

# Early Rehabilitation Strategies

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[00:00:00] **Roberta Pesce:** Hi, everyone, welcome again to another session or talk from Track One. We will be joined by Dr. Cristina Sadowsky from Kennedy Krieger Institute to give us a talk about early rehabilitation strategies. Dr. Sadowsky actually wasn't available to be here live today, so this talk is prerecorded, but we do still encourage you to submit any questions that you may have in the Q and A section, and perhaps another expert can address your questions, or we can send it to Dr. Sadowsky or any other experts to have it answered. Please, please, we still encourage you to submit any questions that you have for us. Also, please note that the closed caption feature is available on the right-hand side of the screen also. All right. Enjoy your talk, and I'll see you soon.

[00:00:59] **Dr. Cristina Sadowsky:** Good afternoon. I am so glad that I am again part of the symposium. This is one of the highlights of my year. I will be talking about Principles of Rehabilitation in Acute Setting, rehabilitation for neuroimmune related paralysis, myelitic process, neuromyelitic process and spinal cord impacts and injuries. So, in the acute phase of paralysis, there are medical factors that affect the acute rehabilitation intervention. And I need to mention them because they set the pace at which the rehabilitative process occurs. The autonomic nervous system is impaired and undergoes what we call instability or dysfunction, which manifests itself in a bunch of impairments.

[00:02:11] From a cardiovascular point of view, there is the variability of the blood pressure or heart rate. In the pulmonary realm, we could have respiratory insufficiency or failure according to the level of the injury, but even if the individual is not ventilator dependent, there are troubles with secretion management because of overproduction of secretion or underproduction. Then there is the genito-urinary and gastro-intestinal, meaning the bowel and the bladder, which are of dysfunction to, presenting incontinence, retention, or inability to evacuate.

[00:03:00] Then there is the sensory dysfunction and pain, which play a role in the rehabilitative intervention, and the effect of paralysis or immobility on muscle and bone mass. So, we have to address these concerns one by one. As I mentioned, cardiovascular concerns are hypotension, which can be related to either the initial shock of the nervous system because of the paralysis onset, but throughout the post paralysis onset period there is what we call orthostatic hypotension, meaning that the blood pressure drops, and the patient

becomes dizzy and fatigued whenever they raise their head and they are not lying down anymore, whenever they are sitting or attempting to stand.

[00:04:01] Hypertension is the opposite, meaning the blood pressure goes high up, and that occurs in individuals that have a neurologic injury at the thoracic level six and above, so kind of mid chest up. Then we have tachycardia and bradycardia, which is too high of a heart rate or too low of a heart rate. The rehabilitative goals in this acute period are to optimize the blood pressure and the heart rate variations and minimize the symptomatic autonomic dysfunction, this variability in-between too high and too low, which is impairing the effort of sitting, standing and mobilization.

[00:04:46] Respiratory concerns that are related to neuroimmune myelitis are impaired chest wall compliance, meaning the chest is either too stiff because of paralysis or too floppy because of the paralysis. Both conditions can occur depending on the stage of the paralysis. Then there is this impaired ability to produce effective coughing, which leads to accumulation of secretions, as I mentioned previously, and respiratory difficulties. The increased production of secretion, again I mentioned it before, so not only that it's hard to get rid of it, but it's more abundant. And this all impairs the ability to sit, stand or move around. And then there is this specific condition which I am sure not a lot of people know about, but it will make sense when I explain it to you. It's called ventilator-induced diaphragmatic dysfunction.

[00:05:57] Diaphragm is a muscle, and when you put it at rest because the patient needs a ventilator or respirator to breathe, that muscle atrophies, the same like the muscle in the arms and the legs that are paralyzed. So, while the ventilator helps us, helps the patient in maintaining the respiratory, the ability to breathe, it also limits the ability of the diaphragm to contract, which leads to the diaphragm thinning. Why is that important? Well, because restoring the diaphragm, adding muscle mass, requires a lot of work, and the work can only be done by active voluntary breathing, and because the diaphragm is a very powerful back muscle extensor, so your ability, the patient's ability, to sit upright straight is dependent in part on the diaphragmatic muscle strength.

[00:07:17] So in the acute period of paralysis, the rehabilitation goals as it pertains to respiratory function, are prevention of atelectasis, which are the smooshing of the cells at the base of the lungs because of the lung cells being full of secretions and unable to contract and expand well, management of secretion, and then the activation of the muscle that ensures breathing, which is the diaphragm.

[00:07:52] The bladder, there is bladder retention and bladder incontinence that's related to paralysis, and obviously the rehabilitative goals are to prevent incontinence, and that is done through intermittent catheterization or progression to intermittent catheterization, initially is an indwelling catheter, but we do need to progress to an intermittent because an intermittent catheterization program is what eases the transition to the next phase of rehabilitation. Having a tube hanging out is not conducive of good motor activity.

[00:08:37] Bowel, I have a friend of mine that says that the inability, that constipation is at the root of all evil because whenever you're constipated, it's basically impossible to move because you're nauseated because the expanded abdomen is pushing the diaphragm, and it's impairing its ability to contract. So having a consistent, adequate, and predictable bowel evacuation is essential for mobilization.

[00:09:24] And then we have pain and sensory dysfunction. We all know that being in pain, which can be neuropathic in nature, musculo-skeletal, or even organ related, like maybe the bowel is too expanded because of the constipation, so pain is stopping individual's activity. It's the most common reason for people stopping to move around is pain. And then there is another condition, which is the inability of the body to know, or

the brain to realize the position of the body in space because of the sensory dysfunction that's associated with the myelitic process.

[00:10:14] So the last component that I need to stress about is the fact that immobility induces muscle loss. Well, muscle and bone loss because they're related, but the muscle, muscle atrophy occurs rapidly, in about 2 weeks, we lose about half of the muscle strength and around one third of the muscle mass. Muscle mass is essential for metabolic function, for glucose, for the sugar and fat metabolism, and also muscle mass has been shown to be correlated with function in every single individual with paralysis, be it stroke-related, spinal cord-related, brain injury-related, there is this correlation. The better the muscle mass, the better the functions. So, we are all about function.

[00:11:22] So where do we begin? We begin with us continuously assessing the risk of rehabilitation versus the benefits of rehabilitation in the acute phase. We concentrate on achievable goals, on things that, the low hanging fruit. We're looking at which system require our most attention. And I just explained that cardiovascular and respiratory, GI, GU, and then muscle, and that's the order in which they are important when we're thinking, "Okay, where are the biggest risks?" And cardiovascular and respiratory are number one and number two. You can actually, sometimes you can switch respiratory and cardiovascular depending on the level of the injury, but what's essential is to continue reassessing day in and day out, in the morning and in the evening, what is the medical condition and what are the rehabilitation needs.

[00:12:46] And the low hanging fruits in rehabilitation while you are in the acute phase are maintaining range of motion, so preventing contractures. Number two is preserving the bone mass. And then it's the continence, both bowel and bladder, because skin integrity is essential in the case of insensate paralytic condition. Getting what we call a pressure sore robs you of anything in-between 2 weeks and 2 years of your recovery, and in some cases really quickly progressing pressure sores that end up inducing infection into the bone actually can rob individuals of their life. Very important never to get a pressure sore.

[00:13:51] Barriers of mobilization, as I said, medical stability, decreased tolerance to position changes because of all of the blood pressure changes, the patient comfort, but also the comfort of the staff that provides the care and of the family because this is a new onset condition. This is acute onset paralysis, so everybody is bewildered by this condition. And then we also have the lines, tubes, and drains that are characteristics of being in an ICU and the sedating medications.

[00:14:32] So how do we do? How do we start this? We create a structure. Structure works. So, lights on and shades up in the hospital by 9 in the morning. And then at night, by 11 o'clock at night is the latest. We need the body, the human body evolved to require 8 hours of sleep a night, and the restorative sleep is in the second part of the night. And in the ICU, you get woken up for vital signs and all of those beeps and machines that are monitoring to make sure that you're alive, but they keep you awake, so if we can control the lights and the noise to get that 8 hours of sleep at night is important.

[00:15:35] Limiting the television is important. Never go to sleep, well, never keep the TV on for about an hour before going to sleep. Head of bed at 30 degrees. Turning in the morning and at nighttime. Put appropriate positioning and then consult occupational and physical therapy. I'm going to progress to the next one because I have a different slide for how to progress it, to progress mobilization.

[00:16:16] There are barriers, so criteria to pause this mobilization. Changes of more than 20 percent in the heart rate, blood pressure, or respiratory rate. So, if you have a good baseline and then the activity, the rehabilitation induces a change of more than 20 percent from the baseline, we stop and reassess. If there

are changes in the oxygenation or in the ability to breathe, if there are major changes in mental status or the heart rate goes crazy, if the mobilization induces behavior sometimes related to pain, sometimes related to the medication that are making the activity unsafe, or if there are concerns about removing some of those life maintaining interventions like vascular access or endotracheal tube, so those we pause. We pause the intervention.

[00:17:22] And then if we can do it, we start slow with just range of motion and positioning, and we build up the expectations of the patient and of the family. I personally am a big supporter of using electrical stimulation, functional electrical stimulation or just the simple handheld machine in the ICU. There are studies that show that it shortens the ICU stay, and it definitely maintains the muscle mass, which I told you before that is essential for maintaining function. Then you progress to sitting at the edge of the bed, gradually increase the time. Working on the trunk strength, of the core strengthening and range of motion when moving out of bed to the chair. And we increase the time, and then we progress hopefully to standing depending on the neurologic deficit.

[00:18:34] What if we can't do any of the active therapy? We can still do stuff in the acute rehabilitation phase in the ICU. Can position, optimizing this neutral hips, neck, and shoulder position. We can put splints to maintain range of motion with the goal not only to maintain, but also to promote it. And again, heading back to the electrical stimulation to assist with muscle strengthening, recruitment, and preventing atrophy. Other barriers in the ICU are the staff, family, and patient comfort. So, I will not bewilder here much, but I can tell you that physicians have a barrier of mobilization of individual with paralysis in the ICU because they don't know how to do it. So that's why we involve the physical and occupational therapist, and we know that the benefits are decreased length of stay in the ICU, but only if we prevent the dislodging of the endotracheal tube, loosening of the central lines and the, does increase the muscle, the workload for the nurses and the therapists. So, the unit needs to be adequately staffed.

[00:20:20] We do need to provide the opportunity for the family to be involved because they will be the ones that will accompany the patient throughout their rehabilitative process. So, I love hugs. I think that they are good in allowing for sitting and core strengthening. They're also great in releasing this great hormonal factors that allow with decreasing the stress. So, hugs at the edge of the bed or while sitting outside of the bed in the chair are a wonderful rehabilitative intervention when you have acute onset paralysis.

[00:21:22] Mobilization of patients having these lines, tubes and drains need to be done following a plan. So, we involve the respiratory therapist, the nurses, and the rehab staff to be successful. Invasive mechanical ventilation, whether through the endotracheal tube or the tracheostomy should not be a barrier for mobilization. It should just be done smart and planned. And then while we're doing that, as I said, we monitor things so safety is ensured. We look at oxygen saturation. We look at heart rate, at the respiratory mechanics, the rate, the work of breathing.

[00:22:19] If the patient is intubated and is on a ventilator, we look at specific ventilator parameters to see that they are still standing in the safety area. Finally, we're addressing the medications that a lot of individuals in the ICU get sedative, analgesics, and hypnotics, and we, as the rehabilitative team, and you, as the patient and the family caring for an individual with new onset paralysis, need to be able to minimize the amount of sedating medication because we all know that in the ICU everybody is busy doing stuff, and sometimes we do what we call snow the patient, meaning we allow them to sleep under the influence of drugs, because frankly it's easier, but that is not conducive for restoration of function. The patient, yes, at night, the patient needs to sleep, like I said, minimally 8 hours, but not during the day, well, during the day, naps are okay.

[00:23:46] And then transitioning, all of this is done in preparation to transitioning to the inpatient rehabilitation program. I believe that this talk will be given by my colleague, Dr. Cabahug. But early mobility ensures a successful transition because it increase the tolerance. It already prepares the patient and the family onto the expectations, what to expect from rehabilitation. It might transition quicker to the inpatient rehabilitation, and it definitely improves the quality of life while being in the ICU.

[00:24:36] I want to end by putting some of my favorite quotes, "Skill without imagination is barren." I'm a physician, and I think I have a lot of skills, but when we deal with individuals that are paralyzed, you need to think out of the box. You've heard of this. You need to think beyond what is apparent, and once you dream it, you have to apply it because "Vision without execution is hallucination," and that is specific to the ICU stay, and it is, it happens because of the fact that we're losing the cycle, day-night cycle. So, people in, you might have heard about the ICU psychosis, so we don't want to have that.

[00:25:43] Also, a couple of other words of wisdom, "Knowing is not enough. We must apply," and "Willing is not enough. We must do." I am a doer. I hope that I presented some very practical notions of what to expect and what to ask for when you or your loved one is in the ICU with new onset paralysis. Thank you very much and have a great rest of the conference. Bye.

[00:26:24] **Roberta Pesce:** Thank you so much, Dr. Sadowsky, for this talk. And to all of you, please proceed to the other session that will be happening, or perhaps it already started, so I would be quick in the other session area, so please head to sessions and click on the other session that you see available. Thank you all.