[MUSIC PLAYING]

SPEAKER 1: All right. So this talk is about the state of science updates on gait, stem cells, electrical stimulation, and robotics. These are some of the really hot topics these days. These are the things that our patients always ask us about, because this is what's kind of in the news, in the media, and sort of on the forefront as far as research.

So these are our objectives. I'm not going to read them all for you, but you can kind of see what the goal of the talk is. Can everybody hear me OK?

SPEAKER 2: Yeah.

SPEAKER 1: All right. Good. So I get to talk a little bit about walking evidence update and specifically predicting walking outcomes. That's kind of a big topic nowadays, is trying to get it right in as far as walking prognosis for patients with spinal cord injuries.

So what we know is that after a spinal cord injury, everybody wants to walk for the most part. And we know also from research is that eventually these priorities change. In fact, bound bladder and sexual function usually surpasses walking as a priority one to two years after an injury.

We also have limited time in inpatient rehab and limited outpatient visits to work on the most pertinent functional skills for individuals. And as remember from Martha's talk this morning, pursuit of non-functional ambulation leads to decreased participation outcomes later, due to poor wheelchair skills, transfer skills, and things like that.

So here are some ways that we can predict a person's ability to recover walking. One is by using the age impairment scale. For those of you who aren't familiar, it's the way that we classify the level and severity of injury. It's used internationally, so we kind of speak a common language. And there's actually some pretty good evidence connecting the injury classification with walking outcomes.

And in this article, by Scivoletto et al, they basically looked at the level of injury and the classification of the injury and looked at walking outcomes.

And now this initial chart here is kind of showing you how people tend to recover based on when they had their initial exam. So in case not everybody knows this, with an ASIA A injury that means that there's no sacral sparing, typically no motor and sensory function below the injury level. With ASIA B, there's sensory function, but typically no motor. With ASIA C, there's sensory function, and weak motor function below the injury. And with D, there's sensory function, and stronger, but not full strength, motor function below the injury level.

So what this is showing you here. Whoops. A little crazy there. Holy cow. Trying to go with the laser pointer. All right. So this is if someone was initially classified as ASIA A within 72 hours of the injury. This is the proportion of who stayed or changed to different grades. So 84% of people who were initially complete or ASIA A stayed there.

OK. And then there's a little bit of variability. When you go down through ASIA B, C and D, there's a little bit more changing. The reason this might be, especially in the early phases compared to later-- so here, this is when the exam is done at 30 days. And then there's a little bit less changing of categories at a later time point-- at one year follow up.

Does this chart make sense to everybody? All right. So some of that can be because within 72 hours of initial injury, they could still be in the phase of spinal shock. There could be acute medical issues that's kind of masking the function. And then there's also just more probability for some spontaneous recovery later, whereas at 30 days, things may have stabilized a little bit more, and there's maybe less change expected.

So now this is actually looking at walking recovery. OK. So this is individuals who are able to recover functional walking at one year post injury. So with complete cervical lesions, 0%. With complete thoracic and lumbar lesions, one study said five. One said 8.5% recover that.

Now when we go down here to ASIA B, where there's only light touch preservation, it ranges from 0% to 33% recovery of walking function at one year. Whereas if you have preservation of light touch and pinprick sensation, now your chances go up. Now they're ranging from 66% all the way to 89% of walking function.

And the reason that they think that probably is because neuroanatomically, in the spinal cord itself, the proximity of the tracks that carry that information are really close together. So the spinothalamic tract is what carries pain and temperature sensation from the body up to the brain, and then the lateral corticospinal tract carries the motor information from the brain down to the body. And those two structures are really close to each other in the spinal cord. So if you're getting function in one, you can sometimes assume that it can continue into the other areas.

Now we get into the ASIA C categories here. It's pretty variable, but it seems that age really becomes the biggest factor there. So individuals who are older who have these types of injuries may have a little bit less of a good prognosis for recovering walking.

And with ASIA D, you typically expect pretty good walking recovery. Except down here, this one study said 80% for individuals who were over 50 years old.

So if you're like me, you're thinking, OK. That's all great. But I mean, there's a lot of variability there. So what about someone who has a complete injury, but with motor sparing? What about that spontaneous neurologic recovery that happens? What about spinal cord syndromes? What about medical complexity in incomplete injuries? What about cognition, obesity, spasticity, mental illness, comorbidities? How do I decide? I need help. All right.

It's a lot of pressure, though. Because I mean, we have to do this in a short time frame, and we really want to try to do the best thing for these people. Because as we know, we don't want to have these bad outcomes later. So we can't really solve all these riddles, but there is some help out there. And again, Martha Summers alluded to this a little bit in her talk earlier, and I think she talked a little bit about it.

So I'm going to review some of this, but there's this clinical prediction rule in that study done by van Middendorp et al. And they developed this clinical prediction rule. So they had this retrospective cohort study where they had a large sample of patients with spinal cord injuries-- traumatic injuries. They examined those common factors of those individuals who achieved independent walking at one year and used that mathematically to come up with a clinical prediction rule.

It's very simple and quick to calculate when you first evaluate a patient, whether you're a physician doing their initial exam, whether you're a therapist. It was later validated in two separate studies so it showed to kind of hold up as far as being a valid measure. And what it can do is it can help focus walking prognoses based on their actual physical presentation and not just the ASIA classification, which is kind of why we like it.

Now there was a recent study that was just published that shows that maybe the accuracy of it drops a little bit when you actually separate out categories. So with ASIA B and ASIA C, it may not be quite as strong. So again, it's a tool. It's something that can help you with prognosis, but it's not gospel truth there.

So how do you do this? Again, some of this might be repetitive, but it's good to go over it again. You use age, the motor and light touch scores at the L3 and S1 level. OK? With those you use to calculate the clinical prediction rule score, plot on a graph to determine the percent score, and what that percent score is telling you is the probability of independent household ambulation at one year post spinal cord injury.

So this is the table that shows you how to calculate. So you look at their age. Look at their motor score for L3, which would be your quadriceps. You get the test score, and you multiply it by the coefficient. This is your minimum score. This is your maximum score. So a negative 10 would be somebody who's 65 or older who has no function in any of those points. Someone with a score of 40 is going to be someone under 65 with full function at all those points. And then there's everything in between.

So from there, you go over here and you plot it on this graph. I think again, Martha probably showed you some of this. But someone with a score of 15 in the clinical prediction rule-- you come up here. You go over here. Somewhere in the upper 60s, like 67%, we'll say. All right. So that's how you can use that.

Where this becomes interesting is, someone with the same motor function and sensory function, but who's a little bit older. You know, they're going to be subtracting 10 off their score. So you go all the way from 15 to five now. And look-- your percentage goes way down. So you can see how age really plays a factor in this clinical prediction rule.

So what we did here is to kind of see, how can we use this clinically? So I headed up, with the help of some people, a quality improvement project on our unit and specifically wanted to look at patients whose walking probability was really hard to determine. So we weren't really interested in the people who we were pretty sure had a low probability of walking or high probability walking. It was that kind of in-between group of people where we really had no idea how to predict this.

So we also wanted to see, is this information beneficial for the patients? Is it beneficial for the therapist for planning care and for goal setting? Does it also predict short-term walking outcomes in rehab, not just those long-term walking outcomes, and also any other factors associated with walking prognosis that we might be able to pick up on.

So what we did is, as we got patients admitted onto the unit, we calculated their walking probability using the CPR. And then we shared that with their primary therapists. And then we asked them, based on their judgment, to share it with the patient or use that information how they saw fit. And then we asked them about it. Did you share it with the patient? Did they find it useful and why? Was it for motivating them? Was it for being more realistic? And then, was it also useful for your plan of care and your goal setting?

We also collected additional data, like cognitive impairments and obesity, to see if those played a factor. Because there is some research out there that shows that those things can actually affect outcomes in this population.

So here's some of the results of the QI project. What we found is that clinicians with less years of experience were more likely to share that CPR info with their patients and find it useful. And when that info is shared with the patients, 76.1% found it useful, mostly for things like being motivating or for being realistic with their expectations. And knowledge of that CPR data did not affect patient outcomes. So it didn't have a negative effect in any way to share that information with them.

And then therapists with all levels of experience on our unit were similar with goal accuracy and patient outcomes. So what we concluded there is that maybe this is beneficial for less experienced clinicians who don't have that clinical judgment or that judgment to pull on for prognosis.

It did not demonstrate strong prediction for walking outcomes in that acute rehab time frame, like it did for the one year outcomes. Impaired cognition and obesity did not actually significantly affect walking outcomes, but we did have a pretty small sample of patients with those factors.

We then focused in on and did the chart reviews on the patients who had really high CPR scores, but really poor walking outcomes in rehab. We kind of wanted to figure out why. And so what we found is that all of them had at least one of these factors, if not many of them-- poor motivation to pursue walking. So walking was not a patient goal. That kind of makes sense. You don't want to walk. You're probably not going to do it a lot and become good at it.

Severe spasticity seem to play a part. History of substance abuse and history of anxiety and/or depression were all really prevalent in the charts of these patients who had really poor walking outcomes. So these might be areas of future research coming.

So what's in the works next? So there's been some clinical practice guidelines that in physical therapy, where they've made recommendations for what kind of outcomes we should use for neurologic population, including spinal cord injury. Pretty soon, some of the locomotive training clinical practice guidelines are going to be coming out, so not only how should we measure these things, but what should we be doing based on research as far as how to do the gait training, and who to do it with?

And then there's another study going on currently at Mercy. I don't know if it's at other sites as well. But they're using activity monitors on patients who have incomplete spinal cord injuries. And then they're tracking their walking outcomes, and they're trying to see, is there something that these activity monitors can pick up to help them predict the walking outcomes?

So again, this is a big focus now, is to see if we can get it right and do the appropriate prognosis for walking for individuals.

And these are the references. So please take a look at these studies. They're actually very good, very well done studies. So if this interests you, take a look, and that's it. Thank you very much.