CLINICAL PATIENT INFORMATION LEAFLET | NEURORESTORE PATHWAY

Understanding Spasticity: Mechanisms & Rehabilitation Management

Evidence-based management of hypertonicity, focal botulinum toxin therapy, and multidisciplinary care.

Spasticity is an involuntary, velocity-dependent increase in muscle tone and tendon jerks resulting from hyperexcitability of the stretch reflex. It occurs following damage to upper motor neuron pathways within the brain or spinal cord (such as from stroke, traumatic brain injury, spinal cord injury, or MS). Left unmanaged, persistent hypertonia leads to muscle shortening, painful joint contractures, skin breakdown, and functional limitation. Through structured, goal-directed medical rehabilitation, spasticity can be controlled to relieve pain, ease hygiene, and enhance mobility.

1. Clinical Presentations & Functional Impact

Anatomical Domain	Characteristic Spastic Patterns	Functional Impact & Clinical Risks
Upper Limb	• Internal shoulder rotation & adduction. • Flexed elbow & pronated forearm. • Flexed wrist & clenched fist. • Thumb-in-palm posture.	• Impaired reach, grasp, and hand hygiene. • Palmar skin maceration and severe odor. • Difficulty dressing shirts and jackets. • Fixed flexor contractures of wrist/fingers.
Lower Limb	• Hip adduction & scissoring. • Stiff-knee (extensor) or flexed knee. • Equinovarus foot (plantarflexed & inverted). • Striatal toe & clawing toes.	• Impaired transfers, standing balance, and walking. • Inability to achieve heel-strike (fall risk). • Perineal hygiene difficulty from hip scissoring. • Pressure sores over lateral foot and toes.
Trunk & Generalized	• Severe axial extensor/flexor spasms. • Asymmetrical pelvic tilt / pelvic obliquity. • Painful nocturnal muscle spasms.	• Poor seated balance and wheelchair instability. • Sleep fragmentation and chronic muscle fatigue. • Secondary musculoskeletal and back pain.

2. Screening for Noxious Triggers

Crucial Clinical Concept: Spasticity is highly reactive. Any acute, noxious stimulus below the neurological injury level can drastically exacerbate muscle spasms and tone. Always screen for:

- **Bladder:** Urinary Tract Infections (UTIs), catheter blockage/kinking, or bladder distension.
- **Bowel:** Constipation, faecal impaction, or painful haemorrhoids.
- **Skin & Orthotics:** Pressure injuries, ingrown toenails, tight clothing, or poorly fitting splints.
- **Occult Medical:** Deep vein thrombosis (DVT), occult bone fracture, or acute intra-abdominal inflammation.

3. The Staged Spasticity Management Framework

Spasticity treatment is individualised, goal-directed, and stepped—progressing from foundational non-pharmacological therapies to targeted focal procedures and systemic pharmacotherapy:

- **Tier 1: Physical & Occupational Therapy (Foundational):** Sustained passive stretching and optimal positioning maintain muscle length. Resting splints, dynamic orthoses (e.g. AFOs), and serial casting provide prolonged low-load mechanical elongation to counteract soft-tissue shortening.
- **Tier 2: Targeted Focal Interventions (Botulinum Toxin):** When spasticity is confined to specific muscle groups, intramuscular **Botulinum Toxin** injections under real-time **ultrasound or EMG guidance** temporarily block acetylcholine release at the neuromuscular junction. This relaxes targeted muscles without causing generalized weakness. Peak effect occurs at 4–6 weeks, creating a golden therapeutic window for aggressive physical therapy and splinting.
- **Tier 3: Systemic Pharmacotherapy (Generalized Tone):** For widespread spasticity, oral antispasmodics (Baclofen, Tizanidine, Dantrolene, Gabapentin) modulate central spinal reflex arcs or peripheral calcium release under close physician surveillance.
- **Tier 4: Advanced Interventional & Surgical Options:** For severe, refractory spasticity, surgically implanted Intrathecal Baclofen (ITB) pumps deliver precise medication directly into the spinal fluid. Fixed contractures are addressed via orthopaedic tendon lengthening or joint releases.

4. The Multidisciplinary Spasticity Care Team

Effective spasticity rehabilitation unites a specialized multidisciplinary clinical team:

- **Rehabilitation Medicine Physician:** Conducts comprehensive tone evaluations (Modified Ashworth & Tardieu scales), establishes functional goals, manages oral antispasmodics, performs ultrasound/EMG-guided botulinum toxin injections, and directs the overall rehabilitation pathway.
- **Physiotherapist:** Implements muscle lengthening and stretching regimens, manages serial casting, provides gait and transfer retraining, and prescribes tailored lower-limb orthoses (AFOs).
- **Occupational Therapist:** Fabricates customized upper-limb resting splints, assesses hand hygiene and functional grasp, evaluates wheelchair seating and positioning, and trains in adaptive dressing techniques.
- **Clinical Nurse Specialist:** Monitors skin integrity, optimizes bowel and catheter routines to eliminate noxious reflex triggers, and educates patients and caregivers on skin checks and splint wear schedules.

5. Practical Daily Guidelines for Patients & Caregivers

- **Adhere to Splinting Schedules:** Wear prescribed splints and orthoses consistently according to your schedule. Always check skin for pressure marks or redness 20–30 minutes after removal.
- **Maintain Optimal Resting Posture:** Ensure limbs rest in elongated, neutral positions in bed or seating. Avoid leaving joints curled or flexed for prolonged hours.
- **Capitalize on the Post-Botulinum Toxin Window:** The 2 to 8 weeks following botulinum toxin injections represent the peak period of muscle relaxation. Schedule intensive physiotherapy and splinting during this phase to maximize functional gains.
- **Report Sudden Tone Increases Immediately:** A sudden spike in spasms or tone is almost always caused by an underlying irritant. Check for ingrown toenails, fever, skin redness, or constipation before adjusting tone medications.

NeuroRestore Spasticity Pathway | Practice Attachment
This leaflet is designed as a patient educational guide. Because spasticity patterns, functional goals, and medical contraindications vary, always consult your Rehabilitation Medicine Physician and allied health team for an individualized assessment and tailored management plan.