

Exploring the role of Pharmacological Strategies within 24-hour Postural Care and Assisted Movement

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Aims

- Identify spasticity and other hypertonic movement disorders
- Have an understanding of the treatment options for spasticity
- Identify triggers that can increase muscle tone
- Feel confident in making referrals to spasticity services with specific requests for intervention that will aid seating
- Q&As

85% of children with **Cerebral Palsy** have **spasticity** as their primary motor type 7% have **dystonia** or athetosis. Many have a **combination** of spasticity and dystonia

85% of individuals with **severe TBI** will present with **spasticity** and develop **contractures**

93% of individuals with **SCI** living in the community with present with **spasticity**

Around **42%** of **stroke** patients will develop **spasticity**

Terminology:Spasticity

'Spasticity is a **motor disorder** characterised by a **velocity-dependent** increase in **tonic stretch reflexes** (muscle tone) with exaggerated tendon jerks, resulting from **hyperexcitability of the stretch reflex**, as one component of the **upper motor neuron syndrome**'

Lance 1980

'Disordered sensorimotor control, resulting, resulting from an **upper motor neuron lesion (UMN)**, presenting as an **intermittent** or **sustained involuntary activations** of muscles "

Pandyan 2005

Terminology: Dystonia

- Dystonia is a movement disorder characterized by sustained or intermittent muscle contractions causing abnormal and often repetitive, movements, postures, or both.
- Dystonic movements are typically patterned, twisting, and may be tremulous.
- Dystonia is often initiated or worsened by voluntary action and is associated with overflow muscle activation

Albanese et al 2013

Terminology: Rigidity

- Rigidity is a hypertonic state characterized by constant resistance throughout range of motion that is independent of the velocity of movement.
- Simultaneous co-contraction of agonists and antagonists may occur, and this is reflected in an immediate resistance to a reversal of the direction of movement about a joint
- The limb does not tend to return toward a particular fixed posture or extreme joint angle

Terminology: Hyper-reflexia

- Hyper-reflexia indicates an upper motor neuron lesion, and reflects a loss of inhibitory modulation of the motor pathways. It is often associated with increased muscle tone (spasticity)

Reflex

A muscle contraction in response to stretching within the muscle

Functions:

1. Maintain muscle tone
2. Protect against injury

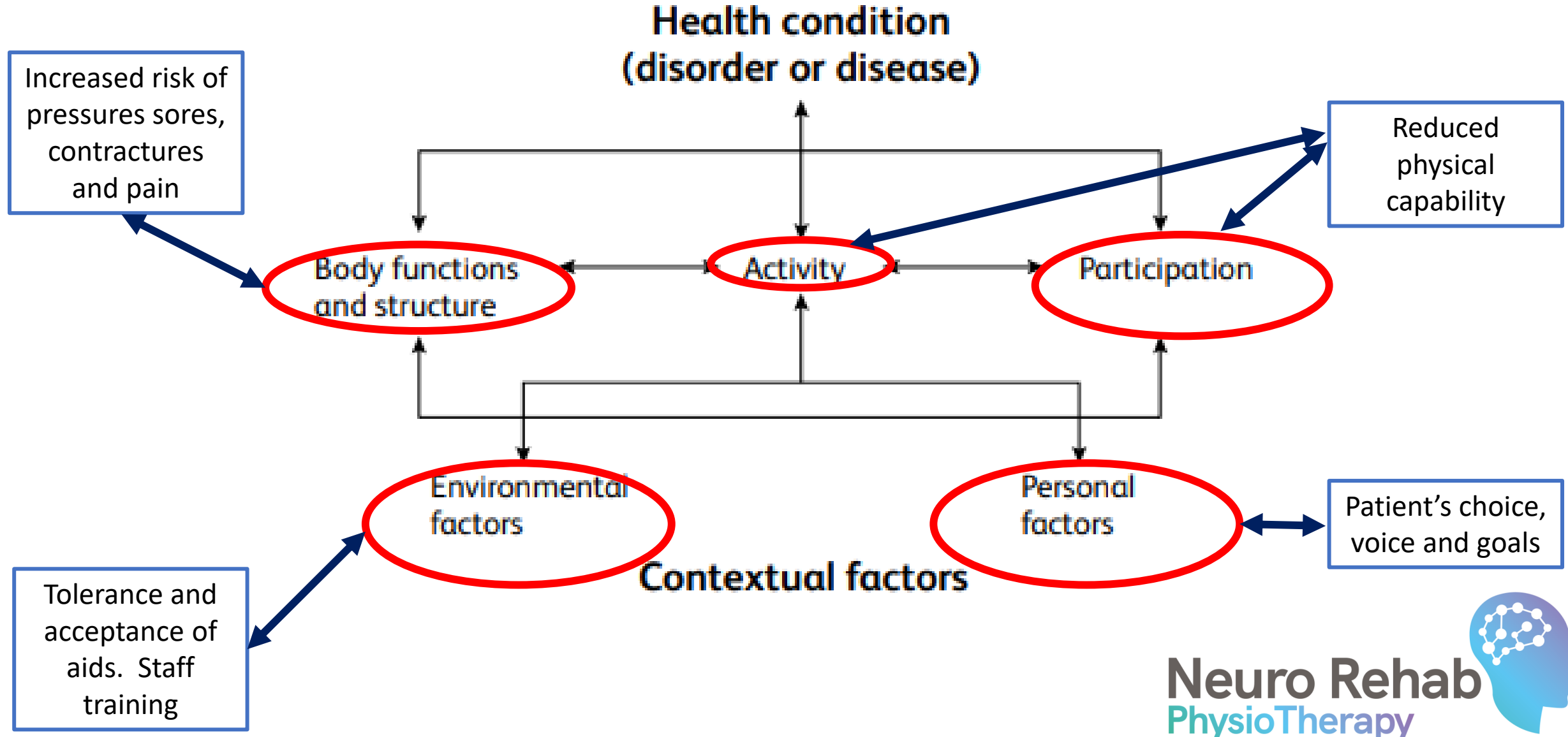
Why worry about spasticity?

Table 2: Harmful effects of spasticity classified according to the WHO ICF

ICF Level	Problem	Effect
Impairment	Muscle spasms	Pain Difficulty with seating and posture Fatigue
	Abnormal trunk and limb posture	Contractures Limb deformity Pressure ulcers/other tissue viability problems
	Pain	Distress and low mood Poor sleep patterns
Activity	Loss of active function	Reduced mobility and dexterity Difficulty with sexual intercourse Difficulty with continence
	Loss of passive function	Difficulty with care and hygiene Increased carer burden Difficulty with wheelchair seating or bed positioning
Participation	Impact of any/all of the above	Poor self-esteem / self-image Reduced social interaction Impact on family relationships Impact on work

Spasticity can have a harmful impact on posture and positioning and is specifically highlighted as in RCP guidance 2018

The interlink between postural care and assistive movement come into it?



- Impairment- pain, range, tone
- Function- comfort in sitting, ease of transfers

Improve

- Contractures
- Anatomical deformities
- Skin breakdown and Pain

Prevent

Spasticity related Postural Goals

Maintain
(not a dirty word!)

Reduce

Without ongoing, planned and timely input, spasticity **will** return

- Carer burden
- Assistance required



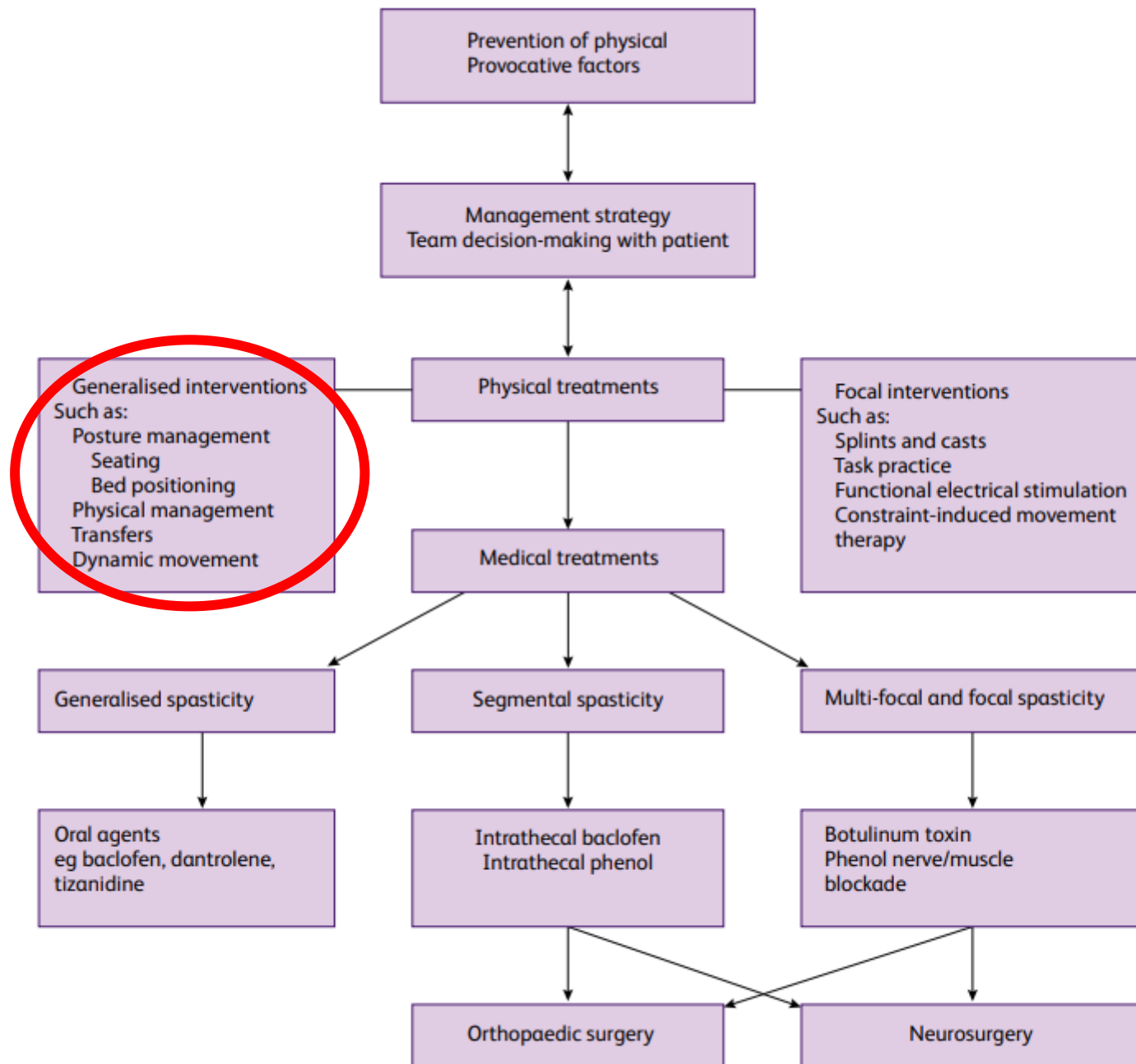


Fig 2: Management strategy for adults with spasticity

Specialist interventions

Systemic Pharmacology

- Increase dosage
- Consider deprescribing
- Drug interactions

Focal Management

- Botulinum Toxin
- Steroid injections
- Nerve Blockade

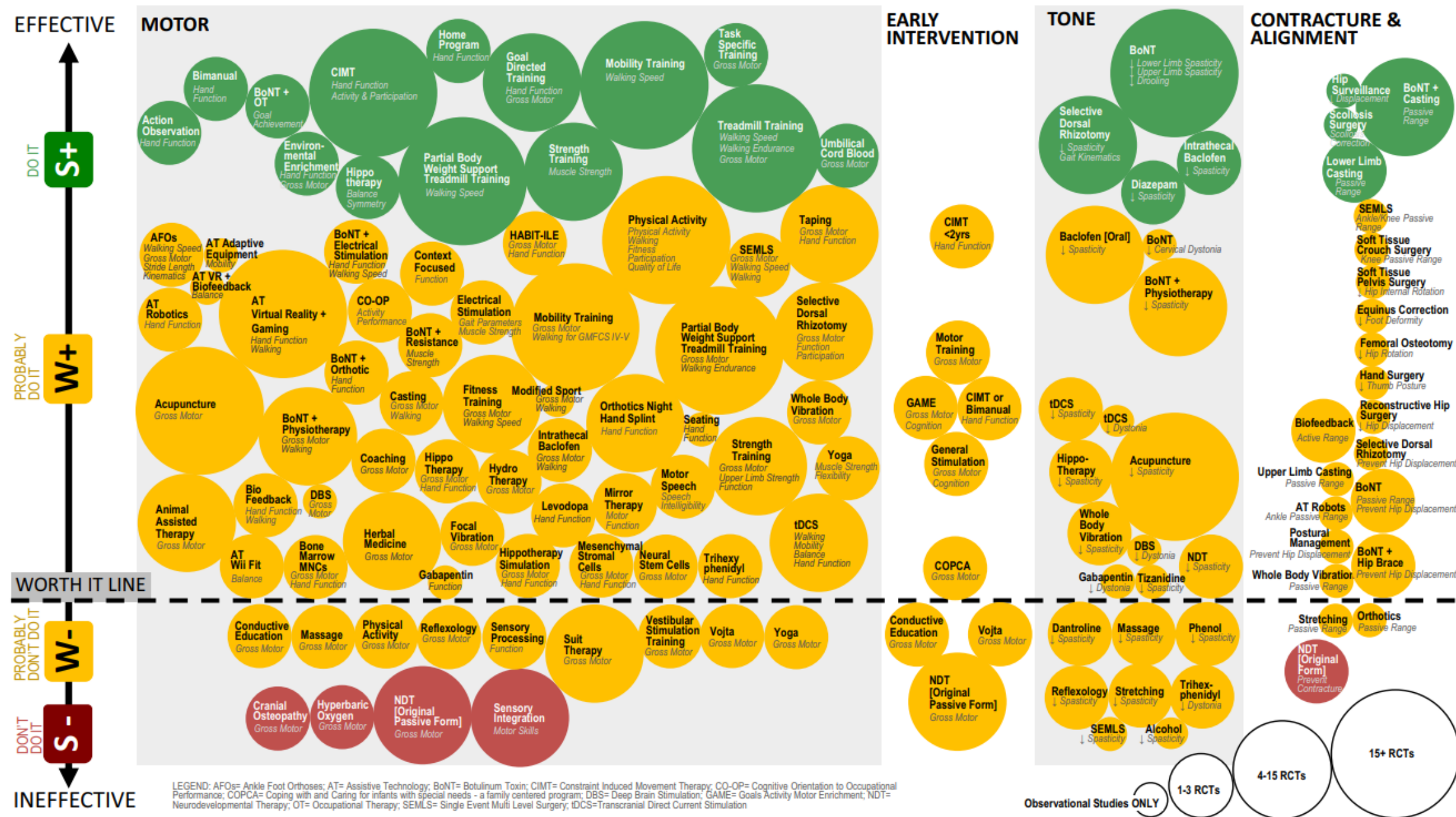
Surgery

- Neurectomy
- Reconstructive
- Orthopaedic

Therapy

- Physio
- OT
- Orthotics





Triggers

- Pain
- Seizures
- Bladder and Bowels
- Skin integrity
- Infection
- Emotions
- Posture
- Fatigue
- Other pain stimulus



Upping our skillset

- Do you ask about medications?
- Prescribed medications will tell you a lot about underlying impairments



Spasticity

Bacofen

Tizanadine

Diazepam

Dantrolene

Gabapentine

Sativex

Botulinum Toxin

Dystonia

Trihexphenidil

Co- careldopa

Diazepam

Botulinum
Toxin

Rigidity

Co-careldopa

Co-beneldopa

Botulinum
Toxin

Side effects

- Vary according to each drug but most used to manage movement disorders can cause
 - drowsiness/sleepiness,
 - weakness,
 - fatigue,
 - Confusion
- Impact on:
 - work
 - School
 - maintaining posture



Baclofen, Adults

Therapeutic indications

- for the relief of spasticity of voluntary muscle resulting from such disorders as: multiple sclerosis, other spinal lesions, e.g. tumours of the spinal cord, syringomyelia, motor neurone disease, transverse myelitis, traumatic partial section of the cord.
- Relief of spasticity of voluntary muscle arising from e.g. cerebrovascular accidents, cerebral palsy, meningitis, traumatic head injury

Dosage

- 5mg three times a day for three days
- 10mg three times a day for three days
- 15mg three times a day for three days
- 20mg three times a day for three days
- Satisfactory control of symptoms is usually obtained with doses of up to 60mg daily, but a careful adjustment is often necessary to meet the requirements of each individual patient. The dose may be increased slowly if required, but a maximum daily dose of more than 100mg is not advised

Precautions for use

- **Epilepsy**
- Baclofen may also exacerbate epileptic manifestations but can be employed provided appropriate supervision and adequate anticonvulsive therapy are maintained
- **Antidepressants**
- During concomitant treatment with tricyclic antidepressants, the effect of Baclofen may be potentiated, resulting in pronounced muscular hypotonia.
- **Antihypertensives**
- Since concomitant treatment with Baclofen and anti-hypertensives is likely to increase the fall in blood pressure, the dosage of antihypertensive medication should be adjusted accordingly.

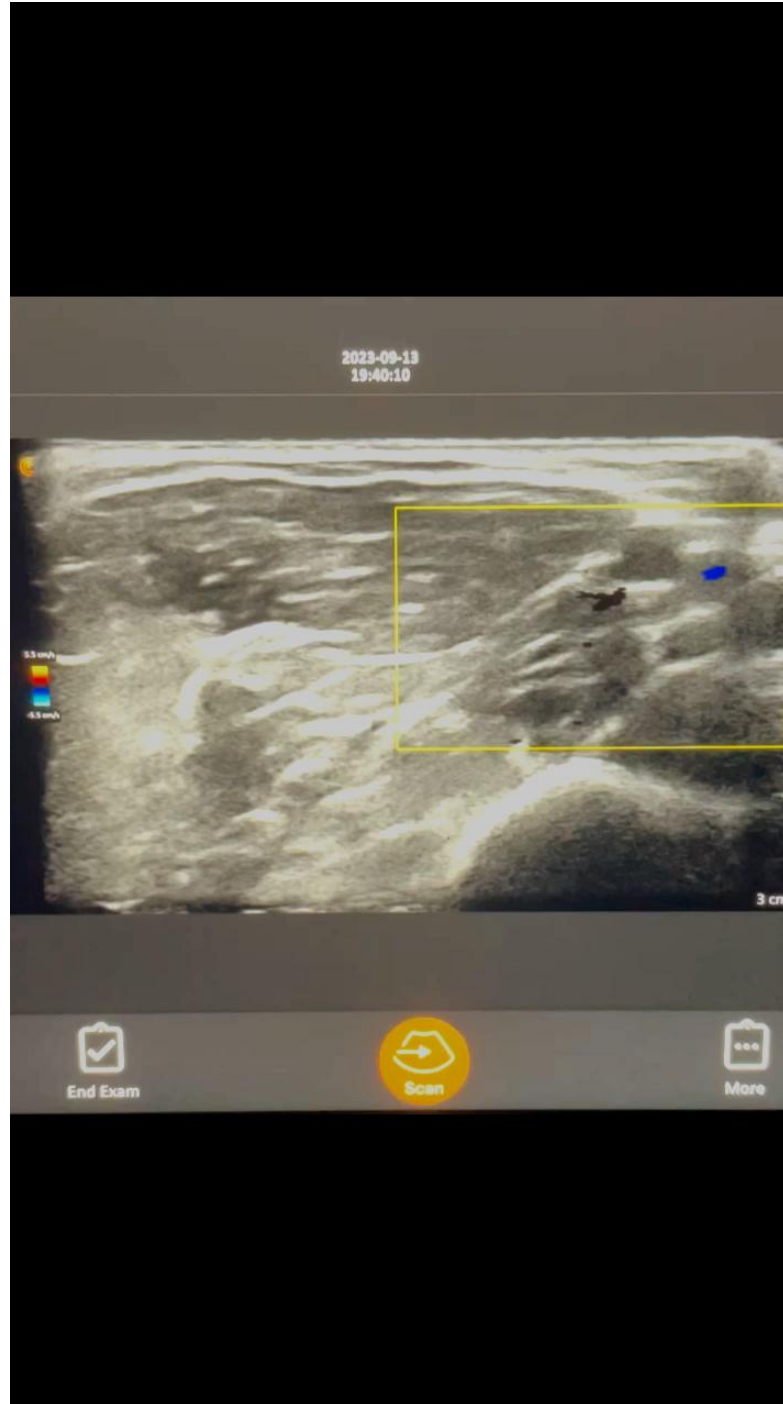


Botulinum Toxin

- Used for focal spasticity
- Injection into the muscle
- Causes relaxation of the muscle
- Temporary effect (3- 4 months).
- Optimal outcome when used in conjunction with splints, positioning aids and stretches



Ultrasound guidance



96% accuracy with US vs 39% accuracy with anatomical guidance.

Boon AJ, et al. *Muscle Nerve* 2011;44:45–9

- Significantly improved outcomes compared with manual needle placement, 1 month after injection:³
 - Modified Ashworth Scale
wrist: $P=0.001$; fingers: $P=0.003$
 - Tardieu angle
wrist: $P=0.01$; fingers: $P=0.001$
 - Passive range of motion
wrist: $P<0.001$; proximal interphalangeal joints: $P=0.009$

Patient follow-up

7–14
days

- Assess the need for splinting / orthotics/ seating/ **postural management** and other therapy interventions
- Education of patient, family, support workers and other therapists
- Review for side effects and adverse reactions

4–6
weeks

- Assessment of the treatment goals have been achieved
- Identification of any adverse events and patient compliance with post-injection regime
- Plan for further input

3–4
months

- Re- assess
- Are the goals the same/ have they changed

Nerve Block

- For regional spasticity
- Local injection of anaesthetic/alcohol for focal spasticity when targeting groups of muscles.
- Causes weakness of muscle groups
- Lasts 12- 18 months



Case Study 1

- Upper limb protraction, internal rotation, flexion and adduction
- Pectoralis major, subscapularis, biceps, brachialis, FCR, FCU, FDS, FDP, FPL, PT

Unilateral/ Bilateral?

Increase the base of support to improve sensory feed back and reduce tone; Tray, gutter arm rest, lat supports, Tilt option



Case Study 2



Case Study 2



Resting Posture



Maximum passive range **before** Botulinum toxin injections

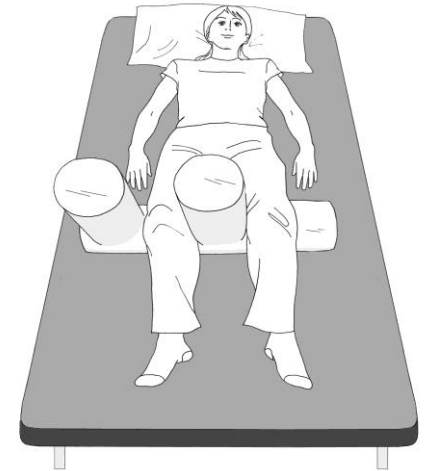


Maximum passive range **after** Botulinum toxin injections

Common Leg Positions

Windswept legs

Unilateral
Semimembranosus,
semitendinosus,
Adductor Longus, adductor brevis
Adductor Magnus
??Iliopsoas



Case Study 1



Case study 3



Common Leg Positions

Proximal flexion, internal rotation and adduction posturing

Potential increased tone in bilateral
iliopsoas

Semimembranosus,
semitendinosus,

Adductor Longus, adductor brevis

Adductor Magnus



Common patterns of deformity

- Head and neck
- Side flexion +/- rotation +/- flexion/ extension
- Sternocleidomastoid, levator scapulae, upper/ mid fibers of trapezius

Increased truncal support

Head rest???



Marks out of 10!

- Do you understand tone?
- Will you ask about medication?
- Will consider spasticity management pre postural Management?
- Will you ask about who is managing tone in your initial assessment





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Easy read useful resources

- Spasticity in Adults: Management using botulinum toxin. RCP guidelines 2018
 - file:///C:/Users/KarenHowarth/Downloads/Spasticity%20in%20adults_final%20version_March%202019.pdf
- Electronic medicines compendium
 - <https://www.medicines.org.uk/emc#gref>
- Link to the traffic light paper
 - <https://link.springer.com/article/10.1007/s11910-020-1022-z>
- Spasticity in under 19s: management. Nice Guidelines 2012 updated 2016
 - <https://www.nice.org.uk/guidance/cg145>