Interdisciplinary Client-Centered Care: Application of Stroke Clinical Practice Guidelines

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Disclosures

There are no conflicts of interest or financial incentives to disclose.
Learning Objectives

By the end of this presentation, participants will be able to:

1. Explain the purpose and utility of clinical practice guidelines in the rehabilitative care of adults recovering from a stroke.
2. Describe the levels of evidence and recommendations for application used in the American Heart Association/American Stroke Association’s guidelines for Adult Stroke Rehabilitation and Recovery.
3. Apply an evidence-based and client-centered approach to an individual with a stroke throughout their continuum of care, including the following: prevention, evaluation, and treatment.
4. Select practical methods to apply the stroke clinical practice guidelines to their specialty area.
Learning Objective 1: Explain the purpose and utility of clinical practice guidelines in the rehabilitative care of adults recovering from a stroke.
What is the Stroke Clinical Practice Guideline?

**Purpose:** Provide a synopsis of best clinical practices in the rehabilitative care of adults recovering from stroke through evidence based practice.
How was the Clinical Practice Guideline Developed?

- Panel of nominated members reviewed relevant articles on adult stroke rehabilitation and recovery

- Evidence organized and classified (by class and level of evidence) according to AHA/American College of Cardiology

- Extensive AHA internal and external peer review, Stroke Council Leadership review, and Scientific Statements Oversight Committee review prior to approval
Learning Objective 2: Describe the levels of evidence and recommendations for application used in the American Heart Association/American Stroke Association’s guidelines for Adult Stroke Rehabilitation and Recovery.
Note:
A recommendation with Level of Evidence B or C does not imply a weak recommendation.
**CLASS I**
*Benefit >> Risk*

- SHOULD be performed/administered

**CLASS IIa**
*Benefit >> Risk*

- Additional studies with focused objectives needed
- IT IS REASONABLE to perform procedure/administer treatment

**CLASS IIb**
*Benefit ≥ Risk*

- Additional studies with broad objectives needed; additional registry data would be helpful
- Procedure/Treatment MAY BE CONSIDERED

**CLASS III**
No Benefit or CLASS III Harm

- PROCEDURE/TEST
- TREATMENT

<table>
<thead>
<tr>
<th>COR III: No Benefit</th>
<th>COR III: Harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Helpful</td>
<td>No Proven Benefit</td>
</tr>
<tr>
<td>Excess Cost w/o Benefit</td>
<td>Harmful to Patients</td>
</tr>
</tbody>
</table>

- Should
- is recommended
- Is indicated
- Is useful/effective/beneficial

**Usefulness/effectiveness is unknown/unclear/uncertain or not well established**

>66% will benefit

22-66% will benefit
LEVEL A
Multiple populations evaluated*
Data derived from multiple randomized clinical trials or meta-analyses

LEVEL B
Limited populations evaluated*
Data derived from a single randomized trial or nonrandomized studies

LEVEL C
Very limited populations evaluated*
Only consensus opinion of experts, case studies, or standard of care
The use of splints and taping for prevention of wrist and finger spasticity after stroke

CLASS III, LEVEL B

CLASS III indicates:  

LEVEL B indicates:
The use of splints and taping for prevention of wrist and finger spasticity after stroke

CLASS III, LEVEL B

CLASS III indicates: NOT RECOMMENDED

LEVEL B indicates: LIMITED POPULATION (single RCT)
**Learning Objective 3:**
Apply an evidence-based and client-centered approach to an individual with a stroke throughout their continuum of care, including the following: prevention, evaluation, and treatment.

**Learning Objective 4:**
Select practical methods to apply the stroke clinical practice guidelines to their specialty area.
81 yo female that experienced R MCA and R BG CVA, underwent tPA administration with partial thrombectomy

- PMH: Uncontrolled HTN and hypothyroidism

<table>
<thead>
<tr>
<th>Body Function/Structure Impairments</th>
<th>Activity Limitations/Participation Restrictions</th>
<th>Personal &amp; Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strength</strong>: L UE/LE hemiparesis (grossly 2/5 MMT), L facial droop</td>
<td>Previously independent with ADLs/IADLs and driving</td>
<td>Motivated</td>
</tr>
<tr>
<td><strong>Sensation</strong>: Decreased L UE/LE light touch</td>
<td>Previous ambulation without AD</td>
<td>Lives with her daughter in single level home with 3 STE (without HR)</td>
</tr>
</tbody>
</table>
| **Perception**:  
  - Poor midline orientation seated or standing with R contraversive pushing  
  - L neglect to environment and body | Engaged in gardening, weekend coffee with friends, and knitting | |
| **Cognition**: unable to follow >1 step commands, increased time for motor planning and executive functioning | Current: Supine<>sit, STS, stand-pivot: maxAx1 | |
| | Unable to ambulate | |
| | Seated grooming: maxAx1 | |
| | Toileting: bed-pan dependent | |
What would be your therapy priorities for Sally in acute care?
Primary Focus of Acute Care

- Patient Stabilization
- Delivery of Acute Stroke Treatments
- Initiation of Prophylactic & Preventative Measures
- PT/OT/SLP as Soon as Tolerated
- Discharge Planning
What prevention strategies would you consider implementing in the acute care setting for Sally?
What was Addressed with Sally

- Skin Breakdown
- Deep Venous Thrombosis Prophylaxis
- Bowel & Bladder Incontinence
- Fall Prevention
### Skin Breakdown Prevention

**CAUSES:** HEMIPARESIS, SENSORY CHANGES, ALTERED LEVELS OF CONSCIOUSNESS, PRESSURE ULCERS, IMPAIRED CIRCULATION, OLDER AGE, INCONTINENCE

<table>
<thead>
<tr>
<th>Recommendations: Prevention of Skin Breakdown and Contractures</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>During hospitalization and inpatient rehabilitation, regular skin assessments are recommended with objective scales of risk such as the Braden scale.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>It is recommended to minimize or eliminate skin friction, to minimize skin pressure, to provide appropriate support surfaces, to avoid excessive moisture, and to maintain adequate nutrition and hydration to prevent skin breakdown. Regular turning, good skin hygiene, and use of specialized mattresses, wheelchair cushions, and seating are recommended until mobility returns.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Patients, staff, and caregivers should be educated about the prevention of skin breakdown.</td>
<td>I</td>
<td>C</td>
</tr>
</tbody>
</table>
Braden Scale

- Assessment for predicting risk of pressure sore
- 6 categories
- Total score can range from: 6-23
- At risk is Braden Score 15-18 (or lower)

Sally's score: 16

What strategies do you implement to prevent skin breakdown that could be applicable to Sally?
Skin Breakdown Prevention

Turning Schedule → Activity → Protect heels

Avoid Friction & Shearing → Manage moisture

Pressure Redistribution Surfaces → Specialized Cushions

Maintain Adequate Nutrition → Skin Hygiene
Deep Venous Thrombosis Prevention

- **Causes:** Limb immobility and reduced activity level
- **Pharmacological**
  - Prophylactic Treatment (Heprin or Lovenox)
- **Mechanical**
  - Compression stocking - neither positive or negative
  - Increase in skin complications
Treatment of Bowel & Bladder Incontinence

- 40%-60% of individuals post-stroke have urinary incontinence
- Risk Factors: age, cognition and motor impairments, history of urological issues
- Treatment for Sally
  - Bladder scanning
  - Cognitive awareness training
  - Prompted voiding
  - Pelvic floor muscle training
Prevention of Falls

- Strongest risk factors for falls:
  - past falls, low muscle strength, impaired gait, poor balance, and specific and multiple medications
  - Physical, psychological and social implications

<table>
<thead>
<tr>
<th>Recommendations: Prevention of Falls</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is recommended that individuals with stroke discharged to the community participate in exercise programs with balance training to reduce falls.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>It is recommended that individuals with stroke be provided a formal fall prevention program during hospitalization.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>It is reasonable that individuals with stroke be evaluated for fall risk annually with an established instrument appropriate to the setting.</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>It is reasonable that individuals with stroke and their caregivers receive information targeted to home and environmental modifications designed to reduce falls.</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>Tai Chi training may be reasonable for fall prevention.</td>
<td>Ilib</td>
<td>B</td>
</tr>
</tbody>
</table>

Edution  Exercise
How to Determine Level of Disability

ASSESSMENTS
National Institute of Health Stroke Scale

• Most widely used assessment of impairment
• Ranges from 0-42 (higher score = more severe)
• Training and formal certification are widely available
• Good predictor of short and long-term morbidity and mortality

<table>
<thead>
<tr>
<th>Cutoff Scores$^1$</th>
<th>Outcomes Related to NIHSS Scores at Admission$^2$</th>
</tr>
</thead>
</table>
| • Very Severe: >25  
  • Severe: 15-24  
  • Mild-Mod: 5-14  
  • Mild: <5 | • >14 = SNF (LTC)  
  • 6-13 = Inpatient Rehab  
  • <5 = 80% will D/C home |

Sally's NIHSS Score of 16

NIH Stroke Scale

Patient Identification: ____________________________
Pt. Date of Birth: __/__/____
Hospital: ____________________________
Date of Exam: __/__/____

Interval:  
[ ] Baseline  
[ ] 2 hours post treatment  
[ ] 24 hours post onset of symptoms ±20 minutes  
[ ] 7-10 days  
[ ] 3 months  
[ ] Other: ________________

Time: ______:____ [ ]am [ ]pm

Person Administering Scale: ____________________________

Administer stroke scale items in the order listed. Record performance in each category after each subscale exam. Do not go back and change scores. Follow directions provided for each exam technique. Scores should reflect what the patient does, not what the clinician thinks the patient can do. The clinician should record answers while administering the exam and work quickly. Except where indicated, the patient should not be coached (i.e., repeated requests to patient to make a special effort).

Instructions | Scale Definition | Score
---|---|---
1a. Level of Consciousness: The investigator must choose a response if a full evaluation is prevented by such obstacles as an endotracheal tube, language barrier, orotraheal trauma/bandages. A 3 is scored only if the patient makes no movement (other than reflexive posturing) in response to noxious stimulation. |  
0 = Alert: keenly responsive.  
1 = Not alert: but arousable by minor stimulation to obey, answer, or respond.  
2 = Not alert: requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped).  
3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and areflexic. | __________
Why Use Assessments?

Predict outcomes ➔ Monitor recovery ➔ Monitor response to new therapy

Guide treatment decision ➔ Document clinical status for reimbursement ➔ Inform patient stratification
### Modality-Specific Assessments

#### Upper Limb
- **Fugl-Meyer scale**
- **Box and Block Test**

#### Lower Limb
- **Fugl-Meyer Scale**
- **10 Meter Walk Test**

#### Language Deficits
- **Western Aphasia Battery**
- **Boston Naming Test**

#### Neglect
- **Behavioral Inattention Test**
- **Line Cancellation Test**

#### Sensory Dysfunction
- **Nottingham Sensory Assessment**
- **Box and Block Test**

#### Depression
- **Hamilton Depression Scale**
- **Beck Depression Inventory II**

#### Cognitive Deficits
- **Mini-Mental Status Exam**
- **Trail Making Tests (A and B)**

#### Balance/Posture
- **Berg Balance Scale**
- **Postural Assessment Scale for Stroke**
- **10 Meter Walk Test**
- **Morse Fall Scale**
Determining Next Level of Care

• Comprehensive assessment of body structures and function, activity limitations, and participation restrictions

• Interprofessional team approach

• Consideration of the following:
  • Severity of residual neurological deficits
  • Activity limitations
  • Cognitive and communicative abilities
  • Level of family support
  • And so on...

<table>
<thead>
<tr>
<th>Recommendations: Assessment of Disability and Rehabilitation Needs</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is recommended that all individuals with stroke be provided a formal assessment of their ADLs and IADLs, communication abilities, and functional mobility before discharge from acute care hospitalization and the findings be incorporated into the care transition and the discharge planning process.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>It is recommended that all individuals with stroke discharged to independent community living from postacute rehabilitation or SNFs receive ADL and IADL assessment directly related to their discharge living setting.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>A functional assessment by a clinician with expertise in rehabilitation is recommended for patients with an acute stroke with residual functional deficits.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Determination of postacute rehabilitation needs should be based on assessments of residual neurological deficits; activity limitations; cognitive, communicative, and psychological status; swallowing ability; determination of previous functional ability and medical comorbidities; level of family/caregiver support; capacity of family/caregiver to meet the care needs of the stroke survivor; likelihood of returning to community living; and ability to participate in rehabilitation.</td>
<td>I</td>
<td>C</td>
</tr>
</tbody>
</table>
Early Supported Discharge

"Appropriately resources early supported discharge (ESD) services provided for a selected group of stroke patients can reduce long-term dependency and admission to institutional care as well as reducing the length of hospital stay"

## Examples for need of...

<table>
<thead>
<tr>
<th>Skilled Nursing Services</th>
<th>Regular Contact by a Physician</th>
<th>Multiple Therapeutic Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowel and Bladder Impairment</td>
<td>Medical Comorbidities</td>
<td>Moderate to Severe....</td>
</tr>
<tr>
<td>Skin Breakdown</td>
<td>Complex Rehab Issues</td>
<td>-Motor Deficits</td>
</tr>
<tr>
<td>Impaired Bed Mobility</td>
<td>Acute Illness</td>
<td>-Sensory Deficits</td>
</tr>
<tr>
<td>Dependence for ADL's</td>
<td>Pain Management Issues</td>
<td>-Cognitive Deficits</td>
</tr>
<tr>
<td>Inability to Manage Meds</td>
<td></td>
<td>-Communication Deficits</td>
</tr>
<tr>
<td>High Risk for Nutritional Deficits</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research generally shows:

- IRF patients have higher rates of return to community living and greater functional recovery
- SNF or Nursing Home have higher rehospitalization rates and poorer survivals
- Most studies demonstrate substantial baseline differences in patient case
## Determining Next Level of Care for Sally

<table>
<thead>
<tr>
<th>Functional Transfers</th>
<th>Max A x 1 or 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grooming</td>
<td>Max A for attending to L side</td>
</tr>
<tr>
<td>Toileting</td>
<td>Max A x2 d/t severe neglect and motor impairment</td>
</tr>
<tr>
<td>Neglect</td>
<td>Severe L neglect; improved pusher syndrome</td>
</tr>
<tr>
<td>Berg Balance Scale</td>
<td>Unable to perform</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PASS</th>
<th>Unable to perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Meter-Walk Test</td>
<td>Unable to perform</td>
</tr>
<tr>
<td>Box and Blocks</td>
<td>Unable to perform</td>
</tr>
<tr>
<td>Orientation</td>
<td>Only orientated to self; not date, circumstance or location</td>
</tr>
</tbody>
</table>
What should be Sally's next level of care?
Focus of Inpatient Rehabilitation

- Support patients in transition from hospital to next level of care
- Pursue the highest level of function
- Limited to patients for whom significant improvement is expected within reasonable length of time
- Will likely return to a community setting
- 3 hours of therapy per day (PT/OT/SLP) for at least 5 days/week
Predictors of Need for Inpatient Rehabilitation

- Older age
- Impaired cognition
- Lower functional level post – CVA
- Urinary incontinence
- Neglect
What top 3 priority intervention strategies would you include in the inpatient setting for Sally?
What was Addressed with Sally

Dysphagia
Communication
Motor Speech Disorders
Cognition
Visual Impairments
Perceptual Deficits: With/Without Neglect
Limb Apraxia
Balance and Ataxia
Lower Extremity Mobility
Upper Extremity Activity
Dysphagia

- Affecting 42%-67% of individuals with CVA
  - 1/2 aspirate
  - 1/3 develop pneumonia
- Can cause malnutrition, dehydration, weight loss, and decreased QOL
Cognition

- Usefulness of drugs is not well established (Class IIB)
- Affects more than 1/3 of stroke survivors
- Associated with poor long-term survival, higher disability, greater institutionalization, and double the risk for dementia

What can we do, as therapists, to provide an enriched environment?
Cognitive Rehabilitation

Most cog rehab programs use a variety of activities including:

- Practice requiring attention
- Planning or working on memory
- Compensatory strategies

What is recommended?

- Memory strategy training (visual imagery, notebooks)
- External compensation (assistive tech)
- Errorless learning may be effective
Exercise

Consistent results among 12 RCT leading to relatively small positive effects of exercise on cognition

Enriched Environment

1. Room with computer, books, games, virtual reality, and encouragement from staff increased engagement and reduced time spent inactive or alone

2. 95 minutes of daily, self-selected music improved verbal memory, focused attention, and decreased depressive symptoms

3. 30 minutes virtual reality for 4 wks improved visuospatial memory
Communication Disorders

Communication Disorders May Affect:
- Speaking
- Listening
- Reading
- Writing
- Gestures
- Pragmatics

Which Negatively Affects....

- Social Participation
- Psychosocial well-being
- Quality of Life

Social Participation
Psychosocial well-being
Quality of Life
Aphasia

COMMUNICATION

<table>
<thead>
<tr>
<th>Recommendations, Aphasia</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech and language therapy is recommended for individuals</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>with aphasia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment for aphasia should include communication partner</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>training.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensive treatment is probably indicated, but there is no</td>
<td>IIa</td>
<td>A</td>
</tr>
<tr>
<td>definitive agreement on the optimum amount, timing, intensity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>distribution, or duration of treatment.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Motor Speech Disorders

**Dysarthria** – collective term for a group of speech disorder that result from paralysis, weakness, or incoordination of the speech musculature

**Apraxia** – disorder of motor planning or programming resulting in difficulty in volitionally producing the correct sounds (occurs with non-fluent aphasia)
## Visual Impairments

<table>
<thead>
<tr>
<th>Eye Movement</th>
<th>Visual Field Cuts</th>
<th>Visual Perception</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong>: eye exercises for convergence insufficiency are RECOMMENDED</td>
<td></td>
<td><strong>CLASS I</strong>: Multimodal audiovisual spatial exploration training appears to be more effective than visual spatial exploration training alone and is RECOMMENDED</td>
</tr>
<tr>
<td>CLASS IIB: Compensatory scanning training MAY BE considered</td>
<td><strong>CLASS IIB</strong>: Yoked Prisms may be useful to improve VFD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CLASS III</strong>: The use of behavioral optometry approaches (eye exercises and the use of lenses and colored filters) to improve eye movement control, eye focusing, and eye coordination is NOT RECOMMENDED</td>
</tr>
</tbody>
</table>

Eye and visual function can be improved through various visual therapy: eye exercises, use of lenses, prisms, filters, occluders and computer games. However, large majority of interventions are not evidence based.
Perception Deficits - With/Without Neglect

(Hemispatial Neglect or Hemi-Inattention – decreased attention to and awareness of 1 side of space)

2 intervention categories for neglect:
1. Bottom-Up Approach
2. Top-Down Approach

Visual organization training for perceptual deficits, without neglect
- Intended to produce extension of damaged visual fields
Limb apraxia (ideational) – a decrease or difficulty in performing purposeful, skilled movements that cannot be attributed to hemiplegia or lack of effort

- Paucity of research

<table>
<thead>
<tr>
<th>Recommendations: Limb Apraxia</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy training or gesture training for apraxia may be considered.</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>Task practice for apraxia with and without mental rehearsal may be considered.</td>
<td>IIb</td>
<td>C</td>
</tr>
</tbody>
</table>
Initiation

Execution

Termination
Trunk and Extremities: Balance and Ataxia

**Balance** depends on – visual, vestibular and somatosensory systems
- No specific approach, program or duration is superior
  - Successful: group, one-on-one, circuit; hospital, home and community programs
  - Not successful: aquatic

**Ataxia** – disorder of coordinated muscle activity during voluntary movement
- Successful: intensive task-oriented therapy upper limb training and postural training

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*Presence of ataxia with or without weakness does NOT negatively affect general functional recovery*
## Trunk and Extremities: Lower Extremity Mobility

### Lower Extremity Strengthening Post-Acute & Chronic CVA

- Lower limb resistance training = increases strength, gait speed and improves QOL
- NMES > TENS for gait improvements
- Perineal nerve stimulation vs AFO
  - Both equivalent and effective compensatory strategies

### Recommendations: Mobility

<table>
<thead>
<tr>
<th>Recommendations: Mobility</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive, repetitive, mobility-task training is recommended for all individuals with gait limitations after stroke.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>An AFO after stroke is recommended in individuals with remediable gait impairments (e.g., foot drop) to compensate for foot drop and to improve mobility and paretic ankle and knee kinematics, kinetics, and energy cost of walking.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Group therapy with circuit training is a reasonable approach to improve walking.</td>
<td>Ila</td>
<td>A</td>
</tr>
<tr>
<td>Incorporating cardiovascular exercise and strengthening interventions is reasonable to consider for recovery of gait capacity and gait-related mobility tasks.</td>
<td>Ila</td>
<td>A</td>
</tr>
<tr>
<td>NMES is reasonable to consider as an alternative to an AFO for foot drop.</td>
<td>Ila</td>
<td>A</td>
</tr>
</tbody>
</table>
### Trunk and Extremities: Lower Extremity Mobility

#### Robotics and Electromechanics-Assisted Training Devices

- **Treadmill + Body Weight Support (BWS) or robotics training > overground walking** in acute, non-ambulatory CVA population
  - Specific to those <3 mo post-CVA and unable to walk
  - No evidence on optimal device type, protocol and pt selection

<table>
<thead>
<tr>
<th>Practice walking with either a treadmill (with or without body-weight support) or overground walking exercise training combined with conventional rehabilitation may be reasonable for recovery of walking function.</th>
<th>IIb</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot-assisted movement training to improve motor function and mobility after stroke in combination with conventional therapy may be considered.</td>
<td>IIb</td>
<td>A</td>
</tr>
<tr>
<td>Mechanically assisted walking (treadmill, electromechanical gait trainer, robotic device, servo-motor) with body weight support may be considered for patients who are nonambulatory or have low ambulatory ability early after stroke.</td>
<td>IIb</td>
<td>A</td>
</tr>
</tbody>
</table>
Trunk and Extremities: Lower Extremity Mobility

**Neurodevelopmental Therapy (Bobath, Brunnstrom, PNF)**
- Motor improvements shown
  - Equivalent or inferior to other approaches to improve walking

**Rhythmic Auditory Cuing**
- Short term improvement

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<table>
<thead>
<tr>
<th>The effectiveness of rhythmic auditory cueing to improve walking speed and coordination is uncertain.</th>
<th>IIb</th>
<th>B</th>
</tr>
</thead>
</table>

<p>| The effectiveness of neurophysiological approaches (i.e., neurodevelopmental therapy, proprioceptive neuromuscular facilitation) compared with other treatment approaches for motor retraining after an acute stroke has not been established. | IIb | B |</p>
<table>
<thead>
<tr>
<th><strong>Trunk and Extremities: Lower Extremity Mobility</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acupuncture</strong></td>
</tr>
<tr>
<td><strong>EMG Biofeedback</strong></td>
</tr>
<tr>
<td><strong>Virtual Reality</strong></td>
</tr>
<tr>
<td>• Promotes changes in gait parameters</td>
</tr>
<tr>
<td><strong>Aquatic therapy</strong></td>
</tr>
<tr>
<td><strong>Medications</strong></td>
</tr>
<tr>
<td>• Dextroamphetamine, methylphenidate, levodopa and SSRIs (including Fluoxetine)</td>
</tr>
</tbody>
</table>

| The usefulness of electromyography biofeedback during gait training in patients after stroke is uncertain. | IIb | B |
| Virtual reality may be beneficial for the improvement of gait. | IIb | B |
| The effectiveness of neurophysiological approaches (i.e., neurodevelopmental therapy, proprioceptive neuromuscular facilitation) compared with other treatment approaches for motor retraining after an acute stroke has not been established. | IIb | B |
| The effectiveness of water-based exercise for motor recovery after an acute stroke is unclear. | IIb | B |
| The effectiveness of fluoxetine or other SSRIs to enhance motor recovery is not well established. | IIb | B |
| The effectiveness of levodopa to enhance motor recovery is not well established. | IIb | B |
| The use of dextroamphetamine or methylphenidate to facilitate motor recovery is not recommended. | III | B |
## Summary: Trunk and Lower Extremities

(Limb Apraxia, Balance and Ataxia, LE Mobility)

<table>
<thead>
<tr>
<th>Recommendations: Mobility</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive, repetitive, mobility- task training is recommended for all individuals with gait limitations after stroke.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>An AFO after stroke is recommended in individuals with remediable gait impairments (eg, foot drop) to compensate for foot drop and to improve mobility and paretic ankle and knee kinematics, kinetics, and energy cost of walking.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Group therapy with circuit training is a reasonable approach to improve walking.</td>
<td>IIa</td>
<td>A</td>
</tr>
<tr>
<td>Incorporating cardiovascular exercise and strengthening interventions is reasonable to consider for recovery of gait capacity and gait-related mobility tasks.</td>
<td>IIa</td>
<td>A</td>
</tr>
<tr>
<td>NMES is reasonable to consider as an alternative to an AFO for foot drop.</td>
<td>IIa</td>
<td>A</td>
</tr>
</tbody>
</table>
### Other Consideration: Spasticity

Spasticity = velocity-dependent resistance to stretch of a muscle

- Strongest predictor of mod-severe spasticity (MAS >/= 2): severe proximal and distal limb weakness on acute hospital or rehab admission

<table>
<thead>
<tr>
<th>Recommendations: Spasticity</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted injection of botulinum toxin into localized upper limb muscles is recommended to reduce spasticity, to improve passive or active range of motion, and to improve dressing, hygiene, and limb positioning.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Targeted injection of botulinum toxin into lower limb muscles is recommended to reduce spasticity that interferes with gait function.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Oral antispasticity agents can be useful for generalized spastic dystonia but may result in dose-limiting sedation or other side effects.</td>
<td>IIa</td>
<td>A</td>
</tr>
</tbody>
</table>
Other Consideration: Spasticity

<table>
<thead>
<tr>
<th>Physical modalities such as NMES or vibration applied to spastic muscles may be reasonable to improve spasticity temporarily as an adjunct to rehabilitation therapy.</th>
<th>Iib</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrathecal baclofen therapy may be useful for severe spastic hypertonia that does not respond to other interventions.</td>
<td>Iib</td>
<td>A</td>
</tr>
<tr>
<td>Postural training and task-oriented therapy may be considered for rehabilitation of ataxia.</td>
<td>Iib</td>
<td>C</td>
</tr>
<tr>
<td>The use of splints and taping are not recommended for prevention of wrist and finger spasticity after stroke.</td>
<td>III</td>
<td>B</td>
</tr>
</tbody>
</table>
### Upper Extremity Interventions

<table>
<thead>
<tr>
<th>Task-Specific Training</th>
<th>CIMT</th>
<th>Bilateral UE Training</th>
<th>Robotic Therapy</th>
<th>NMES</th>
<th>Strengthening</th>
<th>Mental Practice / Imagery</th>
<th>Virtual Reality &amp; Video Gaming</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning or re-learning a motor skill for ADL and IADL tailored to the person; Recommend for Treatment</strong></td>
<td>Shown to improve UE activity, participation and QOL; <strong>Reasonable to Consider for Treatment</strong></td>
<td>No consistent evidence of superiority over other task-specific training</td>
<td>Large amounts of UE movement practice; <strong>Reasonable to Consider for Treatment</strong></td>
<td>Used for those with minimal ability for volitional movement; <strong>Reasonable to Consider for Treatment</strong></td>
<td>As an adjunct to functional task practice; <strong>Reasonable to Consider for Treatment</strong></td>
<td><strong>Reasonable to Consider for Treatment</strong></td>
<td><strong>Reasonable to Consider for Treatment</strong></td>
</tr>
</tbody>
</table>
Transition of Care & Community Re-Integration

Collaborative and Interdisciplinary D/C Planning

Social and Family Caregiver Support
Effective D/C Planning

- Hospital length of stay and readmissions were statistically significantly reduced.
- Impact of D/C planning on mortality, health outcomes and cost = unclear.
- D/C planning should include rehabilitation professionals to identify long-term needs.
- Alternative methods of communication and support.

<table>
<thead>
<tr>
<th>Recommendation: Ensuring Medical and Rehabilitation Continuity Through the Rehabilitation Process and Into the Community</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is reasonable to consider individualized discharge planning in the transition from hospital to home.</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>It is reasonable to consider alternative methods of communication and support (eg, telephone visits, telehealth, or Web-based support), particularly for patients in rural settings.</td>
<td>IIa</td>
<td>B</td>
</tr>
</tbody>
</table>

HAPPY DISCHARGE!!
Social and Family Caregiver Support

12%-55% of caregivers experience emotional distress

Education to both improved knowledge & decreased patient depression

"How To's"
- Physical care needs
- Financial assistance
- Medications
- Respite Care
- Domestic Assistance
- Reassurance

Active involvement

Follow-up by educator

Recommendations: Social and Family Caregiver Support

<table>
<thead>
<tr>
<th>Recommendations: Social and Family Caregiver Support</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>It may be useful for the family/caregiver to be an integral component of stroke rehabilitation.</td>
<td>IIb</td>
<td>A</td>
</tr>
<tr>
<td>It may be reasonable that family/caregiver support include some or all of the following on a regular basis:</td>
<td>IIb</td>
<td>A</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counseling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of a support structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial assistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It may be useful to have the family/caregiver involved in decision making and treatment planning as early as possible and throughout the duration of the rehabilitation process.</td>
<td>IIb</td>
<td>B</td>
</tr>
</tbody>
</table>
Case Application: Sally - D/C IPR

81 yo female that experienced R MCA and R BG CVA, underwent tPA administration with partial thrombectomy
PMH: Uncontrolled HTN and hypothyroidism

<table>
<thead>
<tr>
<th>Body Function/Structure Impairments</th>
<th>Activity Limitations/ Participation Restrictions</th>
<th>Personal &amp; Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strength</strong>: L UE/LE hemiparesis, grossly 3+/5 MMT, L side facial droop</td>
<td><strong>Transfers</strong>: minAx1 (balance/perception)</td>
<td>Lives with her daughter in single level home with 3 STE (without HR)</td>
</tr>
<tr>
<td><strong>Sensation</strong>: Decreased L UE/LE light touch</td>
<td><strong>Bed mobility</strong>: Supervision (cues to initiate)</td>
<td>Daughter very involved in her care and completes caregiver training, - Can commit to 24/7 care</td>
</tr>
</tbody>
</table>
| **Perception**:  
  □ Poor midline orientation seated or standing with R contraversive pushing  
  □ L neglect to environment and body | **Toileting**: modAx1 with grab bars (pericare, clothing mgmt); continent | |
| **Cognition**: unable to follow >2step commands, increased time for motor planning and executive functioning | **Bathing/Grooming**: modAx1 (shower bench, hand-held, cues to attend L side) | |
| | **Locomotion**: 10 ft with FWW, maxAx1 (midline orientation), 120 ft with w/c, minAx1 (steering) | |
| | PASS - 19/36 (<32 poor postural control) BERG, 10MWT – unable to perform | |
What should be Sally's next level of care?

- Home
- Skilled Nursing Facility
- Outpatient
- Home Health
- Assisted Living
24/7 Caregiver Support

Family demonstrates proficiency with caregiver training

Low level functional mobility

24/7 assist
- Home Health PT, OT, SLP – 3 wks
- Transition to OP PT, OT, SLP

Without 24/7 family assist = SNF
Prior to Discharge...

Adaptive Equipment & Assistive Devices

Orthotics

Deconditioning and Fitness post-CVA

Chronic Care Management

Community Resources

Community Rehab

Return to Recreational/Leisure Activities

Other: Return to Work, Sexual function, Driving
Adaptive Equipment

### Recommendations: Adaptive Equipment, Durable Medical Devices, Orthotics, and Wheelchairs

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulatory assistive devices (e.g., cane, walker) should be used to help with gait and balance impairments, as well as mobility efficiency and safety, when needed.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>AFOs should be used for ankle instability or dorsiflexor weakness.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Wheelchairs should be used for nonambulatory individuals or those with limited walking ability.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Adaptive and assistive devices should be used for safety and function if other methods of performing the task/activity are not available or cannot be learned or if the patient’s safety is a concern.</td>
<td>I</td>
<td>C</td>
</tr>
</tbody>
</table>

### Adaptive ADL Equipment
- Adaptive eating utensils
- Shower equipment
- Grab bars
- Toilet risers / commode

### Locomotion with AD
- Improved ambulatory function
- Improved walking confidence and safety
- W/C self-propulsion early after CVA is NOT detrimental to functional outcomes
Other Considerations - Orthotics

- Standard AFO vs Hinged AFO
  - Hinged > Standard with improving ambulatory function
    - Dependence
    - Standard AFO > no orthotic with improving ambulation after 3 months of use

Will your patient wear the AFO?

Walking disability (speed)

Walking Impairment (step/stride length)

Balance (weight distribution in standing)
What adaptive equipment or assistive device would you recommend for Sally?
Sally's AD Recommendations

- Wheelchair
- Tub transfer bench
- Grab bars (toilet + shower)
- Reacher
- Removable bed rails
Motor Impairments and Recovery: Deconditioning and Fitness After Stroke

**Activity level post-stroke = predictor of life satisfaction**

- Post-mild or moderate stroke **CAN** improve their exercise capacity
- Decreases cardiac complications and increased survival
  - 10-25% reduction in mortality for every 1-MET increase in exercise capacity

Aerobic exercise

- Bone health, fatigue, executive functioning and memory, depression, emotional well-being
- Walking ability (endurance>speed)
- Social participation and return to work
- Prevents: glucose intolerance, vascular stiffness, high resting BP, elevated cholesterol
Motor Impairments and Recovery: Deconditioning and Fitness After Stroke

Exercise Program Prescriptions
Initiation of aerobic exercise in subacute period (11-78 days post-CVA)
- Repetition
- Gradual progressive task difficulty
- Functional practice

Monitor training intensity!
- Moderate training intensity: 40-70% heart rate reserve (HRR)
- Deconditioned? - 30% HRR can induce CV training

FITT Principle
- 3 days/week for a minimum of 8 weeks
- 20 min training + 3-5 min of low-intensity warm-up/cool-down
- + lighter physical activity (brisk walking, stairs) during other days
- Deconditioned? - deliver in multiple bouts of <= 5 min in a single session or throughout day
Chronic Care Management

- Early participation in fitness training and education on lifestyle choices, risk factor reduction and secondary prevention.
- Unable to exercise = alternative solutions to maintain active lifestyle
- Group exercising, fitness centers, and exercise salience >

Passive approaches = not adequate
Community Resources

- Stroke survivors and their caregivers can manage their chronic condition if given appropriate resources

- Improved and maintained functional outcomes with community interventions

- Exercise referral scheme to 3rd-party professionals to increase exercise = increases number of people to achieve 90=150 min/wk of moderate physical activity

- Inventories for community resources: NEStrokeCouncil.Org
Recovery Healthcare Professional Resource Page

Healthcare Professional Resources

- Webinar: Stroke Rehabilitation and Recovery: Moving From Paper to Practice | Professional Education Deck (PPT) | (Video)
- Adult Stroke Rehabilitation and Recovery Guidelines Key Recommendations for The Rehab Program (PDF)
- Adult Stroke Rehabilitation and Recovery Guidelines Key Recommendations for Assessment (PDF)
- Adult Stroke Rehabilitation and Recovery Guidelines Key Recommendations for Prevention and Medical Management of Comorbidities (PDF)
- Adult Stroke Rehabilitation and Recovery Guidelines Key Recommendations for Sensorimotor Impairments and Activities (PDF)
- Adult Stroke Rehabilitation and Recovery Guidelines Key Recommendations for Transitions in Care and Community Interventions (PDF)

Patient Resources

- Patient Guide to Making Rehab Decisions (PDF) Learn what to expect in medical rehab, how to choose the right rehab facility and the questions you should ask your healthcare provider.
- Patient Quick Sheet to Rehab Planning (PDF) Learn how to make good rehab decision with asking the right questions. Discover questions you should ask at the hospital, before discharge, for rehab providers and even questions your family members should be asking.

Rehab Activation Resources

- Stroke Rehab Resources Activation Kit (PDF) Use this toolkit to share resources to help survivors make the best possible rehab decisions and to improve patient outcomes.
Rehabilitation in the Community

Home- or community-based rehab programs > center- or institutionally located- rehab programs

**Home-Based Care vs No Therapy**
- Increased survival
- Improved ADL abilities

**Home-Based Care vs OP Therapy**
- OP increased CV health and decreased CV events = increased QOL
- OP decreased depression

**Recommendations: Rehabilitation in the Community**

| Patients with stroke receiving comprehensive ADL, IADL, and mobility assessments, including evaluation of the discharge living setting, should be considered candidates for community- or home-based rehabilitation when feasible. Exclusions include individuals with stroke who require daily nursing services, regular medical interventions, specialized equipment, or interprofessional expertise. |
| Class | Level of Evidence |
| I | A |

It is reasonable that caregivers, including family members, be involved in training and education related directly to home-based rehabilitation programs and be included as active partners in the planning and implementation or treatment activities under the supervision of professionals.

| It is reasonable that caregivers, including family members, be involved in training and education related directly to home-based rehabilitation programs and be included as active partners in the planning and implementation or treatment activities under the supervision of professionals. |
| llb | B |
### Recommendations: Recreational and Leisure Activity

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is reasonable to promote engagement in leisure and recreational pursuits, particularly through the provision of information on the importance of maintaining an active and healthy lifestyle.</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>It is reasonable to foster the development of self-management skills for problem solving for overcoming barriers to engagement in active activities.</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>It is reasonable to start education and self-management skill development about leisure/recreation activities during and in conjunction with in-patient rehabilitation.</td>
<td>Ila</td>
<td>B</td>
</tr>
</tbody>
</table>
Sexual Dysfunction

"Multiple studies indicate that stroke survivors and their significant others have concerns about sexuality but are frequently reluctant to ask their healthcare providers about these concerns."

<table>
<thead>
<tr>
<th>Recommendation: Sexual Function</th>
<th>Class</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>An offer to patients and their partners to discuss sexual issues may be useful before discharge home and again after transition to the community. Discussion topics may include safety concerns, changes in libido, physical limitations resulting from stroke, and emotional consequences of stroke.</td>
<td>IIb</td>
<td>B</td>
</tr>
</tbody>
</table>
Return to Work

• In the United States, about 20% of stroke survivors are of vocational age

• Most frequent factors in returning to work:
  • Younger age
  • Less severe impairments
  • Independence with ADLs
  • Good communication skills
  • Good higher-level cognitive skills
  • Processing speed
Return to Driving

• Driving has a major impact on participation in community activities
• Between 1/3 to 2/3 of individuals return to driving after stroke
• State law determines someone eligibility to drive
• No standardized driving assessment batteries
Wrap-Up

3 important take-away points

What "squares" with your thinking?

Anything still "circling"?
Questions?
Reference