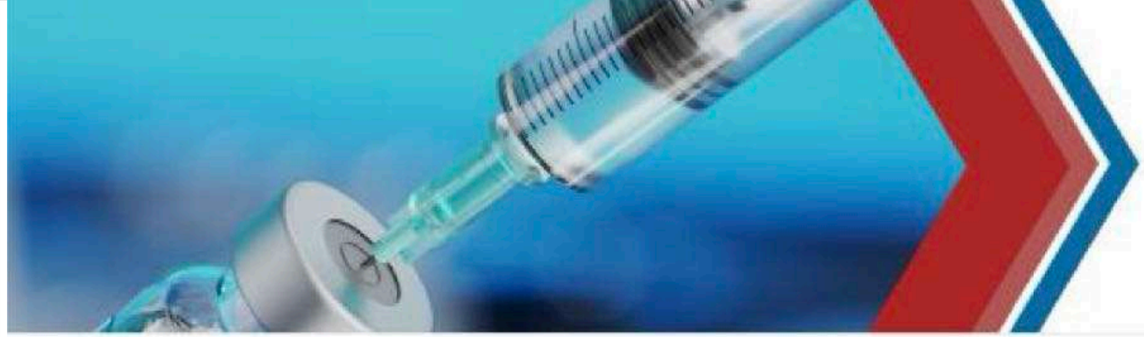


International Parkinson and Movement Disorder Society Asian & Oceanian Section

MDS-AOS Botulinum Toxin Convergence on Skills for Movement Disorders and Spasticity (ABCs-MDS)
November 25 – 26, 2025 | Manila, Philippines

Childhood Spasticity

Mary Jeanne Oporto Flordelis,MD
FPARM, DPBRM

Spasticity

> manifested as velocity- and muscle length–dependent increase in resistance to externally imposed muscle stretch. It results from hyperexcitable descending excitatory brainstem pathways and from the resultant exaggerated stretch reflex responses. Other related motor impairments, including abnormal synergies, inappropriate muscle activation, and anomalous muscle coactivation, coexist with spasticity and share similar pathophysiological origins.[6]

6Li S, Francisco GE, Rymer WZ. A new definition of poststroke spasticity and the interference of spasticity with motor recovery from acute to chronic stages. *Neurorehabil Neural Repair*. 2021; 35(7): 601-610. doi:10.1177/15459683211011214

UE Spasticity

- **Shoulder adduction and internal rotation with elbow extension and wrist flexion**
- **Shoulder abduction elbow flexion with wrist and fingers flexed**

LE Spasticity:

Adducted thighs

Equinovarus foot
Extended knee

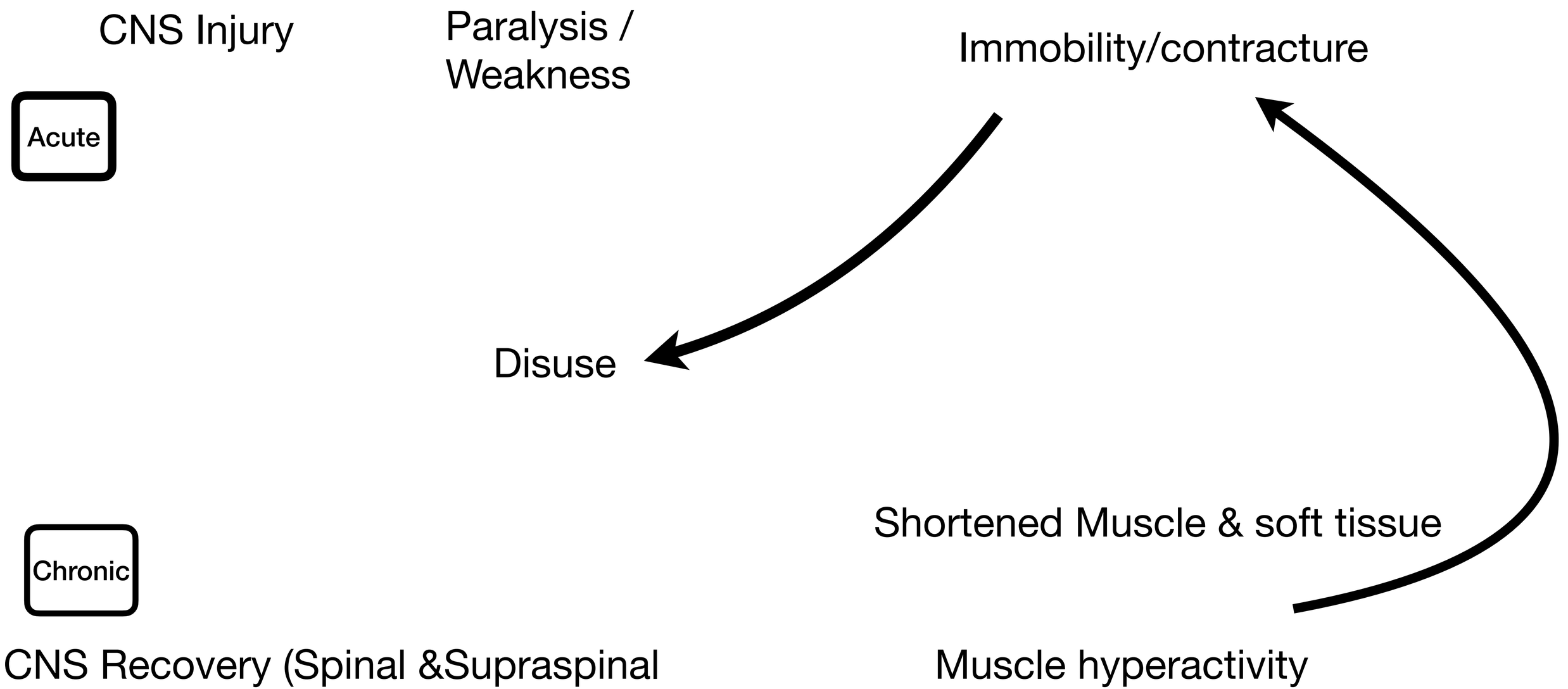
Flexed knee
Plantar flexed foot

Flexed toes

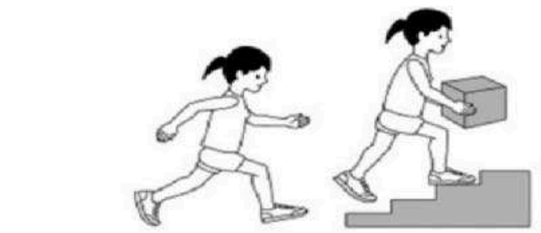
Striatal toe

Flexed knee/ extended knee

Spasticity & Disability Cascade



Disability



GMFCS Level I

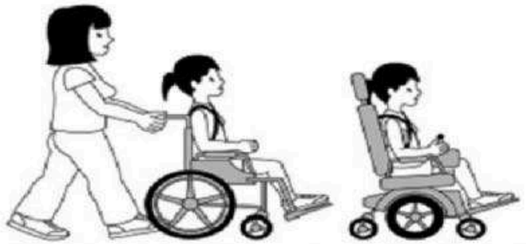
Youth walk at home, school, outdoors and in the community. Youth are able to climb curbs and stairs without physical assistance or a railing. They perform gross motor skills such as running and jumping but speed, balance and coordination are limited.

GMFCS Level II

Youth walk in most settings but environmental factors and personal choice influence mobility choices. At school or work they may require a hand held mobility device for safety and climb stairs holding onto a railing. Outdoors and in the community youth may use wheeled mobility when traveling long distances.

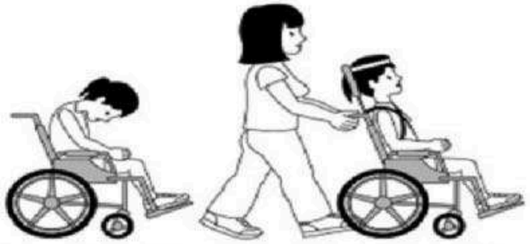
GMFCS Level III

Youth are capable of walking using a hand-held mobility device. Youth may climb stairs holding onto a railing with supervision or assistance. At school they may self-propel a manual wheelchair or use powered mobility. Outdoors and in the community youth are transported in a wheelchair or use powered mobility.



GMFCS Level IV

Youth use wheeled mobility in most settings. Physical assistance of 1-2 people is required for transfers. Indoors, youth may walk short distances with physical assistance, use wheeled mobility or a body support walker when positioned. They may operate a powered chair, otherwise are transported in a manual wheelchair.



GMFCS Level V

Youth are transported in a manual wheelchair in all settings. Youth are limited in their ability to maintain antigravity head and trunk postures and control leg and arm movements. Self-mobility is severely limited, even with the use of assistive technology.

GMFCS descriptors: Palisano et al. (1997) Dev Med Child Neurol 39:214-23
CanChild: www.canchild.ca

Sequence of Care

BEFORE INITIATING TREATMENT

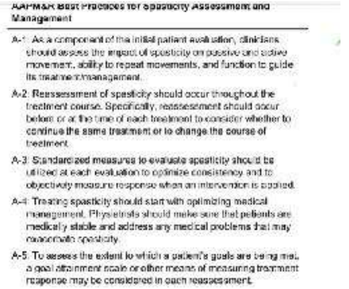
- **History & PE essential**
- **Medical Assessment**
- **Optimize medical management**
- **Identity and eliminate triggers/ perpetuators of spasticity —**

Spasticity Assessment:

- **Passive ROM: MAS, TARDEU**
- **Active motion of spastic limb: ARM,**
- **Rapid Alternating movements (test fatigue)**
- **UE : Action Research Arm Test , video of UE use**
- **LE :Gait speed (10m / 2 min walk)**

Best Practice in Assessment

1. Impact of spasticity on PROM, AROM, function
2. Reassessment throughout treatment (start;mid and end)
3. Use standard measures of assessment for consistency & objectivity
4. Optimize medical measures before treatment of spasticity
5. Use Goal Attainment Scale



AAPM&R Best Practices for Spasticity Assessment and Management

A-1: As a component of the initial patient evaluation, clinicians should assess the impact of spasticity on passive and active movement, ability to repeat movements, and function to guide its treatment/management.

A-2: Reassessment of spasticity should occur throughout the treatment course. Specifically, reassessment should occur before or at the time of each treatment to consider whether to continue the same treatment or to change the course of treatment.

A-3: Standardized measures to evaluate spasticity should be utilized at each evaluation to optimize consistency and to objectively measure response when an intervention is applied.

A-4: Treating spasticity should start with optimizing medical management. Physiatrists should make sure that patients are medically stable and address any medical problems that may exacerbate spasticity.

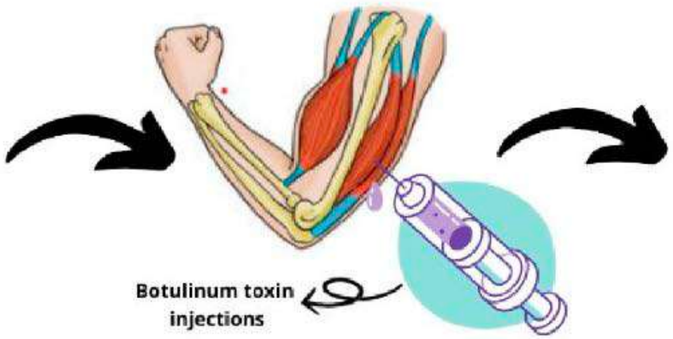
A-5: To assess the extent to which a patient's goals are being met, a goal attainment scale or other means of measuring treatment response may be considered in each reassessment.

Patient care is Holistic

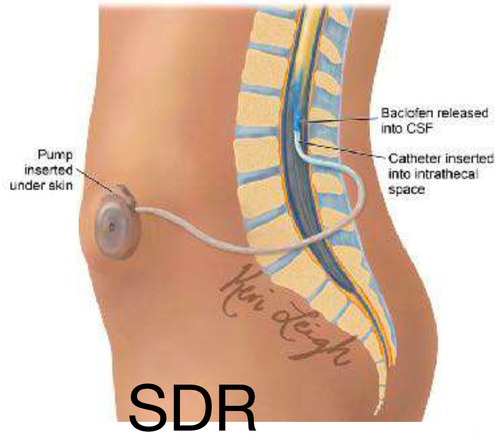
- **Patient -centered** evaluations, treatment, and reassessments
- GOAL ATTAINMENT SCORES
- Consider **impact** of spasticity management
  - on function
    - reduction of tone
  - on quality of life

Management:

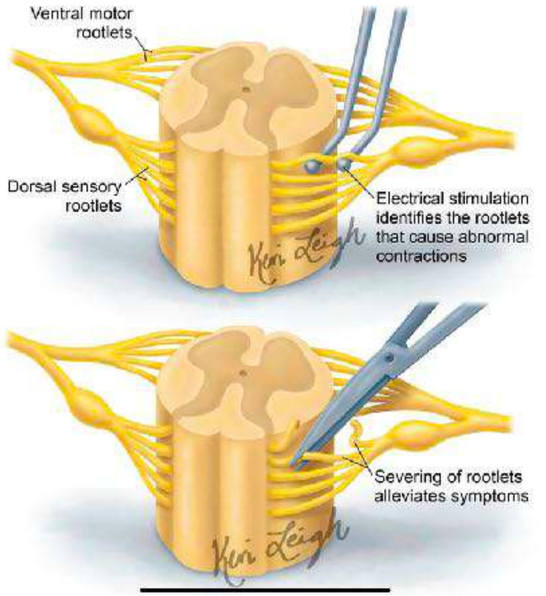
- Medical
  - Oral
  - Injections
- Surgical Procedures
- Non Pharmacological
- Reassessment and GAS evaluation



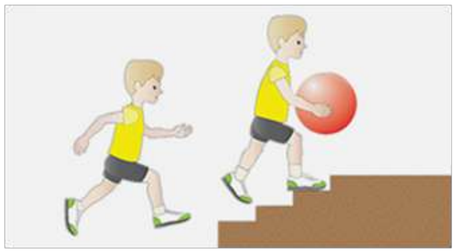
Intrathecal Baclofen



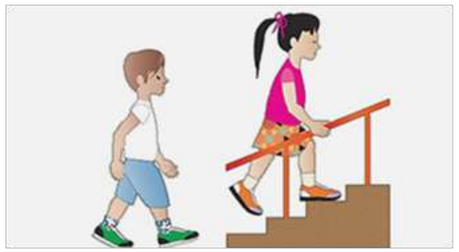
SDR



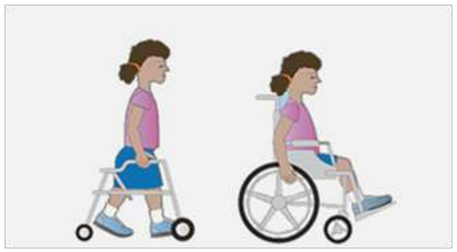
Disability



GMFCS Level I

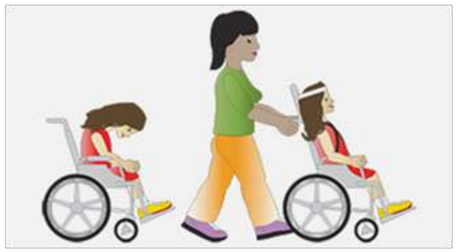


GMFCS Level II



GMFCS Level III

GMFCS Level IV



GMFCS Level V

- **Treatment interventions depend upon disability**
- **Reassessment after treatment**
- **Follow up care and Planning**

Best Practice in Assessment And Management of Spasticity

TABLE 1. AAPM&R best practices for spasticity assessment.

AAPM&R Best Practices for Spasticity Assessment and Management
A-1: As a component of the initial patient evaluation, clinicians should assess the impact of spasticity on passive and active movement, ability to repeat movements, and function to guide its treatment/management.
A-2: Reassessment of spasticity should occur throughout the treatment course. Specifically, reassessment should occur before or at the time of each treatment to consider whether to continue the same treatment or to change the course of treatment.
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A-4: Treating spasticity should start with optimizing medical management. Physiatrists should make sure that patients are medically stable and address any medical problems that may exacerbate spasticity.
A-5: To assess the extent to which a patient's goals are being met, a goal attainment scale or other means of measuring treatment response may be considered in each reassessment.

1. Evaluate effect of spasticity on active , passive movements and function
2. Assess and reassess effectiveness of treatment relative to re treatment
3. Standardized, objective and consistent measures of spasticity
4. Optimize all medical options, (address confounding medical problems.
5. Use goal attainment measures at each reassessment

PM&R: May 2024

Assessment and Intervention

1. Generalized hyperactivity / spasticity
2. Neural Focal Spasticity
3. Non neural Muscular shortening and joint contracture

1. Oral medications-Antispasticity , Intrathecal Baclofen.
2. Chemodenervation~ Botulinum toxin ; phenol neurolysis, Selective Dorsal Root Rhizotomy
3. Non pharmacological ; Surgical interventions

Delphi recommendation for injections in LOWER LIMB SPASTICITY:

Congregate postures:	Muscle	Injection sites
Adducted thigh	Adductors: longus /magnus & brevis	2-2-2
Flexed Knee	Medial& lat. hamstring	4
Extended Knee	Quadriceps : femoris,lateralis Medialis	4-2-2
Plantar flexed foot and ankle	Gastrocs; Tib. Post	4-4
Equinovarus ankle	Tib.post.gastroc,soleus Soleus	2-4-2
Flexed toes	Flex dig.long FHL ; FDB	2-1-2
Striatal toe	Ext.hal.longus	2

Best Clinical Practice in Botulinum toxin treatment in children with Cerebral Palsy . TOXINS, Basel May 2015

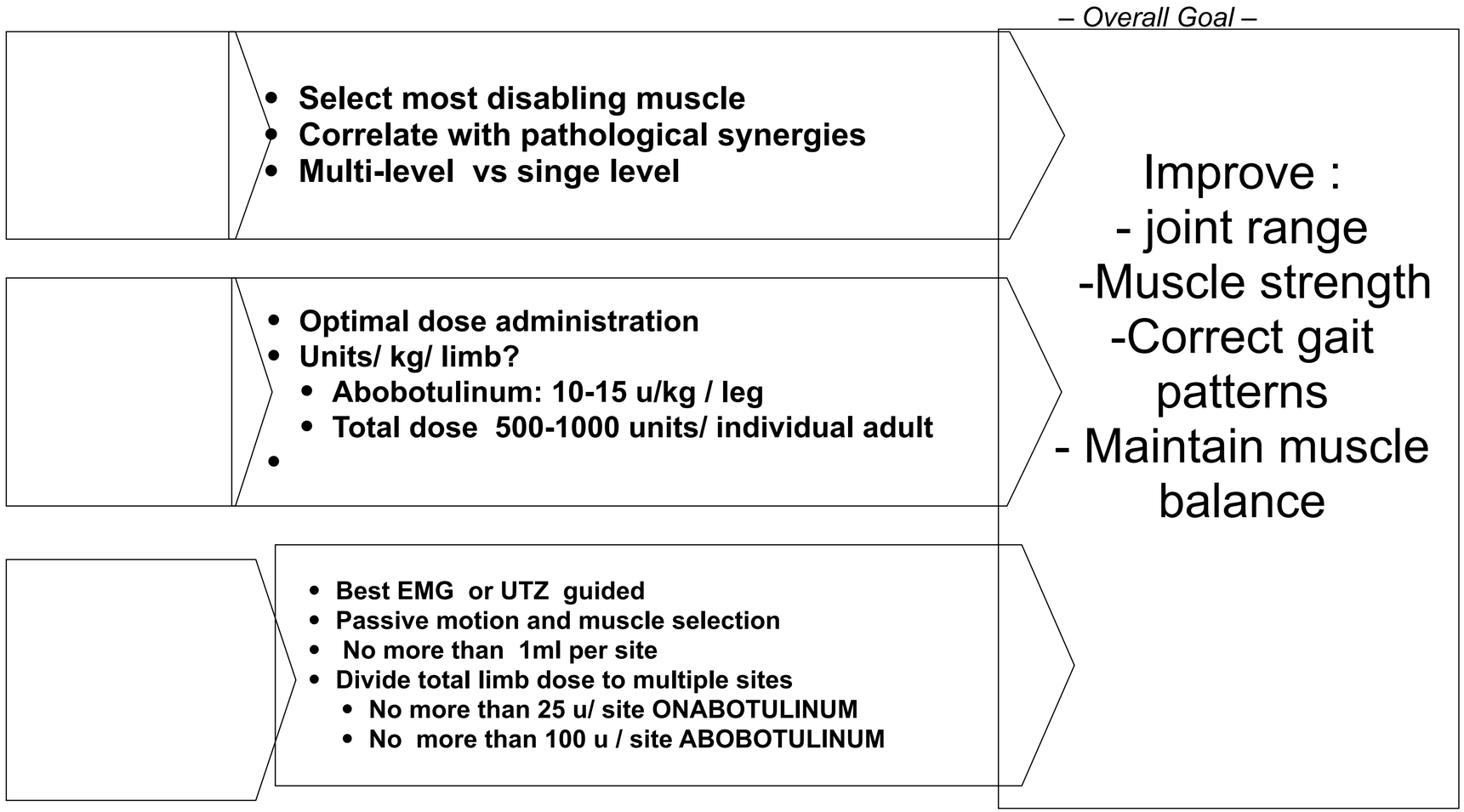
DOSE

- .Abobotulinum :
  - ≤20 units/kg BW first injection
  - ≤30 units/kg body weight , subsequent injections
  - max total dose of 1000 units, (European Marketing Authorisation.)
- OnabotulinumtoxinA
  - : ≤12 units/kg BW first injection
  - ≤15 units/kg BW ,subsequent injections
  - max total dose of 300 units
- IncobotulinumtoxinA:
  - ≤12 units/kg BW first injection
  - ≤15 units/kg body weight subsequent injections
  - max total dose of 300 units
- The key-muscle concept is characterised by: the treatment goal being the next stage of physiological motor development; selection of the key muscles; early commencement of treatment; and long-term treatment.

BoNT injections are associated with significant costs, and repeated injections and dosage are often further restricted by finances for coverage of treatment. These limitations prevent the sole utility of chemodenervation for a multipattern treatment, for example, elbow flexion, clenched fist, stiff knee gait, and equinovarus of the foot. Consequently, phenol neurolysis (PN) and BoNT can be used in complement, with PN frequently reserved for proximal nerves and BoNT used for distal musculature.

INTEGRATED TREATMENT

ESSENTIALS :



SDR in Children

Good Response:

- Classification (GMFCS) I - III
- age 4 and 10years
- pure spasticity,
- antigravity hip flexor strength,
- adequate cognition,
- absence of contractures,
- no basal ganglia or thalamic lesions on imaging

SDR

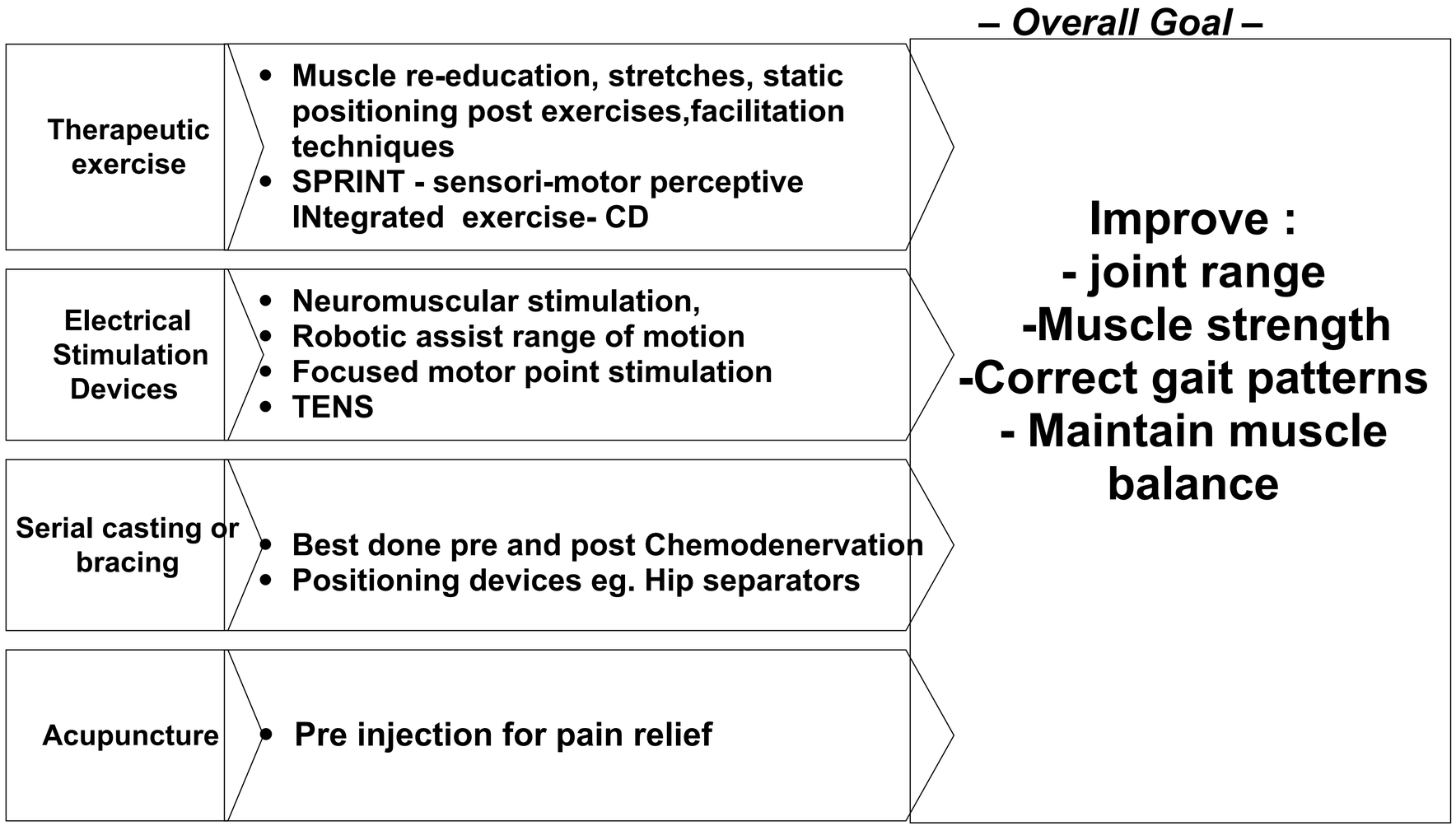
- reduced spasticity.. on to 17years post SDR .
- children 10years post SDR had normalized their MAS scores to a 1in all muscle groups compared to those without an SDR who had only partial reduction in spasticity.
- reduction (spasticity) due to SDR rather than natural history alone.
- diplegic CP, GMFCS I to III reduction in spasticity maintained through early adulthood.

- SDR in adult patients with CP helps reduce spasticity and maintain or improve level of ambulation
- adults have a higher propensity to develop new sensory deficits or neuropathic pain

Nonpharmacologic interventions

- Improves function
- Avoid secondary deleterious impact of spastic
- Augment the results of treatments

NonPharmacologic Intervention:



Physical Exercise

Pre-injection stretches to maximize optimum muscle length and joint range of motion

Post injection - improve mobility
Orthotic worn day and night or
Ambulation training in correct movements with orthotics, treadmill

GMFCS IV-V
Balance,sitting,hygiene ; QOL;

Physical exercise essential to After care

POSITIONING INTERVENTIONS:

Child with Multiple Spasticity

Unique needs

Tailored interventions

Multimodal interventions

Maximum outcomes

Suitable Options

Multiple limb Spasticity:

- Best to use combination therapy- oral ; surgical, ITB, BontA injections, phenol neurolysis
- Integration of interventions
- Consider co morbidity; child development;nutritional status; current functional status and prognosis as well as goals;

Spasticity interventions should :

- Multimodal therapy

  A combination for maximal benefit.
- Interdisciplinary physiatrist; pediatrician; neurologist; surgeon; allied healthcare; carer, family, patient
- Goal assessment and re-assessment

Summary

No stand Alone Approach

Medical / Surgical Intervention

•

<u>Early Interdisciplinary Rehabilitation :</u>

- Maintain muscle length
- Joint alignment
- Maximize muscle strength and reduce imbalance
- Task specific training
- Let the child have a childhood

Clinical Recommendations Spasticity Management

AAPMR TEP RECOMMENDS:

- Bontx for Focal Spasticity
- Intrathecal Baclofen for

  Spinal / cerebral spasticity
- SDR in younger PX
- Use of Non pharmacological interventions in conjunction

Management/treatment recommendation statement	SORT Grade [a]
Pharm-1: The AAPM&R Spasticity TEP suggests use of oral medications to manage generalized or systemic spasticity; oral medications can be used either exclusively or as a component of a multimodal treatment approach.	C
INJ-1: The AAPM&R Spasticity TEP recommends clinicians consider use of botulinum toxin A for management of focal upper and lower limb spasticity.	A
INJ-2: The AAPM&R Spasticity TEP suggests that clinicians consider use of phenol or alcohol blocks for management of focal spasticity.	C
SUR-1: The AAPM&R Spasticity TEP recommends use of intrathecal baclofen pump therapy (ITB) as an effective treatment of spinal or cerebral origin spasticity in appropriately identified patients.	A
SUR-2: The AAPM&R TEP recommends utilization of selective dorsal rhizotomy (SDR) to treat spasticity with proper patient selection focused on patients with primarily spasticity of the lower extremity (LE), adequate LE strength and selective motor control, and absence of significant contractures. Technical Note: Historically, the procedure has primarily been performed in children; more recently SDR in adults has been noted to be helpful in reducing spasticity, maintaining or improving level of ambulation, but with a higher propensity to develop new sensory deficits or neuropathic pain.[10]	A
NP-1: The AAPM&R Spasticity TEP recommends consideration of use of nonpharmacologic interventions from a range of treatment modalities, in conjunction with other therapeutic	NG

No Recommendation due to insufficient evidence

- Hyperbaric oxygen
- Shock wave therapy
- Transcranial magnetic stimulation
- Transcranial direct stimulation
- Pulsed electromagnetic therapy

Remember:
Let them have a Childhood !

References:

- AAPM&R Concensus Guidance on Spasticity Assessment and Management. JPM&R. 21 May 2024.

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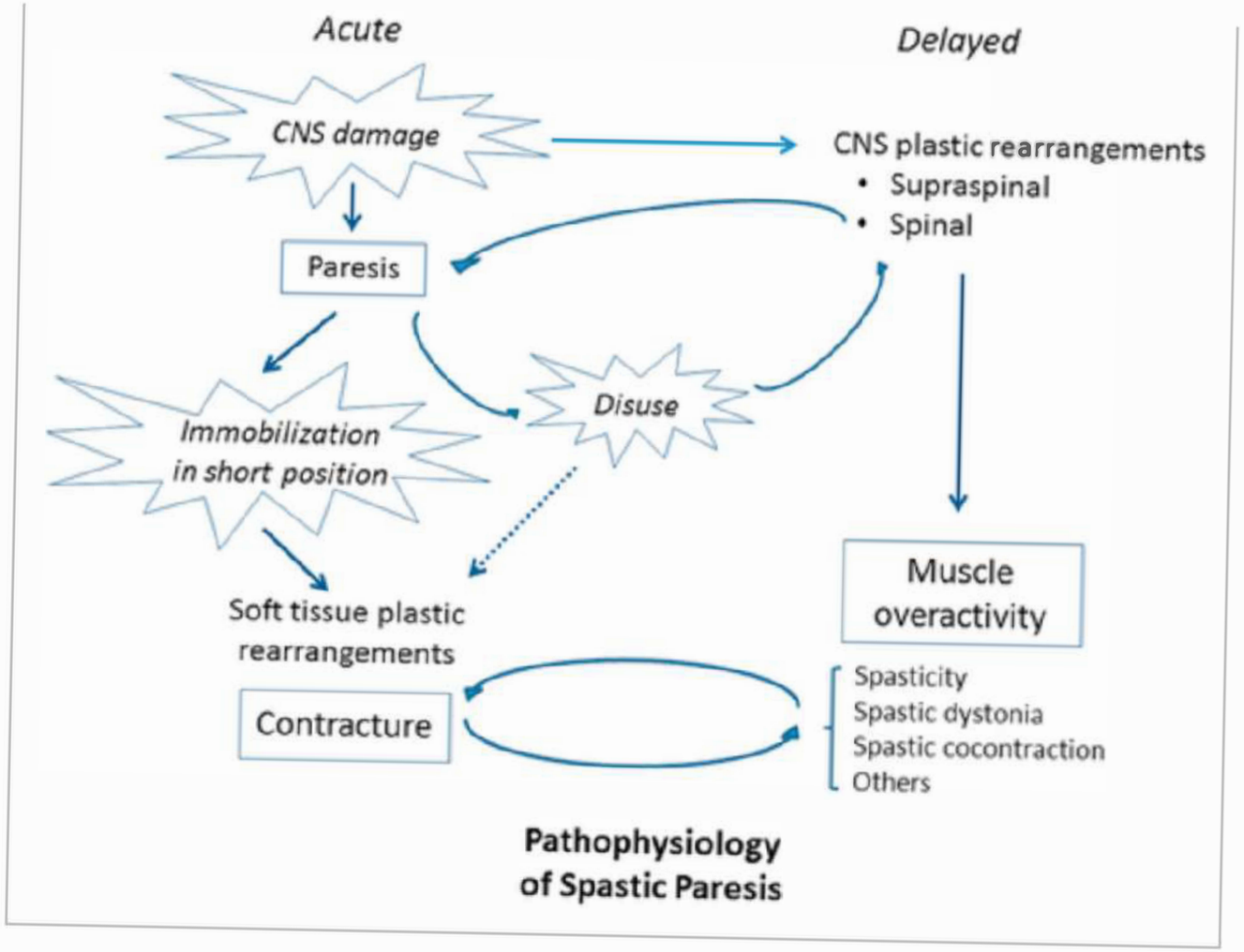
Acute
Delayed
CNS damage
CNS plastic rearrangements
• Supraspinal
• Spinal
Paresis
Disuse
Immobilization
in short position
Soft tissue plastic
rearrangements
Muscle
overactivity
Contracture
Spasticity
Spastic dystonia
Spastic cocontraction
Others
Pathophysiology
of Spastic Paresis