Veterans Affairs/Department of Defense Clinical Practice Guideline for the Management of Adult Stroke Rehabilitation Care

Executive Summary

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Background—A panel of experts developed stroke rehabilitation guidelines for the Veterans Health Administration and Department of Defense Medical Systems.

Methods—Starting from previously established guidelines, the panel evaluated published literature through 2002, using criteria developed by the US Preventive Services Task Force. Recommendations were based on evidence from randomized clinical trials, uncontrolled studies, or consensus expert opinion if definitive data were lacking.

Results—Recommendations with Level I evidence include the delivery of poststroke care in a multidisciplinary rehabilitation setting or stroke unit, early patient assessment via the NIH Stroke Scale, early initiation of rehabilitation therapies, swallow screening testing for dysphagia, an active secondary stroke prevention program, and proactive prevention of venous thrombi. Standardized assessment tools should be used to develop a comprehensive treatment plan appropriate to each patient's deficits and needs. Medical therapy for depression or emotional lability is strongly recommended. A speech and language pathologist should evaluate communication and related cognitive disorders and provide treatment when indicated. The patient, caregiver, and family are essential members of the rehabilitation team and should be involved in all phases of the rehabilitation process. These recommendations are available in their entirety at http://stroke.ahajournals.org/cgi/content/full/36/9/e100. Evidence tables for each of the recommendations are also in the full document.

Conclusions—These recommendations should be equally applicable to stroke patients receiving rehabilitation in all medical system settings and are not based on clinical problems or resources unique to the Federal Medical System. **(*Stroke*. 2005;36:2049-2056.)**

Key Words: AHA/ASA-Endorsed Practice Guidelines ■ stroke ■ rehabilitation ■ quality of life

The Management of Stroke Rehabilitation Guideline was developed by clinical experts from the Department of Defense, Veterans Health Administration, and academia. The effort drew heavily from the Agency for Health Care Policy and Research Guidelines for Post-Stroke Rehabilitation (1995),[1] the Royal College of Physicians National Clinical Guidelines for Stroke (2000),[2] and the Scottish Intercollegiate Guidelines Network Management of Patients with Stroke (1998).[3]

The panel evaluated the medical evidence for each question according to criteria proposed by the US Preventive Services Task Force.[4] Where evidence was ambiguous or scientific data were lacking, the multidisciplinary group panel developed consensus-based recommendations. The strength of the recommendations made was based on the quality of the evidence, the overall quality of the study, and the net effect of the intervention. The quality of the evidence was determined by the type of study, with the highest rating given to randomized controlled trials and the lowest rating to consensus statements. Overall quality was rated as "good," "fair," or "poor" according to both the quality of the evidence and whether it was directly linked to health outcomes. Final recommendations were graded as follows:

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

The full-text version of this guideline is available online at http://stroke.ahajournals.org/cgi/content/full/36/9/e100 (*Stroke*. 2005;36:e100–e143).

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A: A strong recommendation that the intervention is always indicated and acceptable
B: A recommendation that the intervention may be useful/effective
C: A recommendation that the intervention may be considered
D: A recommendation that a procedure may be considered not useful/effective or may be harmful
I: Insufficient evidence to recommend for or against—the clinician will use clinical judgment

The full guideline can be found at http://stroke.ahajournals.org/cgi/content/full/36/9/e100.

New information and additional references were added during the development of this executive summary and are noted in *[bracketed italicized text].*

Background

Stroke is a leading cause of disability in the United States.[5] Forty percent of stroke patients are left with moderate functional impairment and 15% to 30% with severe disability. Effective rehabilitation interventions initiated early after stroke can enhance the recovery process and minimize functional disability. Improved functional outcomes for patients also contribute to patient satisfaction and can reduce potential costly long-term care expenditures. Substantial evidence indicates that patients do better with a well-organized, multidisciplinary approach to post–acute stroke care[6–8] (Evidence Level=A). Duncan and colleagues[9] found that greater adherence to post–acute stroke rehabilitation guidelines was associated with improved patient outcomes and concluded, "compliance with guidelines may be viewed as a quality of care indicator with which to evaluate new organizational and funding changes involving post–acute stroke rehabilitation."

Stroke rehabilitation begins during the acute hospitalization, as soon as the diagnosis of stroke is established and life-threatening problems are controlled. The highest priorities of early stroke rehabilitation are to prevent recurrence of stroke, manage comorbidities, and prevent complications (Evidence Level=C). Comprehensive assessment of patients is necessary for clinical management and evaluation of outcomes for quality control and research.[10] The use of validated, standardized instruments ensures reliable documentation of neurological conditions, levels of disability, functional independence, family support, quality of life, and progress over time[1] (Evidence Level=A).

Initiation of Secondary Stroke Prevention

After a stroke, patients are at increased risk for additional cerebrovascular events. Risk factor reduction must be an integral part of stroke rehabilitation and recovery. The need for secondary prevention of stroke is lifelong and is a critical component of rehabilitation, with clear data available on hypertension treatment, warfarin use in atrial fibrillation, and antiplatelet therapy use in cerebral ischemia[11–28] (Evidence Level=A).

Evidence-based recommendations with regard to selection and implementation of secondary prevention therapies have been issued previously by the American Heart Association/American Stroke Association (AHA/ASA).[29] These guidelines are currently being updated by the recently constituted AHA/ASA Stroke Council's Standing Committee on Secondary Stroke Prevention.

Table 1 highlights the key points of the guideline.

TABLE 1. Key Points

- The primary goal of rehabilitation is to **prevent complications, minimize impairments, and maximize function.**
- Secondary prevention is fundamental to **preventing stroke recurrence.**
- **Early** assessment and intervention are 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 to ensure optimal outcome.
- **The patients and family and/or caregiver** are essential members of the rehabilitation team.
- **Patient and family education** improves the likelihood of 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 comorbidities is essential to ensure survival.

Prevention of Complications

Deep Venous Thrombosis

See Table 2.[30–36]

Pressure Ulcers

Risk factors for skin breakdown include dependence in mobility, diabetes, peripheral vascular disease, urinary incontinence, and lower body mass index.[37,38] A thorough assessment of skin integrity should be done on admission and daily checks performed thereafter (Evidence Level=C). Positioning, turning, and transferring techniques, and barrier sprays, lubricants, special mattresses, and protective dressings and

TABLE 2. Prevention of Deep Venous Thrombosis

In ischemic stroke
Early mobilization, walking at least 50 feet daily, should always be considered.[30]
Subcutaneous low-dose unfractionated heparin (LDUH) (5000 units BID) is an option.[31]
Low-molecular-weight heparin and heparinoid products may be better than LDUH, according to limited randomized trials.[32–34] These drugs are alternatives to LDUH.
Intermittent pneumatic compression devices and compression stockings should be used in conjunction with above interventions.[35]
[*Alternative anticoagulation such as argatroban or lepirudin should be used in acute heparin-induced thrombocytopenia.*[36]]
In hemorrhagic stroke
No studies are available. Acutely, anticoagulation is avoided and nonpharmacological measures are emphasized.
Mechanical filter devices can be considered when a deep venous thrombosis is evident.

padding should be used to avoid skin injury[39] (Evidence Level=C).

Bowel and Bladder Function

Fifty percent of stroke patients have incontinence during their acute admission, decreasing to 20% by 6 months after stroke.[40] Incontinence is a major burden on caregivers, and management of bladder and bowel problems is essential. Acute use of an indwelling catheter may facilitate fluid management, prevent urinary retention, and reduce skin breakdown in patients with stroke. However, use of a Foley catheter longer than 48 hours after stroke increases the risk of urinary tract infection and should be limited to situations that cannot be managed any other way (Evidence Level=B).

Constipation and fecal impaction are more common after stroke than bowel incontinence. Goals of management are to ensure adequate intake of fluid, bulk, and fiber and to help the patient establish a regular toileting schedule. Bowel training is more effective if the schedule is consistent with the patient's previous bowel habits.[41] Stool softeners and judicious use of laxatives may be helpful (Evidence Level=I).

Dysphagia

Dysphagia occurs in 45% of all hospitalized stroke patients and can lead to worse outcomes, including aspiration pneumonia and death. Malnutrition is present in 15% of patients admitted to the hospital, and this percentage doubles during the first week after stroke.[2] A bedside swallow screening should be completed before oral intake (Evidence Level=B). If the patient's swallow screening is abnormal, a complete bedside swallow examination is recommended (Evidence Level=I).

Detailed Rehabilitation Assessments

Early and thorough assessments of a patient's cognition, communication skills, physical functioning, and psychosocial history and resources are needed to identify current abilities, set realistic goals, and guide treatment planning and interventions (Evidence Level=B).

Provision of Rehabilitation Services

Although the literature is clear that organized services are a dominant component of stroke rehabilitation, it is not possible to specify precise standards and protocols for types of specialized services needed. In general, evidence suggests that better clinical outcomes are achieved when post–acute stroke patients receive coordinated, multidisciplinary evaluation and intervention[6–8,42–49] (Evidence Level=A). The multidisciplinary care team may consist of a physician, nurse, physical therapist, occupational therapist, kinesiotherapist, speech and language pathologist, psychologist, recreational therapist, patient, and family members/caregivers. If an organized rehabilitation team is not available in the facility, patients with moderate or severe symptoms should be offered a referral to a facility with such a service (Evidence Level=I).

The most common care settings for rehabilitation services are inpatient rehabilitation facilities, nursing homes, outpatient therapy clinics, and home care. No study has demonstrated the superiority of one type of rehabilitation setting over another. The decision to provide rehabilitation services in an inpatient setting, either in the general inpatient ward, rehabilitation unit, or long-term care unit, is based on the patient's needs and availability of resources. The rehabilitation program should be guided by specific goals developed in consensus with the patient, family, and rehabilitation team. The patient's family/caregiver should participate in the decision-making process as well as the rehabilitation sessions and should be trained to assist the patient with functional activities when needed (Evidence Level=I).

Intensity/Duration of Therapy

Studies support early mobilization of the patient with an acute stroke to prevent complications. Progressive activity should be provided as soon as medically tolerated (Evidence Level=A).

Two meta-analyses found that greater intensity of services produces better outcomes. Langhorne et al[50] concluded, "More intensive physiotherapy input was associated with a reduction in the combined poor outcome of death or deterioration and may enhance the rate of recovery." Kwakkel et al[51] reported a small but statistically significant intensity–effect relationship in the rehabilitation of stroke patients. Cifu and Stewart[6] concluded that greater intensity of therapy services has "a weak relationship with improved functional outcome." Because of the heterogeneity of the studies, however, no specific recommendations about intensity or duration of treatment can be made (Evidence Level=B).

Patient and Family/Caregiver Education

Education should be provided to patients and families/caregivers in an interactive and written format (Evidence Level=B). Clinical teams should consider identifying a specific team member to be responsible for providing information to the patient and family/caregiver about the nature of the stroke, stroke management rehabilitation and outcome expectations, and their roles in the rehabilitation process (Evidence Level=C). Issues such as need for 24-hour supervision, home environment safety or equipment needs, and driving safety concerns need to be discussed. Younger stroke patients may require consideration of vocational needs as part of their rehabilitation programs. Addressing sexual issues is important given that many poststroke medications may impair this quality-of-life issue, but little research is available to make firm recommendations at this time. Some clinicians use general recommendations similar to those given to post–myocardial ischemic patients with regard to resuming sexual activities.

Specific Rehabilitation Interventions

Dysphagia

Dysphagia treatment is effective[33,52] and may involve compensatory strategies such as posture changes, heightening sensory input, swallow maneuvers, active exercise programs, or diet modifications. Dysphagia management may include nonoral feeding and psychological support. At this time, it is unclear how dysphagic patients should be fed after acute stroke.[53] The literature supports the use of tube feeding for patients who cannot sustain sufficient oral caloric and/or fluid

intake to meet nutritional needs. Limited evidence suggests that percutaneous endoscopic gastrostomy feeding compares favorably with nasogastric tube feeding[54] (Evidence Level=B).

Communication

Disorders of communication and related cognitive impairments occur in as many as 40% of poststroke patients. The most common communication disorders occurring after stroke are aphasia and dysarthria. Aphasia treatment can result in maximizing gains during the period of spontaneous recovery and developing compensatory strategies (including modification of the environment) during the chronic phase. Depending on the pathology and site of lesion, dysarthria for some patients may decrease dramatically, whereas for others, dysarthria persists and requires direct intervention of the affected subsystem (articulation, resonance, phonation, respiration, or prosody), development of compensatory behaviors, or training in the use of augmentative/alternative communication devices. If intervention is indicated, treatment can help maximize recovery of communication abilities and prevent learning of ineffective or inappropriate compensatory behaviors[55–61] (Evidence Level=A, B).

Motor Functioning

Muscle weakness is common after stroke. Lower-extremity strength has been correlated with gait speed in stroke patients.[62] Additionally, lower-extremity muscle strength on admission to rehabilitation is a predictor of function at discharge[63] and also has been inversely correlated with risk of falling in elderly individuals. Strengthening should be included in the acute rehabilitation of patients with weakness after stroke (Evidence Level=I).

More than one half of stroke patients who survive the acute phase of stroke are not able to walk and will require a period of rehabilitation to achieve a functional level of ambulation.[64] A recently proposed gait-training strategy involves unloading the lower extremities by supporting a percentage of body weight to facilitate walking. One subsequent trial found equally beneficial results from a program that included aggressive bracing and assisted walking.[65] It is recommended that treadmill training with partial body weight support may be used as an adjunct to conventional therapy in patients with mild-to-moderate dysfunction resulting in impaired gait (Evidence Level=B).

Persistent loss of upper-extremity function is common among patients with substantial motor function loss after a stroke. One approach aimed at resolving upper-extremity dysfunction has been termed constraint-induced movement therapy, which involves forced use of the involved upper extremity and discourages the use of the unaffected extremity. One study showed a trend toward improved function with the use of constraint-induced movement therapy; however, conclusions are difficult to draw because of the small sample size and significant demographic differences between the study groups.[66] Use of constraint-induced therapy should be considered for a select group of patients—that is, patients with 20 degrees of wrist extension and 10 degrees of finger extension, who have no sensory and cognitive deficits (Evidence Level=C).

Functional electrical stimulation (FES) has been used as a therapeutic modality for poststroke patients but has not been a routine standard of care. There is evidence of short-term increases in motor strength and motor control and a reduction in impairment severity, but there is no evidence of an increase in the patient's level of function.[67–69] It is recommended that FES be used for patients who have demonstrated ankle/knee/wrist motor impairment, for patients who have shoulder subluxation, and for gait training after stroke (Evidence Level=B).

Spasticity

Patients with paretic limbs and muscle spasticity are at high risk of developing contractures that restrict movement, cause pain, and adversely affect skin hygiene. Early treatment is key to preventing disabling complications. Spasticity is typically treated in a stepwise approach, beginning with noninvasive and progressing to more invasive modalities. Positioning, passive stretching, and range-of-motion exercise may provide relief and should be done several times daily in persons with spasticity.[1,2] Corrective measures for contractures that interfere with function include splinting, serial casting, and surgical correction (Evidence Level=C).

Oral drug agents such as tizanidine,[70] dantrolene,[71] and oral baclofen[72] can be used to treat spasticity that results in pain, poor skin hygiene, or decreased function. Tizanidine should be used specifically for chronic stroke patients (Evidence Level=B).

Evidence of functional gains with these agents is scant, and they may produce significant cognitive or other side effects.[73,74] Diazepam or other benzodiazepines are not recommended during the stroke recovery period because of possible deleterious effects on recovery[75–77] (Evidence Level=D).

Use of botulinum toxin,[78–80] phenol/alcohol neurolysis[81–83] (Evidence Level=B), or intrathecal baclofen[84] (Evidence Level=C) should be considered for selected patients with disabling or painful spasticity. Neurosurgical procedures, such as selective dorsal rhizotomy or dorsal root entry zone lesion, may be considered for spasticity, but they lack clinical trial evidence and carry significant risks such as unintended spinal cord damage (Evidence Level=I).

Shoulder Pain

Shoulder pain is a common problem after stroke. As many as 72% of stroke patients will experience at least one episode of shoulder pain during the first year.[85] There are several causes of poststroke shoulder pain, including adhesive capsulitis, traction/compression neuropathy, complex regional pain syndrome, shoulder trauma, bursitis/tendonitis, rotator cuff tear, and heterotrophic ossification. Shoulder pain can delay rehabilitation and functional recuperation because the painful joint may mask improvement of motor function or may inhibit rehabilitation. The incidence of shoulder-hand pain syndrome has been reported to be as high as 67% in patients with a combination of motor, sensory, and visual-perceptual deficits.[30] A variety of treatment interventions could be considered for the treatment of poststroke shoulder pain,

including avoiding the use of overhead pulleys (which encourage uncontrolled abduction), staff education to prevent trauma to the hemiplegic shoulder, intra-articular steroid injections, shoulder strapping, stretching and mobilization techniques, ice, heat, soft tissue massage, FES, and shoulder girdle strengthening (Evidence Levels=B, C).

Psychological

Cognitive deficits after stroke are very common. Although there are anecdotal and large case studies supporting the benefits of cognitive remediation, evidence-based research is lacking and the most research has been in the traumatic brain injury population. The data support a thorough assessment of cognitive functioning as well as treatment of patients with several areas of cognitive impairment via multiple disciplines.[86–91] Teaching compensatory strategies for memory deficits, in particular, may be beneficial[87,92] (Evidence Level=B).

Visual and spatial neglect may occur in patients with nondominant cortical stroke and is a significant contributor to poor prognosis after stroke because it impacts the patient's ability to function safely within the environment. The literature does not suggest any single intervention for addressing neglect, although a multifaceted approach with a strong educational component can help patients adapt to these deficits[93–98] (Evidence Level=B).

A variety of neuropsychiatric sequelae are seen after stroke, with depression in particular being common and underdiagnosed.[99] Anxiety and pathological affect are also seen. The assessment of emotional disorders can be difficult because of aphasia, flat affect, aprosodic speech, and the lack of standardized instruments. Therefore, observation of behavior and utilization of input from family and staff can aid in diagnosing neuropsychiatric disorders.[100] In many instances, it is necessary to call on the expertise of a psychologist or psychiatrist with background in assessment of patients with cognitive and communication disorders.

Once diagnosed, treatment of depression and other emotional disorders can greatly improve rehabilitation outcomes[101,102] (Evidence Level=A). Treatment with psychotherapy (Evidence Level=C) and/or pharmacotherapy (Evidence Level=A) can stabilize mood and improve ability to participate in therapies. Selective serotonin reuptake inhibitors and tricyclic antidepressant medications have been shown to be beneficial for treatment of depression and pathological affect. Given the high incidence of anticholinergic effects with tricyclic medications in older patients, selective serotonin reuptake inhibitors are the preferred agents.[2,103–111]

Use of Pharmacological Agents

While undergoing rehabilitation, stroke patients frequently receive a variety of medications to treat complications of stroke or other unrelated chronic medical conditions. We do not recommend amphetamine use for motor recovery, on the basis of negative large amphetamine clinical stroke recovery trials[112–114] and the lack of documented long-term benefits. Limited data support the use of other neurotransmitter-releasing agents to promote stroke recovery, including methylphenidate,[115] levodopa,[116] and L-threo-3,4-dihydroxyphenyl serine (L-DOPS).[117] Fluoxetine in nondepressed patients appeared to have a small benefit in motor recovery independent of the treatment of depression.[118] Modafinil, a novel stimulant, is selectively used in stroke patients but without proven safety or efficacy. Current data do not permit discrimination among these agents, identification of optimal dosing, or selection of the preferred time of initiation of pharmacotherapy after stroke or the duration of treatment (Evidence Level=B).

Limited data suggest that central nervous system depressants such as neuroleptics, barbiturates, benzodiazepines, and anticonvulsants are associated with poorer outcomes.[78–80] Centrally acting α_2-adrenergic receptor agonists and α_1-receptor antagonists such as clonidine and prazosin have been associated with poorer recovery in studies in animals.[79] *[Notably, benzodiazepines have been demonstrated to cause reoccurrence of stroke symptoms in transient ischemic attack patients.*[119]*]* Clinicians should limit the use of these medications in patients recovering from stroke as much as is practical (Evidence Level=D). Atypical neuroleptics may be safer to use when necessary for behavioral control in stroke patients but are only available in oral form (Evidence Level=C).

TABLE 3. Late-Phase Needs Assessments

1.	Ongoing management of stroke risk factors and comorbid disease
2.	Participation in a regular exercise program
3.	Adaptive devices for activities of daily living
4.	Lower-extremity orthoses and walking aids
5.	Wheelchair
6.	Vocation assessment and return to work
7.	Driving
8.	Sexuality

Late Phase

The majority of patients who have had a stroke will be managed initially in a hospital. Discharge from inpatient care to home (or to residential living or a nursing facility) constitutes an important watershed. Living with disabilities after a stroke is a lifelong challenge during which people continue to seek and find ways to compensate for or adapt to persisting neurological deficits. For many, the real work of recovery begins after formal rehabilitation when the patient attempts to use newly learned skills without the support of the rehabilitation environment or team. Adequate support from family and caregivers is critical to a successful outcome. It is also important to assure that all necessary equipment and support services are in place (Evidence Level=I). See Table 3 for late-phase needs assessments.

Summary

The clinical practice guidelines described above represent the best efforts of a joint task force from the Department of Veterans Affairs and the US Department of Defense to provide evidence-based medical care for patients in need of stroke rehabilitation. In addition to providing state-of-the-art direction for clinicians, the guidelines can also help research-

ers to identify areas for further investigation. In turn, this research can result in more effective procedures and more efficient technology.

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