

Weakness After Stroke

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Webinar Transcript*

Why Weakness Happens After Stroke

Hi everyone. My name is Rachel Higdon. I'm one of the neurological physical therapists with Flint Rehab's remote recovery program. Today we're going to talk about one of the most common symptoms after a stroke, which is weakness, and some strategies that you can use at home as part of your recovery journey.

So whether you've had your stroke recently or years ago, there's information here for you. Let's get started. So when we talk about weakness after a stroke, it's important to understand why it happens. Movement starts in the brain.

Your brain sends out motor signals, messages that travel through the nervous system and tell your muscles how to move. Now, after a stroke, the part of the brain that sends those signals may be injured. Because each side of the brain controls the opposite side of the body, damage on the left side of the brain affects the right arm or leg and damage on the right side of the brain affects the left side of the body. When those motor signals are disrupted or lost, the muscles don't get the instructions they need.

That's what leads to the weakness, paralysis, or even coordination problems. It's not that your muscles are broken. It's that the communication system between your brain and your body has been interrupted. Now the hopeful part is that the nervous system can rewire itself and that process is called neuroplasticity.

Neuroplasticity means your brain can create new pathways and relearn movement through practice and repetition. This is why therapy focuses on doing movements over and over. Each repetition helps rebuild those connections.

Common Recovery Terms

Today I want to start by explaining some of the words you may hear during your recovery. These terms can feel confusing at first, but understanding them will help make sense of what's happening in your body and what we're working towards in therapy. So hemiparesis means partial weakness on one side of the body. This is extremely common.

About 80% of stroke survivors experience some level of hemiparesis. With this, movement is still possible but it might feel slow, limited or weak. The important thing to know is that hemiparesis often improves with repetitive practice. The brain can relearn movement through neuroplasticity and consistent therapy can help strengthen those pathways.

So taking it one step further, hemiplegia or hemiparalysis is a more severe loss of movement on one side. People with this may have very little or no voluntary movement of the arm or the leg, especially at first. But this does not mean that recovery is impossible. It just means that the brain area controlling this movement was more significantly affected.

Flaccidity means that the muscles have no tone. So they may feel soft, loose, or heavy. You may notice that this limb doesn't resist gravity and it might feel like it's just hanging there as shown in the photo here for instance. This often happens immediately after the stroke because the brain cannot send the signals to activate those muscles.

About one-third of patients experience this in the early phase, but many do transition out of this stage as the nervous system begins to recover.

Recovery Expectations

To set up realistic expectations, here's a quick overview of what recovery times generally look like, though it does vary from person to person. So as you probably know, recovery is the fastest early on. Those first 90 days are the brain's hyperplastic window. Research shows that motor recovery can occur twice as fast during this period, and many people begin showing return of tone within days to weeks.

Now, if flaccidity lasts more than three months, recovery becomes harder, but not impossible. Research shows that when a muscle stays completely flaccid past the six-month mark, that's when it's a lot harder to get the full voluntary movement and the chances are usually under 10%. But low does not mean no or zero chance. The brain can still change and we can still improve comfort, positioning, safety, and even get small amounts of activation with the right tools.

Hemiparesis often improves earlier and faster than hemiplegia. Meaningful recovery can continue for 6 to 12 months and smaller gains can still happen years later with high-repetition practice. So our goal in therapy is always to maximize what your body can do, protect the limb, prevent pain, and support independence.

Early Rehabilitation and Home Practice

I'll touch upon some of the early treatments that you likely tried in the hospital with your rehab team right after your stroke, but I'll move through these quickly because most of you here are in the chronic phase and I want to spend more of the time on home-based treatments that matter more for you now. In the hospital, therapy focuses on waking up the nervous system and preventing complications. Early mobilization to start out: sitting upright, moving your limbs, standing, or walking if you're able.

All of these help to counteract flaccidity by providing immediate sensory and motor input to the affected area. When someone is hemiplegic and not moving, the brain receives almost no feedback from that limb. So getting upright even briefly is going to help prevent the complete shutdown of those pathways. It also reduces secondary weakness from being in bed in the hospital for a while.

Bilateral training or bilateral movement just means using both sides at the same time. This allows the stronger limb to drive the weaker one. And this is especially helpful when the affected side cannot initiate any movement. These help to reduce the brain's tendency to ignore the hemiparetic limb.

Sensory stimulation references things like light touch or vibration or joint compression to the joint. All of these can help reactivate those dormant sensory pathways that are essential for the

motor recovery. Without the sensory input, the brain can't generate accurate movement. This is really foundational for earlier on.

Mirror therapy we're going to talk about in depth a little bit later, but it's essentially helpful when movement is very weak or flaccid where you're watching the stronger limb's reflection to activate the motor cortex as if the affected limb were moving. We'll take a look at this in a bit.

Weight Bearing and Joint Protection in Early Recovery

Weight-bearing and joint protection, both of these are really important to get upright and moving. So supported weight-bearing standing or just putting weight through your arm or leg provides strong sensory input to the brain to help normalize tone and improve alignment. For joint protection, when these muscles aren't firing, the joints are at high risk for strain and subluxation. So early joint positioning like using tape, slings, or anything to support the limb is going to prevent pain and structural injury.

That's just like a quick overview of these early treatments that matter more for hemiplegia starting out. But I know most of you here today are months or years post-stroke. So what you really need are more of the chronic based strategies that you can do at home. As you can see there is some overlap here.

Later Treatments for Home Practice

These are just a few of the later treatments for post-stroke recovery. So once you're home the focus does shift more to strengthening and practicing real life movements. High repetition here is essential. Studies show that the brain needs 300 to 600 repetitions per day of a movement to rebuild a pathway.

Task-specific practice trains the exact movement that you want to improve. Again, weight-bearing is going to improve that tone regulation and your alignment. And mirror therapy may still be beneficial here to help with that activation. Let's dive into each of these.

Protecting Vulnerable Joints

Now, if you've been on any of my webinars before, you know that safety is always our number one priority. When muscles are weak or tone is abnormal after a stroke, your joints lose the support they normally rely on. This makes the shoulder, the hip, and the knee all more vulnerable to pain, strain, and even injury. For instance, shoulder subluxation where the shoulder partially slips out of place happens in 17 up to 81% of people with hemiplegia.

That's why joint protection is one of the most important parts of long-term recovery. And joint protection just simply means using your body in ways that reduce stress on vulnerable joints while still encouraging movement. How do we do it? We want to avoid pulling on the affected arm, pulling during transfers or standing.

That can all worsen that subluxation. You can use stable surfaces like countertops to support it or sturdy chairs for standing. For the lower extremity, especially watch out for fatigue. When muscles get tired, alignment is going to break down quickly.

You might notice your knee starting to buckle or your ankle starting to roll. All of which can increase your risk of loss of balance or even falls. Always watch out for alignment. You want to think your shoulders are level, your hips are even, your knees are facing forward.

And you may need to use supports to maintain the arm and the leg in a neutral position.

Supports for Alignment

These are some supports that do help maintain that alignment. That way, you can move safely and comfortably while still trying to exercise. These do not replace the exercise, but they do protect your joints while you continue to rebuild your strength. What does each of these do?

Shoulder supports such as a GivMohr sling, which you see on the right-hand side here, can be used temporarily when pain or subluxation is present. They're going to keep the humeral head aligned in the joint. Hand splints might be used for wrist or finger alignment and prevent contractures, but they can also be used during weight-bearing to maintain alignment or when sleeping. Now, for prolonged sitting, you can also make adjustments to your wheelchair, including usage of arm troughs or cushion supports as you see in the photo here on the left to help protect your shoulder joint even when at rest.

For the lower extremity, you might wear something like an AFO or an ankle-foot orthosis or proper footwear like inserts. These help to lift the foot, improve foot and knee alignment, and reduce the fall risk by maintaining the ankle in a safe position again so it does not roll.

Weight Bearing

Weight-bearing just means putting controlled pressure through that affected arm or leg. This is one of the most powerful ways to wake up those weak muscles because it's going to increase that sensory input to the brain. When the brain feels the limb better, it can activate it better. As you've probably heard before, weight bearing also helps to regulate tone.

It can help reduce stiffness and improve joint stability for the shoulder, wrist, hip, knee, etc. Studies show that weight-bearing activities can increase activation in the affected limb up to 40%. So you can do this supported or not supported depending on where you are in your recovery journey. With support, it might be with a standing frame as you see in the photo here by placing weight through both legs but you're not at risk of falling.

As you begin to progress and do more on your own, you might do things in quadruped on your hands and knees to get weight through the shoulder or the hip joints or even for the upper extremities, leaning forward onto a table or a handrail while keeping the shoulder nice and aligned.

Progressive Strengthening

Probably the most obvious treatment for most of you here is strengthening. When a muscle is weak, we need to strengthen it. But the key here is how we do that. And the emphasis is on the progressive part, continuing to make it harder over time.

Strengthening after a stroke is different from your traditional gym workouts. Weakness comes from poor brain-muscle signaling, not muscle damage. So strengthening helps retrain the brain

to activate muscles more effectively. Here we're going to use slow controlled movements because they improve motor control and reduce abnormal tone.

Research does support strengthening three to four days a week for best results. You want to start with movements that you can control well. Use slow and steady pacing here. Think two to three seconds to contract that muscle, two to three seconds to lower it down.

You really want to use your muscle strength here, even if it's challenging, and not use momentum. Focus on those big major muscle groups, your legs, your core, your shoulders. And when you can, you're going to progress it into more task-specific practice. That means more functional movements for best results.

You might think, how much should I be doing? Well, it really depends on where you are and this is where you want to discuss it with your PT or OT, but we can break it down into a couple different phases.

Phase One Endurance and Motor Control

Phase one is going to focus more on building endurance, motor control, and reducing tone. This is where those high reps are going to be beneficial because they increase neuroplasticity and because again that brain responds to repeated activation. The studies show that high reps of 15 to 30 reps improve the motor control and can also reduce spasticity. We're looking at lighter resistance here.

Examples of this phase might be things like wrist extension just against gravity, finger taps, mini squats, pelvic tilts, marching in place. In phase one, we're just teaching the brain how to activate the muscles. Again, the goal is going to be control, not heavy weight. High reps are going to reduce that stiffness and improve that coordination.

Phase Two Strength and Joint Stability

Now, as you're ready, phase two is going to build that true strength and improve joint stability. This phase is going to help you lift objects, climb stairs, walk longer distances, reduce compensations when you're walking. This is where you're going to do more of a moderate load training. Fewer reps, maybe six to 12 at a time of the heavier resistance.

It might look like things like bicep curls, weights, grip strengthening with putty, pinch strengthening with clothespins, maybe standing leg exercises with ankle weights or planks. Just some exercise examples, but really talk with your physical therapist or your occupational therapist and they will give you a much more progressive program specific towards you.

Mirror Therapy

We briefly touched on mirror therapy before during the treatments that you might do during your hospital stay. You can also do it in outpatient therapy or at home as well if significant weakness persists. If trialing this one, I do recommend performing it first with a rehab professional such as a PT or an OT to see if this is appropriate for you in your recovery and show you how to set it up before trying it at home. So what is it?

Mirror therapy is a neurorehabilitation technique where you place a mirror between your limbs so that the reflection of your stronger side looks like your affected limb moving normally. This visual illusion activates the motor cortex, again, that part of the brain responsible for movement. Even if your affected limb cannot move yet, when you watch the stronger limb moving in the mirror, your brain interprets it as your affected side moving normally. So studies show that mirror therapy can improve hand and arm function by 20 to 30% in chronic stroke survivors and can increase motor cortex activation up to 40%.

How you're going to set it up, you're going to place a mirror between your limbs, either upper extremity or lower extremity, so that the reflection shows your stronger limb. Hide that affected limb behind the mirror and watch the reflection of your stronger limb moving. You want to imagine your affected limb moving exactly the same way. And you can even attempt to move the affected limb even if nothing happens.

Continue to attempt this for about 10 to 15 minutes per day for best results. And just in general for some tips, again, keep those movements slow and controlled. Use everyday tasks as you can, like opening and closing the hand or wrist movements. And it's ideal to do this before strengthening or task-specific training during your training session of the day.

Task Specific Practice

As you can, we want to progress towards task-specific practice. This means choosing meaningful tasks that match your goals. For the hand, this might be grasping and releasing everyday objects. For the arm, maybe it's reaching and placing things on shelves, or for your legs, it's going from sitting to standing, stepping up to a stair, even just weight shifting.

Daily tasks of folding a shirt or brushing your hair begin to build that real-world independence. So this task-specific practice is practicing the exact movement you want to improve. It's one of the strongest drivers of neuroplasticity because the brain learns by doing the real task, not just the general exercise. So how you do it, you're going to pick one functional task.

Maybe it's grasping your coffee mug and breaking it into small repeatable steps like grabbing onto that coffee mug. Aim for 20 to 40 repetitions of that same movement. And again, slow and aligned movements. Avoid any compensations here as much as you can.

You're not thinking about hiking the shoulder or leaning heavily to one side. Better to reduce that compensation and try to work towards improved alignment there.

Again, these are just some examples of what you can do as you begin to get stronger and can tolerate the task-specific practice.

Remote Recovery Support

These are just a few of the home-based strategies that can jumpstart your activation and strength after your stroke. Now, if you're looking for more of a full guided program to continue improving at home, we do offer a remote therapy program where you're matched one-on-one with a therapist to work towards your goals, track your progress, and build a personalized exercise program specific to you. For anyone attending today, we are offering that 50% off your first month, and you're going to receive that email reminder after this webinar.

But for now, let's open up the Q&A to the audience in the chat. And we can have an open discussion about your questions about this topic. I do ask that more specific questions be emailed to us here and we can evaluate and discuss more personally with you there.

I'm going to give everyone just a few minutes to jot down their questions here and then we will go through those.

Q&A

Are there any strategies to reduce clonus?

Good question. So clonus can happen when the muscle is stretched very quickly. So one thing that does help is putting weight through that limb, whether it's your ankle or your hand. If it's happening at your ankle, really try to stand up and put weight down through your heel and just try to hold it there.

Do some weight shifts there, nice and slow. But stretching the calf is also going to help. But in the moment, instead of shifting off of that leg, really try to just put some weight down through that heel.

Are there any pointers for spasticity that hinders movement?

We have a whole separate webinar for spasticity. I would recommend checking that one out. But if spasticity is hindering motion where the limiting factor is spasticity and not weakness, yes, you want to address the spasticity first. So you can go through some tone management strategies.

There is a good amount of overlap here. So you might do some weight bearing through that joint first. You might do some rhythmic movement trying to get more range of motion there in that joint to start out. If it's more severe, that's when you might want to talk to your doctor about more medical management of it, if that is beneficial for you or not.

And there's various different ways to do it, but definitely check out that webinar on spasticity hindering movement.

Which exercises can improve balance?

We are going to chat through that in a whole other topic and webinar coming up. But for balance exercises, you do need to break it down as to what is hindering your balance the most. Is it because you're having the weakness and you're having the hemiplegia and that's why you're off balance or is it being affected by other things such as vision such as reduced sensation or dizziness or inner ear problems, vestibular difficulties? So the exercise that's best for balance is going to depend on why you're having difficulty with that balance.

That's something that we can chat about more individually to determine what is your cause of it. And as with all balance exercises, safety is also our number one priority. Making sure that you're doing it in a safe home setup. Usually, I recommend practicing in a corner with something in front of you so you are protected on all sides, standing balance at home with someone nearby, of course, if you're not in a rehab setting.

How can I reduce too much tone in a muscle?

Again, if it's tone because of that high spasticity, that high tone after a stroke, I do recommend looking at those tone management strategies that we had recommended prior. Try things like stretching, weight bearing, positioning, and rhythmic movements, everything there. Certainly review that to reduce tone before doing more of the strengthening exercises.

Are there strategies to reduce tingling on one side of the leg?

The tingling is going to be due to reduced sensation in that area which can often happen after a stroke or any neurologic impairment. So typically when you're having changes in sensation you might go through various different phases. So you might start with numbness and then as you start to get more return of that sensation, you might feel like pins and needles or tingling here. And then as it starts to heal more, it actually might start to feel like itchy or just typical skin, lighter sensation.

So it feels like skin but not as normal as your unaffected side. So in terms of going through that process, it's good to know kind of where you are during that phase first and what is normal and what is expected. But to reduce it, you can continue to try to provide some sensory stimulation, things like light touch, vibration, joint compression to that area. But a lot of it is also just allowing for time for that sensory nerve to heal if it can.

I think that's another good topic to talk about in the future though is decreased sensation and some strategies for it because there's a lot of others as well.

How do we manage a shoulder subluxation?

In terms of shoulder subluxations, it depends on the amount of subluxation you have. You often do want to provide some sort of support or sling as we mentioned in the presentation to prevent it from dropping down further, especially when you're standing or when you're walking. You can also support it with those arm troughs in your wheelchair if you're utilizing one to prevent the subluxation from worsening during exercise. If you have some muscle recovery there, then you also start to target strengthening these muscles to try to reduce that subluxation if you can.

And that depends on the extent of the stroke that you had. Taping, using tape or having a physical therapist provide that, can sometimes also be beneficial. Really depends on the severity of that shoulder subluxation.

I'm just going through some of these questions, which are a little bit more specific. If you leave your email or again send it to our email, we can work on getting back to you. I'm just seeing if there are any other general type exercises before we log off here.

Which exercises help improve muscle tone in the upper limbs when there is no tone?

They have indicated that they are starting from zero. Again, it's going to depend on where that muscle tone is and the weakness is in your upper extremity. If it's from zero, I'm assuming you mean that muscle is fully flaccid. Joint protection and protecting wherever that weakness is will be first.

If you're talking about the upper extremities, it's probably at the shoulder. Then allow for gentle weight-bearing. Standing and leaning forward, putting some pressure through that joint first, can be a good way to start as long as you're not having severe pain or discomfort during that. And then just doing some generalized strengthening exercises.

They might be isometric, just trying to activate that muscle or get some kind of muscle activation there. For more specific exercises, we would need to do a full evaluation to see what muscles you still have activation of before I can recommend anything specific for you.

Closing and Future Topics

If you have any other questions, we will email you. This is being recorded. I know a bunch of you are asking. We will send that out as well.

And then be sure to answer the polls and the messages here in terms of what kinds of webinars you would like in the future. I think some of your questions were really good to give us ideas of what to talk about during future webinars. And we will see you for the next one. Thanks so much for joining.