PODCAST TITLE: SENSIORMOTOR IMPAIRMENTS A

ADULT STROKE REHABILITATION AND RECOVERY PODCAST SERIES

AMERICAN STROKE ASSOCIATION

Patty Clements:	00:04	This podcast is supported by Kindred Healthcare. Kindred Healthcare is a sponsor of the American Stroke Association's Together to End Stroke initiative.
Patty Clements:	00:13	Hello, and thank you for joining us today as we continue the conversation of our five-part podcast series addressing key recommendations from the American Stroke Association's Guidelines for Adult Stroke Rehabilitation. In today's discussion, we'll be taking a closer look at the recommendations for sensory motor impairments and activities. My name is Patty Clements and I'm with the communication team at the American Heart Association.
Patty Clements:	00:36	Today we have the pleasure to hear from two key experts. First, we'll be hearing from Dr. Carolee Winstein who's a professor of biokinesiology and physical therapy and director of the Motor Behavior and Neurorehabilitation Laboratory at the University of Southern California. Also with us today is Dr. Neila Donovan, an associate professor and director of the Communication Outcomes Research Lab at Louisiana State University Department of Communication Sciences and Disorders. Welcome to you both.
Patty Clements:	01:06	Let's begin with Carolee. Can you talk about some of the impacts sensory motor impairments can have on stroke survivors?
Carolee W.:	01:14	Yes, of course. The magnitude of the impairments depends on the severity of the stroke. But in a majority of cases, the stroke will impair voluntary movements, including walking, postural control, and reaching and grasping actions of the arms, more on one side than the other. Reflexes can also be hyperactive, and what that means is when the doctor uses the reflex hammer and taps on your knee, for example, your leg will have a brisker kick response than before your stroke.

Carolee W.:	01:50	Other deficits can include deficits in motor planning, slowness of responding and problems or slowness with decision making. If the stroke impairs the dominant hemisphere, which is usually the left side of the brain in the majority of people, there may be communication disorders affecting speech production and/or understanding of verbal communication. And finally and depending on the area of the brain that is affected, there may be deficits in memory, motor coordination, and perception, and even mood such as depression.
Patty Clements:	02:28	What about cognitive and memory impairment? Are there therapies for those?
Carolee W.:	02:33	Yes, there are. Modeled after the extensive work actually in animal models of stroke and several recent studies in humans, we now appreciate the importance of enriched environments for brain health and recovery. For example, simply being in a hospital room that has warm colors and some family pictures, a calendar and reminders of one's daily schedule can be more helpful than being in a stark, all-white, sterile room with a bunch of equipment hanging on the wall. For their gathering areas with a piano, pictures on the wall and homelike furniture, access to books, movies, iPads, or computers can provide a more enriched environment than an institution-like, sterile environment.
Carolee W.:	03:33	Another example is the use of virtual reality games, and we're seeing this more and more, seems to engage both motor and cognitive tasks. For example, navigating through a park while sitting on a bicycle where you have a particular target destination that you want to get to in the park. The game can be made more progressively challenging, but not too difficult to begin with. So it's not frustrating, but it's more engaging and interesting.
Patty Clements:	04:06	Have you seen these recommendations in action? Tell us a little bit about that.
Carolee W.:	04:10	Yes, I have. For example, I've seen a number of very creative virtual reality games for reaching and grasping exercises where you're reaching for something that you see in the virtual environment, or balance activities where your movements actually control an avatar on the screen through an environment where there are rewards for successful movements. There are memory assists that can be used, for example, reminders or prompts when you cross your threshold to go outside your home reminding you to take your cane or

reminders built into your smartphone that remind you to take your medications at a certain time during the day, even prompts to remind you to do your mobility exercises for the day.

Carolee W.: 05:02 In addition and particularly interesting is the schedule at which you practice things can impact your memory. There is considerable evidence that spaced practice is much better for building memory than concentrated or massed practice. This is primarily because if the practice is spaced, there is more forgetting between bouts of practice. But it turns out that forgetting actually facilitates memory. Now, this seems somewhat counterintuitive, but it's not total forgetting that facilitates memory. When something is partially forgotten, sort of on the tip of your tongue, you have to work a little harder to reconstruct the memory for recall. It is that harder work retrieving the almost lost item that actually strengthens the memory for later recall.

Carolee W.: 06:00 If you recall something without a space in between, there's less forgetting, the recall is easier, but the later recall is actually poorer than with a spaced practice schedule. Now, how does this translate into therapy? Patients who participate in several shorter therapy sessions throughout the day do much better later than those who participate in one long session in a day. Also equally important, if you can parse out some exercises to perform on your own, safely in your room every day, that will facilitate later recall. It will also serve to build confidence and increase self-management skills, all useful skills after discharge from the inpatient facility.

Carolee W.: 06:53 Finally, a little-known secret is the importance of exercise for stroke recovery. It doesn't have to be exercise boot camp type, even just taking a short walk can be beneficial. Exercise is considered an adjunctive therapy to not only improve physical health, strength, mobility, range of motion, but also cognitive and memory after stroke. And it can reduce depression after stroke. The multiple benefits of an active lifestyle, both physically and cognitively and for mood, cannot be underscored more.

Patty Clements: 07:35 We know that both gross and fine motor skills can be impaired by stroke. Carolee, talk about movement and coordination challenges and how we address them during rehab.

Carolee W.: 07:46 Yeah. This is something we emphasize in the stroke guidelines. At the very least, there should be a discussion with the stroke survivor and their family about the most common

environmental causes of falls after discharge and how to be proactive about preventing them. Most of these can be prevented with proactive strategies. For example, simply using a nightlight, removal of throw rugs, installation of grab bars in the bathroom and shower, clearing the pathway to the bathroom, installing handrails for ramps, and making sure the brakes on the wheelchair are locked before standing up.

Carolee W.: 08:35 In addition to these practical environmental solutions post-discharge, participating in an elementary balance training program before discharge and following through after discharge with specific exercises that are progressed to improve balance, balance confidence, and reduce fear of falling can also reduce the risk of falls and fractures after discharge. So it turns out that fear avoidance behavior will impact the stroke survivor's recovery and prevail if it's not addressed at the time of discharge from the inpatient facility. This is all treatable.

Carolee W.: 09:17 Falls can be prevented, but balance deficits, even real or perceived, first need to be recognized. They need to be measured and documented and a program put in place with follow-up, perhaps in the outpatient clinic on a regular basis.

Patty Clements: 09:36 That balance training has got to be of great importance for survivors who have mobility impairment and they're just trying to get back on their feet.

Carolee W.: 09:45 Yes, it is. It does turn out that practice walking is the best way to recover walking. However, we can help people practice especially early after practice when they do not fully have the volitional control yet. So if that takes a robotic device or a treadmill with body weight support, that is excellent. None of these devices however have been found to be better than the other or even better than gait training without devices. In fact, the sooner the stroke survivor can be free of the assistive devices, the better.

Carolee W.: 10:27 The other thing we know is that voluntary control is more important than having the robot move the legs into the appropriate postures. If the robot can be thought of as an assist if needed only, if the assist is too much, people will simply relax into the robot, let the robot do all the work when in fact that's impeding their own recovery. Also having a knowledgeable physical therapist guide your gait training so that the intensity usually translates into speed yet is challenging enough to build cardiovascular capacity and muscle strength. This is very, very important.

Carolee W.:	11:13	Mobility training is equally important in terms of managing curbs, stairs, ramps, learning how to get up from the ground, and also learning how to fall without injuring yourself. Having a physical therapist advise on specific movement strategies that maximize recovery and minimize compensation movements is important early after stroke.
Patty Clements:	11:39	All extremely important points. What about the use of neurodevelopmental therapy and proprioceptive neuromuscular facilitation, or PNF, in motor retraining?
Carolee W.:	11:50	The evidence shows that these kinds of therapies are no more effective than any other therapies. Now, PNF is useful for strengthening training. It's as useful as lifting weights, however it may be perceived as more natural as the resistance is applied in a kind of a diagonal pattern that is more natural than these planar straight movements that might be done using, for example, a weight machine. The important thing is to quantify the change in weight pushed or in straightness in a reaching movement, and progress the exercise to foster effective capacity building over time.
Carolee W.:	12:39	The expectation is this enhanced capacity will enable more effective functional behaviors like walking, carrying heavy objects, lifting up your grandchild, being able to get down on the floor and play with your grandchild, those kinds of things.
Patty Clements:	12:56	Any other therapies that are not currently recommended?
Carolee W.:	13:01	There are other therapies for which the level of evidence is not yet high enough to recommend. They include interventions to, for example, prime the brain before practice or exercise such as transcranial magnetic stimulation, and certain recovery-promoting drugs such as dexamphetamine. These therapies are still experimental and more research is needed before they would be recommended as part of best practice.
Patty Clements:	13:35	In addition to gross motor movement, fine motor skills are often impaired by stroke. What kinds of approaches are recommended to help stroke survivors recover upper extremity activity and coordination?
Carolee W.:	13:47	Well, certainly functional task practice or task-specific training where the tasks are graded to challenge individual capabilities and are progressed in difficulty as improvement ensures, are recommended. Practice of activities of daily living, especially those that the stroke survivor identifies as something they are

particularly motivated to recover, something that they cannot already do, but will need to do once they are discharged. I think letting people choose, giving them choice, what they want to work on is an effective way to get motivation and enhance engagement in the therapy.

Carolee W.: 14:31 Also building capacity using strengthening exercises, as I just discussed, as an adjunct to functional task practice is another important component. One thing that also helps is using what's called action observation where the stroke survivor sees an actor performing a motor task such as brushing their teeth or eating a meal with a fork and knife, followed immediately by practice of that action using an interleaved schedule of action observation, voluntary practice, and repeated again. That may be more successful than practicing alone without the action observation to kind of prime the brain.

Carolee W.: 15:17 And finally, since more often than not, we use our arms and hands together either in a symmetrical manner like holding a tray or in an asymmetrical manner like answering the telephone or opening a jar, bilateral training paradigms are recommended to facilitate upper limb recovery.

Patty Clements: 15:39 Do the guidelines weigh in on neuromuscular electrical stimulation as well as conventional occupational therapy and exercise?

Carolee W.: 15:47 Yes. In cases where there is minimal voluntary movement, neuromuscular electrical stimulation is reasonable to consider usually within the first few months after stroke or for persons with shoulder subluxation where there's actually a separation between the acromion and the head of the humerus. So there's a big gap there and that can cause pain. It turns out that the sensory information from the neuromuscular electrical stimulation can facilitate volitional movement after stroke. It facilitates the acquisition of actually the person using their own muscle. This is true particularly in the early period after stroke.

Patty Clements: 16:36 So much of rehab is devoted to regaining movement, but many stroke survivors are challenged by movement they do not want, spasticity in limbs, wrists, fingers. Are there any recommendations there?

Carolee W.: 16:50 Yes, there are. There is evidence that targeted injection of botulinum toxin into localized upper limb or lower limb muscles can be used to reduce spasticity and allow for proper hygiene and positioning when there is little or no voluntary control of

movements. I think that's an important caveat. The use of splints and taping of wrists and fingers is not recommended for plasticity prevention. Turns out it just makes it worse. Also learning techniques to relax spasticity such as gentle stretching, positioning, or simply taking a deep breath and exhaling or relaxing the shoulders can be very useful self-management strategies, again, putting the stroke survivor in charge of their own personalized care.

Patty Clements:	17:54	Spasticity, motor impairments, balance problems, all of that can make it pretty difficult to be physically active. What can be done to help stroke survivors maintain their physical level?
Carolee W.:	18:06	Yeah, so there are common challenges of deconditioning after stroke. But they're not that difficult. They're not that different from the deconditioning that occurs with aging. So this highlights the importance of individually-tailored exercise programs to enhance cardiovascular fitness and reduce the risk of stroke recurrence after the formal rehab program ends, really, an artificial end.
Carolee W.:	18:36	We recommend that each stroke survivor should find and participate in a program of exercise, some form of physical activity at home or in the community and many who can will hire a personal trainer who has experience working with people with a disability, or finding a class with individuals at the same level that you are, like working with people with a disability ... sorry, like you in another way to stay active after a stroke. The benefits are huge and the social support really helps keep the group together and engaged in the exercise.
Carolee W.:	19:21	Some like swimming. Others like golf or modified yoga. I guess our recommendation is don't be afraid to try different programs out, especially if you find a knowledgeable instructor. You can even exercise while sitting in your wheelchair.
Patty Clements:	19:38	You've covered a lot of important information today. Any final thoughts?
Carolee W.:	19:43	I think the most important thing to remember for the provider is to help the stroke survivor develop habits to stay active and engaged in the things the stroke survivor enjoys and that are meaningful to them. Trying to maintain a healthy lifestyle that includes proper nutrition, staying physically active and socially engaged, together these three factors, if you try to consistently make them part of your daily life will foster both physical and cognitive health for the rest of your life.

Patty Clements:	20:22	To both of you, Dr. Carolee Winstein and Dr. Neila Donovan, thank you so much for your time today and for weighing in on such an important topic. I'd also like to thank our listeners. We hope you enjoyed today's conversation and I'd like to remind you this is just one podcast in a five-part series. We hope you listen to the entire series and visit us at strokeassociation.org/recovery for additional information.