

Spasticity After Neurologic Injury

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Webinar Transcript*

Understanding Spasticity

Hi everyone. My name is Rachel Higdon and I'm one of the neurologic physical therapists with Flint Rehab's remote recovery program. Today we're going to talk about spasticity, what it is, what it affects, and the daily tools that you can use at home to help manage it and keep your progress moving forward. So I'll start today with some key information about spasticity, but I really want to spend most of our time answering your questions and if we don't get to your question during the session, please leave it in the chat or email us afterwards and we will be sure to get you a response.

Muscle Tone and Spasticity

Why are we even talking about spasticity today? Spasticity is extremely common after a neurologic injury. Depending on the study, between 30% to 80% of stroke survivors develop some degree of spasticity. And it's also common in things like traumatic brain injury, MS, spinal cord injury, cerebral palsy, etc.

And here I just want to make a key distinction between what is tone and what is spasticity. So muscle tone is normal. It's the baseline tension that keeps us upright and ready to move. Think about when you go up to stand, your muscles in your legs contract and help keep you standing and upright.

Spasticity is different. The classic definition of spasticity is a speed-dependent increase in resistance when a muscle is stretched. So let's take a minute and break that down. If you look at the biceps here, the muscle is contracted and then as you straighten the arm out, the muscle is stretched.

So when it comes to spasticity, if you slowly stretch that muscle, you should be able to do it with low resistance, maybe some resistance there. But if you were to do it quickly, you might notice a catch or increase in resistance the rest of the way.

This is caused by the hyperexcitability of that stretch reflex, not by muscle strength or muscle tightness in the traditional sense. And I emphasize this because people often think that their muscles are tight and therefore need to be stretched or massaged, when in reality the difficulty is of a neurologic origin, not of a muscular origin.

The Neurologic Cause

As I said, the problem is not in the muscle. It's in the brain and the nerves that control how that muscle responds. After a stroke, the pathways that normally quiet and calm down muscles are weakened, which creates these overactive reflex loops. The nerves that tell muscles to tighten then keep firing even when they shouldn't.

I like to explain it this way to patients. The brain is sending these unclear messages, the spinal cord is overreacting, and then the muscle is just responding to that faulty input to keep it in a basic, almost oversimplified sense.

Common Triggers

Research shows that spasticity is highly sensitive to both internal and external stimuli. Things like stress, fast movements, pain, cold, etc. All of the things that you see here are real-world triggers that can increase spasticity for various different neurologic reasons that I won't really get into, but they all have the same results. They increase that spasticity.

I always tell patients, if your spasticity suddenly increases, check for these triggers first, especially things like bladder issues, skin irritation, infections, things that you may not notice. It's sometimes your body's way of telling you that something else is going on that needs to be addressed and you're only seeing it because of that heightened spasticity response.

Tools for Managing Spasticity at Home

What can you do about your spasticity? So all of these things help calm the nervous system and reduce that reflex overactivity. So these are all tools that I teach every day to patients because they're backed by strong evidence and all of them are accessible at home. First, slow breathing, meditation, anything like that can help reduce that reflex excitability.

Slow stretching is very important, and remember to keep it slow. Because spasticity is velocity dependent, doing it fast can actually have the opposite response and increase the spasticity. So slow, gentle stretching and gentle heat for those muscles as well. This can also help if you're having a lot of pain associated with the spasticity in general before you start with certain exercises.

And then we're going to get more in-depth with these other techniques like weight bearing, positioning, splinting and rhythmic movements as well. All of these are simple but powerful ways to help prepare that brain for better movement qualities.

Rhythmic Movement

Rhythmic movement. When I say rhythmic movement, I mean things like cycling or rotating the wrist around, doing the arm bike, any kind of back and forth movement where that muscle is contracting and relaxing. So this kind of rhythmic, repetitive movement is one of the most effective ways to reduce spasticity because it gives the brain predictable sensory input over and over again, thereby telling it to not react with such strong reflexive patterns and getting used to that movement with every cycle.

This is often why you might start with like doing the bike or the arm bike in the beginning of your PT session or maybe when doing your exercises at home with some back-and-forth range of motion exercises.

Weight Bearing

Weight-bearing is probably one of the most common things that you may do for your spasticity and also one of the most evidence-supported interventions for it. Steady pressure helps to calm

the reflexes. Those joints and muscles send these "everything is stable" signals to the nervous system helping to calm down that spasticity. You can do this in many different ways.

If it's spasticity in your lower extremities, like your hips and your legs, it's often in a standing position, either standing with some support by a therapist, a caregiver, or in some kind of equipment like a standing frame as seen here. If it's for your upper extremities, if you're having a lot of spasticity in your wrist and your hand, it might just be applying some weight and pressure to the hand. Perhaps as shown here, leaning forward onto a table, putting some pressure into that hand, stretching it out, or if you can tolerate it, getting on your hands and knees and adding a little bit more pressure through the joints there.

This is not just for getting that good stretch, but like I said, also for getting more sensory input through the joints as well.

Positioning Stretching and Range of Motion

And then, prolonged positioning, range of motion, stretching, all of those things help with the prevention of muscle shortening. These exercises don't directly reduce or impact spasticity itself, but rather they help to maintain the motion that you have to prevent contractures over time. Remember how we discussed that spasticity is of neurologic origin and not muscular? Well, if you don't keep up with the range of motion and the stretching, it can become a muscular issue as well in that those muscles can get overly tight and might not become reversible.

That's why physical therapists and occupational therapists are so serious about stretching and positioning, especially early on, because they keep the muscles long, prevent that permanent stiffness, and protect your ability to move. There are a few different ways this can be done, as we can see here. Positioning with support, so using things like pillows, wedges, splints, often done for wheelchair setup or maybe in bed how you're sleeping. It helps to keep the limb in a comfortable and slightly lengthened position.

It should not be at its end range where it's so stretched out, but like I said, in a nice gentle stretched position. The photo here shows a wedge in between the person's legs. This would be for someone who's having a lot of inner thigh or adductor spasticity. Perhaps when they walk, they cross or they scissor their legs because those legs are pulling inward.

They stretch out those inner thigh muscles by allowing a wedge in between them as they sleep or as they're in their wheelchair.

Splinting

You can do that for both the hand, the wrist, as well as like the ankle. As seen here, this is for someone with spasticity where their hand is in a very flexed position, perhaps in a fist, and they might be doing this as either part of therapy here or even as a night splint to keep the hand in a slightly stretched position over time.

Low Load Prolonged Stretching

Doing range of motion exercises and what we call low-load prolonged stretching is also very beneficial to keep the motion that you already have. So here when we say low-load, we're not talking about an intense stretch. Again, that gentle stretch but holding it for a longer period of

time such as 90 seconds to 2 minutes as opposed to 30 seconds where you might just be maintaining that motion. And here in this photo it shows someone stretching out their hip flexor, so the front of your hip.

Perhaps if you are seated in a wheelchair all day, that front of the hip muscle might be really tight. So here you're stretching it out, but the thigh and the leg is supported on the table, so it's not overly intense for that patient and just letting gravity do its job and stretch it out very gently.

Working With Your Care Team

Now, spasticity management is often a team approach. So it may be addressed just with physical therapy, but often times it's combined with various different disciplines. So this is just more of a reference table for you to see, especially if you have more intense spasticity, who else might be involved in your care team. So if you have spasticity either hemiparetically all on one side or if it is kind of throughout the whole body, you might be on something like an oral medication such as baclofen or perhaps use a baclofen pump.

And you might talk to like your primary care doctor, your physical medicine and rehab doctor, or your neurologist to address this. If the spasticity is more localized, let's say the only place that you feel it is in your ankle or just in your wrist, then you may get Botox to a specific muscle where it's addressing just that one part. So these are things that are out of my scope as a physical therapist, but I would refer you to any of these other disciplines to see if they're appropriate for you.

And then orthotics and casting as well, so as we talked about the splint, sometimes you may need a custom splint or a brace, and that's where your physical therapist or occupational therapist may refer you over to an orthotist to actually cast you for a specific brace. So I always encourage people to find a good network of these kinds of disciplines to speak to about their particular cases.

Remote Recovery Support

Before we start the Q&A, I just wanted to again show this special offer. We'll be emailing this out if you do want to work one-on-one with me as part of remote recovery program, and we'll be emailing this out afterwards. But I do want to get to some of your questions and just open up the discussion conversation. I'm going to end this here.

And let's see. If you want to jot down some questions in the chat, I'd be happy to talk through and answer some of the questions more specific to your diagnosis. I'll give everyone a second.

Q&A

Should I avoid strengthening because I am worried it might make my spasticity worse?

This is a really good question that we get commonly. And the old school of thought used to say, yes, you should avoid it, but that's actually been disproven. So current research shows that strength training does not increase spasticity and strength training is encouraged instead. Keep in mind, it is not a muscular problem, it is neurological.

So you do want to keep trying to strengthen those muscles as part of your physical therapy.

Why did spasticity start or get worse after I came home rather than right after my stroke?

One person says, "I didn't have spasticity right after my stroke." Another says, "I didn't have it after my first stroke, but then when I got home, it started to come on and it was way worse." So just to explain sometimes what happens with that. You may not have spasticity with every single stroke. If you don't notice it when you're, for instance, in the hospital in the first one to three days after, what can be happening is what's known as spinal shock.

So you may have low tone or no tone where your muscles are a bit more paralyzed and you can't have that muscle reflex reaction. And then once all of the inflammation and swelling kind of calms down, the reflexes return at a heightened level. So it's not that you didn't have spasticity and then something happened and then when you went home all of a sudden something's worse, that's not the case at all. It's just that you didn't show any reflexes until you got home and then the spasticity came on as it normally would. And that is fairly common afterwards.

How often should I complete prolonged stretches per day?

Good question. In terms of range of motion and stretching exercises, about 30 seconds is what's recommended if you want to maintain what you have. But you can do them longer, like 90 seconds or 2 minutes. And I usually say between two or three reps on each side if you're feeling it on both sides or just on the one side if spasticity is just impacting that one side.

Two reps of 2 minutes is usually pretty good. Now, if you are maybe trying to do more prolonged standing and weight bearing for that kind of stretch, working up to whatever you can tolerate, but trying to get to maybe 20 minutes. Now, of course, if you're doing something like a standing frame, you may want to look at how you feel overall though, not just with the spasticity. Watch out for things like skin breakdown, watch out for things like light-headedness, blood pressure, everything that you may be monitoring when you're in a therapy session.

You want to monitor those at home as well. And if you are using those kinds of splints or supported devices like standing frames, remember to check the skin afterwards for any kind of redness or skin breakdown. Redness is going to be normal, but it should go away after about 45 minutes. Keep an eye on all of those.

Is dynamic splinting preferable to rigid splinting or more beneficial?

Dynamic is great if you can do it. Just to clarify for those that may not understand what this question is asking, so, a dynamic brace is something that often has a spring in it. You put it on your knee and your leg, let's say, and it's trying to stretch out into a straightened position, but if you apply force to it, it will let you bend a little bit, and then as you relax, it'll push you more into a stretch.

These are great if you can use them because you can usually tolerate them for longer periods of time. Now, a static splint or stretch is just holding you in one position. It's solid. There is no kind of mechanism or movement, at all to allow that kind of give to it.

These are often more intensive of a stretch. It can be better for a shorter period of time. So maybe you may have to work up to getting used to it overnight versus something that is more dynamic. You can tolerate it for longer periods of time.

And if you're working with someone who has very severe spasticity or perhaps, is more sensitive to pain, then a dynamic splint might be more comfortable for them. I'm not really saying one is better than the other per se, but we always say what is the best exercise to do? It's the one that you're going to do. It's the one that you're going to be compliant with and consistent with.

For this, it's going to be the one that you are going to use, but both are beneficial.

Can spasticity help me stand or walk and is it normal for walking to worsen when spasticity improves?

My spasticity got better, but my walking got worse. Good question. Sometimes we can use spasticity to our advantage. Especially if you have, let's say, quadriceps or thigh spasticity, and that is allowing your leg to be very straight.

If that muscle is weak, then you may be reliant on the spasticity to keep you upright in standing. And that might be something that you discuss with your physical therapist, with your doctor, if you want to reduce the spasticity, which typically we still want to reduce that spasticity, but you might just want to be aware that this can impact how you're walking and how you're standing. You might lose some stability while you're working on strengthening the muscles. Typically we still want to try to reduce the spasticity overall, and then just be more cautious during that time and then target really hard the strengthening of that muscle.

Why might grip strength or stability change after Botox for spasticity?

That goes along with someone else's question here regarding Botox. after you get Botox to a muscle, to reduce spasticity, it paralyzes that muscle, so you may need to do more strengthening exercises to continue to work towards your recovery and your stability of it. For instance, if you are getting Botox to your hand or your wrist where you're usually in a fist and then you got that Botox to that area and now you are able to open your hand more, but you might have lost some of your grip strength with it.

Well, it's not that you lost your grip strength. It's that the Botox helped to relax the spasticity and you relied on that spasticity for your grip strength. But, the good part is because you're able to open the hand more now, you're able to target more of the strengthening exercises that you were not able to do before. Even though it might seem like one step forward, three steps back, it's not because you're able to continue working towards the recovery there.

Is it true that spasticity worsens during recovery and then lessens until it disappears?

It can definitely reduce over time. It doesn't always without intervention, which is why physical therapists and occupational therapists want to put a lot of emphasis on stretching and range of motion to keep up with not getting any kind of contracture or tightness or stiffness in that area. But yes, over time it can certainly get better on its own, especially as you start to get back to doing many things in your daily life. So even though you may not be doing specific exercises for

it, if you're getting back to your daily life and you're doing things like laundry and walking, you are doing specific exercises actually for it because every step you take you're stretching or activating that muscle or lifting up that laundry or cooking.

So that's often why we tend to see it get better over time too because you start to use it more throughout your life as well. Regarding the earlier part of your question, it tends to initiate, worsen, and then lessen. It can worsen because of what that initial component was when I was talking about you may not notice it because your reflexes are all lower when you're in the hospital with all of the inflammation or other medical conditions. And then as medically you become more stable, those reflexes can become more heightened once you get home. Which is why you may see it get worse temporarily.

I have a lot of good questions. I'll certainly be responding via email to a lot of these later on.

Can spasticity be reversed after four years or after having it chronically for years?

We don't want to think about it as reversing spasticity, but rather thinking about it as spasticity management. If it has gotten to a point where the spasticity is making your muscles be shortened as we had discussed and now they're contracted, that is a lot harder to reverse and that is something that is going to be more medically managed. That being said, if you have the range of motion and the muscle is not overly shortened and it's not as painful, you can move it slowly, you can do some of these rhythmic movements.

Absolutely. We see a lot of improvement with spasticity over time for people that haven't even looked at it over the course of like 4 years in your instance. So even doing things like these weight-bearing exercises, the rhythmic movement patterns, everything like that is going to still be beneficial for you and can still help just as exercise can help many years after your initial injury.

Why do I get spasms at night or when relaxing if spasticity is velocity dependent?

A few questions here are all kind of similar. So voluntary movement, things like those rhythmic patterns of like moving your arm back and forth, that voluntary movement can sometimes override and dampen the reflexes, especially if you do them rhythmically and slowly. So when you're resting and sleeping at night, there's less voluntary movement to dampen the reflex, so you may notice more of the spasticity. Also at night like certain temperature changes and changes in position that are involuntary might also be causing some of the spasticity to worsen as well.

It kind of is on a case-by-case basis and for these patients I would probably ask a few more questions to actually kind of talk through what you're noticing.

A lot of really good questions here. Many are very very specific to their personal cases, so I'm going to be shooting a bunch of emails out in a little bit.

Do pool therapy, saunas, or gentle heat help with spasticity?

A few people are asking about pool therapy, saunas, and things like that. I would put all of those into the category of gentle heat. So heat can help to temporarily calm the muscle and allow for more movement. And also if you're having a lot of pain when it comes to the spasticity, it can

help reduce the pain so that you can tolerate some of the other techniques that target more directly the spasticity.

If it feels good for you and you like it, then go for it. Just be sure that you're also not either overdoing it with those and that you're staying hydrated. Especially when it comes to the sauna because dehydration can increase spasticity as well. Gentle heat like a moist hot pack is what is preferred or pool therapy is usually in like a nice warm pool as well and that can help.

Closing and Follow Up

It looks like we are just about out of time here. If you put a question in the chat, we'll just make sure that we have a way to email you. I'll try to get back to as many of you as I can over email over the next week or so, but I'd really appreciate everyone hopping on and a lot of very good questions. I hope that helped a little bit to answer some of your questions.

Thanks so much.