Introduction

This update of the Clinical Practice Guideline for the Management of Stroke Rehabilitation was developed under the auspices of the Veterans Health Administration (VHA) and the Department of Defense (DoD) pursuant to directives from the Department of Veterans Affairs (VA). VHA and DoD define clinical practice guidelines as:

> "Recommendations for the performance or exclusion of specific procedures or services derived through a rigorous methodological approach that includes:
>
> Determination of appropriate criteria, such as effectiveness, efficacy, population benefit, or patient satisfaction and a literature review to determine the strength of the evidence in relation to these criteria."

This VA/DoD Stroke Rehabilitation guideline update builds on the 1996 VA Stroke/Lower Extremity Amputee Algorithms Guide and the 2003 VA/DoD Guideline for the Management of Stroke Rehabilitation in the Primary Care Setting. The 2003 version of this guideline focused on stroke rehabilitation, utilizing a team model of intervention and interactions with patients and families (caregivers & support systems).

Algorithms:

This guideline has been developed using an algorithmic approach to guide the clinician in determining care and the sequencing of interventions on a patient specific basis. The clinical algorithm incorporates the information presented in the guideline in a format which maximally facilitates clinical decision-making. The use of the algorithmic format was chosen because such a format improves data collection, facilitates diagnostic and therapeutic decision-making, and changes in patterns of resource use. However, this should not prevent providers from using their own clinical expertise in the care of an individual patient. Guideline recommendations are intended to support clinical decision-making and should never replace sound clinical judgment.

The VA developed an algorithm for the Stroke/Lower Extremity Amputee Algorithms Guide (1996) and the results of implementation of this guideline demonstrated the utility of the algorithm, as well as the feasibility of implementing a standard algorithm of rehabilitation care in a large healthcare system (Bates & Stineman, 2000).

The algorithm of the 2003 version of the guideline was modified to emphasize early decision making regarding discharge to home/community. The key decisions in early stages of the assessment and management of a patient recovering from stroke include assessment of rehabilitation needs and the appropriateness of providing these interventions in both community and outpatient rehabilitation settings.

The interventions module on this 2010 update has been reorganized, and the recommendations are formulated to address possible impairment regardless of care setting.

Target Population:

This guideline applies to adult patients (18 years or older) with post-stroke functional disability who may require rehabilitation in the VHA or DoD health care system.

Audiences:

The guideline is relevant to all healthcare professionals providing or directing treatment services to patients recovering from a stroke, in any healthcare setting (primary care, specialty care, and long-term care) and in community programs.

Guideline Goals:

The most important goal of the VA/DoD Clinical Practice Guideline for the Management of Stroke Rehabilitation is to provide a scientific evidence-base for practice evaluations and interventions. The guideline was developed to assist facilities to implement processes of care that are evidence-based and designed to achieve maximum functionality and independence as well as improve patient and family quality of life. To facilities lacking an organized rehabilitation bedservice unit (RBU), it will provide a structured approach to stroke care and assure that Veterans who experience a stroke will have access to comparable care, regardless of geographic location. The algorithm will serve as a guide to help clinicians determine best interventions and timing of care for their patients, better stratify stroke patients, reduce re-admissions, and optimize healthcare utilization. If followed, the guideline is expected to have a positive impact on multiple measurable patient outcome domains.

Development Process:

The development process of this guideline follows a systematic approach described in "Guideline-for-Guidelines," an internal working document of the VA/DoD Evidence-Based Practice Working Group that requires an ongoing review of the work in progress. Appendix A to the full guideline clearly describes the guideline development process followed for this guideline.

Literature searches were conducted covering the period from January 2002 through March 2009 that combined terms for Cerebrovascular Disorders and rehabilitation or rehab [title]. Adding a stroke text word did not appear to be useful in that sensitivity was not enhanced but specificity was decreased. Electronic searches were supplemented by reference lists and additional citations suggested by experts. The identified and selected studies on those issues were critically analyzed, and evidence was graded using a standardized format. The evidence rating system for this document is based on the system used by the U.S. Preventive Services Task Force (USPSTF).

If evidence exists, the discussion following the recommendations for each annotation includes an evidence table identifying the studies that have been considered, the quality of the evidence, and the rating of the strength of the recommendation [SR]. The Strength of Recommendation, based on the level of the evidence and graded using the USPSTF rating system (see Table: Evidence Rating System), is presented in brackets following each guideline recommendation.

Where existing literature was ambiguous or conflicting, or where scientific data was lacking on an issue, recommendations are based on the clinical experience of the Working Group. Although several of the recommendations in this guideline are based on weak evidence, some of these recommendations are strongly recommended based on the experience and consensus of the clinical experts and researchers of the Working Group. Recommendations that are based on consensus of the Working Group include a discussion of the expert opinion on the given topic. No [SR] is presented for these recommendations. A complete bibliography of the references in this guideline can be found in Appendix E to the full guideline.

Evidence Rating System

Strength of Recommendation (SR)	
A	A strong recommendation that clinicians provide the intervention to eligible patients. Good evidence was found that the intervention improves important health outcomes and concludes that benefits substantially outweigh harm.
B	A recommendation that clinicians provide (the service) to eligible patients. At least fair evidence was found that the intervention improves health outcomes and concludes that benefits outweigh harm.
C	No recommendation for or against the routine provision of the intervention is made. At least fair evidence was found that the intervention can improve health outcomes, but concludes that the balance of benefits and harms is too close to justify a general recommendation.
D	Recommendation is made against routinely providing the intervention to asymptomatic patients. At least fair evidence was found that the intervention is ineffective or that harms outweigh benefits.
I	The conclusion is that the evidence is insufficient to recommend for or against routinely providing the intervention. Evidence that the intervention is effective is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.

Stroke Rehabilitation Guideline Working Group Update 2010

Department of Veterans Affairs	Department of Defense
Barbara Bates, MD, MBA - Co-Chair	**Amy Bowles, MD - Co-Chair**
Jonathan Glasberg, MA, PT	Shannon Crumpton, M.Ed., HFI, CSCS
Karen Hughes, BS, PT	Karen Lambert, CPT
Richard Katz, Ph.D	**Quality Management Division US Army Medical Command**
Beverly Priefer, RN	
Lori Richards, PhD, OTR/L	Ernest Degenhardt, MSN, RN, ANP-FNP
Robert Ruff, MD, PhD	Angela V. Klar, MSN, RN, ANP-CS
Paula Sullivan, MS, CCC-SLP, BRS-S	**American Heart Association**
Andrea L. Zartman, Ph.D.	**David N. Alexander M.D.**
Office of Quality and Performance, VHA	**Pamela W. Duncan, Ph.D., P.T., FAPTA**
Carla Cassidy, RN, MSN, NP	Barbara Lutz, PhD, RN, CRRN, FAHA
FACILITATOR **Oded Susskind, MPH**	
Research Team – Evidence Appraisal RTI International North Carolina	**Quality Healthcare Informatics**
Linda Lux, MPA Meera Viswanathan, PhD Kathleen Lohr, PhD	Martha D'Erasmo, MPH Rosalie Fishman, RN, MSN, CPHQ

* ***Bolded*** *names are members of the Editorial Panel. Additional contributor contact information is available in Appendix D to the full guideline*

Key Points

- The primary goal of rehabilitation is to prevent complications, minimize impairments, and maximize function.
- Secondary prevention is fundamental to preventing stroke recurrence (see: AHA/ASA Guideline for Prevention of Stroke in Patients with Ischemic Stroke or Transient Ischemic Attack).
- Early assessment and intervention is critical to optimize rehabilitation.
- Standardized evaluations and valid assessment tools are essential to the development of a comprehensive treatment plan.
- Evidence-based interventions should be based on functional goals.
- Every candidate for rehabilitation should have access to an experienced and coordinated rehabilitation team in order to ensure optimal outcome.
- The patient and family and/or caregiver are essential members of the rehabilitation team.
- Patient and family education improves informed decision-making, social adjustment, and maintenance of rehabilitation gains.
- The rehabilitation team should utilize community resources for community reintegration.
- Ongoing medical management of risk factors and co-morbidities is essential to ensure survival.

Outcome Measures

1. Effective rehabilitation improves functional outcome. An indicator for improvement is the positive change in the Functional Independence Measures (FIM™) score over a period of time in the post-acute care period. Within the Veterans Health Administration (VHA) this measure is captured in the Functional Status and Outcomes Database for rehabilitation. All stroke patients should be entered into the database, as directed by VHA Directive 2000-016 (dated June 5, 2000; Medical Rehabilitation Outcomes for Stroke, Traumatic Brain, and Lower Extremity Amputee Patients).
2. Additional indicators that should be measured at three months following the acute stroke episode may include the following:
    - Functional status (including activities of daily living [ADL] and instrumental activities of daily living [IADL])
    - Rehospitalizations
    - Community dwelling status
    - Mortality

The primary outcome measure for assessment of functional status is the FIM™. The FIM™ has been tested extensively in rehabilitation for reliability, validity, and sensitivity, and is by far the most commonly used outcome measure. A return to independent living requires not only the ability to perform basic ADLs, but also the ability to carry out more complex activities (i.e., IADLs), such as shopping, meal preparation, use of the phone, driving a car, and money management. These functions should be evaluated as the patient returns to the community. New stroke specific outcome measures, such as the Stroke Impact Scale, may be considered for a more comprehensive assessment of functional status and quality of life.

Stroke Rehabilitation Assessment

1 Patient with stroke during acute phase [A]

2 Obtain medical history & physical examination
Initial brief assessment of complications, impairment and rehabilitation needs [B]
Assessment of Stroke Severity (NIHSS) [C]

3 Initiate secondary prevention and early intervention of rehabilitation therapy [D]

4 Assessment and prevention of complications [E]

5 Post acute stroke patient referred to rehabilitation services

6 Obtain medical history & physical examination [F]
Determine nature and extent of impairments and disabilities based on stroke severity, functional status, and social support [G]

7 Does the patient have severe stroke and/or maximum dependence and poor prognosis for functional recovery? [H]

Y → 8 Educate patient/family about future plan
Discharge patient from rehab
Arrange for medical follow-up

N → 9 Does patient need rehabilitation interventions? [I]

Y → 10 Are early supportive discharge rehabilitation services appropriate? [J]

Y → Go to Algorithm 3 Community Based Rehabilitation

N → Go to Algorithm 2 Inpatient Rehabilitation

N → 11 Discharge patient from rehabilitation services [K]

12 Arrange for medical follow-up for primary care [L]

Initial Brief Assessment

Assessment of complications and prior and current impairment:
- Risk factors of stroke
- Medical co-morbidities
- Consciousness and cognitive status
- Brief swallowing assessment
- Skin assessment and pressure ulcers
- Mobility and need for assistance of movement
- Risk of DVT
- Emotional support for family and caregiver

Assessment & Prevention of Complications

- Swallowing problems – aspiration
- Malnutrition and dehydration
- Skin breakdown
- Risk for deep vein thrombosis
- Bowel and bladder dysfunction
- Pain
- Fall prevention
- Osteoporosis
- Seizures

[E]

Assessment of Impairments & Disabilites

1. Assessment of impairments:
   - Communication impairment
   - Motor impairment and mobility
   - Cognitive function
   - Sensory: touch, vision, and hearing
   - Emotional and behavioral
2. Assessment of activity and function
   - ADL, IADL
3. Assessment of support system:
   - Family, caregivers, community

[G]

Inpatient Stroke Rehabilitation

13 Post-stroke patient in inpatient rehabilitation [M]

14 Determine level of care based on:
1. Medical status
2. Function (motor and cognitive)
3. Social support
4. Access to care

15 Educate patient and family
Reach shared decision regarding rehabilitation program
Determine & document treatment plan
[N]

16 Initiate/continue rehabilitation programs and interventions
[O]

17 Reassess progress, future needs and risks
Refer/consult rehabilitation team
[P]

18 Is patient progressing toward treatment goals? [P]
Y → 19
N → 20

19 Is patient ready for community living? [Q]
Y → Go to Algorithm 3 Community Based Rehabilitation Box 25
N → 23

20 Address adherence to treatments and barriers to improvement:
-If medically unstable, refer to acute services
-If there are mental health factors, refer to mental health services
[R]

21 Severe stroke and/or maximum dependence, or poor prognosis for functional recovery? [H]
Y → 22
N → 23

22 Educate patient/family about future plan
Discharge patient to home/nursing home
[H]

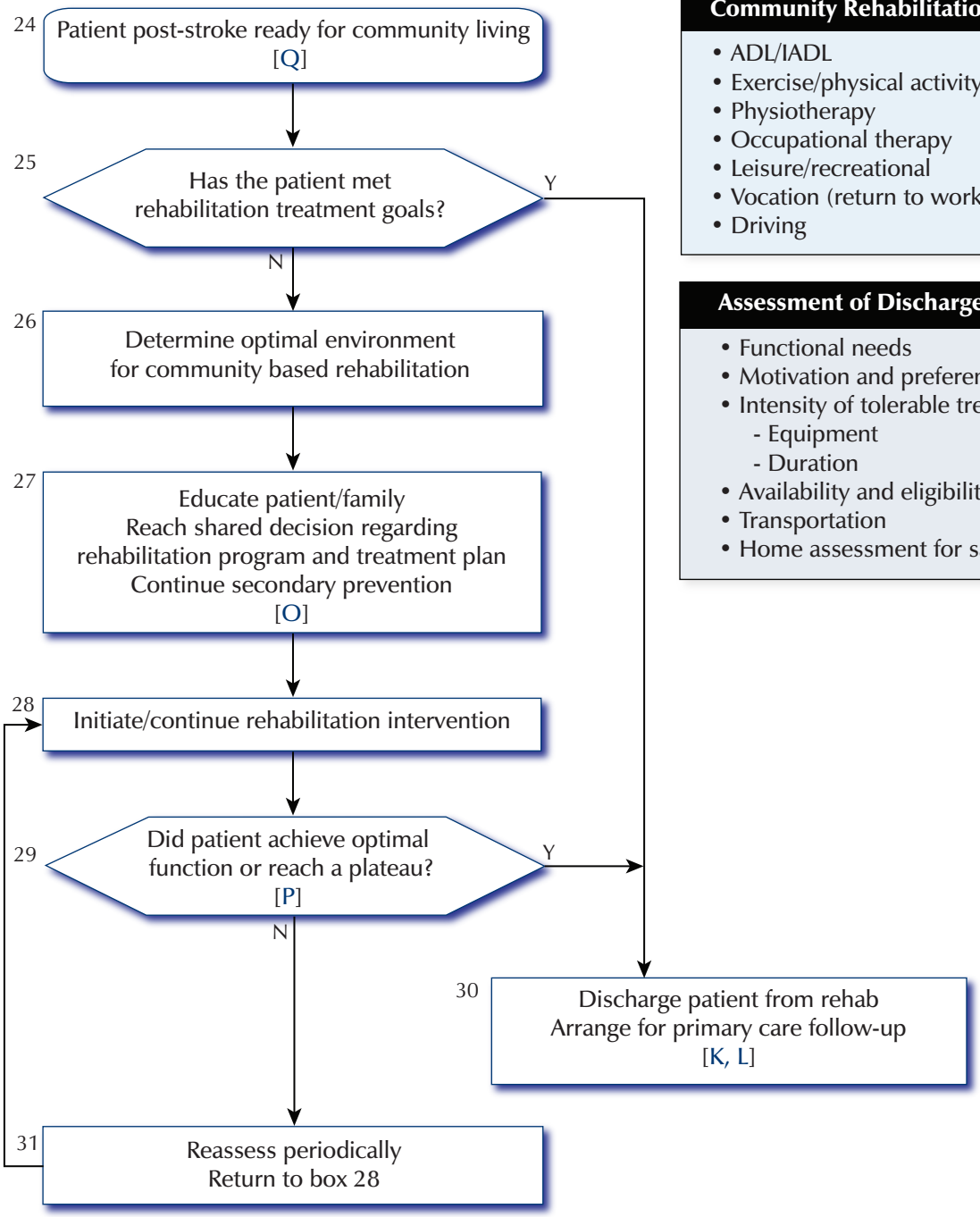
23 Continue inpatient rehabilitation services
Go back to box 18

Reassessment of Rehabilitation Progress

1. General (medical status)
2. Functional status (e.g. FIM)
   - Mobility
   - ADL/IADL
   - Communication
   - Nutrition
   - Cognition
   - Mood/Affect/Motivation
   - Sexual function
3. Family Support
   - Resources
   - Caregiver
   - Transportation
4. Patient and family adjustment
5. Reassessment of goals
6. Risk for recurrent stroke

[O]

Community Based Stroke Rehabilitation



Community Rehabilitation Services

- ADL/IADL
- Exercise/physical activity
- Physiotherapy
- Occupational therapy
- Leisure/recreational
- Vocation (return to work)
- Driving

Assessment of Discharge Environment

- Functional needs
- Motivation and preferences
- Intensity of tolerable treatment
  - Equipment
  - Duration
- Availability and eligibility
- Transportation
- Home assessment for safety

Annotations

Annotations

The highest priorities of early stroke rehabilitation are to prevent recurrence of stroke, manage comorbidities and prevent complications. Ensuring proper management of general health functions, mobilization and encouraging resumption of self-care activities as well as provision of emotional support to the patient and family are important. Following the "acute" phase of stroke care, the focus of care turns to recovery of physical and cognitive deficits, as well as compensation for residual impairment.

Annotation A. Patient with Stroke During the Acute Phase

1 Rehabilitation During The Acute Phase

AHCPR (1995) defines "acute care" as the period of time immediately following the onset of an acute stroke. Patients with an acute stroke are typically treated in a medical service or in a specialized stroke unit, and rehabilitation interventions are normally begun during the acute phase.

Because of the nature of the neurological problems and the propensity for complications, most patients with acute ischemic stroke are admitted to a hospital. A recent meta-analysis demonstrates that outcomes can be improved if a patient is admitted to a facility that specializes in the care of stroke. The goals of early supportive care after admission to the hospital are to:

a. Observe changes in the patient's condition that might prompt different medical or surgical interventions
b. Facilitate medical and surgical measures aimed at improving outcome after stroke
c. Institute measures to prevent complications
d. Begin planning for therapies to prevent recurrent stroke
e. Begin efforts to restore function through rehabilitation or other techniques

After stabilizing the patient's condition, the following can be initiated when appropriate; rehabilitation, measures to prevent long-term complications, chronic therapies to lessen the likelihood of recurrent stroke, and family support (AHA, 1994).

1.1 Organization of Post-Stroke Rehabilitation Care

Over the years, the organization and delivery of stroke care has taken many forms and may range from minimal outpatient services to intensive inpatient services on a specialized rehabilitation unit with an interdisciplinary team. Lacking a clear evidence base, the types of services provided to patients with stroke are widely variable. The Agency for Healthcare Policy and Research Guideline for Post-Stroke Rehabilitation (AHCPR, 1995) concluded, "A considerable body of evidence, mainly from countries in Western Europe, indicates that better clinical outcomes are achieved when patients with acute stroke are treated in a setting that provides coordinated, multidisciplinary stroke-related evaluation and services. Skilled staff, better organization of services, and earlier implementation of rehabilitation interventions appear to be important components."

The VA/DoD Working Group reviewed the literature addressing the question of organization of care. Although the reviews and trials make it clear that rehabilitation is a dominant component of organized services, it is not possible to specify precise standards and protocols for specific types of specialized units for stroke patients. Limitations stem from imperfections in the way the reviews

and trials controlled for differences in the structure and content of multidisciplinary/standard care programs, the period defined as acute post-stroke care, staff experience and staff mix, and patient needs for rehabilitation therapy (i.e., stroke severity and type).

Annotation B. Initial Assessment of Complications, Impairment and Rehabilitation Needs

1.2 Brief Assessment

Recommendations

1. The initial assessment should have special emphasis on the following:

Medical Status

a. Level of consciousness and cognitive status
b. Risk factors for stroke recurrence
c. History of previous antiplatelet or anticoagulation use, especially at the time of stroke
d. Medical co-morbidities (see Annotation E: 3.1-3.5)

Risk of Complications

e. Screening for aspiration risk (Brief swallowing assessment) (see Section 1.3)
f. Malnutrition and dehydration (see Annotation E: 2.2)
g. Skin assessment and risk for pressure ulcers (see Annotation E: 2.3)
h. Risk of deep vein thrombosis (DVT) (see Annotation E: 2.4)
i. Bowel and bladder dysfunction (see Annotation E: 2.5)
j. Pain (see Annotation E: 2.6)

Function

k. Motor function and muscle tone
l. Mobility, with respect to the patient's needs for assistance in movement
m. Emotional support for the family and caregiver

1.3 Screening for Aspiration Risk

Recommendations

1. Strongly recommend that all acute/newly diagnosed stroke patients be screened for swallowing problems prior to oral intake of any medication, foods, or fluids to determine risk for aspiration.
2. Screening should be performed by appropriately trained provider within the first 24 hours of admission to determine the risk of aspiration:
   - Low risk for aspiration: Patients who are cooperative, able to talk, voluntary cough, swallow saliva and pass a simple swallowing screening test (water).
   - High risk for aspiration: Patients who are non-cooperative, failed the simple swallowing screening test (wet, hoarse voice or coughing are noted, or volume of water consumed is below population norms), or have a history of swallowing problems, aspiration, or dysphagia.
3. Patients who are not alert should be monitored closely and swallowing screening performed when clinically appropriate.

4. If screening results indicate that the patient is at high risk for dysphagia, oral food and fluids should be withheld from the patient (i.e., the patient should be nil per os [NPO]) and a comprehensive clinical evaluation of swallowing food and fluids be performed within 24 hours by a clinician trained in the diagnosis and management of swallowing disorders.

Annotation C. Assessment of Stroke Severity

1.4 Use of Standardized Assessments

Recommendations

1. Strongly recommend that the National Institutes of Health Stroke Scale (NIHSS) be used at the time of presentation/hospital admission, or at least within the first 24 hours following presentation. [A]
2. Recommend that all patients should be screened for depression and motor, sensory, cognitive, communication, and swallowing deficits by appropriately trained clinicians, using standardized and valid screening tools. [C]
3. If depression, or motor, sensory, cognitive, communication, or swallowing deficits are found on initial screening assessment, patients should be formally assessed by the appropriate clinician from the coordinated rehabilitation team. [C]
4. Recommend that the clinician use standardized, validated assessment instruments to evaluate the patient's stroke-related impairments, functional status and participation in community and social activities. [C]
5. Recommend that the standardized assessment results be used to assess probability of outcome, determine the appropriate level of care, and develop interventions.
6. Recommend that the assessment findings be shared and the expected outcomes discussed with the patient and family/caregivers.

Annotation D. Initiate Secondary Prevention and Early Interventions

1.5 Secondary Stroke Prevention

For specific evidence based recommendations providers may refer to the AHA/ASA Guidelines for Prevention of Stroke in Patients with Ischemic Stroke or Transient Ischemic Attack (http://stroke.ahajournals.org/cgi/content/full/42/1/227).

1.6 Early Intervention of Rehabilitation Therapy

Recommendations

1. Strongly recommend that rehabilitation therapy should start as early as possible, once medical stability is reached. [A]
2. Recommend that the patient receive as much therapy as "needed" and tolerated to adapt, recover, and/or reestablish the premorbid or optimal level of functional independence.

Annotation E. Obtain Medical History and Physical Examination

Recommendations

1. A thorough history and physical examination should be completed on all patients and should include, at a minimum:
    a. Chief complaint and history of present illness
    b. Past medical and psychiatric history
    c. Past surgical history
    d. Medications
    e. Allergies
    f. Family history
    g. Social history
    h. Functional history
    i. Review of systems
    j. Physical examination
    k. Imaging studies
2. The assessment should cover the following areas:
    a. Risk of complications (swallowing problems, malnutrition, skin breakdown, risk for DVT, bowel and bladder dysfunction, falls, and pain) (see Annotation E: 2.1-2.7)
    b. Determination of impairment (communication, cognition, motor, psychological, and safety awareness) (see Annotations G: 4.1-4.6) and assessment of prior and current functional status (e.g., FIM™) (see Annotation G: 5.1)
    c. Assessment of participation in community and social activities, and a complete psychosocial assessment (family and caregivers, social support, financial, and cultural support) (see Annotation G: 6.1)

Annotation F. Assessment and Prevention of Complications

2 Prevention of Complications

Recommendations

1. Recommend that risk of complications should be assessed in the initial phase and throughout the rehabilitation process and followed by intervention to address the identified risk. Areas of assessment include:
   a. Swallowing problems (risk of aspiration) (see 2.1)
   b. Malnutrition and dehydration (see 2.2)
   c. Skin assessment and risk for pressure ulcers (see 2.3)
   d. Risk of deep vein thrombosis (DVT) (see 2.4)
   e. Bowel and bladder dysfunction (see 2.5)
   f. Pain (see 2.6)
   g. Risk of falling (see 2.7)
   h. Osteoporosis (see 2.8)
   i. Seizures (see 2.9)

2.1 Swallowing Problems, Aspiration Risk

Recommendations

Assessment

1. Recommend all patients receive evaluation of nutrition and hydration status, as soon as possible after admission. Food and fluid intake should be monitored daily in all patients and body weight should be determined regularly.
2. Recommend that if screening for swallowing problems indicates that the patient is at risk for dysphagia, the patient should be nil per os (NPO) and a comprehensive clinical evaluation of swallowing of food and fluid be performed within 24 hours by a professional trained in the diagnosis and management of swallowing disorders. Documentation of this exam should include information about signs and symptoms of dysphagia, likelihood of penetration and aspiration, and specific recommendations for follow-up including need for a dynamic instrumental assessment, treatment, and follow-up. [I]
3. Recommend patients who are diagnosed as having dysphagia based on comprehensive clinical evaluation of swallowing should have a dynamic instrumental evaluation to specify swallowing anatomy and physiology, mode of nutritional intake, diet, immediate effectiveness of swallowing compensations and rehabilitative techniques, and referral to specialist. The optimal diagnostic procedure (VFSS, FEES) should be determined by the clinician, based on patient needs and clinical setting.

2.2 Malnutrition and Dehydration

Recommendations

1. Recommend all patients receive evaluation of nutrition and hydration, as soon as possible after admission. Food and fluid intake should be monitored in all patients, and body weight should be determined regularly.
2. Recommend that a variety of methods be used to maintain and improve intake of food and fluids. This will require treating the specific problems that interfere with intake, providing assistance in feeding if needed, consistently offering fluid by mouth to dysphagic patients, and catering to the patient's food preferences. If intake is not maintained, feeding by a feeding gastrostomy may be necessary.
3. Patients at high risk for, or problems with, nutrition and their family/caregiver should receive counseling by a Registered Dietitian upon discharge regarding healthy diet and food choices.

2.3 Prevention of Skin Breakdown

Recommendations

Assessment

1. Recommend a thorough assessment of skin integrity be completed upon admission and monitored at least daily, thereafter. [C]
2. Risk for skin breakdown should be assessed using a standardized assessment tool (such as the Braden Scale). [I]

Treatment

3. Recommend the use of proper positioning, turning, and transferring techniques and judicious use of barrier sprays, lubricants, special mattresses, and protective dressings and padding to avoid skin injury due to maceration, friction or excessive pressure. [C]

2.4 Risk for Deep Vein Thrombosis (DVT)

Recommendations

Assessment

1. Concurrent risk factors that increase the risk of DVT should be assessed in all patients post stroke to determine the choice of therapy. These risk factors include mobility status, congestive heart failure (CHF), obesity, prior DVT or pulmonary embolism (PE), limb trauma, or long bone fracture.

Treatment

2. Recommend all patients be mobilized, as soon as possible.
3. Recommend the use of subcutaneous low-dose low molecular weight heparin (LMWH) to prevent DVT/ PE for patients with ischemic stroke or hemorrhagic stroke and leg weakness with impaired mobility.
4. Attention to a history of heparin induced thrombocytopenia will affect treatment choice. A platelet count obtained 7-10 days after initiation of heparin therapy should be considered.
5. Consider the use of graduated compression stockings or an intermittent pneumatic compression device as an adjunct to heparin for non-ambulatory patients, or as an alternative to heparin for patients in whom anticoagulation is contraindicated.
6. Consider inferior vena cava filter (IVCF) in patients at risk for PE in whom anticoagulation is contraindicated.

2.5 Bowel and Bladder Dysfunction

Recommendations

Assessment

1. Recommend a structured assessment of bladder function in acute stroke patients, as indicated. Assessment should include:
    - Assessment of urinary retention through the use of a bladder scanner or an in-and-out catheterization
    - Measurement of urinary frequency, volume, and control
    - Presence of dysuria
2. There is insufficient evidence to recommend for or against the use of urodynamics over other methods of assessing bladder function.

Treatment

3. Consider removal of the indwelling catheter within 48 hours to avoid increased risk of urinary tract infection; however, if a catheter is needed for a longer period, it should be removed as soon as possible.
4. Recommend the use of silver alloy-coated urinary catheters, if a catheter is required.
5. Consider an individualized bladder training program (such as pelvic floor muscle training in women) be developed and implemented for patients who are incontinent of urine.
6. Recommend the use of prompted voiding in stroke patients with urinary incontinence.
7. Recommend a bowel management program be implemented in patients with persistent constipation or bowel incontinence. [I]

2.6 Pain

Recommendations

Assessment

1. Recommend pain assessment using the 0 to 10 scale. [C]
2. Recommend a pain management plan that includes assessment of the following: likely etiology (i.e., musculoskeletal and neuropathic), pain location, quality, quantity, duration, intensity, and aggravating and relieving factors. [C]

Treatment

3. Recommend balancing the benefits of pain control with possible adverse effects of medications on an individual's ability to participate in and benefit from rehabilitation. [I]
4. When practical, utilize a behavioral health provider to address psychological aspects of pain and to improve adherence to the pain treatment plan. [C]
5. When appropriate, recommend use of non-pharmacologic modalities for pain control such as biofeedback, massage, imaging therapy, and physical therapy. [C]
6. Recommend that the clinician tailor the pain treatment to the type of pain: [C]
    a. Musculoskeletal pain syndromes can respond to correcting the underlying condition such as reducing spasticity or preventing or correcting joint subluxation.
    b. Non-steroidal anti-inflammatory drugs (NSAIDs) may also be useful in treating musculoskeletal pain.
    c. Neuropathic pain can respond to agents that reduce the activity of abnormally excitable peripheral or central neurons.
    d. Opioids and other medications that can impair cognition should be used with caution.

7. Recommend use of lower doses of centrally acting analgesics, which may cause confusion and deterioration of cognitive performance and interfere with the rehabilitation process. [C]
8. Shoulder mobility should be monitored and maintained during rehabilitation. Subluxation can be reduced and pain decreased using functional electrical stimulation applied to the shoulder girdle. [B]

2.7 Fall Prevention

Recommendations

1. Recommend that all patients be assessed for fall risk during the inpatient phase, using an established tool. [B]
2. Recommend that fall prevention precautions be implemented for all patients identified to be at risk for falls while they are in the hospital.
3. Refer to the falls prevention toolkit on VA's National Center for Patient Safety (NCPS) for specific interventions.
4. Recommend regular reassessments for risk of falling including at discharge, ideally in the patient's discharge environment. [B]
5. Recommend that patient and family/caregiver be provided education on fall prevention both in the hospital setting and in the home environment. [B]

2.8 Osteoporosis

Recommendations

1. Early mobilization and movement of the paretic limbs will reduce the risk of bone fracture after stroke. [A]
2. Consider medications to reduce bone loss which will reduce the development of osteoporosis. [B]
3. Consider assessing bone density for patients with known osteoporosis who have been mobilized for 4 weeks before having the patient bear weight.
4. Assess for level of Vitamin D and consider supplemental Vitamin D in patients with insufficient levels. [B]

2.9 Seizures

Recommendations

Assessment

1. Obtain an EEG of individuals who have a clinical seizure or manifest in a prolonged or intermittent stage of consciousness.

Treatment

2. Treat patients with post-stroke epilepsy with anti-epileptic medications (AEDs). [B]
3. Consider the side effect profile of AEDs when choosing a chronic anticonvulsant. [B]
4. Leviteracetam, and lamotrigine are the first-line anticonvulsants for post-stroke seizure and epilepsy in elderly patients or in younger patients requiring anticoagulants. [B]
5. Extended-release carbamazepine might be a reasonable and less expensive option in patients under 60 years of age with appropriate bone health who do not require anticoagulation. [C]
6. Prophylactic treatment with an AED is not indicated in patients without a seizure after a stroke. [A]

3 MEDICAL CORMORBIDITIES

3.1 Diabetes/Glycemic Control

Recommendations

1. Recommend obtaining clinical information for a history of diabetes or other glycemic disorder and including a blood test with admission labs in a patient with suspected stroke. [A]
2. Recommend monitoring blood glucose levels for a minimum of 72 hours post-stroke. [B]
3. Insulin should be adjusted to maintain a blood glucose (BG) < 180 mg/dl with the goal of achieving a mean glucose around 140 mg/dl. Evidence is lacking to support a lower limit of target blood glucose but based on a recent trial suggesting that blood glucose < 110 mg/dl may be harmful, we do not recommend blood glucose levels < 110 mg/dl. [A]
4. Insulin therapy should be guided by local protocols and preferably "dynamic" protocols that account for varied and changing insulin requirements. A nurse-driven protocol for the treatment of hypoglycemia is highly recommended to ensure prompt and effective correction of hypoglycemia. [I]
5. To minimize the risk of hypoglycemia and severe hyperglycemia after discharge it is reasonable to provide hospitalized patients who have DM and knowledge deficits, or patients with newly discovered hyperglycemia, basic education in "survival skills". [I]
6. Patients who experienced hyperglycemia during hospitalization but who are not known to have DM should be re-evaluated for DM after recovery and discharge. [B]
7. Recommend maintenance of near-normoglycemic levels (80-140 mg/dl) for long-term prevention of microvascular and macrovascular complications. [A]

3.2 Cardiac

Recommendations

1. Monitor vital signs at the time of physical therapy interventions, particularly in patients with coronary heart disease (CHD).
2. Consider modifying or discontinuing therapy for significant changes in heart rate, blood pressure, temperature, pulse-oximetry, or if symptoms develop including excessive shortness of breath, syncope, or chest pain.

3.3 Hypertension

Recommendations

1. Blood pressure should be carefully monitored following stroke.
2. The type of stroke (ischemic, hemorrhagic, aneurysmal), the clinical situation, and co-morbidities must be considered in blood pressure management. (see VA/DoD CPG for Management of Hypertension)

3.4 Substance Use Disorders

Recommendations

1. People who have survived a stroke should be educated about the risks associated with excessive alcohol usage, substance abuse, and the risk for stroke recurrence.
2. Patients who are smokers should be counseled about the benefits of smoking cessation on reducing the risk for a future stroke, and they should be considered for nicotine replacement therapy and other interventions that promote smoking cessation.

3.5 Post Stroke Depression

Recommendations

1. There are several treatment options for the patient with stroke and mild depression that can be used alone or in combination based on the patient's individual need and preference for services. (see to VA/DoD guidelines for the Management of Major Depression Disorder)
2. Patients diagnosed with moderate to severe depression after stroke should be referred to Mental Health for evaluation and treatment.
3. There is conflicting evidence regarding the use of routine pharmacotherapy or psychotherapy to prevent depression or other mood disorders following stroke.
4. Patients with stroke who are suspected of wishing to harm themselves or others (suicidal or homicidal ideation) should be referred immediately to Mental Health for evaluation.
5. Recommend that patients with stroke should be given information, advice, and the opportunity to talk about the impact of the illness upon their lives.

Other Mood Disorders

6. Patients following stroke exhibiting extreme emotional lability (i.e. pathological crying/tearfulness) should be given a trial of antidepressant medication, if no contraindication exists. SSRIs are recommended in this patient population. [A]
7. Patients with stroke who are diagnosed with anxiety related disorders should be evaluated for pharmacotherapy options. Consider psychotherapy intervention for anxiety and panic. Cognitive Behavioral Therapy has been found to be a more efficacious treatment for anxiety and panic disorder than other therapeutic interventions.
8. Recommend skills training regarding activities of daily living (ADL's), and psychoeducation regarding stroke recovery with the family.
9. Encourage the patient with stroke to become involved in physical and/or other leisure activities.

4 ASSESSMENT OF IMPAIRMENTS

Annotation G: Determine Nature and Extent of Impairments and Disabilities

4.1 Global Assessment of Stroke Severity

Recommendations

1. Strongly recommend the patient be assessed for stroke severity using the NIHSS at the time of presentation/hospital admission, or at least within the first 24 hours following presentation. [A]
2. Strongly recommend that all professionals involved in any aspect of the stroke care be trained and certified to perform the NIHSS. [A]
3. Consider reassessing severity using the NIHSS at the time of acute care discharge to validate the first assessment or identify neurological changes.
4. If the patient is transferred to rehabilitation and there are no NIHSS scores in the record, the rehabilitation team should complete an NIHSS.

4.2 Assessment of Communication Impairment

Recommendations

1. Assessment of communication ability should address the following areas: listening, speaking, reading, writing, gesturing, and pragmatics. Problems in communication can be language-based (as with aphasia), sensory/motor based (as with dysarthria), or cognitive-based (as with dementia).
2. Assessment should include standardized testing and procedures. [B]

4.3 Assessment of Motor Impairment and Mobility

Recommendations

Motor Assessment

1. Motor function should be assessed at the impairment level (ability to move in a coordinated manner in designated patterns), and at the activity level (performance in real life or simulated real life tasks), using assessments with established psychometric properties.
2. The following components should be considered in assessment of motor function: muscle strength for all muscle groups, active and passive range of motion available, muscle tone, ability to isolate the movements of one joint from another, as well as gross and fine motor coordination.
3. The daily use of a paretic extremity should be assessed using a self-report measure (e.g., the Motor Activity Log), and with accelerometry.
4. Balance should be assessed using a standardized assessment tool (e.g., Berg Balance Scale).
5. Apraxia should be assessed using an established apraxia measure (e.g., Florida Apraxia Screen).

Mobility

6. Stroke survivors with impaired mobility should be referred to a mobility-training program (physical therapy and/or occupational therapy) where specific and individualized goals can be established.

4.4 Assessment of Cognitive Function

Recommendations

1. Assessment of arousal, cognition, and attention should address the following areas:
    a. Arousal
    b. Attention deficits
    c. Visual neglect
    d. Learning and memory deficits
    e. Executive function and problem-solving difficulties
2. There is insufficient evidence to recommend for the use of any specific tools to assess cognition. Several screening and assessment tools exist.

4.5 Assessment of Sensory Impairment: Touch, Vision, and Hearing

Recommendations

1. Recommend that all patients be screened for sensory deficits by appropriately trained clinicians. This assessment should include an evaluation of sharp/dull, temperature, light touch, vibratory and position sensation.
2. Consider using Semmes-Weinstein monofilament to assess cutaneous sensation.
3. Recommend that all individuals with stroke should have a vision exam that includes visual acuity, contrast sensitivity (using Pelli chart), perimetry for visual field integrity, eye movements (including diplopia), and visual scanning.
4. Recommend that a careful history related to hearing impairment be elicited from the patient and or family and that a hearing evaluation be completed for patients who demonstrate difficulty with communication where hearing impairment is suspected.

4.6 Assessment of Emotional and Behavioral State

Recommendations

1. Initial evaluation of the patient should include a psychosocial history that covers pre-morbid personality characteristics, psychological disorders, pre-morbid social roles, and level of available social support.
2. Brief, continual assessments of psychological adjustment should be conducted to quickly identify when new problems occur. These assessments should also include ongoing monitoring of suicidal ideation and substance abuse. Other psychological factors deserving attention include: level of insight, level of self-efficacy/locus of control, loss of identity concerns, social support, sexuality, and sleep.
3. Review all medications and supplements including over the counter (OTC) medications that may affect behavior and function.
4. Inclusion of collateral information (e.g. spouse, children) is recommended to obtain a comprehensive picture of the patient's pre-morbid functioning and psychological changes since the stroke.
5. There is insufficient evidence to recommend the use of any specific tools to assess psychological adjustment. Several screening and assessment tools exist.
6. Post-stroke patients should be assessed for other psychiatric illnesses, including anxiety, bipolar illness, SUD, and nicotine dependence. Refer for further evaluation by mental health if indicated.

5 ASSESSMENT OF ACTIVITY AND FUNCTION

5.1 Activities of Daily Living and Instrumental Activities of Daily Living

Recommendations

1. Recommend that a standardized assessment tool be used to assess functional status (ADL/IADL) of stroke patients. [B]
2. Consider the use of the Functional Independence Measure (FIM™) as the standardized functional assessment.

6 ASSESSMENT OF SUPPORT SYSTEMS

6.1 Patient, Family Support, and Community Resources

Recommendations

1. Recommend all stroke patients and family caregivers receive a thorough psychosocial assessment with psychosocial intervention and referrals as needed.
2. The psychosocial assessment of both the patient with stroke and the primary family caregiver should include the following areas:
    a. History of pre-stroke functioning of both the patient and the primary family caregiver (e.g., demographic information, past physical conditions and response to treatment, substance use and abuse, psychiatric, emotional and mental status, education and employment, military, legal, and coping strategies)
    b. Capabilities and care giving experiences of the person identified as the primary caregiver
    c. Caregiver understanding of the patient's needs for assistance and caregiver's ability to meet those needs
    d. Family dynamics and relationships
    e. Availability, proximity, and anticipated involvement of other family members
    f. Resources (e.g., income and benefits, housing, and social network)
    g. Spiritual and cultural activities
    h. Leisure time and preferred activities
    i. Patient/family/caregiver understanding of the condition, treatment, and prognosis, as well as hopes and expectations for recovery
    j. Patient/family/caregiver expectations of stroke-related outcomes and preferences for follow-up care
3. Recommend a home assessment for all patients who will be discharged home with functional impairments.

Annotation H. Does the Patient have a Severe Stroke and/or Maximum Dependence and Poor Prognosis For Functional Recovery?

Recommendations

1. Families and caregivers should be educated in the care of patients who have experienced a severe stroke, who are maximally dependent in ADL, or have a poor prognosis for functional recovery as these patients are not candidates for rehabilitation intervention.
2. Families should receive counseling on the benefits of nursing home placement for long-term care.

7 THE REHABILITATION PROGRAM

Annotation I. Does the Patient Need Rehabilitation Intervention?

7.1 Determine Rehabilitation Needs

Recommendations

1. Once the patient is medically stable, the primary physician should consult with rehabilitation services (i.e., physical therapy, occupational therapy, speech and language pathology, kinesiotherapy, and physical medicine) to assess the patient's impairments as well as activity and participation deficiencies to establish the patient's rehabilitation needs and goals.
2. A multidisciplinary assessment should be undertaken and documented for all patients. [A]
3. Patients with no residual disability post acute stroke who do not need rehabilitation services may be discharged back to home.
4. Strongly recommend that patients with mild to moderate disability in need of rehabilitation services have access to a setting with a coordinated and organized rehabilitation care team that is experienced in providing stroke services. [A]
5. Post-acute stroke care should be delivered in a setting where rehabilitation care is formally coordinated and organized.
6. If an organized rehabilitation team is not available in the facility, patients with moderate or severe disability should be offered a referral to a facility with such a team. Alternately, a physician or rehabilitation specialist with some experience in stroke should be involved in the patient's care.
7. Post-acute stroke care should be delivered by a variety of treatment disciplines experienced in providing post-stroke care to ensure consistency and reduce the risk of complications.
8. The multidisciplinary team may consist of a physician, nurse, physical therapist, occupational therapist, kinesiotherapist, speech and language pathologist, psychologist, recreational therapist, social worker, patient, and family/caregivers.
9. Patients who are severely disabled and for whom prognosis for recovery is poor may not benefit from rehabilitation services and may be discharged to home or nursing home in coordination with family/ care giver.

Annotation J: Are Early Supportive Discharge Rehabilitation Services Appropriate?

7.2 Determine Rehabilitation Setting

Recommendations

1. The medical team, including the patient and family, must analyze the patient's medical and functional status, as well as expected prognosis in order to establish the most appropriate rehabilitation setting. [I]
2. The severity of the patient's impairment, the rehabilitation needs, the availability of family/social support and resources, the patient/family goals and preferences, and the availability of community resources will determine the optimal environment for care. [I]
3. Where comprehensive interdisciplinary community rehabilitation services and caregiver support services are available, early supported discharge services may be provided for people with mild to moderate disability. [B]

4. Recommend that patients remain in an inpatient setting for their rehabilitation care if they are in need of daily professional nursing services, intensive physician care, and/or multiple therapeutic interventions.
5. Inconclusive evidence to recommend the superiority of one type of rehabilitation setting over another.
6. Patients should receive as much therapy as they are able to tolerate in order to adapt, recover, and/or reestablish their premorbid or optimal level of functional independence. [B]

Annotation K. Discharge Patient from Rehabilitation

See Section 8 –Discharge

Annotation L. Arrange For Medical Follow-Up

See Section 8.1 – Follow-up

Annotation M. Post-Stroke Patient in Inpatient Rehabilitation

Inpatient rehabilitation is defined as rehabilitation performed during an inpatient stay in a free-standing rehabilitation hospital or a rehabilitation unit of an acute care hospital. The term inpatient is also used to refer generically to programs where the patient is in residence during treatment, whether in an acute care hospital, a rehabilitation hospital, or a nursing facility.

Patients typically require continued inpatient services if they have significant functional deficits and medical and/or nursing needs that requires close medical supervision and 24 hour availability of nursing care. Inpatient care may be appropriate if the patient requires treatment by multiple other rehabilitation professionals (e.g, physical therapists, occupational therapists, speech language pathologists, and psychologists).

Annotation N. Educate Patient/Family; Reach Shared Decision Regarding Rehabilitation Program; Determine and Document Treatment Plan

7.3 Treatment Plan

Recommendations

1. Patients and/or their family members should be educated in order to make informed decisions and become good advocates.
2. The patient/family member's learning style must be assessed (through questioning or observation) and supplemental materials (including handouts) must be available when appropriate.
3. The following list includes topics that (at a minimum) must be addressed during a patient's rehabilitation program:
   a. Etiology of stroke
   b. Patient's diagnosis and any complications/co-morbidities
   c. Prognosis
   d. Expectations for what to expect during recovery and rehabilitation

e. Secondary prevention
f. Discharge plan
g. Follow-up care including medications.

4. The clinical team and family/caregiver should reach a shared decision regarding the rehabilitation program.
5. The rehabilitation program should be guided by specific goals developed in consensus with the patient, family, and rehabilitation team.
6. Document the detailed treatment plan in the patient's record to provide integrated rehabilitation care.
7. The patient's family/caregiver should participate in the rehabilitation sessions and should be trained to assist patient with functional activities when needed.
8. As patients progress, additional important educational topics include subjects such as the resumption of driving, sexual activity, adjustment and adaptation to disability, patient rights/responsibilities, and support group information.

The treatment plan should include documentation of the following:

- Patient's strengths, impairments, and current level of functioning
- Psychosocial resources and needs, including caregiver capacity and availability
- Goals:
  - Personal goals (e.g., I want to play baseball with my grandson)
  - Functional goals (e.g., ADL, IADL, mobility)
  - Short term and long term goals
- Strategies for achieving these goals including :
  - Resources and disciplines required
  - Estimations of time for goal achievement
  - Educational needs for patient/family
  - Plans and timeline for re-evaluation

Annotation O. Initiate/Continue Rehabilitation Programs and Interventions

7.4 Treatment Interventions

Recommendations

1. Initiate/continue rehabilitation program and interventions indicated by patient status, impairment, function, activity level and participation. (see Section 9: Rehabilitation Interventions)

Impairments

a. Dysphagia
b. Muscle tone
c. Emotional, behavioral
d. Cognitive
e. Communication
f. Motor
g. Sensory

Activity

a. ADL/IADL
b. Mobility
c. Sexuality
d. Fitness endurance

Support System

a. Psychosocial needs/resources
b. Family/Community Support
c. Caregiver

Annotation P. Reassess Progress, Future Needs, and Risks. Refer/Consult Rehabilitation Team

7.5 Assessment of Progress and Adherence

Recommendations

1. Patients should be re-evaluated intermittently during their rehabilitation. Particular attention should be paid to interval change and progress towards stated goals.
2. Patients who show a decline in functional status may no longer be candidates for rehabilitation interventions. Considerations about the etiology of the decline and its prognosis can help guide decisions about when/if further rehabilitation evaluation should occur.
3. Psychosocial status and community integration needs should be re-assessed, particularly for patients who've experienced a functional decline or reached a plateau.

Annotation Q. Is Patient Ready for Community Living?

7.6 Transfer to Community Living

Recommendations

1. Recommend that all patients planning to return to independent community living should be assessed for mobility, ADL, and IADL prior to discharge (including a community skills evaluation and home assessment).
2. Recommend that the patient, family, and caregivers are fully informed about, prepared for, and involved in all aspects of healthcare and safety needs. [I]
3. Recommend that case management be put in place for complex patient and family situations. [I]
4. Recommend that acute care hospitals and rehabilitation facilities maintain up-to-date inventories of community resources, provide this information to stroke patients and their families and caregivers, and offer assistance in obtaining needed services. Patients should be given information about, and offered contact with, appropriate local statutory and voluntary agencies. [I]

7.7 Function/Social Support

Recommendations

1. Patients and family caregivers should have their individual psychosocial and support needs reviewed on a regular basis post-discharge.
2. Referrals to family counseling should be offered. Counseling should focus on psychosocial and emotional issues and role adjustment.
3. Caregivers should be screened for high levels of burden and counseled in problem solving and adaptation skills as needed.
4. Caregivers and patients should be screened for depressive symptoms and referred to appropriate treatment resources as needed.
5. Health and social services professionals should ensure that patients and their families have information about the community resources available specific to these needs.
6. Provide advocacy and outreach to patients and families living in the community to help them adapt to changes and access community resources.

7.8 Recreational and Leisure Activity

Recommendations

1. Recommend that leisure activities should be identified and encouraged and the patient enabled to participate in these activities. [I]
2. Therapy for individuals with stroke should include the development of problem solving skills for overcoming the barriers to engagement in physical activity and leisure pursuits.
3. Individuals with stroke and their caregivers should be provided with a list of resources for engaging in aerobic and leisure activities in the community prior to discharge.
4. Recommend that the patient participates in a regular strengthening and aerobic exercise program at home or in an appropriate community program that is designed with consideration of the patient's co-morbidities and functional limitations. (see Intervention – Physical Activity) [B]

7.9 Return to Work

Recommendations

1. Recommend that all patients, if interested and their condition permits, be evaluated for the potential of returning to work. [C]
2. Recommend that all patients who were previously employed be referred to vocational counseling for assistance in returning to work. [C]
3. Recommend that all patients who are considering a return to work, but who may have psychosocial barriers (e.g. motivation, emotional, and psychological concerns) be referred for supportive services, such as vocational counseling or psychological services. [C]

7.10 Return to Driving

Recommendations

1. Recommend all patients be given a clinical assessment of their physical, cognitive, and behavioral functions to determine their readiness to resume driving. In individual cases, where concerns are identified by the family or medical staff, the patient should be required to pass the state road test as administered by the licensing department. Each medical facility should be familiar with their state laws regarding driving after a stroke. [I]
2. Consider referring patients with residual deficits to adaptive driving instruction programs to minimize the deficits, eliminate safety concerns, and optimize the chances that the patient will be able to pass the state driving test. [I]

7.11 Sexual Function

Recommendations

1. Sexual issues should be discussed during rehabilitation and addressed again after transition to the community when the post-stroke patient and partner are ready.

Annotation R. Address Adherence to Treatments and Barriers to Improvement: If Medically Unstable, Refer to Acute Services If There Are Mental Health Factors, Refer to Mental Health Services

Recommendations

1. When an encountered barrier, such as a medical illness, makes participation difficult, referral to the appropriate service for treatment is warranted.
2. When the issue is related to mental health factors, assessment of these factors by a psychiatrist/psychologist and intervention/treatment is appropriate.

8 DISCHARGE FROM REHABILITATION

Annotation K. Discharge Patient from Rehabilitation

Recommendations

1. Recommend that the rehabilitation team ensure that a discharge plan is complete for the patient's continued medical and functional needs prior to discharge from rehabilitation services.
2. Recommend that every patient participate in a secondary prevention program. (see Annotation D) [A]
3. Recommend post-acute stroke patients be followed by a primary care provider to address stroke risk factors and continue treatment of co-morbidities.
4. Recommend patient and family are educated regarding pertinent risk factors for stroke.
5. Recommend that the family and caregivers receive all necessary equipment and training prior to discharge from rehabilitation services. [I]
6. Family counseling focusing on psychosocial and emotional issues and role adjustment should be encouraged and made available to patients and their family members upon discharge.

Annotation L. Arrange For Medical Follow-Up

8.1 Long-Term Management

Recommendations

1. Recommend post-discharge telephone follow-up with patients and caregivers be initiated and include problem solving and educational information.
2. If available, asynchronous and real-time tele-health, video, and web-based technologies, (e.g., web-based support groups, tele-rehabilitation), should be considered for patients who are unable to travel into the facility for care and services.

Follow-up

3. Ongoing monitoring of anticoagulant or antiplatelet therapy, treatment of hypertension and hypercholesterolemia, and other secondary prevention strategies are lifelong needs of patients after stroke and should normally be performed by the patient's primary healthcare provider.
4. Recommend post-acute stroke patients be followed up by a primary care provider to address stroke risk factors and continue treatment of co-morbidities.
5. Patient and family should be educated regarding pertinent risk factors for stroke.
6. Provide patient information about, and access to, community based resources.

Rehabilitation Interventions

Rehabilitation Interventions

This section includes recommendations for intervention and treatment that address possible impairments in patients recovering from stroke. In general, patients should receive the intensity and duration of clinically relevant therapy defined in their individualized rehabilitation plan and appropriate to their needs and tolerance levels. All patients with stroke should begin rehabilitation therapy as early as possible once medical stability is reached. The rehabilitation interventions described in this section should apply regardless of the specific rehabilitation setting and may be applicable during inpatient as well as after discharge and follow-up in community outpatient rehabilitation.

9 DYSPHAGIA MANAGEMENT

Recommendations

1. An oral care protocol should be implemented for patients with dysphagia and dentures to promote oral health and patient comfort.
2. Patients with persistent dysphagia should be offered an individualized treatment program guided by a dynamic instrumental swallowing assessment. The treatment program may include:
    a. Modification of food texture and fluids to address swallowing on an individual basis
    b. Education regarding swallowing postures and maneuvers on an individual basis following instrumental assessment to verify the treatment effect
    c. Addressing appropriate method of medication administration for patients with evidence of pill dysphagia on clinical or instrumental assessment
    d. Training patients and care givers in feeding techniques and the use of thickening agents
    e. Patients with chronic oropharyngeal dysphagia should be seen for regular reassessment to ensure effectiveness and appropriateness of long-standing diet, continued need for compensations, and/or modification of rehabilitative techniques.

10 NUTRITION MANAGEMENT

Recommendations

1. The nutritional and hydration status of stroke patients should be assessed within the first 48 hours of admission.
2. Stroke patients with suspected nutritional and/or hydration deficits, including dysphagia, should be referred to a dietitian.
3. Consider the use of feeding tubes to prevent or reverse the effects of malnutrition in patients who are unable to safely eat and those who may be unwilling to eat.
4. Oral supplementation may be considered for patients who are safe with oral intake but do not receive sufficient quantities to meet their nutritional requirements.

11 COGNITIVE REHABILITATION

11.1 Non-Drug Therapies for Cognitive Impairment

Recommendations

1. Recommend that patients be given cognitive re-training if any of the following conditions are present:
   a. Attention deficits [A]
   b. Visual neglect [B]
   c. Memory deficits [B]
   d. Executive function and problem-solving difficulties [C]
2. Patients with multiple areas of cognitive impairment may benefit from a variety of cognitive re-training approaches that may involve multiple disciplines. [C]
3. Recommend the use of training to develop compensatory strategies for memory deficits in post-stroke patients who have mild short term memory deficits. [B]

11.2 Use of Drugs to Improve Cognitive Impairment

Recommendations

1. Consider using acetylcholinesterase inhibitors (AChEIs), specifically galantamine, donepezil, and rivastigmine, in patients with vascular dementia or vascular cognitive impairment in the doses and frequency used for Alzheimer's disease.
2. Consider using the NMDA receptor inhibitor memantine for patients with vascular dementia (VaD) or vascular cognitive impairment (VCI). [B]
3. The use of conventional or atypical antipsychotics for dementia-related psychosis or behavioral disturbance should be used with caution for short term, acute changes.
4. Recommend against centrally acting alpha-2 adrenergic receptor agonists (such as clonidine and others) and alpha-1 receptor antagonists (such as prazosin and others) as antihypertensive medications for stroke patients because of their potential to impair recovery. [D]
5. Recommend against the use of amphetamines to enhance motor recovery following stroke. [D]

11.3 Apraxia

Recommendations

1. Insufficient evidence to support specific therapeutic interventions for apraxia following stroke. [I]

11.4 Hemispatial Neglect / Hemi-inattention

Recommendations

1. Recommend cognitive rehabilitation for patients with unilateral spatial neglect such as cueing, scanning, limb activation, aids, and environmental adaptations. [B]
2. Nursing and therapy sessions (e.g., for shoulder pain, postural control, feeding) need to be modified to cue attention to the impaired side in patients with impaired spatial awareness. [I]

12 COMMUNICATION

Recommendations

1. If the communication assessment indicates impairment in speech, language, and/or cognition, treatment should be considered for those affected components. Treatment can be provided individually, in groups, or by computer or trained volunteer under the supervision of a clinician.
2. Maximum restoration of the impaired ability should initially be considered:
    - For dysarthria (and other impairments of speech), treatment can include techniques to improve articulation, phonation, fluency, resonance, and/or respiration.
    - For aphasia (and other impairments of language), treatment can include models designed to improve comprehension (e.g., stimulation/facilitation) and/or expression (e.g., word retrieval strategies) of language. It is recommended that the rate of treatment ("intensity", "dosage") should be higher rather than lower.
    - For dementia (and other impairments of cognitive aspects of communication), treatment can include techniques to maximize attention, memory, problem-solving, and executive functions.
3. Once maximum restoration is achieved, compensation of the remaining impairment should be considered:
    - For dysarthria, compensatory approaches include prostheses (e.g., palatal lift for hypernasality), alternate modalities (e.g., writing or gesturing), and augmentative/alternative communication (AAC) devices (e.g., a portable typing device that generates synthesized speech).
    - For aphasia, compensatory approaches include alternate modalities (e.g., gesturing) and AAC devices (e.g., a portable electronic pointing board).
    - For dementia, compensatory approaches include memory books, portable alarms, personal digital assistants (PDA's), and similar devices to provide reminders and other information as needed.
4. Once maximum restoration and maximum benefits of compensation are achieved, counsel and educate those closest to the patient to modify the patient's environment to minimize and eliminate obstacles to communication, assisting them in such activities as helping them pay their bills or recording a message on their phone answering machine instructing callers to leave a message.

13 MOTOR IMPAIRMENT AND RECOVERY

13.1 Treatment Approach

Recommendations

1. Strongly recommend a comprehensive motor recovery program early on in stroke rehabilitation.
2. There is insufficient evidence to recommend for or against using neurodevelopmental training (NDT) in comparison to other treatment approaches for motor retraining following an acute stroke. [I]
3. Recommend that motor recovery program should incorporate multiple interventions, emphasizing progressive difficulties, repetition, and functional task practice. [B]
4. Interventions for motor recovery (including improving ambulation) should include cardiovascular exercise fitness and strengthening. [A] (see Sections 13.5 and 13.7)
5. Consider using strength training as a component of the therapeutic approach in paretic patients. [B]

13.2 Range of Motion (ROM)

Recommendations

1. Consider active and passive ROM prolonged stretching program to decrease risk of contracture development (night splints, tilt table) in early period following stroke. [C]
2. Joint movement and positioning needs to be carefully monitored during rehabilitation to prevent the development of maladaptive activity patterns.

13.3 Spasticity

Recommendations

1. Consider deterring spasticity with antispastic positioning, range of motion exercises, stretching and splinting. Contractures may need to be treated using splinting, serial casting, or surgical correction. [C]
2. Consider use of oral agents such as tizanidine and oral baclofen for spasticity especially if the spasticity is associated with pain, poor skin hygiene, or decreased function. Tizanidine should be used specifically for chronic stroke patients. [B]
3. Diazepam and other benzodiazepines should be avoided during the stroke recovery period because this class of medication may interfere with cerebral functions associated with recovery of function after stroke, and these agents are likely to produce sedation which will compromise an individual's ability to participate effectively in rehabilitation. [D]
4. Consider use of botulinum toxin, on its own, or in conjunction with oral medication for patients with spasticity that is painful, impairs function, reduces the ability to participate in rehabilitation or compromises proper positioning or skin care. [B]
5. Intrathecal baclofen treatments may be considered for stroke patients with chronic lower extremity spasticity that cannot be effectively managed by oral medication or botulinum toxin. [B]
6. Consider neurosurgical procedures, such as selective dorsal rhizotomy or dorsal root entry zone lesion, for spasticity that cannot be managed by non-surgical modalities. [I]

13.4 Balance and Posture

Recommendations

1. Recommend that patients demonstrating balance impairments following stroke should be provided a balance training program. [C]

13.5 Lower Extremities

Recommendations

1. Consider using treadmill training in conjunction with other task specific practice and exercise training techniques in individuals with gait impairments post stroke without known cardiac risks for treadmill exercise. [B]
2. Consider the use of partial bodyweight support for treadmill training (partial BWSTT) (up to 40% of individuals' weight) in conjunction with other task specific and exercise training techniques for individuals with gait impairments post stroke without known cardiac risks for treadmill exercise. [B]
3. Recommend for patient with foot drop, ankle foot orthoses (AFO) to prevent foot drop and improve knee stability during walking. [B]

4. Recommend functional electrical stimulation (FES) as an adjunctive treatment for patients with impaired muscle contraction, specifically for patients with impaired gait due to ankle/knee motor impairment. FES can be utilized for individuals with acute or chronic deficits after stroke. [B]
5. Consider transcutaneous electrical nerve stimulation (TENS) as an adjunctive treatment for enhancing recovery of gait function after stroke. [C]
6. Consider rhythmic auditory cueing as a modality to include in multimodal interventions to improve walking speed. [B]
7. There is no sufficient evidence supporting use of robotic devices during gait training in patients post stroke. [D]
8. Consider using virtual reality therapy (VRT) to enhance gait recovery following stroke. [B]

13.6 Upper Extremities

Recommendations

1. Recommend that upper extremity (UE) functional recovery should consist of the practice of functional tasks, emphasizing progressive difficulty and repetition.
2. Recommend that treatment should be tailored to the individual patient and consider the interventions that are most appropriate, engaging, accessible, and available.
3. Recommend constraint-induced movement therapy (CIMT) for individuals with at least 10 degrees of extension in two fingers, the thumb and the wrist. [A]
4. Recommend robot-assisted movement therapy as an adjunct to conventional therapy in patients with deficits in arm function to improve motor skill at the joints trained. [B]
5. Recommend bilateral practice to improve UE function. [B]
6. Recommend treatment with FES for patients who have impaired upper extremity muscle contraction, specifically with patients with elbow/wrist motor impairment. [B]
7. Recommend FES for patients who have shoulder subluxation. [B]
8. Consider FES and mental practice combined with repetitive and intense motor practice of functional tasks. [B]
9. Consider strengthening exercises in addition to functional task practice. [C]
10. Consider virtual reality as practice context. [C]
11. Insufficient evidence to recommend mirror therapy. (I)
12. Do NOT use repetitive practice of movements in rehabilitation of upper extremity.

13.7 Cardiovascular Conditioning and Fitness

Recommendations

1. Strongly recommend that patients participate in a regular aerobic exercise program at home or in an appropriate community program that is designed with consideration of the patient's co-morbidities and functional limitations. [A]

13.8 Adaptive Equipment, Durable Medical Devices, Orthotics, and Wheelchairs

Recommendations

1. Recommend adaptive devices be used for safety and function if other methods of performing the task are not available or cannot be learned or if the patient's safety is a concern. [C]
2. Recommend lower extremity orthotic devices be considered, if ankle or knee stabilization is needed to improve the patient's gait and prevent falls. [C]
3. Recommend that a prefabricated brace be initially used and only patients who demonstrate long-term need for bracing have customized orthoses made. [C]
4. Recommend wheelchair prescriptions be based on careful assessment of the patient and the environment in which the wheelchair will be used. [C]
5. Recommend walking assistive devices be used to help with mobility efficiency and safety, when needed. [C]

14 SENSORY IMPAIRMENT

14.1 Sensory Impairment - Touch

Recommendations

1. Consider that all patients with sensory impairments be provided sensory-specific training.
2. Consider that patients with sensory impairments be provided a trial of cutaneous electrical stimulation in conjunction with conventional therapy when appropriate.

14.2 Sensory Impairment - Vision (Seeing)

Recommendations

1. Patients who have visual field cuts/hemianopsia or eye motility impairments after stroke should be provided with an intervention program for that visual impairment or compensatory strategies. [I]
2. Consider scanning training, visual field stimulation, prisms, and eye exercises as restorative intervention strategies.
3. Consider prisms and/or patching as compensatory intervention strategies.

14.3 Sensory Impairment - Hearing

Recommendations

1. Recommend appropriate hearing aids be obtained and used, for patients with known hearing loss.

15 ACTIVITIES (ADL, IADL)

Recommendations

1. Recommend all patients receive ADL training. [A]
2. Recommend all patients receive IADL training in areas of need. [C]
3. Recommend those individuals with stroke who exhibit ADL /IADL deficits should be given a training program that is tailored to the individual needs and anticipated discharge setting. [I]

Table 5-1: Activities in ADL and IADL

ADL	IADL
Mobility • Bed mobility • Wheelchair mobility • Transfers • Ambulation • Stair climbing	**Home Management** • Shopping • Meal planning • Meal preparation • Cleaning • Laundry • Child care
Self-Care • Dressing • Self-feeding • Toileting • Bathing • Grooming	**Community Living Skills** • Money/financial management • Use of public transportation • Driving • Shopping • Access to recreation activities
Communication • Writing • Typing/computer use • Telephoning • Using special communication devices	**Health Management** • Handling medication • Knowing health risks • Making medical appointments
Environmental Hardware • Keys • Faucets • Light switches • Windows/doors	**Safety Management** • Fire safety awareness • Ability to call 911 • Response to smoke detector • Identification of dangerous situations

Modified from: Pedretti LW. Occupational Therapy: Practice Skills for Physical Dysfunction. 4th ed. St. Louis: Mosby; 1996.

16 ADJUNCTIVE TREATMENT

16.1 Complimentary Alternative Medicine (CAM) - Acupuncture

Recommendations

1. There is insufficient evidence to recommend acupuncture to improve stroke rehabilitation outcomes. [D]

16.2 Hyperbaric Oxygen (HBO)

Recommendations

1. The use of hyperbaric oxygen therapy is not recommended. [D]

17 FAMILY/COMMUNITY SUPPORT

Recommendations

1. Patients and caregivers should be educated throughout the rehabilitation process to address the patient's rehabilitation needs, expected outcomes, procedures, and treatment as well as appropriate follow-up in the home/ community [B]
2. Patient and caregiver education should be provided in both interactive and written formats. [B]
3. Caregivers should be provided in a variety of methods of training based on their specific needs, cognitive capability, and local resources. Training may be provided in individual or group format, and in community-based programs. [B]

APPENDICES

Appendix C. Acronym List

ACE	Angiotensin-Converting Enzyme
ADL	Activities of Daily Living
AFO	Ankle-Foot Orthoses
AHCPR	Agency for Healthcare Policy and Research
ASHA	American Speech and Hearing Association
BI	Barthel Index
CAD	Coronary Artery Disease
CEA	Carotid Endarterectomy
CI	Constraint Induced
CNS	Central Nervous System
CVA	Cerebrovascular Accident
DME	Durable Medical Devices
DoD	Department of Defense
DVT	Deep Vein Thrombosis
EMG	Electromyograghic
FAI	Frenchay Activities Index
FDA	Food and Drug Administration
FEES	Fiberoptic Endoscopic Examination of Swallowing
FEESST	Fiberoptic Endoscopic Examination of Swallowing with Sensory Testing
FES	Functional Electrical Stimulation
FIM	Functional Independence Measure
GAD	Generalized Anxiety Disorder
HDL	High-Density Lipoproteins
IADL	Instrumental Activities of Daily Living
KAFO	Knee-Ankle-Foot Orthoses
LDL	Low-Density Lipoproteins
LDUH	Low-Dose Unfractionated Heparin
LMWH	Low Molecular Weight Heparin
MCA	Middle-Cerebral Artery
NDT	Neuro Developmental Training
NHP	Nottingham Health Profile
NHSTA	National Highway Safety and Traffic Administration
NIH	National Institutes of Health
NIHSS	National Institutes of Health Stroke Scale
NOMS	National Outcomes Measurement System
PE	Pulmonary Embolism
PSD	Post-Stroke Depression
TBU	Rehabilitation Bed Units
RCP	Royal College of Physicians
RCT	Randomized Controlled Trial

ROM	Range of Motion
SIGN	Scottish Intercollegiate Guidelines Network
SLP	Speech and Language Pathologist
SSRI	Selective Serotonin Reuptake Inhibitor
TBI	Traumatic Brain Injury
USPSTF	U.S. Preventive Services Task Force
VFSS	Videofluoroscopy Swallowing Study
PE	Pulmonary Embolism
PSD	Post-Stroke Depression
TBU	Rehabilitation Bed Units
RCP	Royal College of Physicians
RCT	Randomized Controlled Trial