

Spasticity Uncovered

What It Is and How To Manage It



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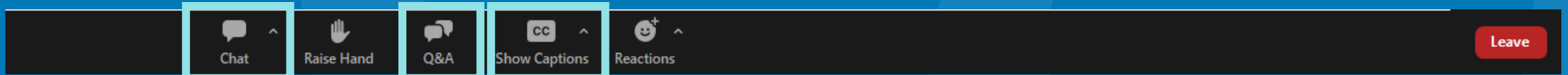
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**Neurology &
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Cinda Hugos

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Florida

Learning Objectives:

1. Describe what spasticity is and explain why it occurs in multiple sclerosis.
2. Recognize common ways spasticity may affect movement, comfort, and daily activities.
3. Identify common misconceptions and under-recognized symptoms associated with spasticity.
4. Summarize pharmacologic and non-pharmacologic approaches used to manage spasticity.
5. Prepare for discussions about spasticity with healthcare providers.

What is spasticity?
Why does it happen?

What Is Spasticity?

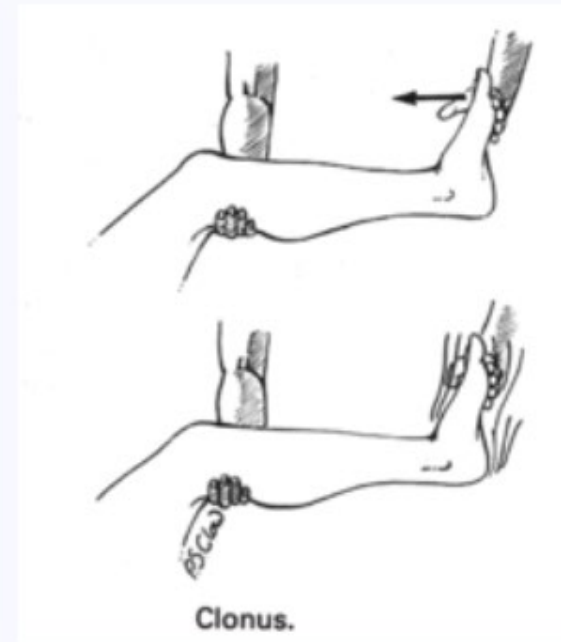
The Clinician's Perspective

- *Increased resistance to passive movement* due to a lowered threshold of tonic and phasic stretch reflexes
 - Burke D., Knowles L., Andrews C. J., Ashby P. (1972). Spasticity decrebrate rigidity in the clasp knife phenomenon: an experimental study in the cat. *Brain* 95(1), 31–48.
- A motor disorder characterized 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 J. W. (1980). "Symposium," in *Spasticity: Disordered Motor Control*, eds Feldman R. G., Young R. R., Koella W. P., editors. (Chicago: Year Book Medical Pubs;), 485–495.

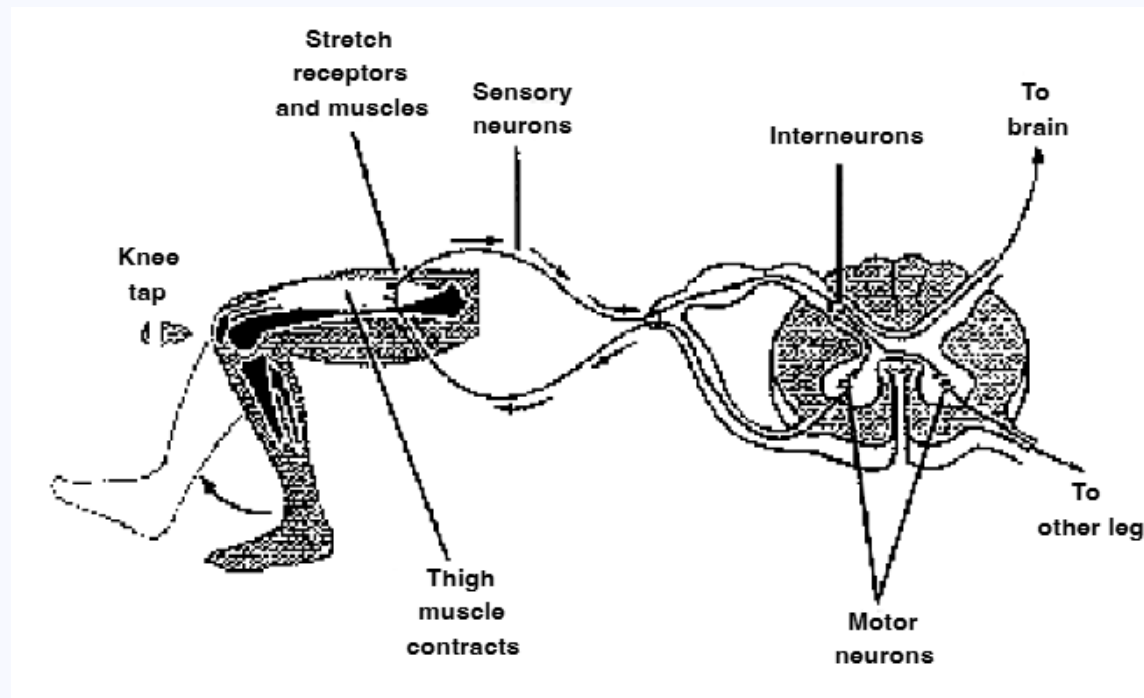
What Is Spasticity?

The Clinician's Perspective

- Increased resistance to rapid passive stretching
- Brisk tendon reflexes
- Clonus
- Flexor and extensor spasms



How MS Causes Spasticity



- Messages from the brain through the spinal cord inhibit stretch reflexes
- MS impairs conduction of this inhibition, so the stretch reflex is overactive
- This is spasticity

Common Ways Spasticity May Affect Movement, Comfort, And Daily Activities



What Is spasticity?

The Patient's Perspective – We Will Focus on the Limbs

I have never had a patient come to me and say:

I am having velocity dependent increase in my tonic stretch reflexes with exaggerated tendon jerks in my legs. What shall I do?

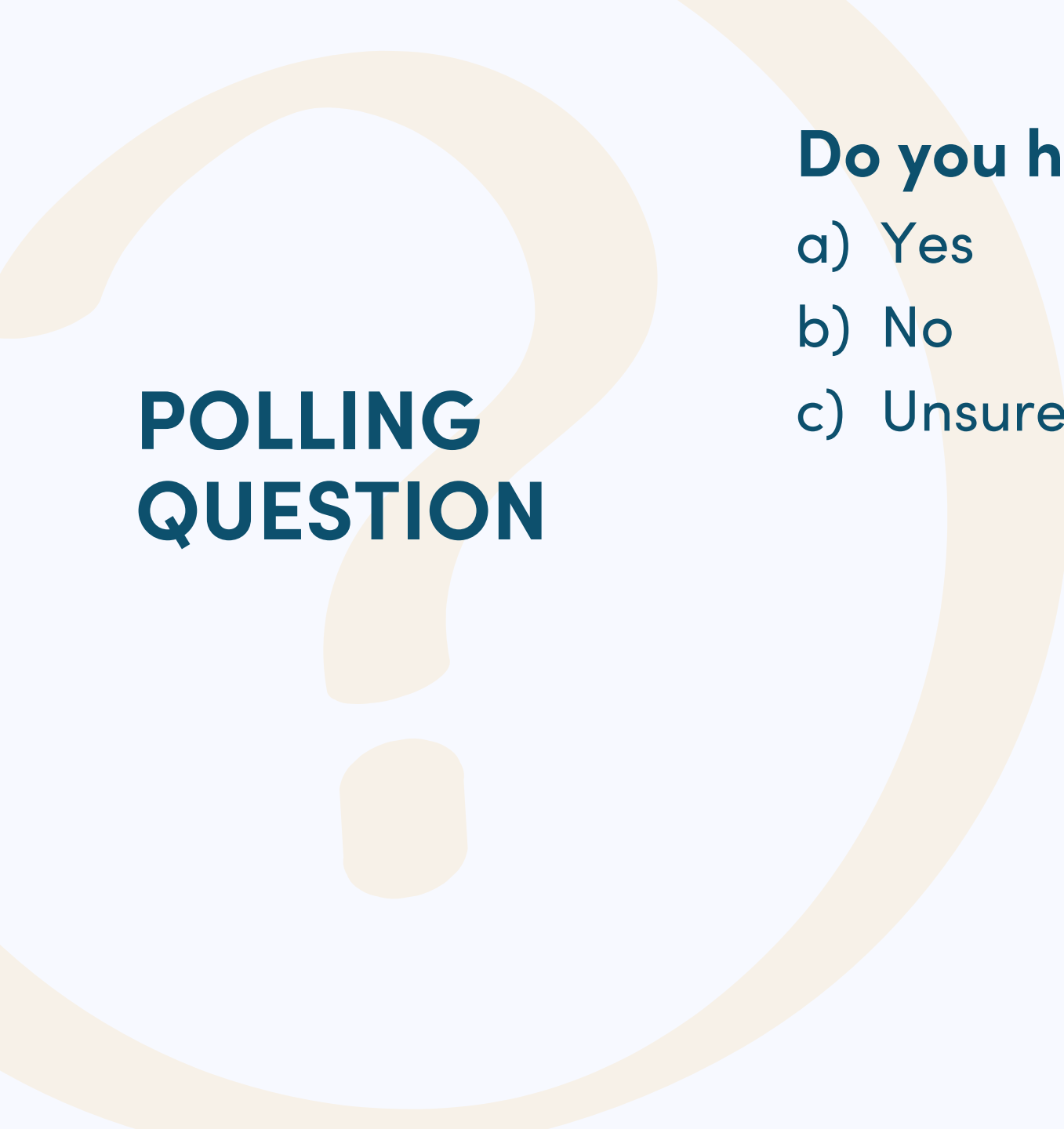
HUH?



What Is Spasticity?

The Patient's Perspective

- Unusual **tightening** of muscles that feels like **leg stiffness**,
 - **Jumping** of legs,
 - A repetitive **bouncing** of the foot,
 - Muscle **cramping** in legs or arms,
 - Legs going out **tight and straight** or **drawing up**.
-
- Varying degree of bother
 - Varying interference with activities of daily living



POLLING QUESTION

Do you have spasticity?

- a) Yes
- b) No
- c) Unsure

Who Has Spasticity?

Over 80% of people with MS report having spasticity

- >30% report moderate to severe spasticity
- Mostly in the legs
- Spasticity in the legs affects walking
- Spasticity prevalence and severity move in lock-step with walking disability

Bethoux F, Marrie RA. A cross-sectional study of the impact of spasticity on daily activities in multiple sclerosis. *Patient.* 2016;9:537.

Ilya Kister, MD; Tamar E. Bacon, BA; et al. Natural History of Multiple Sclerosis Symptoms. *Int J MS Care.* 2013;15:146–156



Spasticity Can Be Good, Bad, or Really Bad

Good

- ❖ Maintains muscle bulk
- ❖ Helpful with transfers
- ❖ Connection to your limbs

Bad



Precipitating Factors for Spasticity in MS

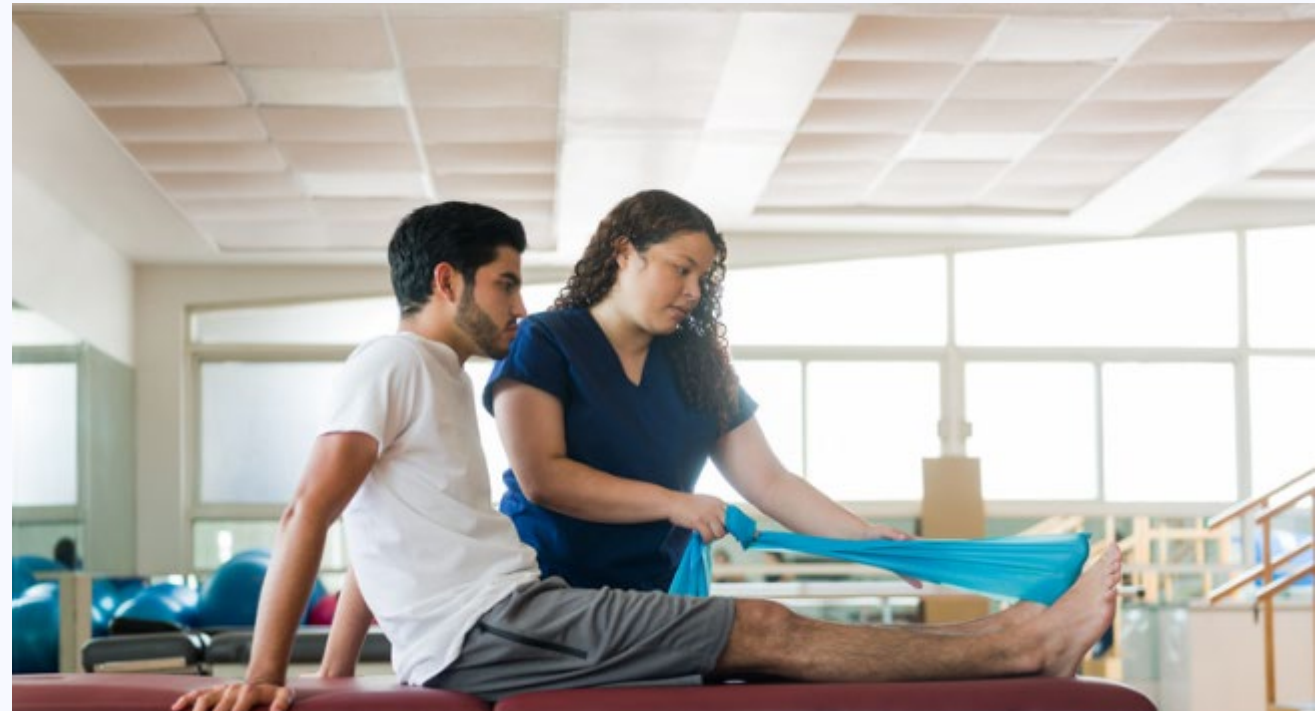
- Relapse
- Disease progression
- DMT – interferons
- Antidepressants (SSRIs)
- Infection
- Fracture
- Skin lesion
- Kidney stones
- Bowel distension
- Excessive fatigue
- Temperature extremes
- Stress
- Tight clothing
- Other noxious stimuli

Pharmacologic and Non-Pharmacologic Approaches to Managing Spasticity



How Do You Manage Your Spasticity?

- Oral medications
- Stretching
- Exercise
- Botulinum toxin injections
- Intrathecal baclofen pump
- Cannabis
- Other



Pharmacologic Approaches



- Oral medications
- Botulinum toxin injections
- Intrathecal baclofen
- Cannabinoids

Oral Medications Used to Treat Spasticity



- Baclofen/arbaclofen
 - Tizanidine
 - Dantrolene
 - Benzodiazepines (diazepam/valium)
 - Gabapentin
-
- **Low adherence to these medications (Halpern, 2013)

Baclofen



- The most commonly used medication for spasticity
- Modestly effective
- Dose limited by side effects, mostly fatigue/sedation
- Taken usually 3x/day
- Arbaclofen is extended release so you only need to take it 2x/day
- 354 patients with MS enrolled in double-blind randomized controlled trial RCT comparing baclofen, arbaclofen ER, and placebo (Kaba, 2016)
 - 10-20mg 2x/day
 - Baclofen and arbaclofen= similar effect on spasticity
 - Less drowsiness and dizziness with arbaclofen

Botulinum Toxin Injections



- Is the toxin that causes botulism and also used for wrinkles
- Tiny amount injected directly into spastic muscles
- Inhibits release of acetylcholine at neuromuscular junction
- Usually repeated ~ every 3 months
- Reduces spasticity but also reduces strength – remember spasticity can help or hinder function

Intrathecal Baclofen

- Pump that releases baclofen directly around the spinal cord
- Gives higher local dose without causing fatigue
- Most effective for leg spasticity
- Requires surgery and ongoing management (filling, can clog or dislodge, etc.)



Cannabinoids



- The cannabis plant has many chemicals in it. These are called cannabinoids.
- THC (tetrahydrocannabinol) and CBD (cannabidiol) are the highest concentration cannabinoids in cannabis
- Nabiximols (Sativex) is an oromucosal spray containing a 50/50 mix of THC and CBD
- Nabiximols is approved in many countries, but *not* the US, for treating moderate to severe spasticity in people with MS who have not responded to other medications
- Common side effects include dizziness, fatigue, and dry mouth. Can worsen cognitive function.

New Directions in Cannabinoids for Spasticity



- Cannabinoids work by binding to cannabinoid receptors in the body, CB1 and CB2 (the endocannabinoid system)
- Drugs that increase the production of the body's own endocannabinoids are being developed and tested for treating MS spasticity

Non-Pharmacologic Rehabilitation – First Line Treatment

Referral for “Skilled physical and/or occupational therapy”

- **Stretching**
- Range of motion
- **Cycling**
- Positioning
- **Orthotics**
- **Electrical Stimulation**
- Casting
- Strengthening
- Light pressure/Stroking
- Cold/Heat

What Do We Know About Stretching for MS Spasticity?

- **1992–93 survey of MS Centers practitioners in North America**
 - 93% (14 of 15) reported stretching was effective and used frequently for MS-related spasticity, but without strong evidence

Chan A, Hugos C, Morrison S, et al. Balance and Spasticity: What We Know and What We Believe. *Neurorehabilitation and Neural Repair*. 1994; 8(3):119–130

- **Spasticity Management and Multiple Sclerosis Clinical Practice Guidelines 2003**

- Recommends daily stretching beginning at the onset of spasticity

Multiple Sclerosis Council for Clinical Practice Guidelines. Spasticity Management and Multiple Sclerosis: Evidence-based management strategies for spasticity in multiple sclerosis. 2003

Systematic Reviews – Research Studies

Evaluating Results Of Other Studies

- **Available evidence was inconclusive on the clinical benefit of stretching for spasticity of any origin**

Bovend'Eerd T, Newman M, Barker K, et al. The effects of stretching in spasticity: A systematic review. Arch Phys Med Rehabil. 2008;89(7):1395-1406

- **Non-pharmacologic interventions for spasticity in MS**

- Low levels of evidence or no evidence for stretching

Amatya B, Khan F, La Mantia L, et al. Non pharmacological interventions for spasticity in multiple sclerosis (Review). The Cochrane Collaboration. 2013

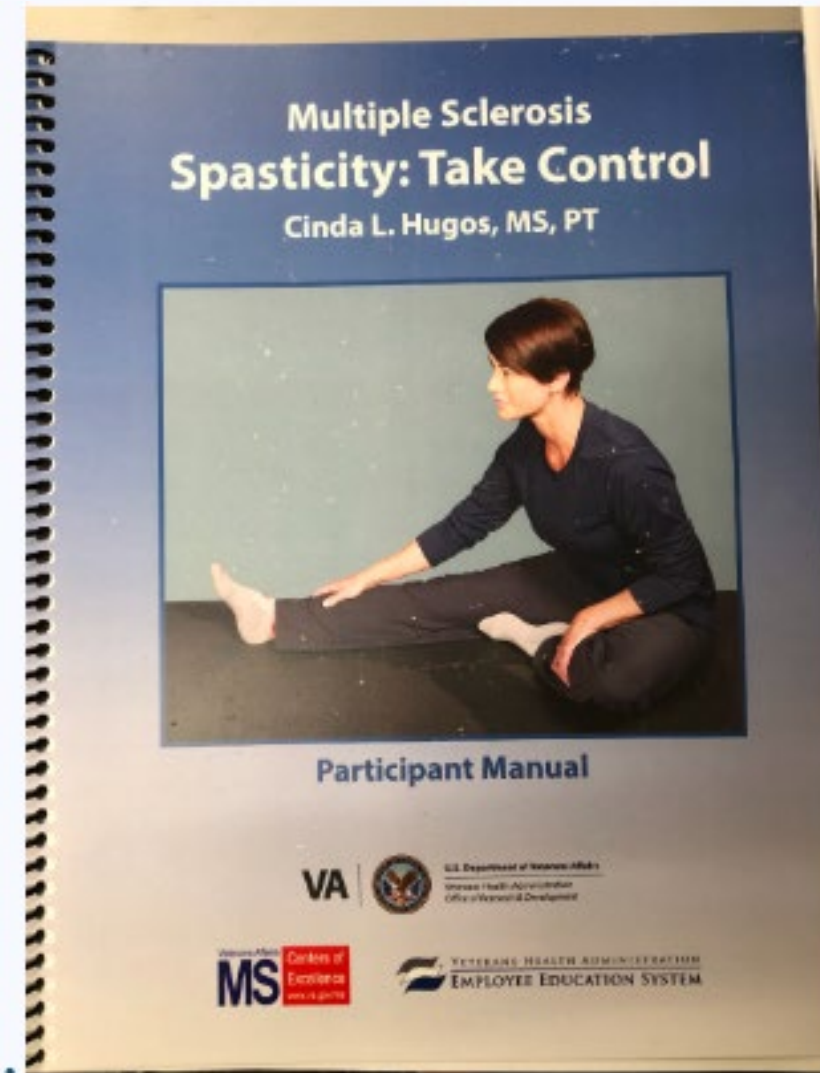
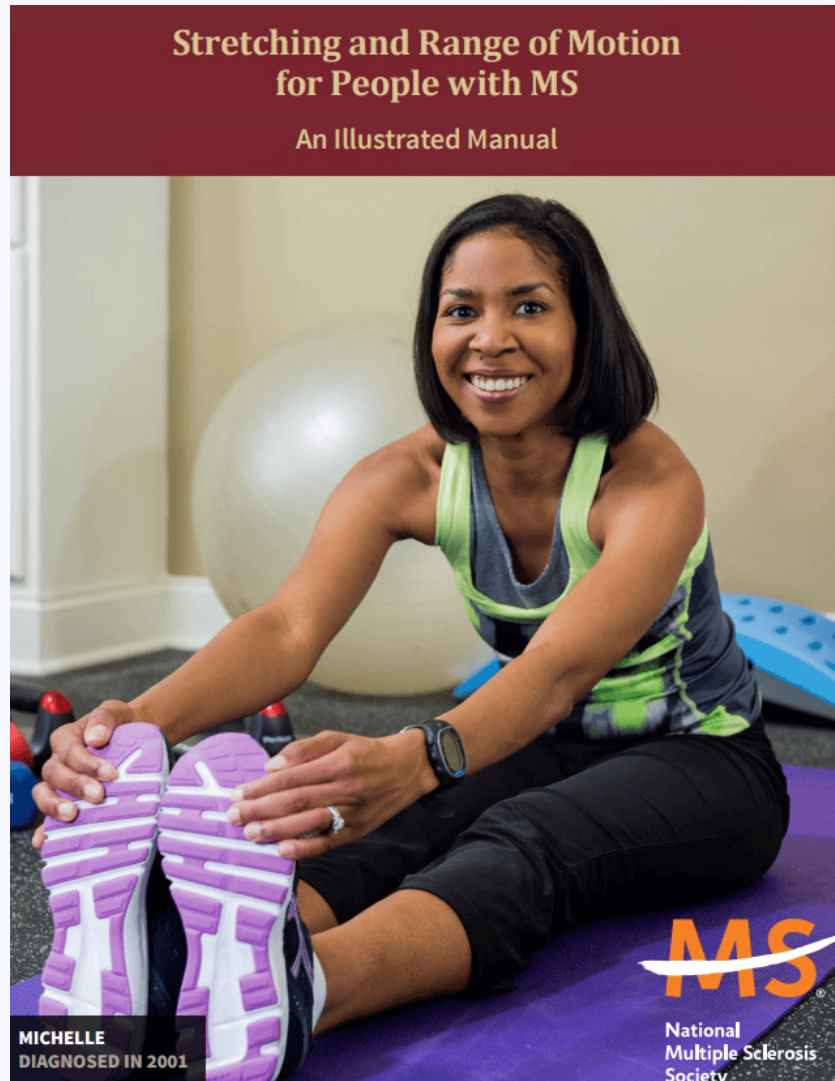
- **Stretch for contractures**

- Stretch does not have clinically important effects on joint mobility in people with, or at risk of, contractures if performed for less than seven months
- The effects of stretch performed for periods longer than seven months have not been investigated

Katalinic OM, Harvey LA, Herbert RD, Moseley AM, Lannin NA, Schurr K. Stretch for the treatment and prevention of contractures. Cochrane Database of Systematic Reviews. 2010

Katalinic OM, Harvey LA, Herbert RD. Effectiveness of stretch for the treatment and prevention of contractures in people with neurological conditions: A systematic review. Phys Ther. 2011;91(1):11-24

Programs for Stretching for MS Spasticity



Stretching vs ROM for MS Spasticity

Education with stretching exercises, the first-line recommended treatment for MS spasticity, and education with ROM exercises may both improve MS spasticity to a similar degree. This study debunks the belief that stretching is essential to managing MS spasticity.

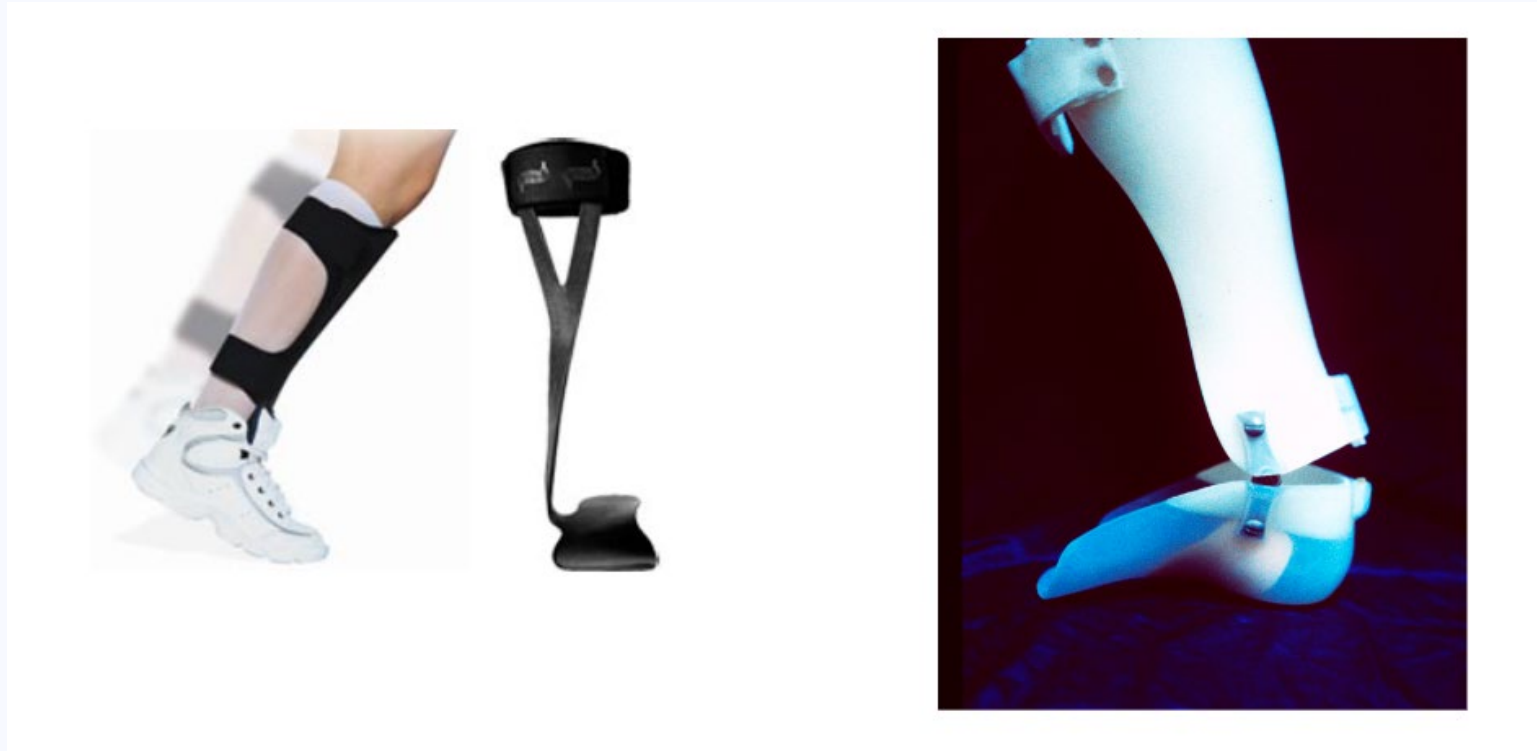


Cycling for Leg Spasticity

Cycling for Leg Spasticity

Unloaded leg cycling exercise is associated with improvements in spasticity from the participant's perspective, but neither improves nor worsens spasticity from electrophysiological and clinical perspectives.

Orthotics for Spasticity



Orthotics for Spasticity Help Walking

A large meta-analysis revealed that ankle foot orthoses (AFO) could immediately improve speed and step length of walking, and standing balance, in patients after stroke and non-progressive cerebral lesions.

Functional Electrical Stimulation



Electrical Stimulation

- This study compared the effects of transcutaneous electrical nerve stimulation (TENS) and functional electrical stimulation (FES) on lower limb spasticity in patients with SCI.
- A single session of electrical stimulation with FES and TENS appears to have similar anti-spasticity effects that last for 4 hours. The findings of this preliminary study suggest that both TENS and FES have the potential to be used as therapeutic adjuncts to relieve spasticity in the clinic. In addition, FES may have better effects on patients presenting with spastic reflexes.

Take Home Messages

- These recommendations – stretching, cycling, orthotics, FES – help you move more freely, easily and safely.
- Current thinking: Just move! Stretch. Cycle. Use devices or ES to help you keep moving.
 - Just do something, anything is better than nothing.
 - Don't worry too much about doing it right or wrong, just do something because it's better than nothing.
 - Nobody knows what 'enough' is so just do something because anything is probably better than nothing!
 - Get help when you're out of other ideas – MD, PT, OT, orthotist

How To Talk To Your Provider

- Tell your provider what you feel, for example
 - Stiffness
 - Involuntary movements in your legs
 - Cramping
 - Leg jerking
- Try to wait for them to say spasticity before you use that word
- Ask what there is that could help
 - Exercise
 - Devices
 - PT
 - Medications

THANK YOU



Q+A



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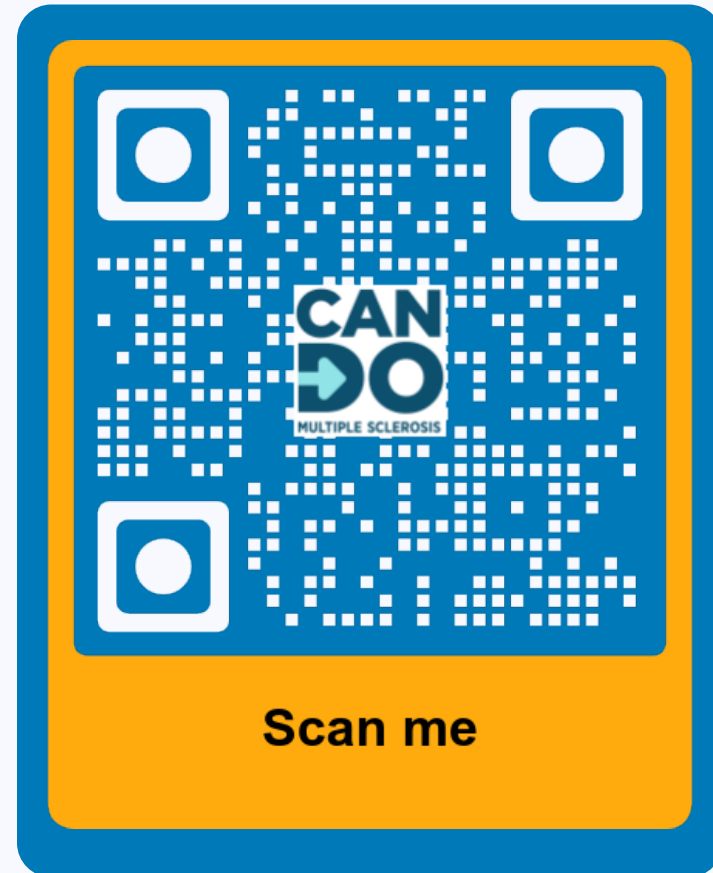


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