



**Interdisciplinary and Rehab Care of  
the Stroke Patient**

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**Disclosure Information**

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## Clinical Practice Guidelines for Adult Stroke Rehabilitation and Recovery

- Clinical Practice Guidelines for Adult Stroke Rehabilitation and Recovery were approved by the American Heart Association in January/February, 2016.
  - \* Stroke rehabilitation requires a sustained and coordinated effort from a large team.
  - \* Communication and coordination among these team members are paramount in maximizing the effectiveness and efficiency of rehabilitation and underlie this entire guideline.



## Recent Stroke and Rehab Facts

- Stroke affects nearly 800,000 individuals annually.
- A 35.8% drop in stroke related deaths means more stroke victims are surviving.
- More than 2/3 of stroke survivors receive rehabilitation services after hospitalization.
- 4 years post Stroke, approximately 1/3 of survivors report persistent debility and difficulty with autonomy, engagement, and fulfilling societal roles.
- Rehabilitation services are the primary mechanism by which functional recovery and return to independence are promoted in the stroke survivor.
- Formal Rehabilitation post stroke commonly ends by 3-4 months post onset.
- In response to Healthcare Reform efforts, post-acute care and rehabilitation are often considered a costly area of care to be trimmed.
- The clinical impact of rehabilitation is paramount for the stroke survivor in reducing the risk of downstream medical morbidity resulting from immobility, depression, loss of autonomy, and reduced functional independence.
- The need for effective stroke rehabilitation is likely to remain an essential part of the continuum of stroke care for the foreseeable future.





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## Multidisciplinary Rehab Team

- Neurologist
- Rehabilitation Nurse
- **Occupational Therapy**
- **Physical Therapy**
- **Speech – Language Pathology**
- Physiatrist
- Social Workers
- Psychologists
- Psychiatrists
- Counselors

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## Rehab Environments

- **Acute**
  - occurs during the acute hospital stay (median LOS for ischemic stroke survivors is 4 days)
  - focuses on acute stabilization of the patient and the initiation of prophylactic and preventative measures
  - data strongly suggest that there are benefits to starting rehabilitation as soon as the patient is medically stable and can tolerate it
- **Post Acute**
  - occurs post discharge from the hospital (Inpatient rehabilitation facilities – IRFs, skilled nursing facilities – SNF, extended care facilities – ECF, home health, outpatient facilities)
  - focuses on supporting patients in their transition from the hospital to home and in their pursuit of achieving the highest level of functioning and independence possible
  - average length of formal rehabilitation post stroke = 3-4 months



## Post Acute Stay Discharge Statistics

- Early Supported Discharge (ESD) – 31% Links inpatient care with community services and allows certain patients to be discharged to home sooner with support of the rehabilitation team.
  - ESD after stroke has been associated with shortened hospital lengths of stay, lower overall costs of care, lower risk of institutionalization, and no adverse effects on functional recovery.
  - ESD is considered appropriate for mild to moderate stroke.
- Skilled Nursing Facility (SNF) – 32%
- Inpatient Rehabilitation Facility (IRF) – 22%
  - Discharge to an IRF or SNF should be based on
    - \*need of skilled nursing services
    - \*need for regular contact by a physician
    - \*need for multiple therapeutic interventions
- Home Healthcare Agencies (HHCA) – 15%



## Acute Focus on Prevention and Medical Management of Co-Morbidities

- Skin Breakdown and Contractures
- Prevention of Deep Vein Thrombosis and Pulmonary Embolism
- Treatment of Bowel/Bladder Incontinence
- Prevention and Treatment of Hemiplegic Shoulder Pain
- Treatment of Central Pain
- Prevention of Falls
- Seizure Prophylaxis
- Secondary Stroke Prevention
- Post-stroke Depression
- Post-stroke Osteoporosis



## Assessment of the Stroke Survivor

- Level of Disability
- Overall Rehabilitation Needs
- ADLs, IADLs, and Disability Measurement
- Motor Impairment, Activity, and Mobility
- Communication Impairment
- Cognition and Memory
- Sensory Impairments (touch, hearing, vision)
- Swallowing
- Nutritional Support



## Level of Disability

- Numerous aspects of neural function and structure - paresis, paralysis, aphasia, neglect, visual field deficit, cognitive changes, depression, sensory deficits, dysarthria, dysphagia, problems with coordination, etc.
- Many Assessment Tools
  - Global Assessment - National Institutes of Health Stroke Scale (NIHSS)
  - Modality-Specific Measures - Fugl-Meyer scale, Box and Block Test, Barthel Index, Western Aphasia Battery, Boston Naming Test, Behavioral Inattention Test, etc.
- Used to – predict outcome, monitor recovery, monitor response to a new therapy, guide treatment decisions, document clinical status, select post discharge setting, and/or meet stroke center certification requirements.



## Overall Rehabilitation Needs

- Best determined by an inter-professional team
- Complete as soon as 24 hours after hospital admission or as soon as the patient is medically stable
- Considerations should include
  - severity or residual neurological deficits
  - activity limitations
  - cognitive and communicative ability
  - psychological status
  - swallowing ability
  - premorbid functional ability
  - medical co-morbidities
  - level of family/caregiver support
  - likelihood of returning to community living
  - ability to participate in rehabilitation program



## ADLs, IADLs, and Disability Measurement

- Activities of Daily Living - ADLs = personal self care and functional mobility
- Instrumental Activities of Daily Living - IADLs = more complex domestic, community, and leisure activities
- Most likely assessed and treated by Occupational Therapy
- Since implementation of Healthcare Reform, focus is on patient-centered and patient-reported outcome measures.
- New computer adapted tests (ADL-CAT) are being developed to better focus on patient reports and can be completed in one-fifth the time compared to traditional assessments such as the Barthel Index
- Until computer-adapted tests become routine, a combination of assessments such as basic ADL measure (Barthel Index) and an IADL measure (Frenchay Activity Index) is recommended to capture the broad spectrum of ADL function.



## Motor Impairment, Activity, and Mobility

- Common after stroke and occur when the lesion includes the corticospinal system (Motor cortical areas and the corticospinal tract)
- Most likely assessed and treated by Physical Therapy and Occupational Therapy.
- Results are used to determine the most appropriate setting for continued rehabilitation services post discharge.
- As with ADLs and IADLs, patient reported outcomes allow a more patient-centered approach.
- As clinicians, we are recognizing that clinic performance does not always equal outside of clinic performance.
- Technology to objectively measure real-world activity has been emerging over the past decade
- Commercially available devices to measure movement when people are outside of the clinic are now readily available and becoming more user friendly. (wrist and ankle worn accelerometers, step activity monitors, etc.)



## Communication Impairment

- Communication is vital to successful daily functioning.
- 1 million people in the US alone are estimated to have aphasia resulting from stroke.
- Most likely assessed and treated by Speech-Language Pathology.
- Assessment is shifting from focusing on disability to maximizing quality of life and ability to participate in daily activities.
- Assessment should consist of a combination of interview, conversation, observation, and standardized tests.
- Focus on motor speech, language, cognitive-communication, pragmatics, reading, and writing.
- Tele-rehabilitation is becoming an accepted alternative to face-to-face intervention with multiple studies demonstrating that tele-practice for communication assessment/treatment is feasible and effective.



## Cognition and Memory

- Functional cognitive impairment affects more than one third of stroke survivors at 3 and 12 months post stroke; persisting in many individuals for years.
- Cognitive status is an important determinant of post-stroke success and deficits in cognition are associated with poor long term survival, higher disability, and greater institutionalization rates.
- Most likely assessed and treated by Speech-Language Pathology and Occupational Therapy.
- Cognitive domains most likely affected by stroke are: memory, orientation, functional language, and attention.
- Cognitive Intervention should focus on:
  - Processing Speed
  - Simple and Complex Attention
  - Functional use of Language
  - Praxis
  - Perceptual and Constructional visual-Spatial abilities
  - Memory (language based and visual-spatial)
  - Executive Functioning (awareness, insight, organization, task maintenance and switching, reasoning, problem solving, safety judgement, and emotional regulation)



## Sensory Impairments Touch, Hearing, & Vision

- Because of the high degree of connectivity in the human brain, sensory impairments are especially troublesome and result in loss of function directly linked to activity limitations and participation restrictions after stroke.
- **Somatosensory** – tactile, pain, temperature, pressure, vibration, proprioception, stereognosis, and graphesthesia.
  - Highly variable
  - Primarily assessed at the bedside
  - Sensory Scales are currently under study and new devices can quantify deficits.
- **Visual Impairments** – Visual field loss affects ~ 30% of stroke survivors.
  - Abnormal eye movement
  - Reduced visual acuity
  - Diplopia
  - Impaired color vision
  - Difficulty reading
  - Deficits in higher order visual processing
- **Hearing Impairments** – Hearing Acuity deficits are evident in ~ 21% of posterior circulation stroke survivors.
  - Often accompanied by vertigo and additional deficits related to brainstem/cerebellar infarction
  - Neuro-otologic testing in addition to audiometry, may provide insight into vestibular dysfunction



## Swallowing

- Dysphagia (swallowing dysfunction) is common after stroke
  - Affecting 42%-67% of stroke survivors within 3 days post stroke
  - 50% of those with dysphagia will aspirate
  - 1/3 of those who aspirate will develop aspiration pneumonia
- Early identification of dysphagia is paramount in preventing adverse health consequences
  - ALL stroke survivors should receive a dysphagia screening prior to any oral intake
  - Dysphagia screening tools are intended to be a nursing tool
- Once Dysphagia/Aspiration is identified via screening, further assessment is warranted via Speech-language Pathology
  - Clinical Bedside Swallow Evaluation
  - Instrumental Evaluation
    - Videofluoroscopy
    - Fiberoptic Endoscopic Evaluation of Swallowing (FEES)
    - FEES with sensory testing
- Dysphagia Intervention should focus on:
  - Behavioral Interventions
    - Swallow exercises
    - Environmental modifications
    - Safe swallowing techniques
    - Appropriate dietary modifications
  - Recent Evidence Suggests
    - Drug therapy, NMES, pharyngeal electric stimulation, physical stimulation, transcranial direct current stimulation, and transcranial magnetic stimulation have no conclusive evidence supporting their use in dysphagia treatment.
    - Acupuncture may be a beneficial alternative treatment of dysphagia
    - Oral hygiene protocols help reduce aspiration pneumonia after stroke



## Nutritional Support

- Malnutrition is a very common complication post stroke at an estimated 56% of stroke survivors being malnourished at some point within the first 3 weeks post stroke.
  - Chronic disease, poly-pharmacy, dysphagia, and functional disability are all associated with malnutrition
- Feed Or Ordinary Diet (FOOD) Trials
  - Benefit of routine nutritional supplements
    - Only recommended for those with malnutrition or those at risk of malnutrition
    - Nutritional supplements are not associated with improved functional outcome
  - Benefits of early tube feeding
    - Early tube feeding (within 7 days of stroke) may increase the survival of the dysphagic patient who cannot safely eat by mouth
    - Conversations about goals of care are needed prior to initiating tube feedings
  - Do PEG tubes result in better outcomes than NG tubes
    - NG tubes are reasonable for the first 2-3 weeks
    - Early PEG tube placement is not supported for the stroke survivor



## Therapy Trends

- Cognitive Impairment – Stroke doubles an individual's risk for developing dementia
  - Non-Drug interventions
    - Traditional Cognitive Rehabilitation – systematic, functionally oriented, and directed at restoration or reestablishment of cognitive activity, the acquisition of compensatory strategies, and/or the use of adaptive technique or equipment for increasing independence.
    - Transcranial Direct Current Stimulation (tDCS) – Preliminary evidence reveals improved complex attention when anodal placement is over the left dorsolateral prefrontal cortex.
    - Exercise – evidence to suggest physical activity has a protective effect against cognitive decline secondary to increased cerebral blood volume, increased expression of growth factors, and a positive effect on depressive symptoms
    - Enriched Environment – Virtual reality training improves visual attention and short term visuospatial memory
  - Drug interventions – minimal evidence to support positive effect on cognitive function post stroke
    - Donepezil – Aricept used for palliative treatment of Alzheimer's Dementia
    - Rivastigmine – Exelon used for behavior management in treatment of Alzheimer's and Parkinson's Dementia
    - Antidepressants
    - Dextroamphetamine, Methylphenidate, Modafinil, and Atomoxetine – Central nervous stimulants used to treat ADHD and narcolepsy



## Therapy Trends cont.

- Limb Apraxia – difficulty performing purposeful movements
  - More common after left vs. right hemispheric stroke
  - Despite it's incidence and its impact on independent functioning, there is little research to support therapeutic interventions
  - Gesture training and task practice may be beneficial
- Hemi-spatial Neglect/Hemi-Inattention – deficits in attention and awareness of one side of space – generally contralateral to the side of lesion
  - Bottom-up approaches – remediate attention processes for space
    - Eye patching
    - Prism adaptation
    - Limb activation, optokinetic stimulation
    - Brain stimulation (transcranial magnetic stimulation, theta burst transcranial magnetic stimulation, or tDCS)
  - Top-down approaches – teach compensatory strategies for neglect
    - Visual scanning training
    - Mental imagery
    - Cognitive Rehabilitation – focus on reasoning and problem solving



## Therapy Trends cont.

- Communication Disorders
  - Cognitive – Communication
    - Common after right hemisphere stroke
    - Non-Drug therapies for cognition apply
  - Aphasia
    - Early (within 3 days of onset) and intense (daily) language therapy is proven efficacious
    - Computerized treatment is beneficial and recommended to supplement treatment provided by a speech-language pathologist (SLP)
    - Communication Partner training is suggested
    - Group participation has also proven to be beneficial.
    - Some drug therapy has shown promise – donepezil, memantine, and galantamine
    - Brain stimulation techniques



## Therapy Trends cont.

- Communication Disorders cont.
  - Motor Speech Disorders
    - Dysarthria – a group of speech disorders that result from paralysis, weakness, or incoordination of the speech musculature.
    - Apraxia of Speech – a disorder of motor planning or programming resulting in difficulty in volitionally producing the correct sounds of speech.
    - Treatment remains behaviorally based and focuses on respiration, phonation, articulation, resonance, loudness, rate, and prosody.
    - Tele-rehabilitation is appropriate with access to face to face intervention with an SLP is impossible or impractical



## Therapy Trends cont.

- Spasticity- Velocity-dependent resistance to stretch of a muscle.
  - When spasticity is present, cost of care is 4 times higher.
  - 42% of stroke survivors have some degree of spasticity
  - Splinting is controversial for the prevention of contracture
  - Taping has no effect and is not recommended
  - NMES combined with therapy may improve spasticity but there is insufficient evidence that the addition of NMES improves functional use
  - Botulinum toxin injections are commonly used to treat spasticity in both upper and lower extremities
  - Oral and Intrathecal anti-spasticity agents (baclofen) have marginal effect on reducing spasticity
- Balance and Ataxia
  - Balance Training Programs are beneficial for reducing risk for falls
    - Strengthening exercises
    - Gait activities
    - Standing challenges
    - Provision of orthotics and devices
  - Ataxia – disorder of coordinated muscle activity during voluntary movement
    - 68%-to 86% of patients with brainstem stroke experience ataxia
    - Intensive task-oriented therapy is beneficial
    - Postural training and provision of trunk support is beneficial



## Therapy Trends cont.

- Mobility – loss or difficulty with ambulation is one of the more devastating sequelae of stroke.
  - Lower Extremity Strengthening
    - Resistance training improves gait speed and ambulation distance
    - NMES to ankle dorsiflexors improves swing phase of the gait cycle
  - Medications for Motor Recovery
    - Dextroamphetamine, methylphenidate, levodopa, and SSRIs
  - Acupuncture – adjunctive treatment for improving walking speed
  - Transcutaneous electrical nerve Stimulation – improved physical function, especially when combined with functional tasks
  - Rhythmic Auditory Cueing – improved velocity and stride length
  - Use of AFOs – improves balance
  - Robotic and electromechanics-Assisted Training Devices – improved probability of patient regaining independent walking
  - Electromyographic Biofeedback – visual or auditory feedback improves gait quality
  - Virtual Reality – functional tasks promote improvements in gait parameters
  - Traditional Physiotherapeutic Approaches – equivalent or slightly inferior to other approaches
  - Water Based Exercises – no data to prove or refute benefit



## Therapy Trends cont.

- Upper Extremity Activity – The majority of stroke survivors experience problems with upper extremity paresis
  - ADLs – functional task specific training is recommended
  - IADLs – functional tasks should be tailored to the patient needs
  - Touch – somatosensory retraining to improve sensory discrimination may be needed
  - Proprioception
- Adaptive Equipment, DME, Orthotics, and Wheelchairs
  - Safety equipment
  - Ambulatory assistive devices
  - Splints/braces
  - Wheelchairs
  - Self care adaptive equipment



## Therapy Trends cont.

- Motor Impairment and Recovery
  - Deconditioning and Fitness
  - Individually Tailored Exercise Program
- Visual Impairments
  - Eye movement
  - Visual fields
  - Visual-spatial or perceptual deficits
- Hearing Loss
  - 86% of stroke patients have hearing loss, most prior to the stroke.
  - Address communication needs





## Transitions in Care and Community Rehabilitation

- Continuity – from acute to subacute, home, community re-entry
- Social and Family Caregiver Support
- Community Resources
- Sexual Function
- Recreational and Leisure Activity
- Return to Work
  - 20% of strokes occur in people of vocational age
  - 20% of those ultimately return to work.
- Return to Driving
  - Approximately 1/3 of stroke survivors return to driving after 1 year.
  - “Fitness to Drive” assessment including an “on-the-road” test

