

Stroke Rehabilitation—An Overview of Existing Guidelines and Standards of Care

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Abstract

Over seven million stroke survivors live in the US today. Despite the publication of the first post-stroke rehabilitation clinical practice guideline in 1995, many healthcare providers are unaware not only of stroke survivors' potential for functional recovery, but also common secondary complications of stroke. This article summarizes the best available evidence-based recommendations for interdisciplinary management of the stroke survivor and caregivers from five sources: two in the US, one in Canada, and two in the UK. Unique characteristics of each guideline are described, followed by a list of common clinical recommendations found in most, if not all, of the guidelines. Despite the advances in stroke rehabilitation over the past 16 years, much research still needs to be done to improve the level of evidence in stroke rehabilitation.

Keywords

Stroke, rehabilitation, practice guideline, standard of care, review, societies

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In the US, the incidence rate of new or recurrent stroke is approximately 795,000 per year, and stroke prevalence for individuals over the age of 20 years is estimated at seven million.¹ Mortality rates in the first 30 days post-stroke have decreased owing to advances in emergency medicine and acute stroke care. There is also strong evidence that organized post-acute, inpatient stroke care delivered within the first four weeks by an interdisciplinary healthcare team results in an absolute reduction of deaths.^{2,3} Despite these achievements, 25–74 % of stroke survivors require some assistance or are fully dependent on caregivers for activities of daily living (ADLs).^{4,5} Thus, stroke continues to represent a leading cause of long-term disability and long-term care placement.

Despite the publication of the Agency for Healthcare Policy and Research (AHCPR) Guideline for Post-Stroke Rehabilitation in 1995,⁶ many healthcare providers are unaware not only of stroke survivors' potential for motor recovery, but also common secondary complications of stroke. Since this time, a number of clinical practice guidelines have attempted to educate interdisciplinary stroke rehabilitation teams about many of these issues. This article summarizes the best available evidence-based recommendations for interdisciplinary management of the stroke survivor and caregivers. The recommendations emanate from the work of the US Departments of Veterans Affairs and Defense (VA/DoD),⁷ the American Heart Association (AHA) Councils on Stroke and Cardiovascular Nursing,⁸

the Canadian Stroke Strategy (CSS),⁹ the Scottish Intercollegiate Guideline Network (SIGN),¹⁰ and the National Institute for Health and Clinical Excellence (NICE).¹¹ The article is organized into the two major sections of unique characteristics of the guidelines and common clinical recommendations.

Unique Characteristics of the Guidelines

Each of the guidelines has its own methodology for developing its guideline. A set of researchable questions and associated key terms were developed within a number of focus areas. Inclusion criteria were developed for the literature search. The literature search resulted in a body of evidence that was critically reviewed for the strength of its findings. Each panel reviewed the body of evidence that addressed a particular question using an established method, formulated recommendations, and graded the evidence supporting each recommendation.

Department of Veterans Affairs and Defense Guideline

The VA/DoD Clinical Practice Guideline for the Management of Stroke Rehabilitation is divided into seven sections, including topics in rehabilitation in the acute phase, medical rehabilitation problems (e.g. bowel, bladder, stroke prevention), medical comorbidities (e.g. hypertension, cardiac, depression), impairments (e.g. motor, sensory, communication, cognitive), basic and instrumental activities of daily living, the rehabilitation program (e.g. needs, setting, interventions, community

re-entry), and discharge from the rehabilitation program (e.g. medical follow-up). The guideline offers three algorithms for the assessment of inpatient rehabilitation, the re-assessment of inpatient rehabilitation, and the assessment for community services. The first algorithm provides a framework for the evaluation of impairments and activity limitations and participation restrictions, medical comorbidities, potential secondary complications, and triage of rehabilitation services. The second algorithm assesses functional progress and whether the stroke survivor in inpatient rehabilitation still requires inpatient services. The final algorithm assesses the need and environment for community-based rehabilitation services. All of the algorithms include the stroke survivor and caregiver in education and decision-making that are central to the patient-centered process.

American Heart Association Council on Stroke and Cardiovascular Nursing Guideline

The AHA Councils on Stroke and Cardiovascular Nursing guideline divides up rehabilitation care using two classification schemes. First, the guideline considers rehabilitation care in inpatient and outpatient environments, in chronic care, and at end-of-life. Each of the environments is defined, and the services provided to the stroke survivor are described. Second, the guideline uses the World Health Organization's (WHO) International Classification of Functioning, Disability, and Health (ICF)¹² as an organizational framework to provide an overview of the interdisciplinary team approach to rehabilitation. The ICF model acknowledges that stroke recovery is a multifaceted process encompassing the interplay of the pathophysiologic processes directly related to the stroke and its associated comorbidities, the impact that stroke has on the stroke survivor, and contextual factors such as personal and environmental resources. As a result, the impact of stroke is described in terms of loss of body functions and structures; activity limitations that stroke survivors experience in basic and instrumental ADLs; and participation restrictions that stroke survivors encounter when re-establishing previous or developing new life roles and societal involvement. Personal factors may include internal attributes (e.g. gender, comorbidities, ethnocultural background), whereas environmental factors include external attributes (e.g. family support, social attitudes, architectural barriers, healthcare resources).

Canadian Stroke Strategy Guideline

The CSS guideline draws its evidence from the web-based Evidence-Based Review of Stroke Rehabilitation.¹³ Like the AHA guideline, the CSS guideline attempts to make recommendations based upon the environment in which stroke rehabilitation takes place. In addition, it organizes guidance into sections on best practices, rationale, system implications, and performance measures. For example, the best practice for prophylaxis of deep venous thrombosis (DVT) states: "Patients at high risk of venous thromboembolism should be started on venous thromboembolism prophylaxis immediately..." While the rationale for DVT prophylaxis is obvious, the system implication suggests: "standardized evidence-based protocols for optimal inpatient care of all acute stroke patients, regardless of where they are treated in the healthcare facility..." The related performance measure is defined as the: "percentage of patients with stroke who experience complications (such as venous thromboembolism) during [their] inpatient stay..." As a result, this recommendation scheme proposes potential solutions to operationalize and monitor guideline implementation.

Table 1: Strength of Recommendation Rating (from the Canadian Stroke Strategy)⁹

A	Strong recommendation. Evidence from randomized controlled trials or meta-analyses of randomized controlled trials. Desirable effects clearly outweigh undesirable effects, or vice versa
B	Single randomized controlled trial or well-designed observational study with strong evidence; or well-designed cohort or case-control analytic study; or multiple time series or dramatic results of uncontrolled experiment. Desirable effects closely balanced with undesirable effects
C	At least one well-designed, non-experimental descriptive study (e.g. comparative studies, correlation studies, case studies), or expert committee reports, opinions and/or experience of respected authorities, including consensus from development and/or reviewer groups

Based on Guyatt GH, et al.¹⁴

Scottish Intercollegiate Guideline Network Guideline

The SIGN guideline also bases its recommendations on the WHO ICF classification scheme. It is divided into five sections: organization of services; management and prevention strategies; transfer from hospital to home; roles of the multidisciplinary team; and provision of information. The section on transfer from hospital to home takes into account community re-entry issues, such as post-discharge support, driving, and follow-up by a primary care provider. The section on roles of the multidisciplinary team emphasizes the need for collaboration and communication. The section on provision of information emphasizes active education and counseling techniques that take into account the needs, values, and preferences of the stroke survivor and his caregivers. The section concludes with a list of Scottish stroke advocacy and caregiver websites.

National Institute for Health and Clinical Excellence Guideline

Finally, the NICE guideline is the oldest of the guidelines, having been issued in July, 2008. The guideline encompasses comprehensive stroke care, of which rehabilitation comprises two sections: recovery phase from impairments and limited activities; and long-term management after recovery. The recovery phase sections consist of 52 sub-sections that cover general topics, a number of specific treatments, common impairments seen after stroke, activity limitations, and personal and environmental adaptations and equipment. The long-term management section discusses monitoring disability and episodes of further rehabilitation, long-term support and care at home, management in nursing homes and residential care, and caregiver support. Following these recommendations, the guideline organizes recommendations that are pertinent to nurses, physical therapists, occupational therapists, speech-language pathologists, and nutritionists. The guideline is scheduled for updating in December, 2011.

Common Clinical Recommendations

According to the VA/DoD Clinical Practice Guideline for the Management of Stroke Rehabilitation,⁷ the primary goal of rehabilitation is to prevent complications, minimize impairments, and maximize function. A number of key points influence the types of recommendations on which the guidelines are based:

- Early assessment and intervention is critical to optimize rehabilitation.
- Secondary prevention is fundamental for preventing stroke recurrence.

Table 2: Summary of the Guidelines' Recommendations

Recommendation	Evidence Level
Early Stroke Rehabilitation Assessment	
1) All patients admitted to an acute care hospital for a stroke should have an initial assessment by rehabilitation professionals as soon as possible after admission; preferably within the first 24 to 48 hours	A C
2) The initial assessment should include assessment of patient function; safety and risk; physical readiness and ability to learn and participate; and transition planning	C
3) All patients with acute stroke with residual stroke-related impairments who are not admitted to hospital should undergo a comprehensive outpatient assessment(s) for functional impairment, which includes a cognitive evaluation, screening for depression, screening for fitness to drive, as well as functional assessments for potential rehabilitation treatment; preferably within two weeks	A C
Secondary Prevention	
1) Lifestyle and risk factor interventions should include: healthy balanced diet;	B
recommended daily sodium intake;	B
exercise;	A
body mass index (BMI) of 18.5 to 24.9 kg/m ² or waist circumference <80 centimeters for women and <94 centimeters for men;	B
smoking cessation; and	A
limiting alcohol consumption to two drinks daily (14 drinks weekly) for men, and one drink daily (nine drinks weekly) for women	C
2) Anti-platelet medications: Acetylsalicylic acid, combined acetylsalicylic acid (25 mg) and extended-release dipyridamole (200 mg), or clopidogrel (75 mg) are all appropriate options for non-embolic ischemic stroke	A
Long-term concurrent use of acetylsalicylic acid and clopidogrel is not recommended for secondary stroke prevention unless there is a compelling indication	B
3) Anti-coagulation medications: Ischemic stroke survivors with atrial fibrillation should receive oral anticoagulant therapy (warfarin or dabigatran) unless contraindicated	A
4) Carotid endarterectomy/stenting: Survivors of transient ischemic attack (TIA) or non-disabling stroke and ipsilateral 50 to 99 per cent internal carotid artery stenosis (measured by two concordant non-invasive imaging modalities) should be offered carotid endarterectomy optimally within fourteen days of the incident event once the patient is clinically stable	A
Carotid stenting may be considered for patients who are not operative candidates for technical, anatomic or medical reasons	A
5) Hypertension: Stroke survivors should lower their blood pressures to achieve a target of consistently lower than 140/90 mmHg	C
Stroke survivors with either diabetes mellitus or non-diabetic chronic kidney disease should lower their blood pressures to achieve a target consistently lower than 130/80 mm Hg	A and C, respectively
6) Dyslipidemia: Stroke survivors should modify their diets as part of a comprehensive approach to achieve low-density lipoprotein (LDL) cholesterol of <100 mg/dL or <70 mg/dL in stroke survivors who already have heart disease	A
7) Diabetes mellitus: Glycemic therapy in most stroke survivors should be targeted to achieve a glycated hemoglobin (HbA _{1c}) level ≤7.0 %	A
Interdisciplinary Team	
1) All patients with stroke require inpatient rehabilitation should be treated in a comprehensive or rehabilitation stroke unit by an interdisciplinary team	A
2) Post-acute stroke care should be delivered in a setting in which rehabilitation care is formally coordinated and organized	A
3) All stroke survivors should be referred to a specialist rehabilitation team on a geographically defined unit as soon as possible after admission; Pediatric acute and rehabilitation stroke care should be provided on a specialized pediatric unit	A B
4) The interdisciplinary rehabilitation team should consist of a physician, nurse, physical therapist, occupational therapist, speech-language pathologist, psychologist, recreational therapist, patient, and family and/or caregivers; for children, the team also should include an educator and child life worker	A
This core interdisciplinary team should consist of appropriate levels of these disciplines, as identified by the Stroke Unit Trialists' Collaboration	B
5) The interdisciplinary rehabilitation team should assess stroke survivors within 24 to 48 hours of admission and develop a comprehensive individualized rehabilitation plan which reflects the severity of the stroke and the needs and goals of the stroke patient	C
Standardized Assessments	
Clinicians should use standardized, valid assessment tools (e.g., NIH Stroke Scale, Functional Independence Measure) to evaluate the patient's stroke-related impairments and functional status	B
Interventions	
1) All stroke survivors should begin rehabilitation therapy as early as possible once medical stability is reached	A
2) Stroke survivors should receive the intensity and duration of clinically relevant therapy defined in their individualized rehabilitation plan and appropriate to their needs and tolerance levels	A
3) The team should promote the practice of skills gained in therapy into the patient's daily routine in a consistent manner	A
4) Therapy should include repetitive and intense use of novel tasks that challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities	A

Table 2 (cont.):

Recommendation	Evidence Level
5) Upper limb:	
A Exercise and functional training should be directed towards enhancing motor control for restoring sensorimotor and functional abilities	A
B Engage in repetitive and intense use of novel tasks that challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities	A
C An upper limb program should include strength training to improve impairment and function after stroke for upper extremity. Spasticity is not a contraindication to strength training; therapists should provide a graded repetitive arm supplementary program for patients to increase activity on the rehabilitation unit and at home	A A
D Following appropriate cognitive and physical assessment, mental imagery should be used to enhance sensory-motor recovery in the upper limb	Early-level A, late-level B
E Functional electrical stimulation (FES) should be used for the wrist and forearm to reduce motor impairment and improve functional motor recovery	A
F Intensive constraint-induced movement therapy (CIMT) should not be used for individuals in the first month post stroke until further research is completed	A
It can be used in a select group of patients with specific inclusion criteria ¹⁵	A
G Electromyography (EMG) biofeedback systems should not be used on a routine basis	A
H There is insufficient evidence to recommend for or against neurodevelopmental treatment in comparison to other treatment approaches for motor retraining following an acute stroke	B
I Use adaptive devices for safety and function if other methods of performing specific tasks are not available or cannot be learned	C
6) Lower limb:	
A Task-oriented training (i.e. training that is progressively adapted, salient, and involves active participation) is recommended to improve transfer skills and mobility	C
B Lower extremity orthotic devices may be helpful if ankle or knee stabilization is needed to help the patient walk. Prefabricated bracing can be used initially, and more expensive customized bracing reserved for patients who demonstrate a long-term need	C
C FES should be considered for use in improving muscle force, strength and function (gait) in selected patients. FES must not be assumed to have sustained effects	C
D There is no conclusive evidence that body weight-supported treadmill training (BWSTT) is superior to overground training to enhance walking abilities. BWSTT could be considered when other strategies for walking practice are unsuccessful in those patients with low ambulatory function	B
7) Spasticity/Contracture:	
A Spasticity and contractures should be treated or prevented by anti-spastic pattern positioning, range-of-motion exercises, stretching and/or splinting	C
B For stroke survivors with focal and/or symptomatically distressing spasticity, consider use of chemodenervation using botulinum toxin to increase range of motion and decrease pain	Early-level C, late-level A
C Consider use of tizanidine for spasticity in patients with generalized, disabling spasticity resulting in poor skin hygiene, poor positioning, increased caregiver burden or decreased function	Early-level C, late-level B
D Recommend against prescription of benzodiazepines during stroke recovery period due to possible deleterious effects on recovery, in addition to deleterious sedation side effects	B
8) Depression:	
A Stroke survivors with post-stroke depression should be considered for antidepressant treatment, with decisions made on an individual basis. Clinicians should monitor response to treatment, plan regular reviews and should be vigilant to the possible occurrence of unwanted side effects, issues of adherence to medication and the possibility of symptom relapse	A
B Routine prescription of antidepressants is not recommended to prevent post-stroke depression	A
9) Falls:	
Stroke survivors who are identified as high risk for falls in the community should have a comprehensive set of interventions implemented, such as an individually prescribed exercise program, in order to prevent or reduce the number and severity of falls	A
10) Dysphagia:	
Stroke survivors with dysphagia should be offered swallowing therapy and the opportunity for reassessment as required	A
11) Cardiovascular fitness:	
Stroke survivors should be provided with a cardiovascular fitness program to maximize functional outcomes after stroke (and as part of overall vascular risk reduction)	B
Education (Specific Areas of Education are Addressed in Each of the Guidelines)	
1) As integral parts of the stroke rehabilitation team, the stroke survivor, family and caregiver must be addressed at all stages across the continuum and at all transition points of stroke care for both adult and pediatric patients Patient and family education should include information sharing, teaching patients self-management skills, and training of caregivers	A
2) Educational content should be specific to the phase of care or recovery and appropriate to the readiness and needs of the stroke survivor, family, and caregiver	B
3) The scope of the educational content should cover all aspects of stroke care and recovery	A
4) Education should be interactive, up to date, ongoing, and provided in a variety of languages and formats (e.g., written, oral, group counseling approach), and ensure communicative accessibility for stroke survivors	B

Table 2 (cont.):

Recommendation	Evidence Level
5) Patient education should promote self-efficacy through mastering self-management skills, including action planning, modeling behaviors and problem-solving strategies, reinterpreting symptoms, and social persuasion through group support and guidance for individual efforts	B
Community Resources	
1) The care management plan should include a pre-discharge needs assessment to ensure a smooth transition from rehabilitation back to the community. Elements of discharge planning should include a home visit by a healthcare professional, ideally before discharge, to assess home environment and suitability for safe discharge, determine equipment needs and home modifications, and begin caregiver training for how the patient will manage activities of daily living and instrumental activities of daily living in their environment	C
2) Patients, families, and caregivers should be prepared with appropriate and realistic expectations regarding role changes, and the availability of services and resources within changing care environments	C
3) Support should include:	
A Written discharge instructions from care providers that identify action plans, follow-up care, and goals, provided to the patient, family, and primary caregiver	C
B Access to a contact person in the hospital or community (designated case manager or system navigator) for post-discharge queries	C
C Access to and advice from health and social service organizations (e.g., through single points of access to all organizations)	C
D Referrals to community agencies such as stroke survivor groups, peer survivor visiting programs, and other services and agencies	C
Ongoing Medical Management	
After leaving the hospital or inpatient rehabilitation facility, stroke survivors must have access to specialized stroke care and rehabilitation services appropriate to their needs	A

- 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.
- 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.
- Patient and family education improves informed decision-making, social adjustment, and maintenance of rehabilitation gains.
- The rehabilitation team should use community resources for community reintegration.
- Ongoing medical management of risk factors and comorbidities is essential to ensure survival.

Based upon this paradigm, a number of recommendations made by most or all of the guidelines are summarized. To simplify the recommendations from the different clinical practice guidelines, the recommendations and classification scheme described by the CSS guideline is used (see *Table 1*).⁹ The summary of recommendations can be seen in *Table 2*.

Conclusion

A number of well-organized clinical practice guidelines in stroke rehabilitation have been published over the past three years. They all are updated from previous editions, have established methods for collecting and rating the scientific evidence, have established techniques for reaching professional consensus, and have clear structure in stating and justifying each recommendation.

However, the publication of these updated guidelines emphasizes a major shortcoming. Despite the advances in stroke rehabilitation since the publication of the AHCPH Guideline for Post-Stroke Rehabilitation in 1995, the reader should note that many of the recommendations still carry an evidence level C rather than an evidence level A. There are still many questions to be answered to improve the level of evidence in stroke rehabilitation. As researchers continue to answer many of these questions, stroke survivors will be able to benefit from proven tools that decrease impairments, increase activity limitations and participation restrictions, and ultimately improve quality of life. ■

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