocial, nutritional, and heart disease risk factor reductions
- Shown to improve exercise capacity, physical function, and quality of life, and to reduce mortality
- Barriers to utilization: Low rates of referrals from health care providers, lack of personal resources, making attendance difficult

- Defined as “a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies which include, but are not limited to, exercise training, education, and behavior change, designed to improve the physical and emotional condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors.”

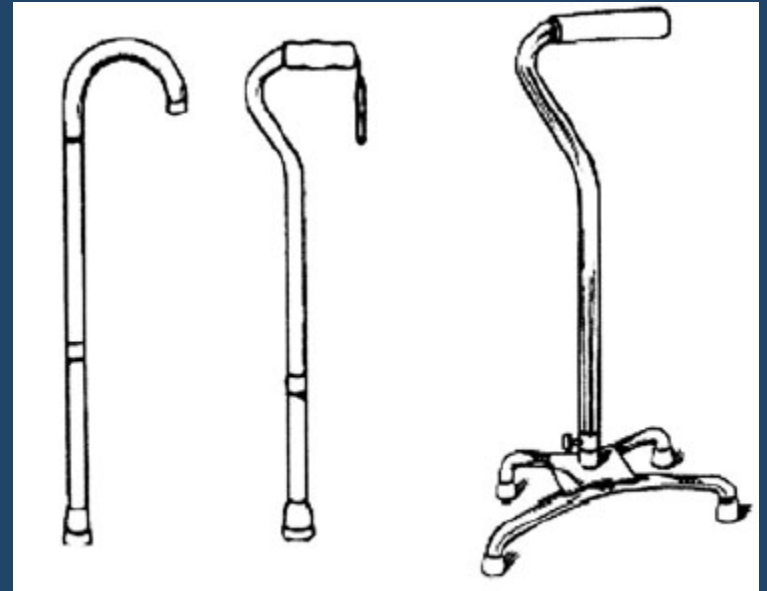
- Traditionally provided to stable patients with moderate to severe chronic obstructive pulmonary disease (COPD)
- Recent studies have shown that rehabilitation in the peri-exacerbation period can reduce hospital admissions
- Effective with equivalent benefits in patients with non-COPD respiratory disease
- Refer any patient with functional status limitations or persistent respiratory symptoms despite otherwise optimal therapy

- Estimated 6.8 million Americans use assistive technology devices to enhance mobility
- Important to obtain a physical or occupational therapy evaluation early in the hospitalization to assess for equipment needs, including mobility aids and adaptive equipment
 - Early assessment is critical to providing older adults with the correct equipment to maximize their independent function
- Important to identify the underlying causes of disability before prescribing a device or modification
 - Medical or surgical treatment for individual diseases and impairments may be more effective or may enhance the usefulness of these approaches

- Supports 15%–20% of body weight, used in hand contralateral to affected limb
- Degree of support increases with increased number of tips, but cane becomes heavier, more awkward to use
- Proper length is important for stability
- To determine length, measure the distance:
 - From the distal wrist crease to the ground as the patient stands erect
 - From the greater trochanter to the ground

CANE: STRAIGHT OR QUAD

- Provide unilateral support
- Assist with balance
- Reduce weight bearing on opposite leg
- Small- and large-based quad canes are available



- Axillary or Forearm
- Used to provide bilateral support
- Axillary crutches are seldom recommended for older adults because greater arm strength and coordination are required for use; risk brachial plexus injury if used incorrectly
- Forearm crutches are more functional because a cuff secures the crutch on the arm, allowing use of the hand

- Can completely support one lower extremity but not full body weight
- Should be adjusted so that the user maintains an erect posture and does not lean forward to reach walker
- **Pick-up walker:** Requires strength and cognitive ability to learn necessary coordination
- **Wheeled walker:**
 - Allows smoother, more coordinated, faster gait
 - More likely to be used correctly by people with cognitive impairment

WALKER: STATIONARY “PICK-UP”

- Provides bilateral support
- Must be lifted and advanced, requiring strength and coordination
- Very stable and allows non-weight-bearing movement



WALKER: ROLLING OR ROLLATOR

- Less stable than stationary walker, but easier to advance
- Allows for smoother, faster gait
- Rollator requires more coordination (because of brakes) and safety awareness
- Rollator good for outside walking because of large wheels



MOBILITY AIDS: WHEELCHAIRS

- Required for patients who cannot safely use, or are unable to ambulate with other mobility aids
- Must be fitted according to the patient's body build, weight, disability, and prognosis
 - Incorrect fit can result in poor posture, joint deformity, reduced mobility, pressure ulcers, circulatory compromise, and discomfort
- The Rehabilitation Engineering and Assistive Technology Society of North America Wheelchair Service Guide provide detailed information for determining the most appropriate wheelchair for the patient www.resna.org/dotAsset/22485.pdf

MOBILITY AIDS: SCOOTERS

- Required for patients who cannot safely use, or are unable to ambulate with, other mobility aids
- Motorized wheelchairs may be used by mentally alert people with bilateral arm weakness, other neurologic disorders that limit arm use, or severe cardiopulmonary disease who lack the endurance to push a wheelchair
- Motorized scooters offer less trunk support than motorized wheelchairs but are more acceptable to some people
- Use increases mobility, but there is a risk of deconditioning because patients might otherwise push a wheelchair or ambulate

- Exoskeletons designed to assist, resist, align, and stimulate function
- Named by the use of letters for each joint involved
 - For example, an AFO is an ankle and foot orthotic device used to support weak pretibial muscles
 - May also benefit patients with spasticity

ADAPTATIONS TO FACILITATE DRESSING

- May be necessary for older adults with problems such as range of motion loss, decreased strength, incoordination, and limited endurance
- Adaptations Include:
 - Shirts that fit over the head or fasten in the front and allow freedom of movement
 - Hooks and loops, Velcro fasteners, or button hooks with customized grips
 - Long, loose socks
 - Long-handled shoehorn
 - Elastic shoelaces that need not be untied

- Can have a major impact on the older adult's ability to function independently or with minimal assistance at home
- Environmental Modifications Include:
 - Assistive devices such as reachers, door knob extenders, special utensils, and adapted telephones
 - Grab bars installed near toilet and in tub/shower
 - Raised toilet seats and bathtub benches
 - Long-handled bath brushes, hand-held shower faucet, and "soap on a rope"

- The WHO model for rehabilitation considers the interactions of body functions and structures, health conditions, activities and participation, and environmental and personal factors
- For an inpatient rehabilitation hospital to be Medicare-certified, a certain percentage of patients must have at least 1 of 13 conditions and receive 3 hours of therapy 5 days/week
- The patient and family are core members of the rehabilitation team

- Many of the comorbidities that would otherwise interrupt or delay rehabilitation can be prevented or managed
- Optimal rehabilitation outcomes depend on comprehensive assessment of the patient, coordinated interprofessional management, multifaceted interventions, and access to appropriate and high-quality care
- Mobility aids, adaptive devices, orthotics, and environmental modifications can be used to increase function and quality of life

- A 76-year-old woman had a stroke 7 days ago that caused left hemiparesis. She now undergoes evaluation for suitability of transfer from the hospital to an inpatient rehabilitation unit.
 - Her medical status is stable.
 - She is alert and shows no signs of delirium.
- Before the stroke
 - Normal results on Mini-Cog test (taken 3 months earlier)
 - Lived independently in a single-story home
- Since the stroke
 - Moderate swallowing problems
 - Strength in left arm and left leg is 3/5 and 4/5, respectively.
 - She is unable to make bed transfers without 2 persons to assist her.

Which one of the following would most support the decision to approve the transfer?

- A. Ability to participate in 3 hours of combined therapy daily
- B. Normal cognition on the Mini-Cog test
- C. Swallowing problems requiring speech and language therapy
- D. Inability to make transfers without assistance
- E. Alert sensorium

Which one of the following would most support the decision to approve the transfer?

- A. Ability to participate in 3 hours of combined therapy daily
- B. Normal cognition on the Mini-Cog test
- C. Swallowing problems requiring speech and language therapy
- D. Inability to make transfers without assistance
- E. Alert sensorium

GNRS5 Teaching Slides Editor:
Barbara Resnick, PhD, CRNP, FAAN, FAANP, AGSF

GNRS5 Teaching Slides modified from GRS9 Teaching Slides

based on chapter by Kathleen T. Foley, PhD, OTR/L and Cynthia J.
Brown, MD, MSPH, AGSF

and questions by Kenneth Brummel-Smith, MD, AGSF

Managing Editor: Andrea N. Sherman, MS

Copyright © 2016 American Geriatrics Society