Stroke: Post-Acute Complications & Management

22nd Annual Stroke Symposium

November 6, 2020

Atul T Patel, MD, MHSA
Disclosures

• Research grants, speaker, and consultant
  ▫ Allergan-Abbvie
  ▫ IPSEN
  ▫ Revance
Outline

- Epidemiology of stroke
- Risk factors
- Signs and symptoms of stroke
- Current status of post acute care
- Common post-acute stroke complications
  - identification
  - management
- Spasticity
STROKE
Epidemiology - USA

• 3rd leading cause of death
• Number one cause of adult disability
• Approximately 800,000 strokes per year
• Every 40 sec someone has a stroke
• Every 4 minutes someone dies from a stroke
• 28% any given year are under 65
• African Americans are at a greater risk
• African Americans are more likely to die post stroke
STROKE
Epidemiology - USA

• 50-60% with mild-mod disability
• 22-25% die within the 1st year
• 30% are severely impaired – LTC
• >50% of stroke victims are alive after 5 yrs
• Incidence doubles every decade beyond 55
Stroke
Risk Factors - controllable

- Hypertension – 4X
- Hyperlipidemia
- Atrial fibrillation – 15% of stroke pts -5X
- Sleep disordered breathing
- Smokers – 2X for ischemic stroke
- Alcohol ?
- Weight
- Diabetes
Stroke
Risk Factors - uncontrollable

- Age
- Gender
- Race
- Family history
Stroke
Common symptoms

- Sudden numbness or weakness
- Sudden confusion, trouble speaking or understanding
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance or coordination
- Sudden severe headache
Stroke
Common signs

• Unilateral motor weakness (hemiparesis)
• Unilateral sensory loss
• Abnormal speech
• Vision loss or visual field deficit
Stroke Location

- Lobe – frontal, parietal, posterior, etc
- Cortical versus subcortical
- Involvement of motor strip, sensory strip
- Speech areas
- Coordination
- Vision
Common issues post stroke
Current transition from acute

- admit to hospital
- work up and transfer to ...
- disposition based on
  - severity
  - comorbidities
  - day of the week
  - insurance
  - luck
Levels of Rehabilitation Care

- Acute Care Hospital
- Inpatient Rehabilitation Facility (IRF)
- Subacute Inpatient Rehabilitation – LTAC, SNF
- Comprehensive Day Rehabilitation
- Outpatient Rehabilitation
- Home Rehabilitation
The Goals of Stroke Rehabilitation

- prevent, recognize, and manage comorbid medical conditions
- maximize functional independence
- optimize psychosocial adaptation of patients and families
- facilitate resumption of prior life roles and community reintegration
- enhance quality of life
Rehabilitation during the Acute Phase

**GOALS:**

- prevention of medical complications
- prevention of deconditioning and contractures
- training of new skills
Natural progression after Stroke

**MOTOR CONTROL:**
- flaccid hemiplegia
- increasing tone and spasticity
- emergence of synergy patterns
- gradually increasing isolated voluntary movements
Principles of Stroke Rehabilitation

➢ Interdisciplinary team approach
➢ Holistic and comprehensive
➢ Uses learning theory:
  ▫ Graded levels of task difficulty
  ▫ Opportunities for repetition of skill performance
  ▫ Professional supervision and feedback
  ▫ “Protected practice”
Principles of Stroke Rehabilitation

- attention to psychological issues
- involvement of family
- need to recruit community resources
- importance of functional activities
- attention to quality of life issues
Complications post stroke
Stroke complications
Post-acute setting

- Deconditioning
- Depression
- Contractures
- Spasticity
- Falls
- Infections
- Skin breakdown
- Malnutrition
- Pain syndromes
Recovery after stroke

- natural recovery
- additional recovery with rehabilitation
- outcomes depend on various factors
  - severity
  - rehabilitation
  - prevention of early and late complications
Neuroplasticity

- Post stroke, the brain is affected by activity
- Even with chronic stroke survivors there is potential for change

New Rehabilitation Interventions

- Partial Body Weight-Supported Treadmill Training
- Orthotics
- Electrical Stimulation
- Constraint-Induced Therapy
- Robotic-Assisted Therapeutic Exercise
- Spasticity Management
“New” Treatment Principles

- Task specific
- Challenging and skilled
- Performed with a lot of repetitions
- Done with relatively normal movement patterns


Partial Body Weight-Supported Treadmill Training
Automated Treadmill Training
Electromechanical-assisted gait training: Cochrane Database

- 8 clinical trials (414 participants) “some evidence that combined with physiotherapy may improve recovery of independent walking and increase walking distance in patients after stroke who could not initially walk independently”
- “It is not clear if such devices should be applied in routine rehabilitation or when and how often they should be used.”
Saebo
Bioness
Constraint-Induced Therapy
Robotic-Assisted Therapeutic Exercise
Spasticity
Patient selection - What is spasticity?

• Classic definition: velocity dependent increase in tone (resistance to passive range of motion) associated with UMN lesions

• 2005 SPASM consortium definition: disordered sensorimotor control, resulting from an upper motor neuron lesion, presenting as intermittent or sustained involuntary activation of muscles

6.7 Million People in the US Are Living With Adult Spasticity¹

Spasticity patients can be found across a variety of neurologic conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>3.2M</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>&gt; 600K</td>
</tr>
<tr>
<td>Adult cerebral palsy</td>
<td>&gt; 194K</td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>≈ 189K</td>
</tr>
<tr>
<td>Traumatic brain injury</td>
<td>&gt; 140K</td>
</tr>
</tbody>
</table>

MS = multiple sclerosis; CP = cerebral palsy; SCI = spinal cord injury; TBI = traumatic brain injury.

# Spasticity Impacts Many Lives

**Patient**
- Clinical condition (e.g., contractures, pain, pressure ulcers, infections, weakness)
- Personal life (e.g., self-care, mobility, self-image, sleep, rehabilitation)

**Caregiver**
- Significantly higher odds of depression and anxiety
- 46% neglect their personal lives and well-being *(n=647)*

**Society**
- 4x higher costs than post-stroke patients without spasticity*
- Direct costs would be $\approx 4.2$ million per 100,000 inhabitants per year†

---

* $84,195 vs $21,842 in 2003 US dollars.
† Based on the assumption that 20% of stroke patients experience spasticity.
Spasticity Characteristics

- Extremity
  - Tetra Para
  - Hemi Mono

- Involvement
  - Global
  - Regional
  - Local

- Pattern
  - Flexor or Extensor

- Origin
  - Spinal
  - Cerebral

- Etiologies
  - Congenital
  - & Acquired

- Static & Progressive courses

Pathophysiology of Impairment After a CNS Lesion

Immediate Consequences

- Paralysis
- Immobilization in Shortened Position

Immediate Consequences

- Damage to Higher Center

Delayed Consequences

- Rearrangement of Spinal Activity
- Spasticity
- Muscle Overactivity

Contracture

Spasticity related complications

- Impact on ADLs
- Impact of mobility
- Pain
- Caregiver burden
- Hygiene
- Deconditioning
Clenched fist

- fingers clasped into palm
- inability to wash palm
- may lead to skin maceration and breakdown
Upper limb posture

- Adducted shoulder
- Flexed elbow
- Pronated forearm
- Flexed wrist
- Flexed fingers
Equinovarus Deformity

Hyperextended Hallux
Synergistic Model of Spasticity Management

Surgery

Removal of Noxious Stimuli

ITB Therapy

Physical Measures

Neurolytic Blockade / Chemodenervation

Oral Medications

Patient selection

• Spasticity management is not a linear or hierarchical process (monotherapy or in combination).

• Potential to improve ambulatory function with concomitant rehabilitative therapy

• Highly effective tool in the pediatric population with attention to unique considerations.

• Consideration of other factors - medical and nonmedical

Closing Remarks

• Stroke is a leading cause of disability.
• Need for better post acute management.
• Need for better preventive management – both 1° and 2°.
• Several different treatment options available to choose from.
• How high-tech can we get?
• Most patients are not getting the basics.
Rehabilitation

• Goals:
  ▫ Optimize function
  ▫ Focus on what is working
  ▫ Minimize effect of what is not working
  ▫ Use appropriate equipment
  ▫ Train caregivers
THANK YOU