VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF **STROKE REHABILITATION** IN THE PRIMARY CARE SETTING

Department of Veterans Affairs
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THE MANAGEMENT OF STROKE REHABILITATION

TABLE OF CONTENTS

APPENDICES

VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF **STROKE REHABILITATION** IN THE PRIMARY CARE SETTING

INTRODUCTION

INTRODUCTION

Stroke is a leading cause of disability in the United States (National Stroke Association, 1994). The Veterans Health Administration (VHA) of the Department of Veterans Affairs (VA) estimates that 15,000 veterans are hospitalized for stroke each year (VA HSR&D, 1997).

Forty percent of stroke patients are left with moderate functional impairments and 15 to 30 percent with severe disability (American Heart Association, 2000). Effective rehabilitation interventions initiated early following stroke can enhance the recovery process and minimize functional disability. Improved functional outcomes for patients also contribute to patient satisfaction, as well as reduce potential costly long-term care expenditures.

There are only 45 rehabilitation bed units (RBU) in the VA today. Many veterans who have a stroke and are admitted to a VA Medical Center will find themselves in a facility that does not offer comprehensive, integrated, coordinated care. In a VA rehabilitation field survey published in December 2000, over half of the respondents reported that the "rehabilitative care of stroke patients was incomplete, fragmented, and not well coordinated" at sites lacking a RBU (VA Stroke Medical Rehabilitation Questionnaire Results, 2000).

In DoD medical treatment facilities there were approximately 20,000 active duty and dependents seen in 2002 for stroke and stroke related diagnoses according to ICD-9 coding (AMEDD-PASBA, 2003). Comprehensive treatment for stroke patients in DoD medical facilities is given primarily at medical centers. maller DoD community hospitals may have limited resources to see both inpatients and outpatients relying more on the TRICARE network for on-going stroke rehabilitation services.

There is a growing body of evidence that indicates patients do better with a well-organized, multidisciplinary approach to post-acute stroke care (Cifu & Stewart, 1999; Evans et al., 1995; Stroke Unit Trialists' Collaboration, 2002). The VA/DoD Stroke Rehabilitation Working Group only focused on the rehabilitation phase of the post-acute care.

Duncan and colleagues (2002c) 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." 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 VA/DoD Stroke Rehabilitation Working Group builds on the 1996 VA Stroke/Lower Extremity Amputee Algorithms Guide, as well as incorporating information from the following existing evidence-based guidelines/reports (see Appendix E – Guideline Development Process):

- Agency for Health Care Policy and Research (AHCPR) Post-Stroke Rehabilitation (1995)
- Scottish Intercollegiate Guidelines Network (SIGN) Management of Patients with Stroke, 20 (1997)
- Royal College of Physicians (RCP) National Clinical Guidelines for Stroke (2000)

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 interventions and evaluations. The guideline was developed to assist facilities to put in place processes of care that are evidence-based and designed to achieve maximum functionality and independence and improve patient/family quality of life. It will provide facilities lacking an organized RBU a structured approach to stroke care and assure that veterans who suffer a stroke will have access to comparable care, regardless of geographic location. The algorithm will serve as a guide that clinicians can use to determine best interventions and timing of care for their patients, better stratify stroke patients, reduce re-admission, and optimize healthcare utilization. If followed, the guideline is expected to have impact on multiple measurable patient outcome domains.

Finally, new technology and more research will improve patient care in the future. The clinical practice guideline can assist in identifying priorities for research efforts and allocation of resources. As a result of implementing evidence-based practice, followed by data collection and assessment, new practice-based evidence may emerge.

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 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 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™ (UDS_{MR}, 1997) (see Appendix D). 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 ADL, but also the ability to carry out more complex activities (i.e., IADL), 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 (Duncan et al., 2002a), may be considered for a more comprehensive assessment of functional status and quality of life.

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VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF **STROKE REHABILITATION** IN THE PRIMARY CARE SETTING

THE PROVISION OF REHABILITATION CARE

THE PROVISION OF REHABILITATION CARE

Organization of Post-Acute Stroke Rehabilitation Care

BACKGROUND

Stroke rehabilitation begins during the acute hospitalization, as soon as the diagnosis of stroke is established and life-threatening problems are under control. The highest priorities during this early phase are to prevent a recurrent stroke and complications, ensure proper management of general health functions, mobilize the patient, encourage resumption of self-care activities, and provide emotional support to the patient and family. Following the "acute" phase of stroke care, the focus of care turns to assessment and recovery of any residual physical and cognitive deficits, as well as compensation for residual impairment.

Over the years, the organization and delivery of stroke care has taken many forms. With the growth of physical medicine, occupational therapy, and physical therapy, varying therapeutics and treatment settings have evolved. Assessment of the effect of stroke care organization and settings is difficult due to the extreme variability of organizational settings. For example, on the one extreme, rehabilitation services can be provided in an outpatient setting—one hour per day, three days per week, by one therapist. At the other end of the structural continuum, rehabilitation services can be provided in a rehabilitation hospital setting—five hours per day, seven days per week, by a team made up of several clinicians.

The Agency for Healthcare Policy and Research Guideline for Post-Stroke Rehabilitation (AHCPR, 1995) has 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 several studies and trials 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. Their 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).

RECOMMENDATIONS

1. Better clinical outcomes are achieved when post-acute stroke patients, who are candidates for rehabilitation, receive coordinated, multidisciplinary evaluation and intervention.
    - Post-acute stroke care should be delivered in a setting where rehabilitation care is formally coordinated and organized.
    - Post-acute 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.
    - The multidisciplinary team may consist of a physician, nurse, physical therapist, occupational therapist, kinesiotherapist, speech and language pathologist, psychologist, recreational therapist, patient, and family/caregivers.
2. 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 team, or a physician or rehabilitation specialist with some experience in stroke should be involved in the patient's care.
3. An organized team approach should also be continued in coordinating the outpatient or home-based rehabilitation care. Community resources for stroke rehabilitation services that include an organized team should be identified and provided to patients and families/caregivers.

DISCUSSION

The evidence for both acute and post-acute (rehabilitation) stroke care suggests that organized care for post-stroke patients is worthwhile to achieve optimal outcomes, and the outcomes measured are substantial (i.e., mortality and dependency and return to community living). In several randomized controlled trials, stroke unit care or organized inpatient multidisciplinary rehabilitation showed improved outcome compared to "standard" care.

Studies of Care in the Acute and Post-Acute Rehabilitation Settings

The Stroke Unit Trialists' Collaboration review (updated in 2001) concluded, "Patients receiving organized inpatient stroke unit care were more likely to survive, regain independence, and return home than those receiving a less organized service." The Cochrane review further concluded, "Acute stroke patients should be offered organized inpatient stroke unit care, typically provided by a coordinated multidisciplinary team operating within a discrete stroke ward that can offer a substantial period of rehabilitation, if required. There are no firm grounds for restricting access according to a patient's age, sex, or stroke severity." However, the reviewers also cautioned that there could be a wide range of results because of varying outcome rates and confidence intervals. The most recent update of this systematic review involved investigators from nearly all the trials, to try to determine why stroke unit care was superior. They found little evidence of differences in staff numbers or mix, although a tendency was shown for assessment and *therapy to begin earlier* in organized settings.

Evans and colleagues (1995) compared the effectiveness of multidisciplinary inpatient physical rehabilitation programs with standard medical care. Based on 11 studies, the researchers found that rehabilitation services improved short-term survival, functional ability, and most independent discharge location. However, they did not find long-term benefits. The authors suggested, "The lack of long-term benefits of short-term rehabilitation may suggest that therapy should be extended to home or sub-acute care settings, rather than being discontinued at discharge."

Cifu and Stewart (1999) reviewed studies that investigated the type of inpatient rehabilitation (interdisciplinary versus multidisciplinary) as a predictor of outcome following a stroke. The authors concluded that an interdisciplinary setting (i.e., services "provided by diverse professionals who constitute a team that communicates regularly and uses its varying expertise to work toward common goals") is strongly related to improved outcome. A specialized multidisciplinary team (which usually includes similar professionals as an interdisciplinary team, but with less consistent "regular communication and common goal orientation") appears to be less effective if it lacks the organizational structure provided by regular communication. Other predictors for improved outcome at hospital discharge and follow-up were increased functional skills on admission to rehabilitation and early initiation of rehabilitation services. Specialized therapy and a greater intensity of therapy services had "a weak relationship with improved functional outcome at hospital discharge and follow-up" and the authors observed that the "current literature is too limited to allow an assessment of the relationship of specific types of non-inpatient rehabilitation services after stroke and functional outcome."

Indreavik et al. (1997-1999) examined the long-term benefits for a combined acute and rehabilitation stroke unit in Norway. Starting with 220 patients, the researchers compared outcomes for surviving patients at 5 years (n=77) and 10 years (n=31) after discharge. Differences in treatment were confined to the first six weeks of treatment. Reportedly, there were no differences in the severity of the strokes in the control and experimental groups. Quality of life was measured by the Frenchay Activities Index (FAI), Nottingham Health Profile (NHP) (81 percent of patients), and a visual analog scale (86 percent of patients). Functional status was measured using the Barthel Index (BI). More patients in the stroke unit group had an FAI score $\geq$30 than did patients in the general ward. The FAI and visual analog scale scores favored stroke unit patients (34.2 versus 27.2; P=0.01 for FAI and 72.8 versus 50.7 mm; P=0.002 for the visual analog scale). Patients in both groups who had better functional status measured by the BI also had higher quality of life scores. Acute care in a stroke unit improved quality of life for patients at 5 years (Indreavik et al., 1998). The researchers also studied survival, proportion of patients living at home, and functional status measured by the BI. Intention-to-treat analysis was used. At 5 years, the Kaplan-Meier survival curve analysis showed that survival was higher in the stroke unit group than in

the ward care group (41 versus 29 percent; P=0.04). More patients who received stroke unit care were living at home (P=0.006), were independent (BI score ≥95; P=0.004), or were at least partly independent (BI score ≥60; P=0.006) (Indreavik et al., 1999). The groups did not differ for help or support received at home. Stroke unit care improved long-term survival and functional status and increased the number of patients living at home.

In a randomized control trial (Kalra et al., 2000), 457 acute stroke patients were assigned to three differing levels of treatment (stroke unit, general ward, domiciliary care). Patients who survived without severe disability at 1 year post-stroke in the three groups were: 129 (85 percent), 99 (66 percent), and 102 (71 percent). Stroke unit care was significantly better than the two lower levels of care. The net effect of the stroke unit was profoundly different for approximately 30 patients (20 percent of sample).

Studies of Care in the Post-Acute Rehabilitation Setting

Langhorne and Duncan (2001) conducted a systematic review of a subset of the studies identified by the Stroke Unit Trialists' Collaboration, those that deal with post-acute rehabilitation stroke services. They defined intervention as "organized inpatient multidisciplinary rehabilitation commencing at least one week after stroke" and sought randomized trials that compared this model of care with an alternative. In a heterogeneous group of 9 trials (6 involving stroke rehabilitation units and 3 involving general rehabilitation wards) recruiting 1,437 patients, organized inpatient multidisciplinary rehabilitation was associated with a reduced odds of death (OR = 0.66; 95% CI, 0.49 to 0.88; P<0.01), death or institutionalization (OR = 0.70; 95% CI, 0.56 to 0.88; P<0.001), and death or dependency (OR = 0.65; 95% CI, 0.50 to 0.85; P<0.001), which was consistent across a variety of trial subgroups. For every 100 patients receiving organized inpatient multidisciplinary rehabilitation, an extra 5 returned home in an independent state. This review of post-acute care concluded that there can be substantial benefit from organized inpatient multidisciplinary rehabilitation in the post-acute period, which is both statistically significant and clinically important.

One RCT has been published (Evans et al., 2001) since the most recent update of the collaboration's work. This study, which deals with both acute and rehabilitative care, sought to quantify the differences between staff interventions in a stroke unit versus staff interventions on a general ward supported by a stroke specialist team. Observations were made daily for the first week of acute care, but only weekly during the post-acute phase. During the observation period, the stroke unit patients were monitored more frequently and received better supportive care, including early initiation of feeding.

Due to the heterogeneity of the literature regarding patient samples, structural design, and outcome measures, it is difficult to identify a "best practice" that applies to all patients with stroke. The evidence does not indicate the specific nature of the intervention or provide explanation of the nature of the team approach or which factor has the greatest impact on patient outcome. The very nature of stroke and its multifaceted effects create the need for a flexible and multifaceted treatment approach.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Better clinical outcomes are achieved when post-acute stroke patients receive coordinated, multidisciplinary stroke-related evaluation and intervention.				
	• Organized and coordinated post-acute inpatient rehabilitation care.	Evans et al., 2001 Langhorne & Duncan, 2001 (SR)	I	Good	A
	• Interdisciplinary team approach.	AHCPR, 1995 Cifu & Stewart, 1999 (SR) Evans et al., 1995 (SR) Evans et al., 2001 Indredavik et al., 1997, 1998, 1999 Kalra et al., 2000 Langhorne & Duncan, 2001 (SR) Stroke Unit Trialists, 2002 (SR)	I	Fair	B
	• Multidisciplinary rehabilitation programs coordinated with the patient and family members/caregivers.	Working Group Consensus	III	Poor	I
2	Referral to a facility with an organized rehabilitation team, for patients with moderate or severe symptoms, or involvement of a rehabilitation specialist with some experience in stroke.	Working Group Consensus	III	Poor	I
3	Organized team approach for outpatient or home-based rehabilitation care.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation; SR = Systematic Review (see Appendix E)
Note: A table comparing all the studies can be found in the "Evidence Appraisal Report for the VA/DoD Clinical Practice Guideline for the Management of Stroke Rehabilitation."

The Use Of Standardized Assessments

BACKGROUND

Comprehensive assessment of patients with stroke is necessary for appropriate clinical management and evaluation of outcomes for quality management and research (Duncan et al., 1999b). The AHCPR Post-Stroke Rehabilitation Guideline recommends the use of well-validated, standardized instruments in evaluating stroke patients. These instruments help to ensure reliable documentation of the patient's neurological conditions, levels of disability, functional independence, family support, quality of life, and progress over time (AHCPR, 1995).

RECOMMENDATIONS

1. Strongly recommend to assess the stroke recovery using the National Institutes of Health Stroke Scale (NIHSS) at the time of presentation/hospital admission, or at least within the first 24 hours following presentation.
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.
3. If depression and motor, sensory, cognitive, communication, and swallowing deficits are found, all patients should be formally assessed by the appropriate clinician from the coordinated rehabilitation team.
4. Recommend that the clinician use standardized, valid assessments to evaluate the patient's stroke-related impairments and functional status and participation in community and social activities.
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 should be shared and the expected outcomes be discussed with the patient and family/caregivers.

DISCUSSION

The AHCPR guideline recommends that "Screening for possible admission to a rehabilitation program should be performed as soon as the patient's neurological and medical condition permits. The individual(s) performing the screening examination should be experienced in stroke rehabilitation and preferably should have no direct financial interest in the referral decision. All screening information should be summarized in the acute medical record and provided to the rehabilitation setting at the time of referral (AHCPR, 1995)." (*Research evidence=NA; Expert opinion=strong consensus)*

The AHCPR guideline panel evaluated the strengths and weaknesses of a battery of standardized instruments for assessment of stroke patients. Appendix B includes a list of preferred standard instruments recommended by the AHCPR guideline panel for patient assessment in stroke. Certain tests have established protocol for credentialing that must be adhered to (e.g., Functional Independence Measure [FIM™]; National Outcome Measure System [NOMS]; and National Institutes of Health Stroke Scale [NIHSS]). However, only the FIM™ and the NIHSS are widely used.

A partial listing of standardized tools can be found at The University of Kansas Landon Center on Aging Web site at http://www2.kumc.edu/coa/. Although the listing is not all inclusive, it provides references, tools and an Access database (toolbox) that may be useful to the coordinated rehabilitation team in completing formal assessments.

New stroke specific outcome measures that may be useful for assessing functional status and quality of life are currently under development (see Appendix B).

The NIHSS Score (See also Annotation C)

The NIHSS score strongly predicts the likelihood of a patient's recovery after stroke. A score of ≥16 forecasts a high probability of death or severe disability, whereas a score of ≤6 forecasts a good recovery (Adams et al., 1999).

Patients with a severe neurological deficit after stroke, as measured by the NIHSS, have a poor prognosis. During the first week after acute ischemic stroke, it is possible to identify a subset of patients who are highly likely to have a poor outcome (Frankel et al., 2000).

The Veterans Health Administration has issued a directive that all individuals who have rehabilitation potential have a functional status outcome assessment, which includes the FIM™ (VHA Directive 2000-016. Medical

Rehabilitation Outcomes for Stroke, Traumatic Brain, and Lower Extremity Amputee Patients; dated June 5, 2000). These data are captured in a functional outcomes data base maintained by the physical medicine and rehabilitation service.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Assess stroke severity using the NIHSS score.	Adams et al., 1999 Frankel et al., 2000	I	Good	A
2	Screen for complications using standardized and valid screening tools.	AHCPR, 1995 Working Group Consensus	III	Poor	C
3	Formal assessment by appropriately trained clinicians.	RCP, 2000 SIGN, 1997 Working Group Consensus	III	Poor	C
4	Standardized assessment tools.	Duncan et al., 1999b	III	Poor	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

Intensity/Duration Of Therapy

BACKGROUND

There has been controversy in the past regarding the timing of initiation of therapy and intensity of therapy required for the acute stroke patient to gain maximum functional outcome. While patients who are medically unstable are considered not suitable for any rehabilitation program, studies generally support early mobilization of the patient with an acute stroke to prevent deep vein thrombosis (DVT), skin breakdown, contracture formation, constipation, and pneumonia. Early therapy initiation, including range-of-motion exercises and physiologically sound changes of bed position on the day of admission, followed by a progressive increase in the level of activity should be provided as soon as medically tolerated. Early mobilization should also include encouraging the patient to resume self-care activities and socialization.

The physical demands of rehabilitation are substantial. The patient's tolerance for therapy will depend on several factors including the severity of the stroke, medical stability, mental status, and level of function.

RECOMMENDATIONS

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

DISCUSSION

Early Initiation of Therapy

One conclusion of a systematic review of 38 randomized control trials dating back to 1965 is that early rehabilitation therapy "appears to have a strong relationship" with improved functional outcome at hospital discharge and follow-up (Cifu & Stewart, 1999). However, the review does not present any quantitative information that indicates the differential gain associated with the provision of specific therapies at different times during the patient's treatment. Nor is there any discussion of when therapy is early versus late/delayed or

early relative to when it would be provided via standard care. Instead, the word *early* seems to mean shortly after a stroke occurs, which could span a variable number of days.

Nine clinical trials focus with varying specificity on the early provision of rehabilitation therapy following a stroke. Importantly, using the word "early" as a search parameter did not insure that an identified study would focus exclusively, primarily, or even secondarily on the scheduling of a service in its own right or compared with standard care. Instead, "early" often meant that the intervention began sometime shortly after a stroke, but with little empirical significance (Ottenbacher et al., 1993; Parry et al., 1999). "Early after stroke" simply means whenever the therapy began.

One exception is a study by Paolucci and colleagues (2000), which examined differences in outcomes for patients for whom therapy was initiated 20 days apart. The researchers found a strong inverse relationship between the start date and functional outcome (albeit with wide confidence intervals and a greater dropout risk). In other words, the earliest starters had significantly higher effectiveness of treatment than did the medium or latest groups. Treatment initiated within the first 20 days was associated with a significantly high probability of excellent therapeutic response (OR=6.11; 95 percent CI; 2.03-18.36), and beginning later was associated with a poor response (OR=5.18; 95 percent CI; 1.07-25.00). On the other hand, early intervention was associated with a five times greater risk of dropout than that of patients with delayed treatment (OR=4.99; 95 percent CI; 1.38-18.03).

A second study involved a comparison of an experimental group of patients who received 3 months of physiotherapy at home, immediately after a stroke, with the control group of patients who received therapy after a 3-month delay (Wade et al., 1992). The findings show that physiotherapy initiated early after stroke slightly improved gait speed (i.e., a few seconds over 10 meters), but the improvement was not maintained 3 months after physiotherapy stopped.

Intensity of Therapy

The heterogeneity of the studies in all aspects—patients, designs, treatments, comparisons, outcome measures, and results—combined with the borderline results in many of the trials, limits the specificity and strength of any conclusions that can be drawn from them. Overall, the trials support the general concept that rehabilitation can improve functional outcomes, particularly in patients with lesser degrees of impairment. There is weak evidence for a dose-response relationship between the intensity of the rehabilitation intervention and the functional outcomes. However, the lack of definition of lower thresholds, below which the intervention is useless, and upper thresholds, above which the marginal improvement is minimal, for any treatment, make it impossible to generate specific guidelines.

Comparisons in many studies are between a more intense but also slightly different service than the control—any difference in outcome could be related to the difference in the nature of the treatment, rather than just its intensity.

Despite all of these limitations, the conclusions of the systematic reviews are fairly consistent: The two meta-analyses both concluded that greater intensity produces slightly better outcomes (Langhorne et al., 1996; Kwakkel et al., 1999). Langhorne et al. (1996) 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. (1999) reported a small but statistically significant intensity-effect relationship in the rehabilitation of stroke patients. The recent meta-analysis of trials studying exercise therapy for arm function concluded, "The difference in results between studies with and without contrast in the amount or duration of exercise therapy between groups suggests that more exercise therapy may be beneficial" (Van der Lee & Snels, 2001). In all the reviews, insufficient contrast in the amount of rehabilitation between experimental and control conditions, organizational setting of rehabilitation management, lack of blinding procedures, and heterogeneity of patient characteristics were major confounding factors.

Regarding general factors affecting the effectiveness of rehabilitation, Cifu & Stewart (1999) concluded that greater intensity of therapy services has "a weak relationship with improved functional outcome." Only the early meta-analysis by Ottenbacher & Jannel (1993) has a neutral conclusion: "The improvement in performance appears related to early initiation of treatment, but not to the duration of intervention."

Four trials addressed intensity of physiotherapy or general rehabilitation services. The earliest trial randomized 133 discharged patients among intensive, routine, and no outpatient therapy and found a dose-response relationship with greater intensity, producing better performance on an index of ADL (Smith et al., 1981). Sivenius et al. (1985) divided 95 patients into intensive and normal treatment groups. Functional recovery, measured by motor function and ADL, was slightly better in the intensive treatment group. Rapoport & Eerd (1989) found that adding weekend physiotherapy services reduced length of stay by comparing time periods during which five days per week or everyday therapy sessions were provided. Partridge et al. (2000) did not find any differences in functional and psychological scores at six weeks in 104 patients randomized between standard 30 minutes and 60 minutes of physiotherapy. Subgroup analyses suggested some subgroups may benefit.

Four additional trials targeted more specific disabilities of extremity function or gait. Sunderland et al. (1992) assigned 132 consecutive stroke patients to routine or enhanced treatment for arm function, the latter including both increased duration and behavioral methods. At six months, the enhanced group showed a slight but statistically significant advantage, concentrated in those patients with milder impairment. Richards et al. (1993) did a pilot study of 27 patients randomized to intensive, gait-focused physical therapy; early, intensive, conventional therapy; and routine conventional therapy. At six weeks gait velocity was better for the intensive, gait-focused group, but this advantage was not sustained at three and six months. Lincoln et al. (1999) randomized 282 patients with impaired arm function to routine physiotherapy, additional treatment by a qualified physiotherapist, or additional treatment by the physiotherapy assistant. There were no differences among the groups on outcome measures of arm function and ADL at baseline, five weeks, three months, or six months. Parry et al. (1999) performed subgroup analyses of the same study and noted that patients with severe impairment improved little, but patients with lesser impairment may have benefited. Kwakkel et al. (1999) randomized 101 middle-cerebral-artery (MCA) stroke patients with arm and leg impairment to additional arm training emphasis, leg training emphasis, or arm and leg immobilization, each treatment lasting 30 minutes, five days a week, for 20 weeks. At 20 weeks the leg training group scored better for ADL, walking, and dexterity than the control, while the arm training group scored better only for dexterity.

The clinical trials provide weak evidence for a dose response relationship of intensity to functional outcomes. Caution is called for in the interpretation of these studies because some patients may not be able to tolerate higher-than-normal levels of therapy. Other patients may not benefit because they do not belong to a subset of patients for whom benefit has been demonstrated. Because of the heterogeneity of the studies, no specific guidelines regarding intensity or duration of treatment are justified.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Early initiation of therapy.	Cifu and Stewart, 1999 (SR) Ottenbacher & Jannell, 1993	I	Good	A
2	Intensity of therapy.	Kwakkel et al., 1999 Langhorne et al., 1996 Richards et al., 1993 Sivenius et al., 1985 Smith et al., 1981 Van der Lee & Snels, 2001	I	Fair	B

QE = Quality of Evidence; R = Recommendation; SR = Systematic Review

Patient's Family And Caregivers

BACKGROUND

With the changes that have occurred in healthcare in the last decade, family members have become an integral part of the long-term care picture. Provision of long-term care can place family members under significant emotional, financial, and physical stress. Though a number of services are available to families/caregivers, the dissemination of this information is sometimes poor. As a result, many families are not able to take advantage of the resources available for respite, support groups, and financial aid. The family member/caregiver's quality of life may be improved if he/she is educated about potential sources of stress and resources. However, education alone has not been found to be sufficient to improve the caregiver's quality of life. Research in this area is limited and of variable quality.

RECOMMENDATIONS

1. The family/caregiver of the stroke patient should be involved in decision making and treatment planning as early as possible, if available, and throughout the duration of the rehabilitation process.
2. The providers must be alert to the stress on the family/caregiver, specifically recognizing the stress associated with impairments (e.g., cognitive loss, urinary incontinence, and personality changes) and providing support, as indicated.
3. Acute care hospitals and rehabilitation facilities should maintain up-to-date information on community resources at the local and national level, provide this information to the stroke patient and families/caregivers, and offer assistance in obtaining needed services.
4. The patient and caregivers should have their psychosocial and support needs reviewed on a regular basis, by a social worker or appropriate healthcare worker, to minimize caregiver distress.

DISCUSSION

Clinicians need to be sensitive to potential adverse effects of caregiving on family functioning and the health of the caregiver. They should work with the patient and caregiver to avoid negative effects, promote problem solving, and facilitate reintegration of the patient into valued family and social roles (AHCPR, 1995). In general, caregivers cope with physical limitations better than cognitive or emotional ones (Evans, 1986). Strong social support has been shown to improve outcomes, especially in patients with severe physical or cognitive deficits (Glass et al., 1993).

Current evidence suggests that stroke caregivers have elevated levels of depression at both the acute stroke phase and the chronic stroke phase. However, major gaps are apparent in this literature, with few studies addressing such areas as caregiver physical health, ethnicity, and caregiver interventions. Given the increasing prevalence of stroke, as well as the increasing pressures on families to provide care, more research is needed to guide policy and practice in this understudied topic (Han & Haley, 1999).

Patient And Family/Caregiver Education

BACKGROUND

The patient and family/caregivers should be given information and provided with an opportunity to learn about the causes and consequences of stroke, potential complications, and the goals, process, and prognosis of rehabilitation.

RECOMMENDATIONS

1. Recommend that patient and family/caregiver education should be provided in an interactive and written format.
2. 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.
3. The family conference may be considered as a useful means of information dissemination.
4. Recommend that patient and family education should be documented in the patient's medical record to prevent the occurrence of duplicate or conflicting information from different disciplines.

DISCUSSION

Information provision or educational interventions have not been shown to be sufficient, by themselves, to improve patient outcomes (3 systematic reviews, 7 clinical trials). Provision of information in a passive format (e.g., giving pamphlets to patients) is not as effective as educational interventions that also include some form of personal support, such as home visits or classes.

Educational interventions have been successful in improving the patient's and caregiver's knowledge about stroke, and may assist patients and caregivers in making effective decisions about treatments (3 systematic reviews, 7 clinical trials).

Better knowledge about stroke does not necessarily translate into better overall health or well-being for either patients or caregivers (2 systematic reviews, 4 clinical trials). Likewise, better decision-making ability has not been shown to result in improved overall outcomes (1 systematic review, 1 clinical trial). Some small trials have claimed success in improving the patient's health habits through educational interventions. While these results are promising, they must be seen as speculative at present (2 clinical trials).

Systematic Reviews

The systematic reviews (Cochrane) examined three types of educational interventions:

- Provision of decision aids to people facing medical decisions (O'Connor et al., 2001)
- Provision of educational material with or without additional educational sessions (Foster et al., 2001)
- Interventions of any sort intended to affect adherence with prescribed, self-administered medications (Haynes et al., 1999)

O'Connor et al. (2001) reviewed 24 trials of decision aids, and concluded "they are superior to usual care interventions in improving knowledge and realistic expectations of the benefits and harms of options; reducing passivity in decision making; and lowering decisional conflict stemming from feeling uninformed." The advantages of decision aids, however, are mixed: "They have had little effect on anxiety or satisfaction with the decision making process or satisfaction with the decision. Their effects on choices vary with the decision. The effects on persistence with chosen therapies and health outcomes require further evaluation."

Forster and colleagues (2001) reviewed nine studies of educational intervention. The authors excluded trials in which information giving was only one component of a more complex rehabilitation intervention (e.g., family support worker trials). Forster et al. found that in two good-quality trials (Evans et al., 1988 and Rodgers et al., 1999) information-plus-education improved knowledge. Information-plus-education, however, had no effect on perceived health status and quality of life or on the Caregiver Hassles scale. One of the two relevant trials found an association between education provision and 4 of 7 subscales of a family functioning scale. However, 58 percent of the patients in that study did not attend 3 or more of the 6 classes offered. Forster et al. write "There is a suggestion that information provided in an educational context is more effective than the simple provision of a booklet or leaflet. However, the success of such strategies is limited if they are unacceptable to the patient." The authors concluded "The results of the review are limited by the variable quality of the trials and the wide range of outcome measures used. The general 'effectiveness' of information provision has not been conclusively demonstrated."

Haynes et al. (1999) reviewed 19 studies (not all conducted among patients with stroke) of interventions to affect adherence with prescribed, self-administered medications. Although ten of the studies demonstrated a positive effect of the intervention on medication adherence, "almost all of the interventions that were effective for long-term care were complex, including combinations of more convenient care, information, counseling, reminders, self-monitoring, reinforcement, family therapy, and other forms of additional supervision or attention." It is likely that educational interventions alone would not have had a significant effect on these patients.

Clinical Trials

Each of the seven clinical trials examined a different aspect of patient/caregiver education:

- 12-week health promotion intervention (1 study)
- Self-management program for chronic disease (1 study)
- Family support program (1 study)
- Audiobooklet decision aid (1 study)
- Small group educational sessions (1 study)
- Information pack (1 study)
- Training in social problem-solving skills (1 study)

In a small study of 35 patients, Rimmer et al. (2000a) found improvements in the patient's physical, mental, and social health after a 12-week health promotion intervention. Investigators for a self-management program for chronic disease (Lorig et al., 1999) found that "Treatment subjects, when compared with control subjects, demonstrated improvements at 6 months in weekly minutes of exercise, frequency of cognitive symptom management, communication with physicians, self-reported health, health distress, fatigue, disability, and social/role activities limitations. They also had fewer hospitalizations and days in the hospital." Both of these studies included an educational component, but it is difficult to say how much of the patient's improvement was due to education, rather than the social context of the education or other factors.

In the remaining five studies (Grant, 1999; Man-Son-Hing et al., 1999; Mant et al., 2000; Mant et al., 1998; Rodgers et al., 1999) researchers did not find any significant effect of the various interventions on patient clinical outcomes. The interventions did provide some benefits to patients and caregivers, however, such as increased knowledge about stroke and improved caregiver mental health (Mant et al., 1998), and significantly increased social activities and improved quality of life for carers (Mant et al., 2000).

Evans et al. (1988) examined effects of caregiver education with and without additional counseling. Both counseling and education significantly improved family functioning and caregiver knowledge. Counseling was more effective than education alone and also resulted in better patient functioning. Neither intervention affected use of social resources.

Foster et al. (2001) provided evidence that passive education alone is not adequate to meet educational needs. Education should be interactive to be most beneficial to the patient and family/caregiver.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Education of patient and caregiver in an interactive and written format.	Forster et al., 2001	I	Fair	B
2	Identification of a specific team member to provide information to patient and caregiver.	Working Group Consensus	III	Poor	C
3	Use of family conferences to disseminate information.	Working Group Consensus	III	Poor	C
4	Documentation of patient and family education.	Working Group Consensus	III	Poor	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

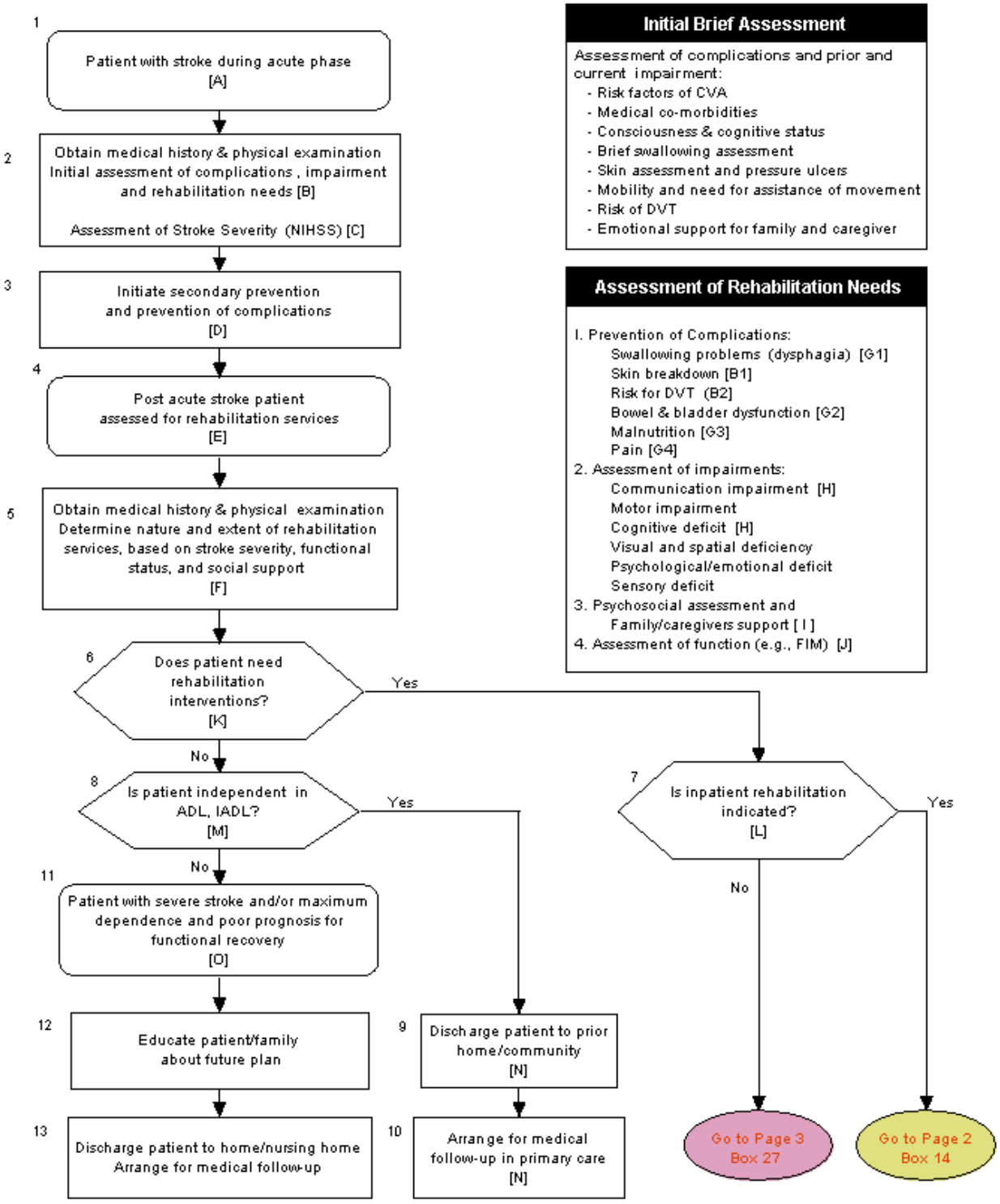
VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF **STROKE REHABILITATION** IN THE PRIMARY CARE SETTING

ALGORITHMS AND ANNOTATIONS

Clinical Practice Guideline for the Management of Stroke Rehabilitation

Assessment

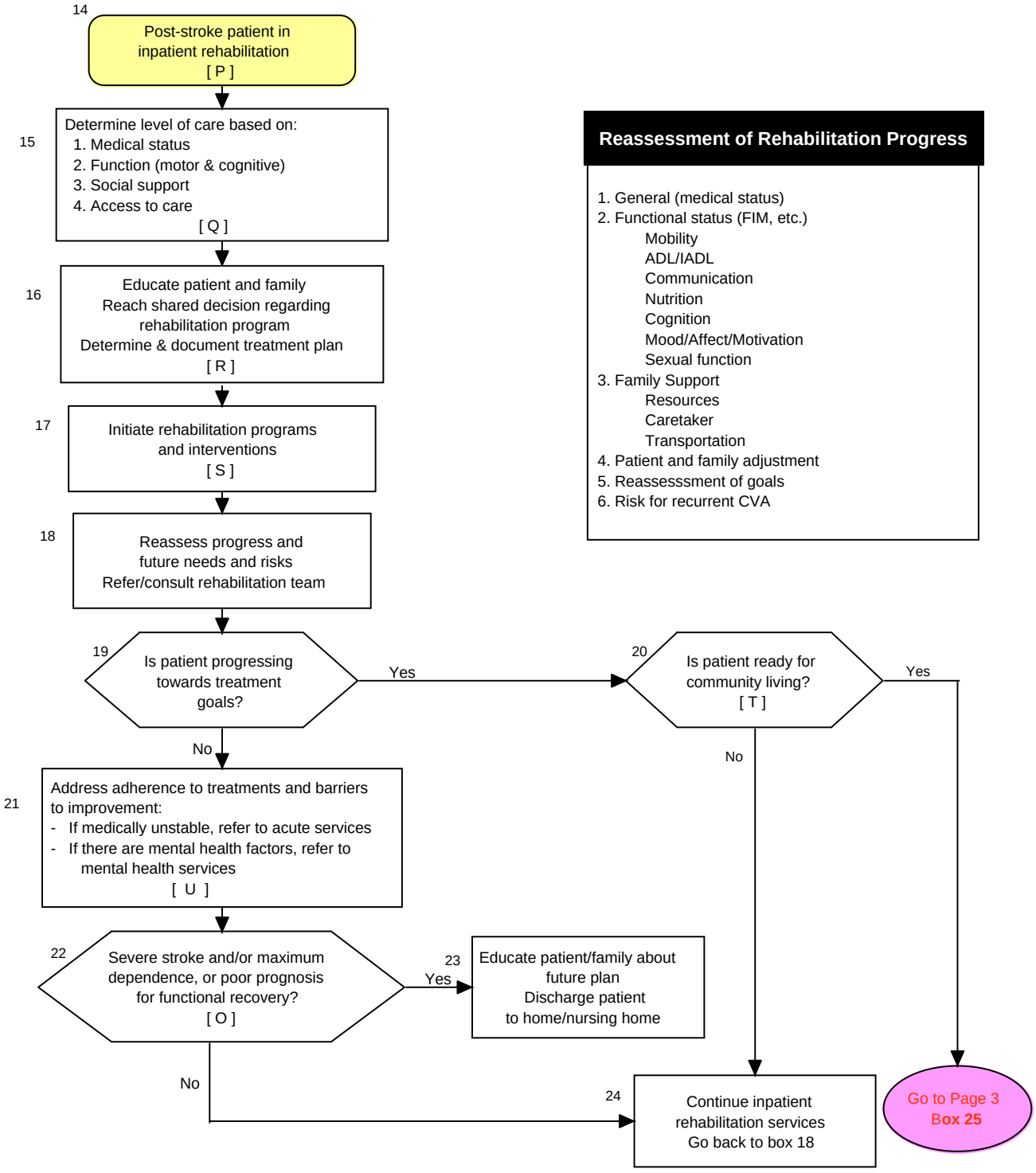
A



Clinical Practice Guideline for the Management of Stroke Rehabilitation

Inpatient Rehabilitation

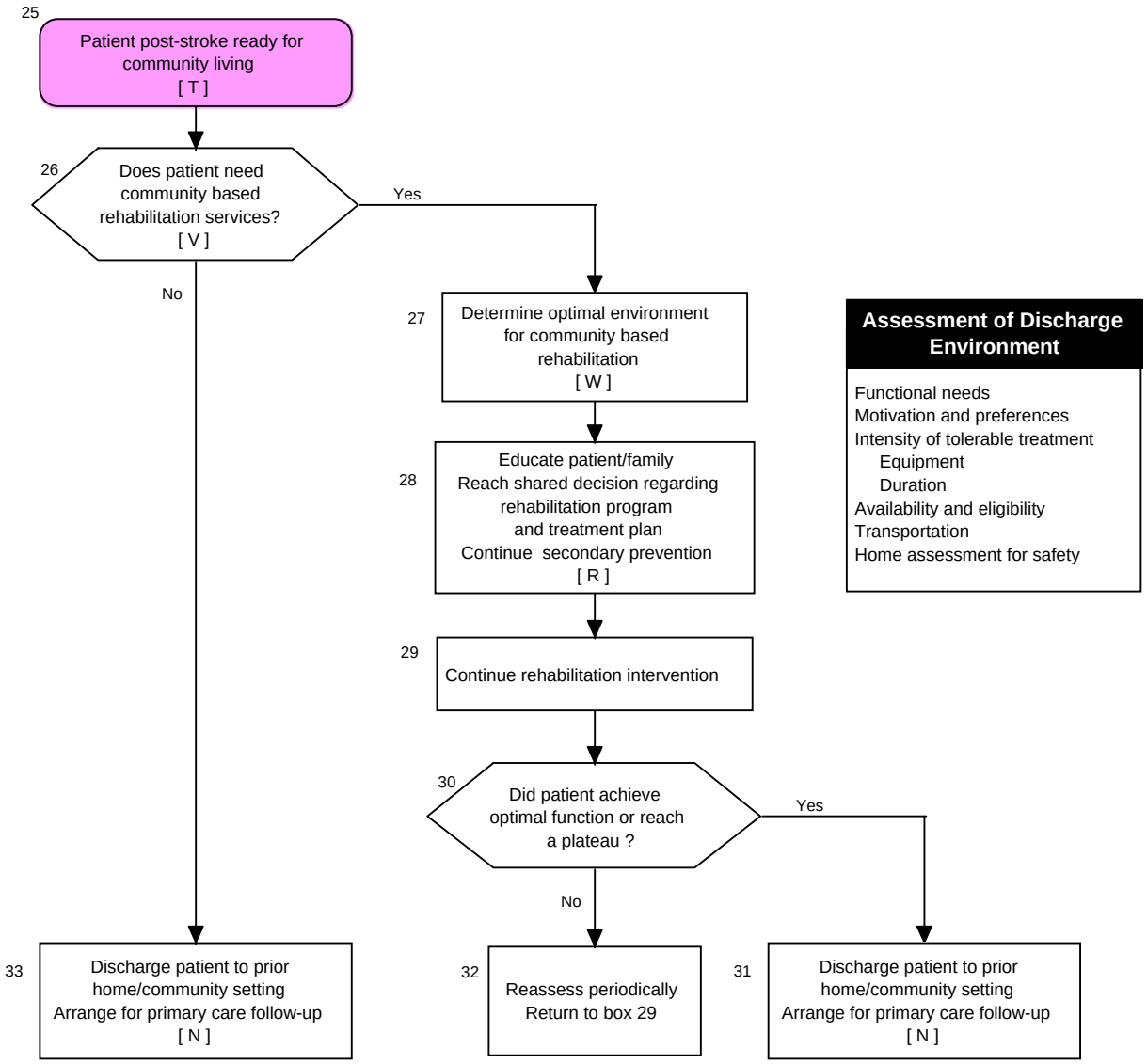
B



Clinical Practice Guideline for the Management of Stroke Rehabilitation

Community Based Rehabilitation

C



ANNOTATIONS

REHABILITATION DURING THE ACUTE PHASE

A. Patient With Stroke During Acute Phase

AHCPR (1995) defines "acute care" as:

> *The period of time immediately following the onset of an acute stroke. A full-service hospital where patients with an acute stroke are treated either in a medical service or in a specialized stroke unit, and where 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. Outcome 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:

1. Observe changes in the patient's condition that might prompt different medical or surgical interventions.
2. Facilitate medical and surgical measures aimed at improving outcome after stroke.
3. Institute measures to prevent subacute complications.
4. Begin planning for therapies to prevent recurrent stroke.
5. Begin efforts to restore neurological function through rehabilitation or other techniques.

After stabilization of 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, family support, and treatment of depression (AHA, 1994).

B. Obtain Medical HistoryAnd Physical Examination. Initial Assessment Of Complications, Impairment, And Rehabilitation Needs

OBJECTIVE

Obtain clinical data required to manage the stroke rehabilitation.

BACKGROUND

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 are to prevent recurrence of stroke and complications and begin mobilization.

RECOMMENDATIONS

1. The National Institutes of Health Stroke Scale (NIHSS) should be used to assess severity of stroke in the initial stages as a predictor of mortality and long-term outcome (see Annotation C).
2. The initial assessment should include a complete history and physical examination, with special emphasis on the following:
    - Risk factors for stroke recurrence
    - Medical co-morbidities
    - Level of consciousness and cognitive status
    - Brief swallowing assessment

- Skin assessment and risk for pressure ulcers (see Annotation B-1)
- Bowel and bladder function
- Mobility, with respect to the patient's needs for assistance in movement
- Risk of deep vein thrombosis (DVT) (see Annotation B-2)
- History of previous antiplatelet or anticoagulation use, especially at the time of stroke
- Emotional support for the family and caregiver

B-1 Risk for Skin Breakdown

BACKGROUND

Pressure ulcers affect approximately 9 percent of all hospitalized patients and 23 percent of all nursing home patients. This condition can be difficult and costly to treat and often results in pain, disfigurement, and prolonged hospitalization (AHCPR, 1995). It is crucial that healthcare personnel work collaboratively to prevent skin breakdown. Patients at highest risk for skin breakdown may have: 1) dependence in mobility, 2) diabetes, 3) peripheral vascular disease, 4) urinary incontinence, 5) lower body mass index, and 5) end stage disease (Berlowitz et al., 2001a&b).

RECOMMENDATIONS

1. Recommend that a thorough assessment of skin integrity should be completed upon admission and monitored, at least daily, thereafter.
2. 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 friction or excessive pressure.

DISCUSSION

A valid and reliable pressure ulcer risk assessment tool, such as the Braden Scale, can help predict the risk of pressure ulcer development and thus help the rehabilitation team implement interventions to prevent skin breakdown. Such interventions may include, but are not limited to the following: repositioning, mobilization, turning, proper transfer techniques, and the use of skin care/incontinence products and surface pressure reducing devices. Treatment of any skin breakdown should begin promptly and be monitored daily (AHCPR, 1995; Sussman & Bates-Jensen, 1998).

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Assessment of skin integrity.	AHCPR, 1995 Sussman & Bates-Jensen, 1998	III	Poor	C
2	Interventions for prevention of skin breakdown.	AHCPR, 1995 Working Group Consensus	III	Poor	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

B-2 Risk for Deep Vein Thrombosis (DVT)

BACKGROUND

There are several approaches to preventing deep venous thrombosis (DVT) in stroke patients. Current practices include anticoagulation, intermittent pneumatic compression, compression stockings, and early mobilization. Walking as little as 50 feet per day, with or without assistance, significantly decreases the incidence of DVT post-stroke (Reding & Potes, 1988).

RECOMMENDATIONS

1. Recommend that all patients be mobilized as soon as possible (the act of getting a patient to move in the bed, sit up, stand, and eventually walk).
2. Strongly recommend the use of subcutaneous low-dose unfractionated heparin (LDUH) (5000 units BID, unless contraindicated) to prevent DVT/pulmonary embolism (PE) for patients with ischemic stroke and impaired mobility. Low molecular weight heparin (LMWH) or heparinoids may be used as an alternative to LDUH, especially in patients with a history of heparin-related side effects (such as thrombocytopenia).
3. Consider the use of graduated compression stockings or an intermittent pneumatic compression machine as an adjunct to anticoagulation, or as an alternative to anticoagulation for patients with intracerebral hemorrhagic or for patients in whom anticoagulation is contraindicated.

DISCUSSION

The largest study for subcutaneous unfractionated heparin, the International Stroke Trial (IST, 1997), established that LDUH was safe in ischemic stroke. This trial also demonstrated a dose response rate for hemorrhagic complications.

Comparative trials for DVT/PE prevention in a stroke population have not been performed; however, randomized trials of several LMWH and heparinoid products in ischemic stroke patients and other patient populations suggest an efficacy and safety superior to unfractionated heparin for DVT prevention. The TOAST study (1998) demonstrated the safety of danaparoid in acute ischemic stroke patients, but the intravenous route, anticoagulation monitoring, and continuous dosing limits extrapolation to prophylactic use. Two recent meta-analyses found that LMWH reduced DVT and PE but increased bleeding in ischemic stroke victims (Bath et al., 2000; Bijsterveld et al., 1999). Another recent LMWH trial found a dose-response effect for DVT prevention and intracranial hemorrhage rate, both increasing at higher doses (Bath et al., 2001). Specific treatment recommendations regarding optimal LMWH agent and dosing cannot be made from the existing data.

The use of nonpharmacological approaches to DVT/PE prevention, such as intermittent pneumatic compression, graduated compression stockings, and early mobilization, appear to have some beneficial effect although they were not tested in fully RCTs. Graded compression stockings produced a reduction in DVT incidence comparable to that in other patient groups (odds ratio=0.43, 95% CI), but the reduction was not statistically significant, and the magnitude of the effect size requires confirmation (Muir et al., 2000). Use of pneumatic compression devices combined with subcutaneous heparin and antiembolic hose reduce the risk of DVT and pulmonary embolism in stroke patients (Kamran et al., 1998). The morbidity and mortality associated with DVT/PE is sufficient reason to continue these clinical practices. These interventions can be used in combination with or as alternatives to anticoagulation.

There are no data from clinical trials on DVT/PE prophylaxis in intracerebral hemorrhage or hemorrhagic strokes. Since the risk of worsening brain hemorrhage if LDUH or LMWH are used is uncertain, graduated compression stockings or sequential compression devices are recommended.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Early mobilization.	Working Group Consensus	III	Poor	C
2	LDUH in ischemic stroke patients for DVT prevention.	IST, 1997	I	Good	A
3	LMWH and heparinoids in ischemic stroke patients for DVT prevention.	Bath et al., 2000 & 2001a Bijsterveld et al., 1999	I	Poor	C
4	Alternating compression machines in stroke patients for DVT prevention.	Kamran et al., 1998	II-3	Fair	B
5	Graduated compression stockings in stroke patients for DVT prevention.	Muir et al., 2000	I	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

C. Assessment Of Stroke Severity (NIHSS)

OBJECTIVE

Stratify patients according to severity and likely outcome.

BACKGROUND

The National Institutes of Health Stroke Scale (NIHSS) is a standardized, validated instrument that assesses severity of neurological impairment after stroke (refer to Appendix C - NIHSS). It is designed so that virtually any stroke will register some abnormality on the scale. The scale has an administration time of 5 to 10 minutes. The NIHSS score is based solely on examination and requires no historical information or contributions from surrogates. It can be administered at any stage by any trained clinician.

The original 11 items of the NIHSS do not test distal upper extremity weakness, which is more common in stroke patients than proximal arm weakness. An additional item examining finger extension is often added to the NIHSS. Although not contributing to the total NIHSS score, this item should be recorded as part of the NIHSS assessment.

RECOMMENDATIONS

1. Strongly recommend that 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.
2. Strongly recommend that all professionals involved in any aspect of the stroke care be trained and certified to perform the NIHSS.
3. Recommend that patients should be reassessed using the NIHSS at the time of acute care discharge.
4. Recommend that if the patient is transferred to rehabilitation and there are no NIHSS scores in the record, the rehabilitation team should complete an NIHSS.

DISCUSSION

The NIHSS is used to guide decisions concerning acute stroke therapy (NINDS tPA Stroke Study Group, 1994). Initial scores have been used to stratify patients according to severity and likely outcome. The presentation NIHSS score was highly correlated with outcome in retrospective analyses of two randomized clinical trials (Adams et al., 1999; Frankel et al., 2000). A second assessment serves as a re-check of the initial measurement

and may be more accurate, as the patient will have been stabilized and may be better able to cooperate with the examiner, thus improving the accuracy of scoring.

Because the severity of stroke as assessed by the NIHSS may influence decisions concerning the acute treatment of stroke patients (such as the use of thrombolytic therapy), application of this scale in clinical settings is becoming more common (Odderson, 1999).

The NIHSS score strongly predicts the likelihood of the patient's recovery after stroke. A score of $\geq$16 forecasts a high probability of death or severe disability, whereas a score of $\leq$6 forecasts a good recovery (Adams et al., 1999). Patients with a severe neurologic deficit after stroke, as measured by the NIHSS, have a poor prognosis. During the first week after acute ischemic stroke, it is possible to identify a subset of patients who are highly likely to have a poor outcome (Frankel et al., 2000).

Potential examiners become certified in the NIHSS by watching a training videotape and passing an examination that involves scoring patients shown on a test tape (Lyden et al., 1994). Certified examiners may be of any background (e.g., physician, nurse, therapist, and social worker) (Dewey et al., 1999; Goldstein & Samsa, 1997; Powers, 2001). Inter-rater reliability between examiners for most items of the NIHSS is high (Goldstein et al., 1989), making the scale highly reproducible. Retrospective estimation of the initial NIHSS score from the admission neurological examination is possible and fairly accurate (Bushnell et al., 2001; Kasner et al., 1999; Williams et al., 2000), although actual testing is preferable.

Continuing validation of the predictive value of the NIHSS within the VA/DoD healthcare system through ongoing prospective data collection is encouraged.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Assess stroke severity using the NIHSS score.	Adams et al., 1999 Frankel et al., 2000	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E)

D. Initiate Secondary Prevention And Prevention Of Complications

OBJECTIVE

Reduce the risk for recurrence of stroke.

BACKGROUND

Following a stroke, patients are at increased risk for additional cerebrovascular events. Specific therapy and risk factor reduction must be an integral part of any plan for stroke rehabilitation and recovery. The need for secondary prevention of stroke is lifelong and continues beyond the period of rehabilitation.

The extant data are clear on certain issues (i.e., the need for treatment of hypertension, use of warfarin in atrial fibrillation, and benefits of antiplatelet therapy); comparative data between interventions and distinction between benefits of individual drugs versus class effects will require further study. Therefore, these recommendations will need to be revised as additional data become available. Additionally, the majority of data concerns prevention of further ischemic events. In cases of hemorrhagic stroke, hypertension and hypercholesterolemia should still be addressed. Refer to Appendix A – Antiplatelet Pharmacotherapy for criteria for choosing antiplatelet therapy.

RECOMMENDATIONS

1. Strongly recommend that patients with a symptomatic carotid stenosis of (70 - 99 percent), who are surgical candidates and have a life expectancy of over 2 years, should undergo carotid endarterectomy (CEA) if the surgical morbidity and mortality is under 5 percent at the treating center (NASCET, 1991). CEA may be considered in selected patients with carotid stenosis of 50 to 69 percent (number-needed-to-treat to prevent one stroke over 5 years=15) (NASCET, 1998). Antiplatelet therapy should be instituted after post-operative recovery from CEA.
2. Strongly recommend that patients with atrial fibrillation, mechanical heart valves, mural thrombi, or other high risk sources of cardiogenic emboli should be treated with warfarin at a target INR of 2.5, range 2.0 to 3.0, if they are likely to be compliant with the required monitoring and are not at high risk for bleeding complications. (ACCP, 2001). In cardioembolic patients who have had a large stroke, anticoagulation should not be started for 7 to 10 days due to the risk of cerebral hemorrhage. In non-cardioembolic ischemic stroke, warfarin has not been shown to be more effective than aspirin (WARSS, 2001).
3. Strongly recommend that patients with non-cardioembolic ischemic stroke should receive antiplatelet therapy after stroke if there is no bleeding contraindication. Aspirin at a dose of 81 mg – 325 mg is cost-effective, and is the usual first-line agent. Clopidogrel at 75 mg/day, and the combination of 200 mg extended release dipyridamole with 25 mg of aspirin taken twice a day are acceptable alternatives to aspirin, and may provide a greater degree of risk reduction than aspirin albeit at a higher cost.
4. Strongly recommend that patients having a stroke while on aspirin be considered for alternative antiplatelet agents (see Appendix A- Antiplatelet Pharmacotherapy and also at www.vapbm.org/PBM/criteria.htm)
5. Strongly recommend that treatment of hypertension should be instituted after the acute period in patients who have consistently elevated blood pressure. Even borderline hypertension conveys an increased stroke risk. Target blood pressure should be in accordance with the VA/DoD Clinical Practice Guideline for the Diagnosis and Management of Hypertension in the Primary Care Setting. Several drugs have been studied and shown to be effective in stroke prevention such as ACE inhibitors, beta-blockers, and thiazide diuretics. The ACE inhibitors, ramipril and perindopril, may exhibit beneficial effects on stroke prevention independent of blood pressure reduction. Control of hypertension remains an essential cornerstone for stroke prevention.Avoid sudden or excessive drops in blood pressure which could exacerbate cerebral hypoperfusion (especially in the acute phase). Do not use fast-acting antihypertensive drugs, which could drop blood pressure too much and too fast.
6. Strongly recommend that patients who have had an ischemic stroke be treated for hypercholesterolemia according to the VA/DoD Clinical Practice Guideline for Dyslipidemia. .
7. Recommend that all patients after stroke should be counseled about smoking cessation, participation in a regular exercise program (as permitted by the patient's physical limitations and general medical condition), maintaining a body-mass index within the desirable range, and avoidance of heavy alcohol use (refer to the VA/DoD Clinical Practice Guideline for Management of Substance Use Disorders in the Primary Care Setting and the VA/DoD Clinical Practice Guideline To Promote Tobacco Use Cessation in the Primary Care Setting).
8. Ongoing monitoring of anticoagulant or antiplatelet therapy, treatment of hypertension and hypercholesterolemia, and other secondary prevention strategies is a lifelong need of patients after stroke and should normally be performed by the patient's primary healthcare provider.

DISCUSSION

In some centers, carotid angioplasty/stenting is sometimes performed as an alternative to CEA, and at least one randomized study is currently underway. At present, there is insufficient evidence to recommend carotid angioplasty/stenting as an alternative to CEA in patients who are acceptable surgical candidates and have a surgically accessible lesion.

While warfarin is the preferred agent for secondary prevention in patients with cardiogenic stroke, an antiplatelet agent is preferable to no antithrombotic therapy in patients who cannot be treated with warfarin. Retrospective data suggest that warfarin may be preferable to aspirin for secondary stroke prevention in patients with intracranial vascular stenosis (Albers, 2000; WASID, 1998). However, prospective data from a randomized trial are lacking at present.

Aspirin and warfarin are equally effective for secondary prevention of non-cardioembolic stroke, although warfarin is associated with a higher minor bleeding rate (WARSS Study, 2001). For this reason, as well as ease of use and superior compliance, aspirin or another antiplatelet agent is usually preferred in this patient population.

Federal Drug Administration (FDA) labeling of aspirin for stroke prevention currently recommends doses of 50 mg to 325 mg/day. However, data on doses less than 75 mg/day are limited (ACCP, 2001). Since aspirin doses of ≥75 mg/day are recommended for cardiac prophylaxis, doses of 75 mg to 325 mg/day are preferred overall for patients on single agent antiplatelet therapy. In the U.S., low dose aspirin is commonly available at the 81 mg strength ("baby aspirin"). Clopidogrel reduces vascular events in patients with stroke, myocardial infarction, or peripheral arterial disease by 8.7 percent versus 325 mg of aspirin daily ($p < 0.05$) (CAPRIE Trial, 1996). However, the 8 percent reduction of stroke in patients entered in this trial because of stroke, was not statistically significant. The combination of 200 mg extended release dipyridamole with 25 mg of aspirin [Aggrenox®], taken twice a day, reduced stroke by a larger amount relative to aspirin (23 percent, $p < 0.01$) in patients enrolled after stroke or transient ischemic attack (ESPS-2, 1996). The addition of dipyridamole to aspirin produced no extra serious bleeding over aspirin alone. No direct comparisons of clopidogrel, either alone or in combination with aspirin, versus the extended release dipyridamole/aspirin combination have been carried out to date, and caution should be exercised when comparing results between trials. Clopidogrel is also indicated for prevention of vascular events in patients with coronary artery disease (CAD), and may be preferable in patients with CAD, as well as stroke. Clopidogrel is recommended for patients allergic to aspirin. Ticlopidine is similar to Clopidogrel chemically and is at least as effective in preventing strokes based on indirect comparisons (TASS Trial, 1993), but it has a high incidence of side effects and requires hematological monitoring for the first 3 months. For these reasons, clopidogrel is recommended over ticlopidine except in unusual circumstances (i.e., a patient with an idiosyncratic intolerance of clopidogrel who is aspirin allergic). However, it is appropriate to continue chronic ticlopidine therapy for patients who are stable and have tolerated the drug. The combination of clopidogrel plus aspirin is rational and reduced vascular events by 20 percent versus aspirin alone, in a study of acute cardiac patients (CURE Trial, 2001). However, there was a non-significant 14 percent reduction in stroke in this study based on few total events; and major bleeding events were significantly increased with combination therapy. Further trials will be required in a stroke population before definitive recommendations can be made about clopidogrel plus aspirin for stroke prevention.

The HOPE Trial (2000) documented a significant reduction of stroke risk in patients treated with ramipril after vascular events. In PROGRESS (2001), perindopril (sometimes in conjunction with indapamide) reduced stroke by 28 percent, and similar benefit was seen in both hypertensive and non-hypertensive patients. Both trials reported modest reductions in blood pressure in the treated groups. There is insufficient evidence to determine whether the stroke reductions represent a unique effect of the specific agents used (ramipril, perindopril), are a class effect of the ACE blocking drugs, or relate to the degree of blood pressure lowering and would be achieved regardless of the agent used.

Individual studies have demonstrated reduction of stroke using simvastatin (4S Study, 1994), pravastatin (CARE Trial, 1996; LIPID Trial; 2001) and atorvastatin (MIRACL Trial, 2001). There is insufficient evidence to suggest which specific drug is preferable. These studies all recruited patients with cardiac disease. Results of a statin stroke prevention study in a specific stroke population are not yet available.

The use of HMG CoA Reductase Inhibitors ("statins") has been shown to reduce incidence of stroke by 23 to 50 percent in patients with cardiac disease, even in the absence of elevated total or low-density lipoproteins (LDL) cholesterol. Use of these agents should be considered in patients with hypercholesterolemia and ischemic stroke. There is insufficient evidence to determine whether LDL levels adequately measure the beneficial effects of statin therapy in ischemic stroke. The use of gemfibrozil has been shown to decrease the rate of death from coronary heart disease, nonfatal myocardial infarct, and stroke. This effect was seen in patients whose high-density lipoproteins (HDL) cholesterol was low and where the goal of treatment was not to lower LDL cholesterol.

Data on lifestyle modifications are compelling, but generally are based on retrospective studies with case controls demographic surveys (Goldstein et al., 2001).

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Carotid endarterectomy.	NASCET, 1998	I	Good	A
2	Warfarin for cardiogenic stroke.	ACCP Guidelines, 2001 SPAF Trials, 1999	I	Good	A
3	Antiplatelet therapy.	CAPRIE, 1996 ESPS-2, 1996 Zusman et al., 1999 ACCP Guidelines, 2001	I I I III	Fair Good Fair	A
4	ACE inhibitor.	HOPE, 2000 PROGRESS, 2001	I	Good	A
5	Statin therapy.	Blauw et al., 1997 Bucher et al., 1998 PPP Project, 2001 Van Mil et al., 2000 VA-HIT Study, 2001 Jonsson & Asplund, 2001	I I I I I II-2	Good	A
6	Lifestyle modification.	Dunbabin & Sandercock, 1990 Goldstein et al., 2001	II-2	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

POST-STROKE REHABILITATION

E. Post-Acute Stroke Patient Assessed For Rehabilitation Services

Post-acute stroke is defined as the period of time immediately following discharge from acute care. The stroke patient has achieved medical stability and the focus of care now becomes rehabilitation. Stroke rehabilitation following discharge from acute care can be conducted in inpatient rehabilitation hospitals or rehabilitation units in acute care hospitals, nursing facilities, the patient's home, or outpatient facilities. Some patient may ecover from the acute phase with no need for rehabilitation services.

Inpatient rehabilitation:

> *Rehabilitation performed during an inpatient stay in a freestanding 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.*

Nursing facility rehabilitation:

> *Rehabilitation performed during a stay in a nursing facility. Nursing facilities vary widely in their rehabilitation capabilities, ranging from maintenance care to comprehensive and intense rehabilitation programs.*

Outpatient rehabilitation:

> *Rehabilitation performed in an outpatient facility that is either freestanding or attached to an acute care or rehabilitation hospital. Day hospital care is a subset of outpatient rehabilitation in which the patient spends a major part of the day in an outpatient rehabilitation facility.*

Home-based rehabilitation:

> *A rehabilitation program provided in the patient's place of residence (AHCPR, 1995).*

F. Obtain Medical History and Physical Examination. Determine Nature and Extent of Rehabilitation Services Based on Stroke Severity, Functional Status, and Social Support

OBJECTIVE

Obtain clinical data to determine the patient's need for rehabilitation services.

ANNOTATIONS

A thorough history and physical should be performed by the rehabilitation physician. The National Institute of Health Stroke Scale (NIHSS) score should be obtained at this time, if not previously determined by the referring team. The history, physical, and NIHSS score provides the framework to begin to determine the nature and extent of needed rehabilitation services.

The history and physical should cover the following areas:

- Risk of Complications (skin breakdown, risk for DVT, swallowing problems, bowel and bladder dysfunction, malnutrition, falls, and pain) (see Annotations B and G)
- Determination of Impairment (Swallowing, Cognition, Communication, Motor, Psychological, and Safety Awareness) (see Annotation H and S)
- Psychosocial assessment (Family and Caregivers, Social Support, Financial, and Cultural Support) (see Annotation I)
- Assessment of prior and current functional status (e.g., FIM™) (see Annotation J)

G. Assess Risk For Complications

G-1 Assessment of Swallowing (Dysphagia)

BACKGROUND

Dysphagia, an abnormality in swallowing fluids or food, is common; it occurs in about 45 percent of all stroke patients admitted to the hospital. It can seriously affect the patient's quality of life and potentially lead to death. It is associated with severe strokes, and with worse outcome. The presence of aspiration may be associated with an increased risk of developing pneumonia after stroke. Malnutrition is also common, being present in about 15 percent of all patients admitted to the hospital, and increasing to about 30 percent over the first week post-stroke. Malnutrition is associated with a worse outcome and a slower rate of recovery (RCP, 2000).

Assessment of dysphagia by personnel who are not adequately trained in the anatomy and physiology of swallowing is oftentimes problematic. Traditionally, speech and language pathologists (SLPs) receive formal training in the oropharyngeal anatomy and physiology. However, many medical centers may not have the availability of the SLP, but may have other health professionals (e.g., occupational therapists and nurses) with training in asssessment and treatment of dysphagia. The availability of the SLP and education of other health professionals in dysphagia is essential to insure that the rates of malnutrition and aspiration pneumonia are kept to a minimum.

RECOMMENDATIONS

1. Recommend that all patients have their swallow screened prior to initiating oral intake of fluids or food, utilizing a simple valid bedside testing protocol.
2. Recommend that the swallow screening be performed by the SLP or other appropriately trained personnel, if the SLP is not available.
3. If the patient's swallow screening is abnormal, a complete bedside swallow examination is recommended. The examination should be performed by the SLP, who will define swallow physiology and make recommendations regarding management and treatment.
4. Recommend that all patients who have a positive bedside screening be tested using videofluoroscopy swallowing study (VFSS)/modified barium swallow. Patients with a high risk for aspiration and/or dysphagia (e.g., brainstem stroke, pseudobulbar palsy, and multiple strokes), regardless of screening results, should undergo VFSS.
5. Consider fiberoptic endoscopic examination of swallowing (FEES) as an alternative to VFSS.
6. There is insufficient evidence to recommend for or against fiberoptic endoscopic examination of swallowing with sensory testing (FEESST) for the assessment of dysphagia.
7. Recommend that the diagnostic assessment, whether VFSS or another modality, include a definition of swallow physiology with identification of the physiologic abnormality and treatment strategies to directly assess their effectiveness.
8. Consider addressing food consistency with dietetics to ensure standardization, consistency, and palatability.

DISCUSSION

No controlled trials were found that compared the effectiveness of a screening program versus no screening for identifying patients who are at increased risk of pneumonia and nutrition problems. Two systematic reviews that included case series showed that patients who have abnormal screening tests are at increased risk of pneumonia and nutrition problems compared to patients who have normal screening tests (ECRI, 1999; Perry & Love, 2001).

The only two signs that seem predictive of aspiration are severe dysphagia and abnormal pharyngeal sensation (ECRI, 1999; Perry & Love, 2001). The ECRI (1999) reports that individual signs and symptoms do not adequately predict pneumonia nor detect aspiration during a bedside evaluation.

The same two systematic reviews, along with a third (Martino et al., 2000), showed that routine screening compared with no screening may decrease the risk of pneumonia, but this is based on very limited data from case series, cohort studies, and a single historical-controlled trial. One systematic review included cost-effectiveness analyses that suggested that routine screening with a preliminary bedside evaluation followed by either a full bedside evaluation or VFSS when the preliminary study is abnormal may be cost-effective, if the assumptions used in the analyses are correct (ECRI, 1999).

Bedside exams: Cohort studies have shown that full bedside evaluations can detect patients who are at risk for pneumonia and nutrition problems, but the magnitude of the increased risk for patients with abnormal tests is not clear. Water swallow tests alone do not seem to be as accurate as full bedside exams. Limited data suggest that the accuracy of water swallow tests or full bedside evaluations may be increased by combining these with an oxygen desaturation test (Lim et al., 2001).

Videofluoroscopy/modified barium swallow: Cohort studies have shown that patients who aspirate on VFSS are at increased risk of developing pneumonia and nutrition problems than are patients with normal tests. There is no good evidence that VFSS is more or less accurate than bedside exams in predicting pneumonia or other complications (ECRI, 1999).

Fiberoptic endoscopic examination of swallowing (FEES): Case series comparing FEES and VFSS have shown that each test detects some patients who aspirate that the other test does not, and that neither test is clearly better than the other. One small cohort study showed that FEES was very sensitive, but not specific in predicting pneumonia (Lim et al., 2001).

One cohort study (20 subjects) showed that FEESST with VFSS improved prognostication for pneumonia over VFSS alone (Aviv, 2000). Further research is needed.

Examination of treatment strategies by x-ray can impact diet and recovery from dysphagia. About 83 percent of patients in VFSS may receive changes in at least one of five important clinical variables: referrals to other specialists, swallowing therapy, compensatory strategies that improve swallowing, changes in mode of nutritional intake, and diet (Martin-Harris et al., 2000).

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Simple valid bedside swallow screening completed prior to initiating oral intake of fluids or foods.	ECRI, 1999 Perry & Love, 2001 Martino et al., 2000	II-2	Fair	B
2	Swallow screening performed by the SLP or other appropriately trained personnel.	Working Group Consensus	III	Poor	I
3	A complete bedside swallow examination, performed by the SLP, for all patients with abnormal swallow screenings.	Working Group Consensus	III	Poor	I
4	VFSS for all positive bedside swallow screenings; patients at high risk for aspiration/ dysphagia should undergo VFSS.	Perry & Love, 2001	II-2	Fair	B
5	FEES as an alternative to videofluoroscopy.	ECRI, 1999	II-2	Fair	C
6	FEESST may be considered.	Aviv et al., 2000	II-3	Poor	I
7	VFSS and other diagnostic procedures for swallow should include assessment of treatment strategies.	Martin-Harris et al., 2000	II-2	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

G-2 Treatment of Bowel and Bladder Incontinence

BACKGROUND

Urinary incontinence is a common problem after stroke. Approximately 50 percent of stroke patients have incontinence during their acute admission for stroke (Nakayama et al., 1997). However, that number decreases to 20 percent by six months post-stroke. Increased age, increased stroke severity, the presence of diabetes, and the occurrence of other disabling diseases increase the risk of urinary incontinence in stroke.

Most patients with moderate to severe stroke are incontinent at presentation, and many are discharged incontinent. Urinary and fecal incontinence are both common in the early stages. Incontinence is a major burden on caregivers once the patient is discharged home. Management of both bladder and bowel problems should be seen as an essential part of the patient's rehabilitation, as they can seriously hamper progress in other areas. Acute use of an indwelling catheter may facilitate management of fluids, prevent urinary retention, and reduce skin breakdown in patients with stroke; however, use of a foley catheter greater than 48 hours post-stroke increases the risk of urinary tract infection.

Fecal incontinence occurs in a substantial proportion of patients after a stroke, but clears within two weeks in the majority of patients (Brockelhurst et al., 1985). Continued fecal incontinence signals a poor prognosis. Diarrhea, when it occurs, may be due to medications, initiation of tube feedings, or infections. It can be due to leakage around a fecal impaction. Treatment should be cause specific (AHCPR, 1995).

Constipation and fecal impaction are more common after stroke than incontinence. Immobility and inactivity, inadequate fluid or food intake, depression or anxiety, a neurogenic bowel or the inability to perceive bowel signals, lack of transfer ability, and cognitive deficits may each contribute to this problem. 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 (Venn et al., 1992). Stool softeners and judicious use of laxatives may be helpful.

RECOMMENDATIONS

1. Recommend 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. Consider removal of the foley catheter within 48 hours to avoid increased risk of urinary tract infection; however, if used, it should be removed as soon as possible.
3. Recommend the use of silver alloy-coated urinary catheters, if a catheter is required.
4. There is insufficient evidence to recommend for or against the use of urodynamics over other methods of assessing bladder function.
5. Consider an individualized bladder training program 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.

DISCUSSION

There are no systematic reviews evaluating the usefulness of urodynamics in the setting of post-stroke incontinence. Weak trial data (i.e., low quality randomized controlled trials [RCT] in the non-stroke setting and

prospective and retrospective cohort studies of patients post-stroke) suggests that urodynamic evaluation may be important in males if empiric anticholinergic therapy is planned, or if urinary incontinence does not resolve within the expected time frame. Retrospective cohort data suggest that, in males with stroke, symptoms do not reliably predict the presence of obstructive findings on urodynamic testing.

A systematic review of diagnostic test studies did not conclusively recommend bladder scanning as an adjunct to bedside clinical evaluation for incontinence over other methods of assessing urinary retention, such as in-and-out catheterization.

Use of an indwelling catheter should be limited to patients with incontinence that cannot be managed any other way. Studies performed in non-stroke populations clearly demonstrate the increased risk of bacteriuria and urinary tract infections (Bjork et al., 1984; Sabanthan et al., 1985; Warren et al., 1982).

A meta-analysis study published in 1998 (Saint et al.) concluded: "Silver alloy-coated urinary catheters are significantly more effective in preventing urinary tract infections than are silver oxide catheters. They are more expensive, but may reduce overall costs of care, as catheter related infection is a common cause of nosocomial infection and bacteremia." This analysis covered a diverse patient population, and was not specific to stroke.

There is systematic review evidence of low to medium quality studies that weakly supports bladder training in the short-term management of urge urinary incontinence in a general population with this disorder. There is systematic review evidence of medium quality studies that weakly supports prompted voiding for short-term improvement in incontinence symptoms. These studies may not be generalizable to stroke patients because of a high prevalence of dementia in the population studied and the conduct of the interventions by research assistants rather than nursing staff.

There is no pertinent evidence for or against scheduled voiding for stroke patients, nor is there evidence supporting a bowel program.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Bladder assessment/ scanning.	Nwosu et al., 1998 Working Group Consensus	II-2 III	Poor Fair	C B
2	Indwelling catheter.	Bjork et al., 1984 Sabanthan et al., 1985 Warren et al., 1982	II-2	Fair	B
3	Silver alloy-coated catheters.	Saint et al., 1998	I	Fair	B
4	Urodynamics.	Ramsay et al., 1995	III	Poor	I
5	Bladder training program.	Roe et al., 2001 Berghmans et al., 2000	III	Poor	C
6	Prompted voiding.	Eustice et al., 2001	I	Fair	B
7	Bowel program.	Venn et al., 1992	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

G-3 Assessment of Malnutrition

BACKGROUND

Adequate nutrition and hydration can be compromised by altered consciousness, swallowing difficulties (dysphagia), sensory or perceptual deficits, reduced mobility, or depression, which can cause decreased interest in eating. Assessment of nutrition and hydration includes monitoring intake, body weight, urinary and fecal outputs, caloric counts, and levels of serum proteins, electrolytes and blood counts.

RECOMMENDATIONS

1. Recommend that all patients receive evaluation of nutrition and hydration, 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 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.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Nutrition and hydration evaluation completed as soon as possible after admission, using a valid nutritional screening method.	Working Group Consensus	III	Poor	I
2	Use a variety of methods to maintain and improve intake of food and fluids.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

G-4 Assessment and Treatment of Pain

BACKGROUND

Patients may have pre-existing pain or acute pain post-stroke. Pain occurring post-stroke may include joint pain from spasticity, immobility, muscle weakness, headache, centrally mediated pain, and shoulder pain. Prevention, assessment, and treatment of pain should continue throughout rehabilitation care.

RECOMMENDATIONS

1. Recommend pain assessment using the 0 to 10 scale.
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 what aggravates or relieves the pain.
3. Control pain that interferes with therapy.
4. Recommend the use of lower doses of centrally-acting analgesics, which may cause confusion and deterioration of cognitive performance and interfere with the rehabilitation process.

DISCUSSION

For pain assessment scales see: VHA. Pain as the 5th Vital Sign Toolkit. Washington, DC: National Pain Management Coordinating Committee, October 2000.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Standardized pain assessment.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation

H. Assessment of Cognition and Communication

OBJECTIVE

Identify areas of cognitive and communication impairment.

BACKGROUND

Assessment of cognition and arousal is important for determining the patient's capabilities and limitations for coping with the stroke and assuring success of the rehabilitation process. The results of the assessment may impact the choice of treatment and disposition.

Assessment of communication ability is important for determining the patient's capabilities and limitations for expressing his/her wants and needs, understanding and contributing to their plan of care (including consent forms and advanced directives), and comprehending instructions affecting the success of the rehabilitation process. The results of the assessment may impact the choice of treatment and disposition.

RECOMMENDATIONS

1. Assessment of cognition, arousal, and attention should address the following areas: learning and memory, visual neglect, attention, apraxia, and problem solving.
2. The Working Group does not recommend for or against the use of any specific tools to assess cognition. Several screening and assessment tools exist.
3. Assessment of communication ability should address the following areas: listening, speaking, reading, writing, and pragmatics.
4. The Working Group does not recommend for or against the use of any specific tools to assess communication. Several screening and assessment tools exist. Appendix B includes standard instruments for assessment of communication.
5. Communication and cognitive problems are prevalent in stroke patients. Team members should be trained to recognize and manage the patient's communication and cognitive problems.

I. Psychosocial Assessment

OBJECTIVE

Provide comprehensive understanding of patient/caregiver psychosocial functioning, environment, resources, goals, and expectations for community integration.

BACKGROUND

A comprehensive understanding and involvement of the whole person, family/caregiver, and environmental system are required for stroke rehabilitation. Without adequate resources and support it is difficult for patients

to sustain the gains made during inpatient care or make further progress in the community. It is essential that the treatment team know the patient (including history, expectations, coping style, resources and emotional support system) in order to fully engage him/her in the treatment process. Motivation and hope for improvement is a critical factor in functional improvement.

RECOMMENDATIONS

1. Recommend that all stroke patients should receive a psychosocial assessment, psychosocial intervention, and referrals.
2. Recommend that families, significant others, and caregivers should be included in the assessment process.
3. Recommend that all stroke patients should be referred to a social worker for a comprehensive psychosocial assessment and intervention.
4. The psychosocial assessment should include the following areas:
    - History of pre-stroke functioning (e.g., demographic information, past physical conditions and response to treatment, substance use and abuse, psychiatric, emotional and mental status and history, education and employment, military, legal, and coping strategies)
    - Family/caregiver situation and relationships
    - Resources (e.g., income and benefits, housing, and social network)
    - Spiritual and cultural activities
    - Leisure time and preferred activities
    - Patient/family/caregiver understanding of the condition, treatment, and prognosis, as well as hopes and expectations for care

DISCUSSION

The assessment should provide information about the significance of the history and situation to the patient/family now, as well as documentation of facts and events. Family/caregiver involvement is also essential to obtain a complete psychosocial assessment, encourage motivation, learn proper ways of assisting the patient with ADL and mobility function, and plan for successful follow-up care. Research suggests that the prevention of social deterioration and impairment should be part of the coordinated efforts to care for post-stroke patients (Ouimet et al., 2001). High levels of family support have been found to be associated with improved functional status in post-stroke patients (Tsouna-Hadjis et al., 2000), emphasizing the importance of family involvement in care and planning issues.

Patients receiving early, systematic discharge planning based on psychosocial assessment experienced an increased likelihood of successful return to home after hospital admission and a decreased chance of unscheduled readmission (Evans & Hendricks, 1993). Unmet needs and gaps in resources should be addressed as soon as possible, not only to plan for discharge, but also to relieve anxiety and encourage future planning during the rehabilitation process.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	All stroke patients receive a psychosocial assessment and intervention and referrals.	Tsouna-Hadjis et al., 2000	II-3	Fair	B
2	Families, significant others and caregivers included in the assessment process.	Tsouna-Hadjis et al., 2000	II-3	Fair	B
3	Comprehensive psychosocial assessment and intervention by a social worker.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

J. Assessment of Function

OBJECTIVE

Provide baseline assessment of overall functional status.

BACKGROUND

Analysis of function focuses on the measurement of task specific activities that are essential to support the well-being of an individual. The assessment of function is accomplished via a test or battery of tests in which the results can be used as (1) an information base for setting realistic goals, (2) an indicator to the patient of current abilities that documents progression toward more complex functional levels, (3) an index for decisions on admission and discharge from a rehabilitation or extended care facility, and (4) a guide for determining the safety of an individual in performing a particular task and the risk of injury with continued performance. The discharge environment must support the functional abilities of the patient.

RECOMMENDATIONS

1. Recommend that a standardized assessment tool be used to assess functional status of stroke patients.
2. Consider the use of the Functional Independence Measure (FIM™) as the standardized functional assessment (see Appendix D – Functional Independence Measure [FIM™] Instrument).
   Appendix B includes the list of other standard instruments for assessment of function and impact of stroke.

DISCUSSION

Standard measurement tools may be employed to objectively document the over-all functional status of a patient who survived a stroke. The most widely used tool for measuring functional status is the Functional Independence Measure (FIM™), although others exist (e.g., Barthel; Lawton). VHA Directive 2000-16 June 2001 states that all VA facilities will complete a FIM™ assessment on all stroke patients with rehabilitation needs.

Assessment of function may include, but is not limited to the following:

- Aerobic capacity and endurance
- Arousal, attention, and cognition
- Assistive and adaptive devices

- Balance
- Circulation (i.e., cardiovascular signs/symptoms and response to position change)
- Continence
- Gait
- Locomotion
- Joint integrity and mobility
- Motor function (i.e., movement patterns, coordination, dexterity, and agility)
- Muscle performance-strength, power, and endurance
- Orthotic, protective, and supportive devices
- Pain
- Posture
- Range of motion
- Reflex integrity
- Sexual activity
- Self care (ADL and IADL)

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Standardized functional assessment tool (e.g., FIM™).	Lin, 2001 Ottenbacher et al., 1996	II-2	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

K. Does Patient Need Rehabilitation Interventions?

OBJECTIVE

Identify the patient who requires rehabilitation intervention.

BACKGROUND

Patients who have sustained an acute stroke should receive rehabilitation services if their post-stroke functional status is below their pre-stroke status, and if there is a potential for improvement. If pre- and post-stroke functional status is equivalent, or if the prognosis is judged to be poor, rehabilitation services may not be appropriate for the patient at the present time.

Patients who have had an ischemic or hemorrhagic stroke with resulting impairments and limitations in activities, as identified on the brief assessment, should be referred to rehabilitation services for an assessment of rehabilitation needs.

RECOMMENDATIONS

1. Strongly recommend that once the patient is medically stable, the primary physician consult rehabilitation services (i.e., physical therapy, occupational therapy, speech and language pathology, kinesiotherapy, and Physical Medicine), as indicated, to assess the patient's rehabilitation needs and to recommend the most appropriate setting to meet those needs.
2. A multidisciplinary assessment, using a standard procedure, should be undertaken and documented for all patients. Patients with need of rehabilitation intervention should be referred to a specialist stroke rehabilitation team, as soon as possible.

DISCUSSION

Assessment of rehabilitation needs should include the following:

- Medical work-up and treatment plan
- Stable vital signs for 24 hours
- No chest pain within the past 24 hours, with the exception of stable angina or documented noncardiac condition
- No significant arrhythmia
- No evidence of DVT
- Cognitive capability of participating in rehabilitation
- Willingness to participate in rehabilitation services
- Prior functional status
- Capacity for improvement
- Functional deficits: *see Annotations G, H, I, and J*
- Assessment of training needs: family, major equipment, and vocation/leisure

L. Is Inpatient Rehabilitation Indicated?

OBJECTIVE

Identify the optimal environment for providing rehabilitation interventions.

BACKGROUND

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. Regardless of the setting, the patient should be cared for by a coordinated team.

RECOMMENDATIONS

1. Strongly recommend that patients in need of rehabilitation services have access to a setting with a coordinated and organized rehabilitation care team, experienced in providing stroke services. The coordination and organization of inpatient post-acute stroke care will improve patient outcome.
2. No conclusive evidence was found to demonstrate the superiority of one type of rehabilitation setting over another.
3. The severity of the patient's impairment, the availability of family/social support, and patient/family preferences will determine the optimal environment for care.
4. Recommend that patients remain in an inpatient setting for their rehabilitation care if they are in need of skilled nursing services, regular physician care, and multiple therapeutic interventions.

DISCUSSION

The Early Supported Discharge Trialists (1999) has shown that if a multidisciplinary team exists in the community, rehabilitation services may be successfully provided in outpatient settings and patients can be discharged from the inpatient setting early. Cifu and Stewart (1999) observed "current literature is too limited to allow an assessment of the relationship of specific types of non-inpatient rehabilitation services after stroke and functional outcome." Evans (1995), in another review of the literature, noted that "[inpatient] rehabilitation services are effective in improving short-term survival, functional ability, and the most independent discharge

location;" however, Evans found a lack of long-term benefits and suggested that therapy be extended to home or other settings, rather than being discontinued at discharge.

Rudd and colleagues (1997) have attempted to address the issue by studying whether early discharge with intensive community-based therapy is as effective as continued inpatient rehabilitation care. The authors controlled for the medical stability of patients and for therapeutic intensity, thereby testing whether patients and caregivers could competently function at home after a shorter period of inpatient care. The groups did not differ for any of the standardized measures. More patients in the community-care group were satisfied with their hospital care than were patients in the conventional-care group (79 versus 65 percent; P=0.03). Mean length of stay after randomization was shorter in the community-care group than in the conventional-care group (12 versus 18 days; P<0.001). Patients with stroke who were discharged early to a community-based rehabilitation team did not differ in impairment and disability compared with patients who received conventional care. Details were not provided about qualitative differences between the community-based and inpatient multidisciplinary therapy programs.

The Working Group consensus is that patients should remain in an inpatient setting for their rehabilitation care if they are in need of skilled nursing services, regular contact by a physician, and multiple therapeutic interventions.

Examples for "need of skilled nursing services" include (but are not limited to) the following:

- Bowel and bladder impairment
- Skin breakdown or high risk for skin breakdown
- Impaired bed mobility
- Dependence for ADL
- Inability to manage medications
- High risk for nutritional deficits

Examples for "need of regular contact by a physician" include (but are not limited to) the following:

- Medical comorbidities not optimally managed (e.g., diabetes and hypertension)
- Complex rehabilitation issues (e.g., orthotics, spasticity, and bowel/bladder)
- Acute illness (but not severe enough to prevent rehabilitation care)
- Pain management issues

An example for "need of multiple therapeutic interventions" includes (but is not limited to) the following:

- Moderate to severe motor/sensory deficits, and/or
- Cognitive deficits, and/or
- Communication deficits

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Organized and coordinated post-acute inpatient rehabilitation care improves outcome.	*See Provision of Rehabilitation Care*	I	Good	A
2	Inpatient versus outpatient settings.	Cifu & Stewart, 1999 Early Supported Discharge Trialists, 1999 Evans et al., 1995 Rudd et al., 1997	I	Fair	B
3	Patient's impairments, availability of family/social support, and patient/family preferences determine the optimal environment for care.	Working Group Consensus	III	Fair	I
4	Patients requiring skilled nursing services, regular physician contact, and multiple therapeutic interventions remain in an inpatient setting for rehabilitation care.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

M. Is Patient Independent in ADL And IADL?

OBJECTIVE

Determine appropriate discharge environment.

BACKGROUND

Instrumental activities of daily living (IADL) are skills beyond basic self-care skills needed to function independently at home and in the community. Successful performance of complex activities of daily living (ADL) tasks (i.e., cooking, cleaning, shopping, and housekeeping) requires higher-level neurophysiological organization than is required for performance of self-maintenance tasks (i.e., bathing and dressing). For a patient planning to return to an assisted living situation, further independence may not be required or expected. For many patients, however, IADL are central to independent living. Cognitive functioning and comprehension are also factors for independent living.

RECOMMENDATIONS

1. Recommend that all post-stroke patients should be reassessed for ADL prior to discharge.
2. Recommend that all patients planning to return to independent community living should be assessed for IADL prior to discharge (including a community skills evaluation and home assessment).
3. Minimal IADL skills required to stay at home alone include the ability to: (1) prepare or retrieve a simple meal, (2) employ safety precautions and exhibit good judgment, (3) take medication, and (4) get emergency aid, if needed. Refer to Table 1 as a guide to differentiate between ADL and IADL.

DISCUSSION

Table 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 Use of 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.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Reassess the patient's ADL prior to discharge.	Nourhashemi et al., 2001	II-2	Fair	B
2	Assess the patient's IADL prior to discharge, if the patient is returning to independent community living.	Ginsberg et al., 1999	II-3	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

N. Discharge Patient to Prior Home/Community; Arrange for Medical Follow-Up in Primary Care

OBJECTIVE

Ensure that the patient's continued medical and functional needs are addressed after discharge from rehabilitation services.

RECOMMENDATIONS

1. Strongly recommend that every patient participate in a secondary prevention program (see Annotation D).
2. Recommend that post-acute stroke patients be followed up by a primary care provider to address stroke risk factors and continue treatment of co-morbidities.

3. Recommend that the patient and family be educated regarding pertinent risk factors for stroke.

DISCUSSION

Patients who do not require any type of rehabilitation services and are discharged from acute care to home (or in the case of profoundly disabled patients, to a nursing home), require follow-up with their primary care provider within one month of discharge.

Patients who receive rehabilitation services require follow-up with their primary care provider within one month of discharge. They also require follow-up with the rehabilitation professional at a point in time 3 to 6 months after discharge.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Secondary prevention program.	*See Annotation D*	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E)

N-1 Exercise Program

BACKGROUND

Ensure the patient is given a home exercise program or referred to an appropriate community exercise program, as indicated.

RECOMMENDATIONS

1. 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.

DISCUSSION

Following discharge from rehabilitation services, patients may have continued medical or functional needs. Muscle weakness and decreased endurance are common impairments following stroke, which may persist after completion of formal rehabilitation. Stroke patients can make improvements in strength and endurance after formal rehabilitation is completed, which may improve function and decrease risk of further disease and disability. Additionally, management of stroke risk factors and co-morbid disease should occur through follow-up with a primary care provider.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Regular strengthening and aerobic exercise program at home or in an appropriate community program.	Macko et al., 1997 Potempa et al., 1996 Rimmer et al., 2000b Teixeira-Salmela et al., 1999	II-2	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

N-2 Adaptive Equipment, Durable Medical Devices, Orthotics, and Wheelchairs

BACKGROUND

Many patients require assistive devices, adaptive equipment, mobility aids, wheelchairs, and orthoses to maximize independent functioning following stroke. Many types of adaptive devices and durable medical devices (DME) are available. Type and level of functional deficit, degree of achieved adaptation, and the structural characteristics of the living environment determine the need for a particular item.

RECOMMENDATIONS

1. Recommend that 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.
2. Recommend that lower extremity orthotic devices be considered, if ankle or knee stabilization is needed to improve the patient's gait and prevent falls.
3. Recommend that a prefabricated brace be initially used and only patients who demonstrate long-term need for bracing have customized orthoses made.
4. Recommend that wheelchair prescriptions be based on careful assessment of the patient and the environment in which the wheelchair will be used.
5. Recommend that walking assistive devices be used to help with mobility efficiency and safety, when needed.

DISCUSSION

There is a vast array of adaptive devices available, including devices to make eating, bathing, grooming, and dressing easier for patients with functional limitations. These devices should only serve as a supplement and should not be expected to take the place of the patient mastering the task in question. Additionally, many patients may need to use adaptive devices early during the rehabilitation following a stroke, but will not require long-term use. This should be taken into account when considering providing a device. Examples of adaptive devices include (but are not limited to) eating utensils with built-up handles, rocker knives, plate guards, non-skid place mats, long handled sponges for bathing, hand held showers, tub and shower chairs, grab bars for bathrooms, and elevated toilet seats.

Lower extremity orthoses, such as ankle-foot-orthoses (AFO) and knee-ankle foot-orthoses (KAFO), may be required if the patient has persistent weakness and instability at the ankle and/or knee joint following a stroke. Proper timing for using an orthosis can facilitate gait training and should be considered early on in the rehabilitation process to permit gait training to occur as early as possible. An orthosis should not be used as a substitute for functional exercise directed at regaining muscle strength and control, particularly if the prognosis for motor recovery is good. Pre-fabricated orthoses can be used in the early stages of gait training, but a custom-fit device should be provided if it is determined that the patient may require long-term use of the orthosis.

Walking devices are helpful for patients with mild gait impairments. These devices increase the base of support around a patient's center of gravity and reduce the balance and effort needed to walk. Walking aids include (but are not limited to) the following:

Single point canes:	Need to be fit to the patient and have rubber tips to improve traction.
Tripod or quad canes:	Have 3 to 4 points of contact and offer more stability than a single point cane; however, they are heavier, bulkier, and more awkward to use.
Walkers:	Support more body weight than canes; should be lightweight and foldable if the patient is planning to use it outside the home.
Rolling walkers:	Allow for more energy efficient ambulation. The two-wheeled walker is the most commonly used walker, because 4-wheeled walkers are less stable and require greater coordination.

Wheelchairs should be provided for patients with severe motor weakness or who easily fatigue. Wheelchair designs vary greatly and a wheelchair prescription should be specific to the patient's needs and environment and patient and family/caregiver preferences.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Use of adaptive equipment.	AHCPR, 1995 Working Group Consensus	III	Poor	C
2	Use of lower extremity orthotic devices.	AHCPR, 1995 Working Group Consensus	III	Poor	C
3	Use of prefabricated braces.	AHCPR, 1995 Working Group Consensus	III	Poor	C
4	Wheelchair prescriptions.	AHCPR, 1995 Working Group Consensus	III	Poor	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

N-3 Return to Work

BACKGROUND

The AHCPR (1995) states, "Stroke survivors who worked prior to their strokes should, if their condition permits, be encouraged to be evaluated for the potential to return to work. Vocational counseling should be offered when appropriate." A meeting report by the American Stroke Association's 26th International Stroke Conference (2001) stated, "…the risk of stroke increases dramatically with age and the average age of workers is increasing." Because of Social Security Administration's change in mandatory retirement age "…more people will be working at the time of stroke and as more treatments are developed, more survivors will be facing the possibility of re-employment."

RECOMMENDATIONS

1. Recommend that all patients, if their condition permits, should be encouraged to be evaluated for the potential of returning to work.

2. Recommend that all patients who were previously employed be referred to vocational counseling for assistance in returning to work.
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.

DISCUSSION

There are many barriers to vocational reintegration that must be addressed if the stoke patient is to return to work. The type of work to which the patient is considering returning may be the single most significant determinant to successful reemployment (e.g., labor versus managerial or clerical) Re-training or returning to school for alternative employment requires a high level of motivation. Studies have indicated that successful reemployment may be dependent on support from family, return to work specialists, and employers.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Evaluate for the potential of returning to work.	AHCPR, 1995	III	Poor	C
2	Refer previously employed patients to vocational counseling.	AHCPR, 1995 American Stroke Association	III	Poor	C
3	Refer patients with psychosocial barriers who are considering returning to work to supportive services.	AHCPR, 1995 American Stroke Association	III	Poor	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

N-4 Return to Driving

BACKGROUND

The question of *if* or *when* a person can resume driving after a stroke can be difficult to answer. The family and medical staff will need to balance the patient's desire for independence with safety concerns. Safe operation of a vehicle requires multi-level functions (e.g., physical, cognitive, psycho-motor, perceptual-motor, and behavioral). Legal requirements vary from state to state.

RECOMMENDATIONS

1. Recommend that 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.
2. Consider referring patients with residual deficits to adaptive driving instruction programs to minimize the deficits, eliminate safety concerns, and ensure that patients will be able to pass the state driving test.

DISCUSSION

There are no incidence rates for motor vehicle accidents for post-stroke patients as a group; however, older drivers (without stroke) are involved in more fatal motor vehicle accidents per miles driven (National Highway Safety and Traffic Administration [NHSTA]). Many factors contribute to this statistic; therefore, caution should be exercised not to over generalize. Since most stoke patients are older drivers with possible residual deficits, they should be considered at greater risk for motor vehicle accidents. Currently there is only mild to moderate correlation of clinical exams to the pass/failure rate of post-stroke patients on state driving road tests.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Clinical assessment of the patient's physical, cognitive and behavioral functions to determine readiness for return to driving.	Working Group Consensus	III	Poor	I
2	Referral to an adaptive driving program for individuals with residual deficits.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

N-5 Sexual Function

BACKGROUND

Sexual issues relate both to sexual function and to changes in body image as a result of the stroke. Sexual activity usually diminishes and sometimes ceases after stroke, but sex remains an important issue to the majority of post-stroke patients. Sexual issues are often not adequately addressed, despite evidence that patients and their partners welcome frank discussions.

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.

DISCUSSION

The most important message is that sexual activity is not contraindicated after stroke. However, both parties need to recognize and adjust for the potential effects of motor, sensory, and self-esteem difficulties. Interventions that stress the importance of effective communication, sharing of concerns, and development of adaptive strategies to avoid fatigue, such as positioning, foreplay, and timing, are often helpful.

O. Patient With Severe Stroke And/Or Maximum Dependence And Poor Prognosis For Functional Recovery

ANNOTATION

Patients who have had a severe stroke or who are maximally dependent in ADL and have a poor prognosis for functional recovery are not candidates for rehabilitation intervention. Families and caregivers should be educated in the care of these patients. The family and caregiver education may include: preventing recurrent

stroke; signs and symptoms of potential complications and psychological dysfunction; medication administration; assisted ADL tasks (e.g., transfers, bathing, positioning, dressing, feeding, toileting, and grooming); swallowing techniques; nutrition and hydration; care of an indwelling bladder catheter; skin care; contractures; use of a feeding tube; home exercises (range of motion); and sexual functioning. Families should receive counseling on the benefits of nursing home placement long-term care.

P. Post-Stroke Patient In Inpatient Rehabilitation

Inpatient rehabilitation is defined as rehabilitation performed during an inpatient stay in a freestanding 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.

Q. Determine Level Of Care

OBJECTIVE

Provide the optimal environment for rehabilitation care.

BACKGROUND

The clinician determines the optimal environment in which inpatient rehabilitation services should be provided. Outcomes are better with the presence of a coordinated team specializing in stroke rehabilitation. The primary determinants of the level of care should be the patient's medical and functional status (i.e., motor and cognition). The decision should be made in the context of social support and access to care.

RECOMMENDATIONS

1. Strongly recommend that rehabilitation services be provided in an environment with organized and coordinated post-acute stroke rehabilitation care.

DISCUSSION

Evidence for the need to assess medical status for appropriate level of rehabilitation intervention is present and well established. Evidence-based rehabilitation clinical practice has used validated instrument scales regarding functional status. Organized and coordinated rehabilitation care has demonstrated optimal stroke outcomes.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Organized and coordinated post-acute inpatient rehabilitation care improves outcome.	*See Provision of Rehabilitation Care*	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E)

R. Educate Patient/Family; Reach Shared Decision Regarding Rehabilitation Program; Determine Treatment Plan

OBJECTIVE

Assure the understanding of common goals among staff, patient, and family/caregivers in the stroke rehabilitation process, and therefore, optimize the patient's functional recovery and community re-integration.

BACKGROUND

Goals are central to the process of rehabilitation because rehabilitation involves behavioral change (Wade, 1998). The use of patient goals that transcend treating disciplines is a common method of creating consistency in the delivery of rehabilitation services; however, not all rehabilitation settings subscribe to their use. The setting of goals is a mechanism for active patient involvement and cooptation of the patient into the "rehabilitation team." Goal setting should use both short-term and long-term perspectives.

RECOMMENDATIONS

1. Recommend that the rehabilitation team and family/caregiver should reach a shared decision regarding the rehabilitation program.
    - The rehabilitation team proposes the preferred environment for rehabilitation and treatments based on expectations for recovery.
    - The rehabilitation team describes to the patient and family/caregiver the treatment options, including the rehabilitation and recovery process, prognosis, estimated length of stay, frequency of therapy, and discharge criteria.
    - The patient, family/caregiver, and rehabilitation team should determine the optimal environment for rehabilitation and preferred treatment.
2. The rehabilitation program should be guided by specific goals developed in consensus with the patient, family, and rehabilitation team.
3. Recommend that the patient's family/caregiver should participate in the rehabilitation sessions, and be trained to assist the patient with functional activities, when needed.
4. Patient and family/caregiver education should be provided in an interactive and written format. Provide the patient and family/caregiver with an information packet that may include printed material on subjects such as the resumption of driving, patient rights/responsibilities, support group information, and audio/visual programs on stroke.
5. Document the detailed treatment plan in the patient's record to provide integrated rehabilitation care.

DISCUSSION

Shared Decision Making

The patient and family are presented with information regarding the rehabilitation process and the alternatives available to achieve their rehabilitation goals. Although the team may make recommendations regarding rehabilitation in the safest and least restrictive environment, the patient and family are ultimately the ones to make the decisions regarding the treatment setting. Alternatives include nursing home placement, lower intensity therapy in another facility, discharge home with homecare services, outpatient therapy, or refusal of all services.

Goal of Therapy

The post-stroke rehabilitation guideline published by the AHCPR (1995) does not address whether or not goals should be used, but rather *how* goals should be used. There is insufficient evidence to evaluate the value of

consensus goal development in stroke rehabilitation. However, it is best common practice to develop comprehensive goals that cover the level of disability and include psychosocial goals. The guideline recommends that: "Both short-term and longer term goals need to be realistic in terms of current levels of disability and the potential for recovery."

The use of goal setting as a targeted outcome and subsequent outcome measure (e.g., Goal Attainment Scaling) has exhibited positive results in several clinical trials involving geriatric rehabilitation, brain injury rehabilitation, and mixed rehabilitation patients (Joyce et al., 1994; Smith et al., 1998; Stolee et al., 1999).

Setting patient goals has multiple utilities. Goals should be realistic targets for use by the patient, family, and staff. Goals can serve in the capacity of a "self-fulfilling prophecy." Goals can create an environment of treatment consistency among treating disciplines, serve as benchmarks for response and recovery, and provide a basis for team meetings.

Treatment Plan
The treatment plan is determined on an individual basis for each patient, taking into account the patient/family's discharge goals and needs. The patient and family ultimately determine their treatment plan and establish short term and long-term goals.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Determining therapy goals.	Working Group Consensus	III	Poor	I
2	Patient and family/caregiver education.	*See Provision of Rehabilitation Care*	I	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S. Initiate Rehabilitation Programs and Interventions

OBJECTIVE
Provide the most appropriate interventions to optimize patient function and quality of life after an acute stroke.

BACKGROUND
Patients who have had an ischemic or hemorrhagic stroke with resulting impairments and limitations in activities, as identified on the brief assessment, should be referred to rehabilitation services for an assessment of rehabilitation needs.

Stroke rehabilitation involves programs to reduce impairments, enhance recovery and adapt to the persisting disability. Adaptation to the disability includes programs to teach mobility, ADL, and community re-integration. These programs also include provision of assistive devices and technology. Mobility and training in ADL have not been, nor are likely to be in the future, subjected to randomized controlled studies. The treatment plan involves a coordinated team that may include physical therapy, occupational therapy, speech and language pathology, kinesiotherapy, Physical Medicine or a stroke rehabilitation physician. The following recommendations address those areas in which high quality evidence has been identified.

DISCUSSION
Assessment of rehabilitation needs should include the following:

- Medical work-up and treatment plan
- Stable vital signs for 24 hours
- No chest pain within the past 24 hours, with the exception of stable angina or documented noncardiac condition
- No significant arrhythmia
- No evidence of DVT
- Cognitive capability of participating in rehabilitation
- Willingness to participate in rehabilitation services
- Prior functional status
- Capacity for improvement
- Functional deficits: *see Annotations G, H, I, J, and K*
- Assessment of training needs: family, major equipment, and vocation/leisure

S-1 Dysphagia Treatment

BACKGROUND

Dysphagia treatment may involve compensatory strategies including posture changes, heightening sensory input, swallow maneuvers (voluntary control of selected aspects of the swallow), active exercise programs, or diet modifications. Dysphagia management may include non-oral feeding, psychological support, nursing intervention, etc. At this time, it is unclear how dysphagic patients should be fed and treated after acute stroke (Bath et al., 2001b).

RECOMMENDATIONS

1. Recommend considering enteral feeding for the stroke patient who is unable to orally maintain adequate nutrition or hydration.
2. Consider the use of a feeding tube, however, there is no evidence to recommend the use of one feeding route over another.
3. Recommend that the dysphagic stroke patient receive both direct swallowing treatment and management by the speech and language pathologist (SLP), when available, when a treatable disorder in swallow anatomy or physiology is identified.

DISCUSSION

The relevant systematic review and the existing guidelines generally support the use of tube feedings for "appropriate" patients, but do not provide evidence regarding timing and route. There is very limited evidence to suggest that PEG feeding may compare favorably with NGT feeding (Finestone et al., 2001).

Due to the limited number of studies and the small numbers of patients, it is difficult to make specific recommendations regarding the various feeding interventions. Data from two ongoing studies may provide evidence about the appropriate use of feeding interventions to improve survival and quality of life for the dysphagic patient.

Data from several studies show swallow improvement with treatment provided during the video fluoroscopy swallowing study (Martin-Harris et al., 2000; Rasley et al., 1993).

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Enteral feeding for patients who are unable to orally maintain adequate nutrition.	Finestone et al., 2001	II-2	Fair	B
2	Initiate swallowing treatment and management once SLP identifies a treatable disorder in swallow anatomy or physiology.	Hinds & Wiles, 1998 Martin-Harris et al., 2000 Perry & McLaren, 2000	II-3	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-2 Acute Communication Disorders

BACKGROUND

Disorders of communication (i.e., problems with speaking, listening, reading, writing, gesturing, and/or pragmatics) and related cognitive impairments may occur in as many as 40 percent of post-stroke patients. The most common communication disorders occurring post-stroke are aphasia and dysarthria. Rapid spontaneous improvement is common, but early evaluation can identify communication problems and monitor change. If indicated, intervention can help maximize recovery of communication abilities and prevent learning of ineffective or inappropriate compensatory behaviors. Goals of speech and language treatment are to: (1) facilitate the recovery of communication; (2) assist patients in developing strategies to compensate for communication disorders and (3) counsel and educate people in the patient's environment to facilitate communication, decrease isolation, and meet the patient's desires and needs.

RECOMMENDATIONS

1. Recommend that patients with communication disorders receive early treatment and monitoring of change in communication abilities in order to optimize recovery of communication skills, develop useful compensatory strategies, when needed, and facilitate improvements in functional communication.
2. Recommend that the SLP educate the rehabilitation staff and family/caregivers in techniques to enhance communication with patients who have communication disorders.

DISCUSSION

The American Speech-Language-Hearing Association (ASHA) requires evaluation and treatment of communication disorders be performed by a certified SLP (i.e., an individual who holds the Certificate of Clinical Competence in Speech-Language Pathology [CCC-SLP]) (ASHA, 2001; ASHA, 2002).

Two meta-analyses that included observational and quasi-experimental studies addressing treatment outcomes of aphasic patients at different recovery periods concluded:

- The recovery of treated individuals was nearly two times that of untreated individuals when treatment was begun in the acute stage (less than four months from insult). Furthermore, treatment brought about an appreciable, but smaller, improvement when begun after the acute period (Robey, 1994).
- Outcomes for treated individuals are superior to those for untreated individuals in all stages of recovery. Outcomes are greater when begun in the acute stage of recovery (Robey, 1998).

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Early treatment for patients with communication disorders by an SLP.	ASHA, 2001 & 2002 Robey, 1994 Robey, 1998	II-2	Fair	B
2	Staff and family/caregiver education in communication techniques.	ASHA, 2001 Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-3 Long-Term Communication Difficulties

BACKGROUND

Disorders of communication (i.e., problems with speaking, listening, reading, writing, gesturing, and/or pragmatics) and related cognitive impairments may occur in as many as 40 percent of post-stroke patients. The most common communication disorders occurring post-stroke are aphasia and dysarthria. Rate of improvement decreases with time post-stroke, making the evaluation and, if indicated, treatment of residual communication disorders an important step towards achieving independence and improving quality of life for stroke patients. Goals of speech-language treatment are to: 1) facilitate the recovery of the communication difficulties; 2) assist patients in developing strategies to compensate for communication disorders; and 3) counsel and educate people in the patient's environment to facilitate communication, decrease isolation, and meet the patient's wants and needs.

RECOMMENDATIONS

1. Strongly recommend that all patients should be evaluated and treated by the SLP for residual communication difficulties (i.e., speaking, listening, reading, writing, and pragmatics).

DISCUSSION

Three RCTs (one individual, one group, and one computer-provided) demonstrated statistically significant improvement of long-term language difficulties in treated stroke patients when compared with untreated stroke patients (Elman & Bernstein-Ellis, 1999; Katz & Wertz, 1997; Wertz et al., 1986).

One RCT treatment study (individual) did not find a significant difference in long-term language difficulties between treated and untreated stroke patients; however, only one-third of the treatment subjects received the prescribed treatment (2 hours/week x 24 weeks) (Lincoln et al., 1984).

Four meta-analyses indicated that treatment is generally efficacious (Robey, 1994; Robey, 1998; Whurr et al., 1992; Whurr et al., 1997).

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Follow-up evaluation and treatment by the SLP for residual communication difficulties.	Elman & Bernstein-Ellis, 1999 Katz & Wertz, 1997 Robey, 1994 & 1998 Wertz et al., 1986 Whurr et al., 1992 & 1997	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-4 Motor Functioning - Strengthening

BACKGROUND

Muscle weakness is a common impairment following stroke. However, facilitation treatment models have often emphasized the management of spasticity without addressing underlying muscle weakness. Another common intervention focus is functional training; sometimes without addressing the contributing impairments. Lower extremity muscle strength has been correlated with gait speed in stroke patients (Bohannon & Walsh, 1992). Additionally, lower extremity muscle strength on admission to rehabilitation is a predictor of function at discharge (Andrews & Bohannon, 2001). Lower extremity strength has also been inversely correlated with risk of falling in elderly individuals.

RECOMMENDATIONS

1. Recommend that strengthening be included in the acute rehabilitation of patients with muscle weakness following stroke.

DISCUSSION

The recommendation for including strengthening in the acute rehabilitation of patients with muscle weakness following stroke is based on Working Group Consensus, considering the positive relationship between muscle strength, function and prevention of falls. Research on strength training of post-stroke patients has studied subjects after acute rehabilitation has been completed (greater than 6 months post-stroke) and has demonstrated improvement in muscle strength and function with training (Rimmer et al., 2000b; Teixeira-Salmela et al., 1999). There is a lack of research on specific strength training during acute rehabilitation.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Strengthening for patients with muscle weakness following stroke.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-5 Partial Body Weight Support for Treadmill Training

BACKGROUND

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 (Visintin et al., 1998). Recent studies

report that the type of training strategy implemented in rehabilitation can affect the patient's locomotor recovery. A recently proposed gait training strategy involves unloading the lower extremities by supporting a percentage of body weight. Body weight support provides symmetrical removal of weight from the lower extremities, thereby facilitating walking in patients with neurological conditions. This specific gait training strategy has been used to enhance/facilitate locomotor abilities after stroke.

RECOMMENDATIONS

1. Recommend that treadmill training with partial body weight support be used as an adjunct to conventional therapy in patients with mild to moderate dysfunction resulting in impaired gait.

DISCUSSION

Treadmill training with partial body weight support is superior to nonbody weight supported treadmill training and is, therefore, recommended as an adjunct to conventional therapy in patients with mild to moderate dysfunction resulting in impaired gait (Visintin et al., 1998).

The RCP guideline (2000) recommends the use of this modality for patients who are not walking three months after an acute stroke. One subsequent RCT found equivalent results for most patients from a program that included aggressive bracing and assisted walking (Kosak & Reding, 2000). One very small RCT found no benefit from partial body weight supported treadmill training initiated within six weeks after the stroke (Teixeira et al., 2001).

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Partial bodyweight support for treadmill training.	Kosak & Reding, 2000 Teixeira et al., 2001 Visintin et al., 1998	I	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-6 Constraint Induced (CI) Movement Therapy

BACKGROUND

Substantial loss of motor function may persist after sustaining a stroke. Persistent loss of upper extremity function is common among these individuals. Several different therapeutic approaches aimed at resolving upper extremity dysfunction following stroke have been postulated. One such approach has been termed constraint induced (CI) movement therapy, and involves forced used of the involved upper extremity and discourages the use of the unaffected extremity. This approach requires substantial exercises (e.g., 6 to 8 hours a day for 2 weeks).

RECOMMENDATIONS

1. Consider the use of constraint induced (CI) therapy 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. To date the only demonstrated benefit occurs in individuals who received 6 to 8 hours of daily training for at least 2 weeks.

DISCUSSION

The AHCPR and RCP guidelines do not make recommendations about the use of CI movement therapy. The Dromerick study (n=23) is the only RCT looking at the results of CI therapy in an acute care setting. This clinical trial demonstrated the feasibility and safety of performing trials in the acute care setting. The results of the study showed a trend toward improved function among the CI group, however, conclusions are difficult to draw due to small sample size and significant demographic differences between the study groups (Dromerick et al., 2000).

CI movement therapy may prove beneficial for a small subset of stroke patients. Benefit has only been shown in patients with specific degrees of active wrist and finger extension on the involved upper extremity. Candidates for CI movement therapy must meet or exceed minimum motor criteria: 20 degrees extension of the affected wrist and 10 for each finger and have no sensory or cognitive deficits (Kunkel et al., 1999). The Working Group can not recommend CI therapy as a preferred treatment for every patient.

The ongoing EXCITE (Extremity Constraint Induced Therapy Evaluation) clinical trial, funded by the National Center for Medical Rehabilitation Research, may support the use of CI movement therapy in other populations.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Constraint induced therapy.	Kunkel et al., 1999 Van der Lee et al., 1999	I	Poor	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-7 Functional Electrical Stimulation (FES)

BACKGROUND

Functional electrical stimulation (FES) is electrical stimulation applied to a muscle, causing it to contract. FES has been used for several years as a therapy modality for post-stroke patients, but has not been a routine standard of care. FES is a time limited intervention, generally used during the first several weeks after the acute stroke.

RECOMMENDATIONS

1. Recommend treatment with FES for patients who have demonstrated impaired muscle contraction, specifically with patients with ankle/knee/wrist motor impairment.
2. Recommend FES for patients who have shoulder subluxation.
3. There is insufficient evidence to recommend for or against using multi-channel FES for severe hemiplegic patients with gait impairment.
4. Recommend FES for gait training following stroke.

DISCUSSION

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 function (Glanz et al., 1996).

The total number of studies evaluating FES appears to be very small. A Cochrane review, a meta-analysis based on two RCTs, concluded that FES leads to improvements in glenohumeral subluxation (Price & Pandyan, 2001). A meta-analysis of four RCTs using FES for wrist extension, knee extension or ankle dorsiflexion concluded improved muscle force in the muscle groups receiving FES. No functional outcomes were reported (Glanz et al., 1996). One additional trial demonstrated short term improvements in gait parameters when multi-channel FES was used for three weeks for patients with severe hemiplegia (Bogataj et al., 1995). These studies did not address the persistence of the effect or functional status change.

From the 1970's through the early 1990's a number of studies were performed that investigated the possibilities of FES as a treatment modality for patients with stroke. Many of the studies reported favorable results and gains in motor strength, coordination, spasticity control, gait speed, and gait endurance. These studies were not RCTs.

The number of recent FES studies is small. A Cochrane review, a meta-analysis based on two RTCs, concluded that FES leads to improvement in glenohumeral subluxation (Price & Pandyan, 2002).
More recently, Daly and colleagues (1993; 2000a; 2000b) investigated the potential for FES to restore gait components in the stance and swing phases of gait. They reported that in the small numbers of patients they studied, there were dramatic gains in gait components, along with functional and quality of life changes. No RCTs were reported by this group, nor was there a description of the persistence of the effect.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	FES for patients with impaired muscle contraction, specifically patients with ankle/knee/wrist motor impairment.	Glanz et al., 1996	I	Fair	B
2	FES for patients who have shoulder subluxation.	Price & Pandyan, 2001	I	Fair	B
3	Multi-channel FES for severe hemiplegic patients with gait impairment.	Bogataj et al., 1995	I	Fair	B
4	FES for gait training following stroke.	Daly et al., 1993 Daly & Ruff, 2000a Daly et al., 2000b, 2001	II-2	Fair	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-8 Neuro Developmental Training for Motor Retraining

BACKGROUND

Several theoretical models of motor behavior exist. These models serve as the foundation for treatment approaches for central nervous system (CNS) dysfunction. Traditional approaches to CNS dysfunction are based on reflex or hierarchical models of motor control. These models of motor control have influenced neuro developmental training (NDT). NDT approaches focus on a progression of movement through the developmental sequence, inhibition of primitive reflexes/spasticity, and facilitation of higher-level control (Mathiowetz et al., 1994). In the NDT model of motor control, higher centers control lower centers in the CNS.

On the contrary, contemporary models of motor control and learning focus on the interaction of higher and lower centers of control and view the nervous system as one system among many that influence motor behavior. Contemporary task oriented approaches focus on the interaction of multiple systems and assume that motor control and behavior are organized around goal directed and functional activities, rather than on muscles or movement patterns.

RECOMMENDATIONS

1. There is insufficient evidence to recommend for or against using NDT in comparison to other treatment approaches for motor retraining following an acute stroke.

DISCUSSION

Three RCTs were found from the literature review (Brunham & Snow, 1992; Muldar et al., 1986; Wagenaar et al., 1990); however, the studies were too small or poorly designed to serve as models for the use of NDT for motor retraining following stroke. These studies have also produced conflicting results. Brunham & Snow (1992) compared NDT to "conventional physiotherapy" and found "the results favored conventional therapy over NDT, although all patients attained their goals regardless of treatment type." Muldar and colleagues (1986) compared "electromyographic (EMG) feedback in the (re) learning of motor control to the effects of a conventional physical therapy procedure (i.e., NDT)" and results of the study found no significant differences. Wagenaar and colleagues (1990) found that there were no significant differences between patients treated with NDT versus the Brunstrom method.

There is insufficient evidence to support the recommendation of NDT versus conventional treatment approaches to promote motor re-training. The three RCTs were too small and poorly designed to serve as models for the use of NDT.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	NDT for motor retraining following acute stroke as compared to other treatment approaches.	Bruhnam & Snow, 1992 Mulder et al., 1986 Wagenaar et al., 1990	I	Fair	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-9 Spasticity

BACKGROUND

Contractures that restrict movement of the involved joint or are painful will impede rehabilitation and may limit a patient's potential for recovery. Patients with paretic limbs with muscle spasticity are at high risk of developing contractures. Early treatment is key to preventing this disabling complication.

RECOMMENDATIONS

1. Recommend that spasticity and contractures be treated with antispastic positioning, range of motion exercises, stretching, splinting, serial casting, or surgical correction.
2. Consider use of tizanidine, dantrolene, and/or oral baclofen for spasticity resulting in pain, poor skin hygiene, or decreased function. Tizanidine should be used specifically for chronic stroke patients (refer to Annotation S-15).
3. Recommend *against* diazepam or other benzodiazepines during the stroke recovery period due to possible deleterious effects on recovery (refer to Annotation S-15), in addition to deleterious sedation side effects.
4. Consider use of botulinum toxin or phenol/alcohol for selected patients with disabling or painful spasticity or spasticity resulting in poor skin hygiene or decreased function.

5. Consider intrathecal baclofen for chronic stroke patients for spasticity resulting in pain, poor skin hygiene, or decreased function.
6. Consider neurosurgical procedures, such as selective dorsal rhizotomy or dorsal root entry zone lesion, for spasticity resulting in pain, poor skin hygiene, or decreased function.

DISCUSSION

Spasticity is defined as velocity-dependent hyperactivity of tonic stretch reflexes. It is one of the most important impairments for patients following stroke, and can result in significant pain and functional disturbances. The most impairing state from spasticity may be contractures, rendering the affected limb functionless. Skin hygiene may also be a problem with spasticity.

Spasticity is typically treated in a stepwise approach, beginning with the least invasive modalities 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. Corrective measures for contractures that interfere with function include splinting, serial casting, or surgical correction. No reliable data exist to compare different physical therapy interventions, with or without antispastic medications.

Tizanidine, baclofen, dantrolene, and diazepam are FDA approved oral medications in the United States for the treatment of spasticity. There is limited evidence from controlled trials of spasticity treatment in stroke patients, and the conclusions of the majority of these trials found that spasticity and pain may be reduced, but no significant functional gains were made. Tizanidine has been shown to have efficacy in chronic stroke patients with improvement in spasticity and pain without loss of motor strength, in an open label dose titration study (Gelber et al., 2001). Dantrolene has limited trial data to support its use in stroke and cited benefits of no cognitive side effects (Ketel & Kolb, 1984). Katrak et al. (1992) found that starting patients on Dantrolene Sodium early after a stroke, before the onset of disabling spasticity, produced no change in clinical tone or functional outcome. Oral baclofen has some data to support its use in stroke (Milanov, 1992). Reportedly, oral baclofen may cause significant sedation and have less impact on spasticity in stroke victims, in comparison to other disease conditions (Pedersen et al., 1974). Diazepam is relatively contraindicated in stroke patients, at least in the stroke recovery period, as reviewed in Annotation S15.

Several procedures exist for the treatment of spasticity. Phenol/alcohol neurolysis has been effective in reducing spasticity (Kirazli et al., 1998; Kong & Chua, 1999; On et al., 1999), but is an invasive procedure with an irreversible therapeutic action and potential notable side effects. Both the AHCPR and RCP guidelines support the use of botulinum toxin injections for selected patients with spasticity due to stroke. A number of double-blind placebo controlled randomized trials of high quality have been published since the guideline reports. These trials confirm the effectiveness of botulinum toxin injections in producing short-term improvements as noted by patients and their caregivers, and in decreasing spasticity in a small select group of patients. However, no evidence was found to suggest that the use of EMG-guidance improves outcomes from the botulinum toxin injection therapy (Childers et al., 1996). Botulinum toxin has several evidence-based indications regarding effective treatment of spasticity and functional benefits in non-stroke conditions (Burbaud et al., 1996; Hesse et al., 1998; Simpson, 1996). No additional RCTs were published since the RCP guideline that addressed the addition of electrostimulation to botulinum injections.

Intrathecal baclofen has been demonstrated to reduce spasticity in a small trial of chronic stroke patients (with stroke onset >6 months previous). There are several neurosurgical procedures for the treatment of spasticity, but they lack any clinical trial evidence. Of these, the most common are selective dorsal rhizotomy or dorsal root entry zone lesions. Significant risks are involved with these invasive procedures, to include operative complications and unintended spinal cord damage.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Use of antispastic positioning, range of motion exercises, stretching, splinting, serial casting, or surgical correction for spasticity.	AHCPR, 1995 RCP, 2000 Working Group Consensus	III	Poor	C
2	Use of tizanidine (in chronic stroke patients), dantrolene, and oral baclofen for spasticity.	Gelber et al., 2001, Ketel & Kolb, 1984 Milanov, 1992	II-1	Fair	B
3	Use of drugs with central nervous system effects may deteriorate recovery.	Goldstein, 1995 & 1998 Graham, 1999 Troisi et al., 2002	II-2	Fair	D
4	Use of botulinum toxin and phenol/alcohol to treat spasticity.	Bakheit et al., 2000 Kirazli et al., 1998 Kong & Chua, 1999 On et al., 1999 Richardson et al., 2000 Simpson, 1996	I	Fair	B
5	Use of intrathecal baclofen for chronic stroke patients.	Meythaler et al., 2001	II-1	Fair	C
6	Use of certain neurosurgical procedures.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-10 Biofeedback

BACKGROUND

Surface and computerized electromyographic (EMG) biofeedback have been used and documented in the treatment of stroke patients since the 1970s for improvement of arm function, gait, and swallowing. Biofeedback has been used primarily as an adjunct to conventional therapies.

RECOMMENDATIONS

1. The Working Group makes no recommendation for or against routine use of biofeedback for post-stroke patients. The use of biofeedback is left to the consideration of the individual provider.

DISCUSSION

Four meta-analyses have addressed biofeedback (Glanz et al., 1995; Moreland & Thomas, 1994; Moreland et al., 1998; Schleenbaker & Mainous, 1993). All four reviews showed trends toward improvements with biofeedback, but only two showed any statistically significant differences (Moreland et al., 1998; Schleenbaker & Mainous, 1993). The limited number of studies and small sample sizes may have led to a type II error. One small RCT, published since these meta-analyses, found no improvements in gait with the use of EMG biofeedback for post-stroke patients (Bradley et al., 1998). In addition, two small RCTs, published since the meta-analyses, showed no benefit when patients received balance training with a biofeedback apparatus that provided cues regarding their center of gravity (Geiger et al., 2001; Walker et al., 2000).

Due to methodological flaws in current studies, further research is indicated to assess the efficacy of biofeedback as an adjunct to conventional therapy for post-stroke patients.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Biofeedback for post-stroke patients.	Schleenbaker & Mainous, 1993 Glanz et al., 1995 Moreland et al., 1998	I	Poor	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-11 Shoulder Pain

BACKGROUND

Shoulder pain resulting from sensori-motor dysfunction of the upper extremity is a common problem following stroke. As many as 72 percent of stroke patients will experience at least one episode of shoulder pain during the first year following the stroke (Van Ouwenaller et al., 1986). Shoulder pain can delay rehabilitation and functional recuperation, as the painful joint may mask improvement of motor function (Van Ouwenaller et al., 1986) or may inhibit rehabilitation because it limits the use of a cane or wheelchair for ambulation. The incidence of shoulder-hand-pain syndrome has been reported to be as high as 67 percent in patients with a combination of motor, sensory, and visuoperceptual deficits" (Reding & Potes, 1988).

RECOMMENDATIONS

1. Consider the following interventions to prevent shoulder pain in the involved upper extremity, following a stroke:
    - Electrical stimulation to improve shoulder lateral rotation
    - Shoulder strapping (sling)
    - Staff education to prevent trauma to the hemiplegic shoulder
2. Recommend avoiding the use of overhead pulleys which encourage uncontrolled abduction.
3. Consider the following interventions to treat shoulder pain:
    - Intra-articular injections (Triamcinolone)
    - Shoulder strapping
    - Improve range of motion (ROM) through stretching and mobilization techniques focusing especially on external rotation and abduction, as a means of preventing frozen shoulder and shoulder-hand-pain syndrome
    - Modalities: ice, heat, and soft tissue massage
    - Functional electrical stimulation (FES)
    - Strengthening

DISCUSSION

There are several causes of post-stroke shoulder pain. The following list of common causes of shoulder pain does not include shoulder subluxation, because its association with shoulder pain remains controversial (Zorowitz, 2001):

- Adhesive capsulitis
- Traction/compression neuropathy
- Complex regional pain syndrome
- Shoulder trauma
- Bursitis/tendonitis
- Rotator cuff tear

- Heterotrophic ossification

Treatment of shoulder pain includes the following interventions:

- Electrical stimulation
- Treatment with steroid injections/medication
- Exercise
- Shoulder positioning protocols
- Strapping the involved upper extremity
- Modalities including ice, heat, soft tissue massage, and mobilization

Price and Pandyan (2001) found that patients who received electrical stimulation had no change in pain intensity, compared to the control group; however, there was a significant treatment effect in favor of pain free lateral rotation.

Intra-articular injections (Triamcinolone) showed significant effects on pain. ROM improved with the injections; however, the improvements were not significant (Dekker et al., 1997).

Bohannon et al. (1986) considered range of lateral rotation the factor that related most significantly to the onset/occurrence of shoulder pain.

The highest incidence of developing hemiplegic shoulder pain occurred with patients who used an overhead pulley (Kumar et al., 1990).

There is no significant difference in the effect of reducing shoulder pain with shoulder positioning protocols versus no prolonged positioning (Dean et al., 2000). However, protecting the hemiplegic limb from trauma and injuries reduced the frequency of Shoulder Hand Syndrome (Braus et al., 1994).

Strapping the hemiplegic limb prolongs the incidence of shoulder pain compared to a non-strapping group (Ancliffe, 1992). Hangar et al. (2000) reported no significant difference in the presence of pain, ROM, or functional outcomes; however, there were trends for less pain in six weeks and better upper limb function in strapped patients.

There is no evidence to support the efficacy of therapeutic modalities used to treat hemiplegic shoulder pain. However, these modalities are commonly used to reduce pain/swelling, and improve circulation, tissue elasticity, and ROM.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Electrical stimulation.	Price & Pandyan, 2001	I	Good	B
2	Intra-articular injections.	Dekker et al., 1997	I	Poor	B
3	ROM – lateral rotation.	Bohannon et al., 1986	II-2	Fair	B
4	Exercise – pulleys encourage uncontrolled abduction.	Kumar et al., 1990	I	Fair	D
5	Positioning protocol.	Dean et al., 2000	I	Fair	B
6	Strapping.	Ancliffe, 1992 Hangar et al., 2000	II-2 I	Fair	C

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-12 Cognitive Remediation

BACKGROUND

Impairments in cognitive functioning are common following a stroke. In particular, impairments in attention, memory, and executive functioning (i.e., integrating multiple and complex processes) can be especially disabling. The treatment of cognitive deficits through cognitive remediation designed to reduce deficits can be approached in a variety of ways. Cicerone and colleagues (2000) completed a comprehensive review of the evidence-based literature for cognitive remediation for both traumatic brain injury (TBI) and stroke. The review revealed a large number of RCTs in a variety of areas of cognitive functioning and provided comprehensive guidelines for cognitive rehabilitation specific to these populations. There is support for cognitive remediation of deficits in both the acute and post-acute phases of recovery from stroke and TBI, although some of the improvements were relatively small and task specific. Some benefits were specific to the TBI population, although it seems reasonable to extend some of these results to the stroke population.

RECOMMENDATIONS

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

DISCUSSION

Two RCTs and two Level II studies demonstrated improved attention in post-acute stroke rehabilitation patients through utilization of a variety of treatment approaches with differing levels of complexity and response demands. The interaction and monitoring of activities by therapists were also considered important aspects of these treatments. The results seen were fairly small and task specific and the ability to generalize these to stroke patients is unclear. There was insufficient evidence to distinguish between spontaneous recovery and interventions in moderate to severe patients in the acute recovery phase.

Evidence from six Level I studies and eight Level II studies exists to support the utilization of visual spatial rehabilitation for visual neglect after a right CVA.

Four RCTs utilizing TBI patients demonstrated some benefit for memory functioning. Three of these studies reported an increase in memory function based on neuropsychological measures and decreased subjective complaints of memory. The fourth study showed similar benefits when patients were stratified by severity of initial memory impairments. The use of training to develop compensatory strategies for memory deficits has been found beneficial in stroke patients who have mild impairments and who are fairly independent in daily function, actively involved in identifying their memory problems, and are capable and motivated to incorporate use of the strategy. No data specifically utilizing stroke patients were identified.

A Cochrane review (Cicerone et al., 2000) with one RCT (n=12) showed no significant improvement for memory functioning or subjective memory complaints.

Three studies with various non-RTC designs and relatively small sample sizes (n=43) looked at executive functioning in stroke and TBI patients. Benefit from formal problem-solving strategies and the ability to apply

these strategies to everyday situations and functional activities was found for patients with executive function and problem-solving dysfunction. There is some evidence that the promotion of awareness and self-regulation through verbal instruction, questioning, and monitoring can improve problem-solving skills.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Use of training to improve attention in post-acute stroke.	Cicerone et al., 2000 Gray et al., 1992 Niemann et al., 1990 Sohlberg et al., 1987 Strache, 1987	I I I II II	Good	A
2	Use of training to compensate for visual neglect following a right CVA.	Cicerone et al., 2000	I	Good	B
3	Use of formal problem solving strategies.	Cicerone et al., 2000	II	Fair	C
4	Multimodal intervention for multiple cognitive deficits.	Cicerone et al., 2000	III	Fair	C
5	Use of training to develop compensatory strategies for a mild short-term memory deficit.	Cicerone et al., 2000 Ryan & Ruff, 1988	I	Good	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-13 Mood Disturbance: Depression and Emotionalism

BACKGROUND

Assessment:

All patients should be screened for emotional disorders given the high incidence following a stroke. Post-stroke depression often manifests with subtle signs, such as refusal to participate in therapy. High index of suspicion is necessary in order to recognize depression before it interferes too much with therapy and with the patient's well-being. The assessment of the post-stroke patient can be complicated by cognitive deficits that prevent the patient from recognizing or being able to report symptoms of depression. The patient may present with flat affect or aprosodic speech caused by organic changes related to stroke that may be misinterpreted as sadness or indifference to their situation. In addition, the aphasic patient with receptive and/or expressive language difficulties poses a unique challenge for the diagnostician. There is not a single, universally accepted tool for the assessment of post-stroke depression (PSD). In fact, most screening instruments used to assess depression were not established for patients with cognitive and/or physical impairments.

Various studies have used different criteria for the diagnosis of PSD. Given the limitations of the research and the problems unique to this patient population, assessment that involves a variety of information from multiple sources may be most beneficial. Therefore, a psychiatric illness may be best diagnosed using a clearly delineated criteria for major depression, as well as other categories of psychiatric symptoms (e.g., mania and anxiety) along with patient self-report, observation of patient behavior, information from family members familiar with the patient's premorbid condition, and staff reports of changes in behavior, motivation, effort, and emotional reactivity.

Treatment:

A variety of neuropsychiatric sequelae can be seen following a stroke, with depressive symptoms being most common. In fact, PSD is estimated to occur in between 25 to 75 percent of post-stroke patients (depending upon diagnostic criteria utilized) (Robinson, 1998) and is under diagnosed by nonpsychiatric physicians. PSD is frequently untreated because the neurovegatative symptoms of depression, including sleep disturbance, decreased appetite, fatigue, and feelings of hopelessness, are similar to common post-stroke symptoms. Speech

and cognitive difficulties can also make the assessment of PSD very difficult. Because the consequences of depression can impact a patient's ability to actively participate in therapies and lengthen recovery, it is important to address the symptoms early on in the rehabilitation process. Literature suggests that PSD is treatable with a variety of medications, with selective serotonin reuptake inhibitors (SSRI) and tricyclic antidepressants being the most frequently studied medications. Although the literature regarding the efficacy of individual psychotherapy during rehabilitation is limited, there are some studies that suggest adaptations of cognitive-behavioral therapy techniques and brief supportive therapy may be beneficial.

It is extremely common for post-stroke patients to experience periods of emotionalism. The symptoms generally decline over time with no need for treatment with medication or therapeutic intervention. This is mistakenly interpreted by many family and staff as depression. Although these symptoms are frequently unrelated to mood, they can be a cause for frustration and concern for the patient and family. However, as many as 15 percent of patients experience a more extreme form of emotional change referred to as "pathological affect" or "pseudo-bulbar affect" (uncontrollable laughing/crying) (Robinson, 1998), and if not treated, can develop into clinical depression. Therefore, patient and family education is very important. When this lability interferes with the patient's rehabilitation or complicates the patient's relationship with family members, pharmacotherapy may be considered. These extreme symptoms have also been found to respond to antidepressant medication.

Depression frequently co-exists with other psychiatric syndromes and "the presence of depressive symptoms should lead to consideration of other types of mood disturbance" (RCP, 2000). Anxiety in particular is found to co-exist with depression in the post-stroke patient population, but frequently goes undiagnosed (Castillo & Robinson, 1993). Anxiety can create uncomfortable or disabling feelings of worry/fear accompanied by physical symptoms that make participation in therapy more difficult. Shimoda and Robinson (1998) reported that generalized anxiety disorder (GAD) accompanied by PSD delayed recovery from depression, delayed ADL recovery, and reduced overall social functioning. Unfortunately, few studies have been conducted to address the treatment and recovery from post-stroke GAD.

RECOMMENDATIONS

Assessment

1. The Working Group makes no recommendation for the use of one specific diagnostic tool over another.
2. Recommend using a structured inventory to assess specific psychiatric symptoms and monitor symptom change over time (refer to the VA/DoD Guideline for Management of Major Depressive Disorder).
3. Recommend assessing post-stroke patients for other psychiatric illnesses, including anxiety, bipolar illness, and pathological affect.

Treatment

4. Strongly recommend that patients with a diagnosed depressive disorder be given a trial of antidepressant medication, if no contraindication exists.
5. The Working Group makes no recommendation for the use of one class of antidepressants over another; however, side effect profiles suggest that SSRIs may be favored in this patient population.
6. Recommend that patients with severe, persistent or troublesome tearfulness be given a trial on antidepressant medications.
7. Strongly recommend SSRIs as the antidepressant of choice in patients with severe, persistent, or troublesome tearfulness.
8. There is insufficient evidence to recommend for or against the use of individual psychotherapy alone in the treatment of post-stroke depression.
9. Recommend that patients be given information, advice, and the opportunity to talk about the impact of the illness upon their lives.
10. Routine use of prophylactic antidepressants is not recommended in post-stroke patients.
11. Recommend that mood disorders causing persistent distress or worsening disability be managed by or with the advice of an experienced clinical psychologist or psychiatrist.

DISCUSSION

Given the high rate of cognitive impairments (in particular aphasia) following a stroke, the utilization of formal assessment instruments is often difficult.

There is insufficient evidence at present to recommend the routine use of antidepressants following stroke.

Level I evidence from existing guidelines, plus data from two systematic reviews and four additional clinical trials support the use of anti-depressants in post-stroke patients with depression to improve mood (if no contraindications); the benefit of this intervention on other clinical outcomes is not fully proven; evidence is lacking to fully suggest which category of anti-depressant be used as first-line.

Anxiety symptoms in post-stroke patients should be assessed and treated, particularly in those patients with a diagnosed depressive disorder. Any patient diagnosed with one form of mood disorder should be assessed for others.

There is insufficient evidence to support the use of behavioral/cognitive therapy alone for post-stroke depression; however, the utilization of an adapted form of cognitive behavioral therapy has been found to have some usefulness and the utilization of therapy in conjunction with antidepressant medication may be beneficial.

Data from several small controlled trials supports the benefit of anti-depressant therapy in post-stroke mood lability, but the clinical impact is difficult to determine.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Pharmacotherapy for depression.	Andersen, 1995 Cole et al., 2001 Gill & Hatcher, 2001 Kimura et al., 2000 Miyai & Reeding, 1998 RCP, 2000 Robinson et al., 2000 Wiart et al., 2000	I	Good	A
2	Pharmacotherapy for emotional lability.	Brown et al., 1998 Burns et al., 1999 Cole et al., 2001 Gordon, 1992 RCP, 2000 Robinson et al., 1993	I	Good	A
3	Psychotherapy.	Grober et al., 1993 Lincoln et al., 1997	II	Fair	C
4	Information/advice.	RCP, 2000	I	Fair	B
5	Routine use of prophylactic antidepressants.	Dam et al., 1996 Palomaki et al., 1999 Raffaele et al., 1996 Robinson et al., 2000	I	Good	**D**

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-14 Visual and Spatial Neglect

BACKGROUND

A multitude of stroke presentations with various combinations of visual-perceptual impairments are seen in the post-stroke population. When present, visual and spatial neglect can have a substantial negative impact on an individual's ability to function safely within his or her environment and is a significant contributor to poor prognosis after stroke (Paolucci et al., 1996). Unilateral neglect is the lack of awareness of a specific body part or external environment contralateral to the site of the brain lesion and usually occurs in patients with right (nondominant) cortical strokes (O'Young et al., 2002). Unilateral body neglect may occur independently of visual field cuts or visual inattention or be compounded by these deficits (Zoltan, 1996). Testing and observation by a trained professional is necessary to recognize neglect and to distinguish it from visual field cuts, impaired attention, planning or visuospatial abilities, thereby allowing the professional to properly treat the deficit.

It is important to note that with neglect, the patient does not realize that he/she is failing to attend to one side of their world. Because of safety concerns related to this, such as the risk of sustaining burns or injury to the affected limb, neglect should be addressed early in the rehabilitation process. The clinician may observe neglect when a patient dons his/her shirt on only one arm, shaves only half of his face or fails to notice food on half of his/her lunch tray. Reading, writing, drawing and mobility may also be negatively impacted by the presence of neglect.

Many patients with mild neglect have spontaneous improvements of their symptoms within weeks of onset. Those with profound neglect may improve over a period of many months. The literature does not reveal a single intervention best suited for addressing neglect. A multi-faceted approach can be helpful. Patient education is an important element within these interventions. Patient education is often a long-term process, and the goal is to teach the patient to acknowledge the neglect (to some degree).

RECOMMENDATIONS

1. Recommend that stroke patients be assessed for visual and spatial neglect, as indicated.
2. Recommend that treatment for stroke patients with visual/spatial neglect focuses on functional adaptation (e.g., visual scanning, environmental adaptation, environmental cues, and patient/family education).

DISCUSSION

No systematic reviews were found that addressed screening of patients for post-stroke neglect. No randomized trials were found that compared a strategy of screening for neglect with a strategy that did not include screening. In addition, no studies were found that calculated sensitivity or specificity of screening tests for neglect by comparing them to a reference standard. There does not appear to be a reference standard that could be used in such an analysis.

When a battery of different neglect tests are given to patients without comparison to any reference standard, each of the tests misses "cases" identified by other tests. Conversely, some healthy individuals with no history of stroke or other neurological problem may score very poorly on some of these tests. The only study that compared a series of tests for neglect with clinical impressions found that clinicians identified more patients as neglected during the routine course of care than showed up as positives on the test. Only one of the studies addressed the issue of testing for neglect during the "early" stages of stroke recovery.

No systematic reviews or meta-analyses were found that addressed therapy for visual and spatial neglect. Six small RCTs addressed interventions for neglect. With one exception, only a single trial assessed each intervention. The trials were small and exploratory in nature. A multi-faceted approach to visual-spatial neglect can be helpful as there is no compelling evidence that a single approach is sufficient.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Assessment for visual and spatial neglect.	Agrell et al., 1997 Halligan et al., 1989 Jehkonen et al., 1998 Schubert & Spatt, 2001 Stone et al., 1991 Wilson et al., 1987 Working Group Consensus	III	Poor	C
2	Treatment that focuses on functional adaptation.	Antonucci et al., 1995 Beis et al., 1999 Fanthome et al., 1995 Paolucci et al., 1996 Rossetti et al., 1998 Wiart et al., 1997	I	Poor	B

QE = Quality of Evidence; R = Recommendation (see Appendix E)

S-15 Use of Pharmacologic Agents

BACKGROUND

While undergoing rehabilitation for stroke, patients frequently receive a variety of medications to treat complications of stroke or other unrelated chronic medical conditions. While many of these concomitant medications cross the blood-brain barrier and have central nervous system effects, relatively little is known about the potentially deleterious or beneficial effects of these drugs on stroke recovery. Providers often do not consider their potential impact on stroke outcomes. Limited data exist for certain pharmaceutical agents regarding beneficial or deleterious influences on recovery from stroke, but further study is needed before definitive recommendations can be made.

RECOMMENDATIONS

1. Recommend against the use of neuroleptics, benzodiazepines, phenobarbitral, and phenytoin during the stroke recovery period. These pharmaceutical agents should be used cautiously in stroke patients, weighing the likely benefit of these drugs against the potential for adverse effects on patient outcome.
2. Recommend against centrally acting α_2-adrenergic receptor agonists (such as clonidine and others) and α_1-receptor antagonists (such as prazosin and others) as antihypertensive medications for stroke patients because of their potential to impair recovery (see Annotation D).
3. There is insufficient evidence regarding optimal dose and safety use of neurotransmitter-releasing agents and central nervous system stimulants. Consider stimulants/neurotransmitter-releasing agents in selected patients to improve participation in stroke rehabilitation or to enhance motor recovery. Dextroamphetamine has been the most tested stimulant at 10 mg per day, but insufficient evidence is available regarding optimal dosing and safety to support the routine use of CNS stimulants during rehabilitation. Data remains sparse to consider routine use of neurotransmitter-releasing agents in stroke recovery.

DISCUSSION

Several small, controlled trials have found a benefit of using the CNS stimulant dextroamphetamine in patients during active rehabilitation for hemiparesis (Crisostomo et al., 1988; Walker-Batson et al., 1995) and aphasia (Walker-Batson et al., 2001), although other trials have failed to document a benefit (Borucki, 1992; Sonde et

al., 2001). The safety of dextro-amphetamine in a stroke population has been tested in a small series (Unwin and Walker-Batson, 2000). Limited data support the use of other neurotransmitter-releasing agents to promote stroke recovery, including methylphenidate (Grade et al., 1998), levodopa (Scheidtmann et al., 2001), and L-DOPS (Nishino et al., 2001).

Fluoxetine in non-depressed patients in a small RCT appeared to have a small benefit in motor recovery independent of the treatment of depression (Dam et al., 1996). A functional MRI prospective double-blind crossover, placebo-controlled study on eight pure motor hemiparetic patients demonstrated motor cortex modulation by a single dose of fluoxetine (Pariente et al., 2001). Data do not permit discrimination amongst these agents, or identification of an optimal dosing and administration protocol for any of these medications. The preferred time of initiation of pharmacotherapy after stroke and duration of treatment also remain uncertain.

The Cochrane Review evaluated the pharmacological treatment following stroke with aphasia (Greener et al., 2001). A total of 10 trials were identified as suitable for review. The drugs reviewed included piracetam, bifemalane, piribedil, bromocriptine, idebenone, and Dextran 40. Weak evidence supported piracetam, a drug currently not available in the United States, for use in aphasia recovery. Insufficient safety data and the lack of adequately designed clinical trials to fully evaluate the efficacy of the listed pharmaceutical agents were noted. Dextroamphetamine in a recent trial was tested in a small, randomized trial in aphasia not evaluated in the Cochrane review (Walker-Batson et al., 2001). The drug was beneficial for aphasic patients, but the beneficial effects did not appear to be sustained at six months.

In retrospective analyses of data collected during stroke clinical trials (Goldstein, 1995; Graham et al., 1999; Troisi et al., 2002), and in animal studies of recovery from brain injury (Goldstein, 1998), CNS depressants such as neuroleptics, barbiturates, benzodiazepines, and anticonvulsants have been associated with poorer outcomes. In the human studies, it is difficult to separate cause and effect, since the conditions treated by these medications, when occurring after stroke, may themselves be associated with more severe brain injury and worse outcome. In the absence of additional data, clinicians should limit the use of these medications in patients recovering from stroke as much as is practical. Routine use of these medications for minor indications (e.g., use of benzodiazepines for mild insomnia during inpatient rehabilitation) is discouraged.

Centrally acting α_2-adrenergic receptor agonists (such as clonidine and others) and α_1-receptor antagonists (such as prazosin and others) have been associated with poorer outcomes in at least one retrospective analysis. Model studies found poorer recovery in animals treated with clonidine and prazosin (Goldstein, 1998). Data support the beneficial effects of other classes of antihypertensives (ACE inhibitors, angiotensin receptor blockers, and diuretics) for secondary stroke prevention, and these drugs are generally preferred as first line agents for hypertension control in patients following stroke.

Consider bromocriptine or dextroamphetamine in selected aphasic patients. There is insufficient data on optimal dosing and safety precludes routine use of these medications for aphasia.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Use of drugs to enhance stroke recovery.	Crisostomo et al., 1988 Dam et al., 1996 Grade et al., 1998 Nishino et al., 2001 Scheidtmann et al., 2001 Walker-Batson, 1995 & 2001	I	Fair	B
2	Avoidance of certain drugs with central effects.	Goldstein, 1995 & 1998 Graham et al., 1999	II-2	Fair	D
3	Avoidance of certain antihypertensive agents.	Goldstein, 1995 & 1998	II-2	Fair	D

QE = Quality of Evidence; R = Recommendation (see Appendix E)

T. Is Patient Ready For Community Living?

OBJECTIVE

Provide smooth transition back to community living following stroke.

BACKGROUND

The majority of patients who have had a stroke will be managed initially in a hospital. The time of discharge from inpatient care to home (or to residential living or nursing home) constitutes an important watershed. There is much anecdotal and some research-based evidence that discharge could be better managed. 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 stroke patients and their families, the real work of recovery begins after formal rehabilitation.

RECOMMENDATIONS

1. Recommend that the patient and family/caregivers are fully informed about, prepared for, and involved in all aspects of healthcare and safety needs.
2. Recommend that the family/caregivers receive all necessary equipment and training in moving and handling, in order to position and transfer the patient safely in the home environment.
3. Recommend that the patient have appropriate vocational and income support opportunities. Stroke patients who worked prior to their strokes should be encouraged to be evaluated for the potential to return to work, if their condition permits. Vocational counseling should be offered when appropriate.
4. Recommend that leisure activities should be identified and encouraged and the patient enabled to participate in these activities.
5. Recommend that case management be put in place for complex patient and family situations.
6. 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.

DISCUSSION

The first few weeks after discharge from an inpatient stay following a stroke are difficult as the patient attempts to use newly learned skills without the support of the rehabilitation environment or team. The full impact of the stroke may not become apparent until the patient has been home a few weeks and tries to get on with his/her life. 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.

Evans et al. (1995), after noting that rehabilitation services are effective in improving short-term survival, functional ability, and the most independent discharge location, have suggested that "the lack of long-term benefits of short-term rehabilitation may suggest that therapy should be extended to home or sub-acute care settings, rather than being discontinued at discharge. These services should be organized and in place at the time of discharge."

Caregiving can be extremely taxing, both physically and emotionally. Adverse health effects on caregivers include increased risk of depression (Blazer et al., 1987; Kramer et al., 1985; Lichtenberg & Barth, 1990; Schultz et al., 1990), increased use of health services and the self-administration of medications prescribed originally for the stroke patient (Lichtenberg & Gibbons, 1992). Depression has been associated with physical abuse of the patient (Joslin et al., 1991) and a greater likelihood of nursing home placement (Stephens et al.,

1991). Clinicians need to be sensitive to the potential adverse effects of caregiving on family functioning and the health of the caregiver. Opportunities for respites may be extremely important.

Clinicians should work with the patient and caregivers to avoid negative effects, promote problem solving, and facilitate reintegration of the patient into valued family and social roles. Preexisting organizational and functional characteristics of the family may have important effects on a successful transition to community living. A caregiver is more likely to give adequate support if he/she is a spouse who is knowledgeable about stroke and its disabilities, is not depressed, and lives in an otherwise well-functioning family unit (Evans et al., 1992).

Community supports can help buffer the effects of disabilities on the patient, family and caregivers. Educational support can be provided through printed materials, videotapes, computer programs, information on support groups, etc. The availability of emotional support and physical services such as homemaker home health, Meals-on-Wheels, devices (e.g., ramps), and equipment may also be crucial to a successful outcome.

Participation in leisure activities is closely related to both health status and quality of life (Drummond, 1990; Jongbloed & Morgan, 1991; Krefting & Krefting, 1991; Shank, 1992; Sjogren, 1982). Interest in leisure and recreational activities may provide motivation to resume an active lifestyle.

A patient is ready for discharge from an inpatient setting when:

- He/she has no skilled nursing needs or, if needs are present (e.g. wound care), can be met by caregiver or community support services.
- Does not require regular physician care.
- Has an environment available that is supportive of or can be modified to support the individual's specific functional deficits.
- Is functionally independent, or if requires some assistance, can be assisted by family or caregiver
- If additional rehabilitation services are required, they are available and accessible in the community.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Patient and family/caregiver: • Education and information • Equipment and training • Vocation counseling • Encourage leisure activities	Working Group Consensus	III	Poor	I
2	Assign case management in complex situations.	Working Group Consensus	III	Poor	I
3	Maintain resource listing.	Working Group Consensus	III	Poor	I

QE = Quality of Evidence; R = Recommendation (see Appendix E)

U. 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

BACKGROUND

During the rehabilitation process, patients will occasionally come up against unexpected barriers to their continued progress or to their ability to adhere to the treatment plan. These include medical complications and mental health factors that make it difficult to participate/adhere to treatment goals. Lack of or incorrect information about diagnosis, prognosis, treatment rationale, and need for behavioral change may also become barriers to improvement.

Most times, this assessment and treatment can occur in the rehabilitation setting and will not require a transfer to another service. Once the barriers have been successfully addressed, re-examination of treatment goals may be helpful.

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

V. Does Patient Need Community-Based Rehabilitation Services?

Nursing facility rehabilitation:

Rehabilitation performed during a stay in a nursing facility. Nursing facilities vary widely in their rehabilitation capabilities, ranging from maintenance care to comprehensive and intense rehabilitation programs.

Outpatient rehabilitation:

Rehabilitation performed in an outpatient facility that is either freestanding or attached to an acute care or rehabilitation hospital. Day hospital care is a subset of outpatient rehabilitation in which the patient spends a major part of the day in an outpatient rehabilitation facility.

Home-based rehabilitation:

A rehabilitation program provided in the patient's place of residence (AHCPR, 1995).

W. Determine Optimal Environment For Community-Based Rehabilitation Services

OBJECTIVE

Determine if therapy following hospital discharge should be provided on an outpatient basis or in the home environment by home health services.

BACKGROUND

Patients referred for outpatient or home care services are those who have rehabilitation needs but do not meet the criteria for continued inpatient stay. These patients do not have skilled nursing needs or require regular physician contact; however, they may have multiple therapy needs. Outpatient rehabilitation can occur in different settings, including the patient's home.

RECOMMENDATIONS

1. Strongly recommend continuing outpatient rehabilitation services in the setting where they can most appropriately and effectively be carried out. This is based on medical status, function, social support, and access to care.

DISCUSSION

In determining where continued rehabilitation should take place following hospital discharge, the following factors must be considered. The discharge plan is developed within the coordinated team. Traditionally, this process is led by the social worker on the team.

1. *Can the patient tolerate treatment provided in the outpatient setting?* Some patients who are appropriate for discharge, but who still require continued therapy, may not be able to tolerate a full outpatient program. They may be too frail or debilitated to tolerate traveling to an outpatient clinic setting. The distance to be traveled should not be prohibitive and the patient must be able to safely travel by the available means (i.e., transfers and sitting balance) and tolerate the travel, in addition to the therapy sessions. Patients may require interventions specific to their home environment. For these patients, the therapeutic interventions may be better provided in the environment where they will be used (e.g., homemaking activities or mobility in the discharge environment).
2. *Can the required therapeutic interventions only be provided in a clinic setting?* The equipment available for home health rehabilitation is limited. Specialized exercise equipment is usually not available in the home setting. In addition, there is greater access to coordinated programs and physician support in the outpatient setting. Depending upon the patient's community setting, certain necessary services may not be available through home health (e.g., SLP and driver's training).
3. *Is the patient eligible for home health services?* The patient's eligibility for home health services must be determined.

EVIDENCE

	Recommendation	Sources	QE	Overall Quality	R
1	Community rehabilitation setting.	Weir, 1999	I	Good	A

QE = Quality of Evidence; R = Recommendation (see Appendix E)

VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF **STROKE REHABILITATION** IN THE PRIMARY CARE SETTING

APPENDICES

APPENDIX A
Antiplatelet Pharmacotherapy
(refer to the PBM website at www.vapbm.org)

The following criteria are based on current literature and expert opinion from clinicians. It is expected that significant, new information will be forthcoming in this important drug class. Thus, the following recommendations are dynamic and will be revised as new clinical data become available. These guidelines are not intended to interfere with clinical judgment. Rather, they are intended to assist practitioners in providing cost effective, consistent, high quality care.

A paucity of data exists in some areas of secondary stroke prevention. Management of hypertension, hyperlipidemia, smoking cessation and diabetic control has been shown to lower the risk of an initial cerebrovascular event. However, more study is needed to define the degree of benefit these factors contribute for secondary stroke prevention. Given the significant risk reduction associated with these factors in primary prevention, it should be insured these same issues are addressed in secondary stroke prevention.

Patients should be evaluated for the presence of carotid artery stenosis. Patients with internal carotid artery stenosis of more than 70 percent are candidates for carotid endarterectomy. Patients with symptomatic carotid artery stenosis after surgical intervention should receive antiplatelet therapy. Adjusted dose warfarin should be employed in patients with atrial fibrillation and symptomatic ischemic events.

1. Choice of Antiplatelet Agent (refer to Tables 1 and 2)

- The British Antiplatelet Trialists (1994) showed an odds reduction for combined endpoints of myocardial infarct, stroke and vascular death to be 23 percent with all antiplatelet agents.
- In patients at high risk for stroke, the results from CAPRIE (1996) and ESPS-2 (1996) show a number-needed-to-treat of 111 and 24 for clopidogrel and aspirin/extended release dipyridamole, respectively.
- The subset of patients with symptomatic peripheral vascular disease experienced the most benefit from clopidogrel therapy in the CAPRIE trial (1996).
- The results of ESPS-2 (1996) showed an advantage for aspirin/extended release dipyridamole over aspirin alone. However, the benefits in risk reduction for the outcome of stroke or death were not significant as the confidence interval included zero. This range includes the possibility of no benefit from the combination product.
- There are insufficient clinical data to support the superiority of combination therapy with clopidogrel and aspirin in secondary stroke prevention.

2. Dosage and Administration

- Clopidogrel dosage is 75mg daily.
- Aspirin dosage is 81mg to 325mg daily; in patients experiencing GI upset the dose may be decreased to no lower than 81mg daily. Aspirin doses should be individualized, using the lowest dose to achieve effect (no cerebral ischemia symptoms).
- The combination of aspirin 25mg-extended release dipyridamole 200mg is given twice daily.

3. Warnings/Adverse Events

- The development of thrombocytopenic purpura with clopidogrel therapy has been reported. The background rate is thought to be about four cases per million person-years.
- If a patient is to undergo elective surgery and an antiplatelet effect is not desired, therapy with irreversible antiplatelet agents (aspirin and clopidogrel) should be discontinued 7 days prior to surgery. Since dipyridamole is a reversible antiplatelet agent- the immediate release product could be given until 24 hours prior to surgery.
- The use of these agents would be contraindicated in active pathological bleeding or most intracranial hemorrhage.

- In CAPRIE (1996), clopidogrel was associated with a rate of gastrointestinal bleeding of 2.0 percent, versus 2.7 percent on aspirin.
- In ESPS-2 (1996), aspirin-extended release dipyridamole was associated with a rate of bleeding at any site of 8.7 percent, placebo 4.5 percent, aspirin alone 8.2 percent and extended release dipyridamole alone 4.7 percent.

4. Monitoring Parameters

- Patients should be monitored for development of bleeding.
- The effect of hepatic failure on the use of these agents is unknown.
- Aspirin use should be avoided in patients with creatinine clearances of <10 ml/minute.
- If Ticlopidine is used, check CBC every two weeks for three months after the drug is started. If WBC count drops below 4.0K, consider stopping the medication and using another antiplatelet agent instead.

Table 1. Cost Comparison of Antiplatelet Agents

Agent	FSS price/tablet	Tablets/day	Cost/day
Aspirin 325 mg	$0.007	1	$0.007
Aspirin 81 mg	$0.004	1	$0.004
Clopidogrel 75 mg	$1.82	1	$1.82
ASA/dipyridamole 25mg/200mg	$0.80	2	$1.60
Ticlopidine 250mg	$0.11	2	$0.22

Table 2. Selection of Antiplatelet Agent

Condition	Preferred Agent	Dose	Alternative	Dose
Atrial fibrillation	Warfarin[(a)]	Dose adjusted to maintain INR 2.0 - 3.0 (target INR 2.5)	Aspirin[(b)]	—
Primary prevention	Aspirin	81mg – 325mg	Clopidogrel[(c)]	75 mg PO QD
Secondary prevention	Aspirin	81mg – 325mg	Clopidogrel[(d)] Aspirin/extended release dipyridamole[(e)]	75mg PO QD 25mg/200mg PO BID

[(a)] In patients with atrial fibrillation, warfarin is recommended for all patients over the age of 75 (unless a specific contraindication exists), and in patients of any age with a prior embolic event or with known risk factors for stroke. Patients with lone atrial fibrillation may differ in therapy. Those under 65 years require no mandatory therapy, but aspirin is optional. For those patients age 66 to 75 years, aspirin is recommended and warfarin is optional.
[(b)] Patients who experience recurrent symptoms of cerebral ischemia on appropriate warfarin therapy, consideration should be given to adding aspirin 80 mg daily.
[(c)] Patients with aspirin allergy, recent history of active gastrointestinal bleeding, or other contraindications to aspirin therapy.
[(d)] Those with a contraindication to aspirin therapy.
[(e)] Patients who experience recurrent cerebral ischemia. Alternatively, aspirin/extended release dipyridamole may be used as the first-line therapy in selected high risk patients.

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APPENDIX B
Standard Instruments for Post-Stroke Assessment

Preferred Standard Instruments for Patient Assessment in Stroke (AHCPR, 1995)

Type	Name and Source	Approximate Time to Administer	Strengths	Weaknesses
Level-of-consciousness scale	Glasgow Coma Scale[a]	2 minutes	Simple, valid, reliable.	None observed.
Stroke deficit scales	NIH Stroke Scale [b]	2 minutes	Brief, reliable. Can be administered by non-neurologists.	Low sensitivity.
	Canadian Neurological Scale [c]	5 minutes	Brief, valid, reliable.	Some useful measures omitted.
Global disability scale	Rankin Scale [d,e]	5 minutes	Good for overall assessment of disability.	Walking is the only explicit assessment criterion. Low sensitivity.
Measures of disability/activities of daily living (ADL)	Barthel Index [f]	5-10 minutes	Widely used for stroke. Excellent validity and reliability.	Low sensitivity for high-level functioning.
	Functional Independence Measure (FIM™) [g]	40 minutes	Widely used for stroke. Measures mobility, ADL, cognition, functional communication.	"Ceiling" and "floor" effects.
Mental status screening	Folstein Mini-Mental State Examination [h]	10 minutes	Widely used for screening.	Several functions with summed score. May misclassify patients with aphasia.
	Neurobehavioral Cognition Status Exam (NCSE) [i]	10 minutes	Predicts gain in Barthel Index scores. Unrelated to age.	Does not distinguish right from left hemisphere. No reliability studies in stroke. No studies of factorial structure. Correlates with education.
Assessment of motor function	Fugl-Meyer [j]	30-40 minutes	Extensively evaluated measure. Good validity and reliability for assessing sensorimotor function and balance.	Considered too complex and time-consuming by many.
	Motor Assessment Scale [k]	15 minutes	Good, brief assessment of movement and physical mobility.	Reliability assessed only in stable patients. Sensitivity not tested.
	Motricity Index [l]	5 minutes	Brief assessment of motor function of arm, leg, and trunk.	Sensitivity not tested.
Balance assessment	Berg Balance Assessment [m]	10 minutes	Simple, well established with stroke patients; sensitive to change.	None observed.

Type	Name and Source	Approximate Time to Administer	Strengths	Weaknesses
Mobility assessment	Rivermead Mobility Index [n]	5 minutes	Valid, brief, reliable test of physical mobility.	Sensitivity not tested.
Assessment of speech and language functions	Boston Diagnostic Aphasia Examination [o]	1-4 hours	Widely used. Comprehensive, good standardization data. Sound theoretical rationale.	Time to administer long. Half of patients cannot be classified.
	Porch Index of Communicative Ability (PICA) [p]	1/2-2 hours	Widely used. Comprehensive, careful test development and standardization.	Time to administer long. Special training required to administer. Inadequate sampling of language other than one word and single sentences.
	Western Aphasia Battery [q]	1-4 hours	Widely used. Comprehensive.	Time to administer long. "Aphasia quotients" and "taxonomy" of aphasia not well validated.
Depression scales	Beck Depression Inventory (BDI) [r]	10 minutes	Widely used. Easily administered. Norms available. Good with somatic symptoms.	Less useful in elderly and in patients with aphasia or neglect. High rate of false positives. Somatic items may not be due to depression.
	Center for Epidemiologic Studies Depression (CES-D) [s]	<15 minutes	Brief, easily administered, useful in elderly. Effective for screening in stroke population.	Not appropriate for aphasic patients.
	Geriatric Depression Scale (GDS) [t]	10 minutes	Brief, easy to use with elderly, cognitively impaired, and those with visual or physical problems or low motivation.	High false negative rates in minor depression.
	Hamilton Depression Scale [u]	<30 minutes	Observer rated. Frequently used in stroke patients.	Multiple differing versions compromise interobserver reliability.
Measures of instrumental ADL	PGC Instrumental Activities of Daily Living [v]	5-10 minutes	Measures broad base of information necessary for independent living.	Has not been tested in stroke patients.
	Frenchay Activities Index [w]	10-15 minutes	Developed specifically for stroke patients. Assesses broad array of activities.	Sensitivity and interobserver reliability not tested; sensitivity probably limited.
Family assessment	Family Assessment Device (FAD) [x]	30 minutes	Widely used in stroke. Computer scoring available. Excellent validity and reliability. Available in multiple languages.	Assessment subjective; sensitivity not tested; "ceiling" and "floor" effects.

Type	Name and Source	Approximate Time to Administer	Strengths	Weaknesses
Health status/ quality of life measures	Medical Outcomes Study (MOS) 36-Item Short-Form Health Survey [y]	10-15 minutes	Generic health status scale SF36 is improved version of SF20. Brief, can be self – administered or administered by phone or interview. Widely used in the United States.	Possible "floor" effect in seriously ill patients (especially for physical functioning), suggests it should be supplemented by an ADL scale in stroke patients.
	Sickness Impact Profile (SIP) [z]	20-30 minutes	Comprehensive and well-evaluated. Broad range of items reduces "floor" or "ceiling" effects.	Time to administer somewhat long. Evaluates behavior rather than subjective health; needs questions on well-being, happiness, and satisfaction.

Note: ADL=activities of daily living. IADL=instrumental activities of daily living.

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APPENDIX C
National Institutes of Health Stroke Scale (NIHSS)

For binder, print document and type the above heading on top of the first page; then insert here.

For html, link to the pdf file

APPENDIX D
Functional Independence Measure (FIM™) Instrument

	ADMISSION	DISCHARGE	FOLLOW-UP
Self-Care			
A. Eating			
B. Grooming			
C. Bathing			
D. Dressing – Upper Body			
E. Dressing – Lower Body			
F. Toileting			
Sphincter Control			
G. Bladder Management			
H. Bowel Management			
Transfers			
I. Bed, Chair, Wheelchair			
J. Toilet			
K. Tub, Shower			
Locomotion			
L. Walk/Wheelchair			
M. Stairs			
Motor Subtotal Score			
Communication			
N. Comprehension			
O. Expression			
Social Cognition			
P. Social Interaction			
Q. Problem Solving			
R. Memory			
Cognitive Subtotal Score			
TOTAL FIM Score			

SCORING

L E V E L S	**Independent** 7 Complete Independence (Timely, Safely) 6 Modified Independence (Device)	NO HELPER
	Modified Dependence 5 Supervision (Subject = 100%+) 4 Minimal Assist (Subject = 75%+) 3 Moderate Assist (Subject = 50%+) **Complete Dependence** 2 Maximal Assist (Subject = 25%+) 1 Total Assist (Subject = less than 25%)	HELPER
Note: Leave no blanks. Enter 1 if patient is not testable due to risk.		

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APPENDIX E
Guideline Development Process

The Guideline for the Management of Stroke Rehabilitation is the product of many months of diligent effort and consensus building among knowledgeable individuals from the Veterans Administration (VA), Department of Defense (DoD), academia, and guideline facilitators from the private sector. An experienced moderator facilitated the multidisciplinary Working Group that included internists, physiatrists, neurologists, geriatricians, nurse practitioners, occupational therapists, physical therapists, recreational therapists, speech and language pathologists, psychologists, social workers, kinesiotherapists, pharmacists, and rehabilitation/clinic coordinators, as well as consultants in the field of guideline and algorithm development.

Development Process

"Only well-focused questions and search terms will lead to a successful search for evidence" (AHCPR, 1996). The process of developing this guideline was evidence-based whenever possible. Evidence-based practice integrates clinical expertise with the best available clinical evidence derived from systematic research. Where evidence is ambiguous or conflicting, or where scientific data are lacking, the clinical experience of the multidisciplinary Working Group was used to guide the development of consensus-based recommendations. The developers incorporated the evidence and recommendations into a format that would maximally facilitate clinical decision-making (Woolf, 1992). The review of the literature, evaluation of evidence, and development of the guideline proceeded in sequential steps.

The following three guidelines were identified by the Working Group as appropriate seed guidelines. They served as the starting point for the development of questions and key terms.

- Agency for Health Care Policy and Research (AHCPR) Post-Stroke Rehabilitation (1995)
- Royal College of Physicians (RCP) National Clinical Guidelines for Stroke (2000)
- Scottish Intercollegiate Guidelines Network (SIGN) Management of Patients with Stroke, 20 (1997)

Fifty-one researchable questions and associated key terms were developed by the Working Group after orientation to the seed guidelines and to goals that had been identified by the Working Group. The questions specified:

- Population – characteristics of the target population
- Intervention – diagnostic, screening, therapy, and assessment
- Control – the type of control used for comparison
- Outcome – the outcome measure for this intervention (morbidity, mortality, patient satisfaction, and cost)

A systematic search of the literature was conducted. It focused on the best available evidence to address each key question, and ensured maximum coverage of studies at the top of the hierarchy of study types: evidence-based guidelines, meta analyses, and systematic reviews (Cochrane, EBM, and EPC reports). The seed guidelines evidence was carefully reviewed.

The search continued using well-known and widely available databases that were appropriate for the clinical subject. Limits on language (English), time (1990 through January 2002) and type of research (randomized controlled trials [RCTs]) were applied. The search included MEDLINE and additional specialty databases (DARE), depending on the topic.

The search strategy did not cast a wide net. Once definitive clinical studies that provided valid relevant answers to the question were identified, the search stopped. It was extended to studies/reports of lower quality (observational studies) only if there were no high quality studies.

The results of the search were organized and reported using reference manager software. At this point, additional exclusion criteria were applied. Typical exclusions were studies with physiological endpoints, or

studies of populations that were not comparable to the population of interest (e.g., studies of rehabilitation of patients with other diseases).

Evidence Appraisal Reports for each of the 51 questions were prepared by the Center for Evidence-Based Practice at the State University of New York, Upstate Medical University, Department of Family Medicine (these reports are available by request). Each report covered:

- Summary of findings
- Methodology
- Search terms
- Resources searched
- Articles critically appraised
- Findings

The Working Group suggested some additional references. Copies of specific articles were provided to participants on an as-needed basis. This document includes references through January 2002.

The clinical experts and research team evaluated the evidence for each question according to criteria proposed by the U.S. Preventive Services Task Force (USPSTF) (2001). See "Rating the Evidence," below.

The Working Group participated in two face-to-face sessions to reach a consensus about the guideline recommendations and to prepare a draft document. The draft was revised by the experts through numerous conference calls and individual contributions to the document. The guideline presents evidence-based recommendations that have been thoroughly evaluated by practicing clinicians.

The final draft was reviewed by experts from the VA and DoD in physical medicine and neurology. Their feedback was integrated into the final draft. Nonetheless, this document is a work in progress. It will be updated every two years, or when significant new evidence is published.

Rating the Evidence

Evidence-based practice involves integrating clinical expertise with the best available clinical evidence derived from systematic research. The Working Group reviewed the evidence and graded it using the rating scheme developed by the USPSTF (2001). The experts themselves, after an orientation and tutorial on the evidence grading process, formulated Quality of Evidence ratings (see Table 1), a rating of Overall Quality (see Table 2), a rating of the Net Effect of the Intervention (see Table 3), and an overall Recommendation (see Table 4).

TABLE 1: Quality of Evidence (QE)

I	At least one properly done RCT
II-1	Well designed controlled trial without randomization
II-2	Well designed cohort or case-control analytic study
II-3	Multiple time series, dramatic results of uncontrolled experiment
III	Opinion of respected authorities, case reports, and expert committees

TABLE 2: Overall Quality

Good	High grade evidence (I or II-1) directly linked to health outcome
Fair	High grade evidence (I or II-1) linked to intermediate outcome; *or* Moderate grade evidence (II-2 or II-3) directly linked to health outcome
Poor	Level III evidence or no linkage of evidence to health outcome

TABLE 3: Net Effect of the Intervention

Substantial	More than a small relative impact on a frequent condition with a substantial burden of suffering; *or* A large impact on an infrequent condition with a significant impact on the individual patient level.
Moderate	A small relative impact on a frequent condition with a substantial burden of suffering; *or* A moderate impact on an infrequent condition with a significant impact on the individual patient level.
Small	A negligible relative impact on a frequent condition with a substantial burden of suffering; *or* A small impact on an infrequent condition with a significant impact on the individual patient level.
Zero or Negative	Negative impact on patients; *or* No relative impact on either a frequent condition with a substantial burden of suffering; *or* An infrequent condition with a significant impact on the individual patient level.

TABLE 4: Grade the Recommendation

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

Abstract of the USPSTF:

- Once assembled, admissible evidence is reviewed at three strata: (1) the individual study, (2) the body of evidence concerning a single linkage in the analytic framework, and (3) the body of evidence concerning the entire preventive service. For each stratum, the Task Force uses explicit criteria as general guidelines to assign one of three grades of evidence: good, fair, or poor.

- Good or fair quality evidence for the entire preventive service must include studies of sufficient design and quality to provide an unbroken chain of evidence-supported linkages that generalize to the general primary care population and connect the preventive service with health outcomes. Poor evidence contains a formidable break in the evidence chain, such that the connection between the preventive service and health outcomes is uncertain.

- For services supported by overall good or fair evidence, the Task Force uses outcomes tables to help categorize the magnitude of benefits, harms, and net benefit from implementation of the preventive service into one of four categories: substantial, moderate, small, or zero/negative.

- The Task Force uses its assessment of the evidence and magnitude of net benefit to make a recommendation, coded as a letter: from A (strongly recommended) to D (recommend against). It gives an "I" recommendation in situations in which the evidence is insufficient to determine net benefit (Harris et al., 2001).

Algorithms

The overall view of the Stroke Rehabilitation guideline is presented in an algorithmic format. There are indications that this format improves data collection and clinical decision-making and helps to change patterns of resource use. It allows the clinician to follow a linear approach to critical information needed at the major decision points in the clinical process, and includes:

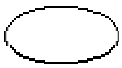
- An ordered sequence of steps of care
- Recommended observations
- Decisions to be considered
- Actions to be taken.

A clinical algorithm diagrams a guideline into a step-by-step decision tree. Standardized symbols are used to display each step in the algorithm (SMDMC, 1992). Arrows connect the numbered boxes indicating the order in which the steps should be followed.

Rounded rectangles represent a clinical state or condition.

Hexagons represent a decision point in the guideline, formulated as a question that can be answered Yes or No. A horizontal arrow points to the next step if the answer is YES. A vertical arrow continues to the next step for a negative answer.

Rectangles represent an action in the process of care.



Ovals represent a link to another section within the guideline.

A letter within a box of an algorithm refers the reader to the corresponding annotation. The annotations elaborate on the recommendations and statements that are found within each box of the algorithm. Included in the annotations are brief discussions that provide the underlying rationale and specific evidence tables. The reference list at the end of each section includes all the sources used—directly or indirectly—in the development of the annotation text. A complete bibliography is provided at the end of the document.

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APPENDIX F
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
CCC-SLP	Certificate of Clinical Competence-Speech and Language Pathology
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	Electromyographic
FAI	Frenchay Activities Index
FDA	Federal 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
RBU	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
VA	Veterans Affairs
VAMC	Veterans Affairs Medical Center
VFSS	Videofluoroscopy Swallowing Study
VHA	Veterans Health Administration

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APPENDIX H
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