**Tools for Assessing Individualized Risk for Unintentional Injuries Among Those With Spinal Cord Injury**

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ANN OUTLAW: Thank you all for joining us for this webcast, which is brought to you by the Knowledge Translation for Employment Research Center, or the KTER Center. We're housed at the American Institutes for Research. And I'm your host, Ann Outlaw. This project is funded by the National Institute on Disability, Independent Living, and Rehabilitation Research, or NIDILRR.

Before we begin, I'd like to go over some logistics for our listeners. You can find information, including a 508 version of the presentation slides, on our website at kter.org. Closed captioning is available by selecting the CC button at the bottom of your YouTube window. And this is an on demand webcast, so if you have any questions for our presenters today, please email me at aoutlaw@air.org, and I'll convey these messages to our guests. You can also ask your questions in the evaluation form, which I'll provide later at the end of today's webcast.

Today we'll hear an update from the project A Multidisciplinary Approach to Translating New Knowledge into Practice to Promote Health and Well-being After Spinal Cord Injury. This project is one of a handful of projects funded by NIDILRR for translating disability and rehabilitation research into practice. These are exciting projects as they really practice knowledge translation strategies in tangible ways. At the KTER Center, we take time each year to share how these projects are doing. And it's my pleasure now to share an update from this project.

Today we'll hear about the individual tools for assessing risk of unintentional injuries among those with spinal cord injury. Joining us today are Yue Cao and Chao Li from the Health Sciences and Research Department at the Medical University of South Carolina, or MSUC.

Dr. Cao, are you ready to begin?

YUE CAO: Yes.

ANN OUTLAW: Great, thank you.

YUE CAO: OK, thank you so much for having me. And I will first to introduce the study. And this study was supported by the National Institute on Disability Independent Living and Rehab Research. And we have two purposes for today's presentation. First, I will first describe a study of behavioral factors and unintentional injuries after a spinal cord injury, which is forthcoming in the Archives of Physical Medicine and Rehabilitation.

And then, Dr. Li, will present two individualized tools based on this study. The first tool is to assess the risk of fall related injuries. And the second is to assess the risk of non-fall related injuries.

A little bit of background-- we know SCI is a traumatic injury that may result in permanent sensory and motor loss. And unintentional injuries one of the leading causes of health care utilization, disability, and mortality in the United States. And the people with SCI are more vulnerable to subsequent unintentional injury due to the existing disability, spasticity, weak muscles, and because a pattern of high risk behaviors often leads two SCI, and these behaviors may continue at SCI onset.

For this study, we have a 4,670 participants who met the following inclusion criteria-- traumatic SCI of at least a one year duration, they are at least 18 years of age, and they have a residual impairment from SCI. And all the participants, they completed a self report assessment during 2012 to 2016. We measured demographic factors-- injury characteristics, and the behavioral factors.

Our outcome measure is a self-reported number of times in past year they had been injured seriously enough to receive medical care in a clinic, emergency room, or hospital. Based on the information, we classified the participants into three categories. First, not injured at all. Second, injured with at least one fall related injury. And the third, injured but with no injury related to a fall.

Then we developed multinomial logit model to identify the risk factors associated with the three category unintentional injury outcome.

Here's the results. We found 23% of the participants reported at least one unintentional injury in the past a year. And among these participants, the average number of times injured was 1.8. 11% of participants that reported that at the least one fall related injury. And 12% of participants had at least one injury, but none of them is fall related.

Now, we have four tables. Those tables basically show the multinomial logit regression. And because they are very busy, I will not go through them in details. Because Dr. Li, when he present the calculators, you will see all those predictors.

And if you have interest to this table detail, you can look at our PowerPoint later, or you can look at our publication forthcoming.

So I just gave a brief summary of those tables. First, prescription medication use for pain and a depression, non-medical substance usage, prescription medication misuse, and binge drinking were associated with greater odds of unintentional injury. And we also found that there were some differences between fall related and non-fall related unintentional injuries, especially the ambulation associated with greater odds of fall related injuries, but lower odds of non-fall related injuries.

And here's the link to the individual tools Dr. Li will present those calculators. And if you have interest for our publication and it's forthcoming, I think, next month. And right now, I will turn it over to Dr. Li.

CHAO LI: Thank you, Dr. Cao. My name is Chao Li, and I'll continue to present our two calculators.

As mentioned by Dr. Cao, we have two injury calculators to present today. And the first one is fall related unintentional injury calculator. And the other one is non-fall related unintentional injury calculator. And the first, let's take a look at the fall related unintentional injury. And here we can see a set of variables we included in the calculator. For instance, we have sex, characterized as male and female, and also current age. We can type in the age here. And also, years post injury-- we can type in the actual years post injury.

And then, we have walking status, which was categorized into three groups-- I cannot walk at all, and I cannot walk but need at least one person's assistance, and I can walk without others assistance. Then we have the SCI injury label as cervical, thoracic, lumbar, and a sacral. And then we have four categories of race ethnicity-- Hispanic, non-Hispanic white, non-Hispanic black, and non-Hispanic other. And for income, we categorize it into three groups-- less than $25,000, $25,000 to $75,000 and over $75,000.

And also we have the self perceived weight. It can be underweight, a bit underweight, average weight, a bit overweight, and overweight. The next factor we have here is binge drinking. It is considering all types of alcoholic beverages. How many times during the past month did you have five or more drinks on one occasion? And options are now-- one to five times per month, and six times or more per month. And the next variable here is substance misuse. Basically we ask, in the past three months, did you use substances including cannabis, cocaine, and so on and so forth, for which you did not have a prescription? And we dichotomized, the option as null, not at all, and yes, at least one time.

And then, the next four questions asking about prescription medication use. For instance, the first one is, in the past 12 months, how often did you use prescription drugs for spasticity, and the next one is, for prescription drugs for sleep, and then the next one is, prescription drugs for pain, and then, prescription drugs for depression. And the last variable factor we have here is if they use their prescribed medication for other symptoms, for instance, if they use spasticity medication to help with other symptoms, for instance, problems sleeping, pain, anxiety, and depression. And then if they have any kind of this situation, they choose yes. If they don't, they choose no.

And then, once people pick all of the variables, choose their options, and then click Calculate, the calculator will give us the personalized risk of fall related unintentional injury.

And at the bottom, we have a brief introduction of the calculator and also, the list of variables we included in the model, and also, a source of data, and calculator limitations, and disclaimer, and also the reference.

So next, let's try to choose some characters, mock characters, and see how the calculator works. First, let's just choose some very basic characters with low risk profile, and see how the risk will be. First, let's just choose male, and current age, less type in 50 years old, and 10 years post injury. And first, let's see if people cannot walk at all. And injury level is cervical, non-Hispanic white, and $25,000 to $75,000 income, and average weight. And let's assume they don't have any risk behaviors for in this case, no binge drinking, no substance misuse, and no prescription medication use, and no here. And then once we hit the button Calculate, it will give us the personalized individualized risk of fall related unintentional injury.

And here we have here is based on several assumptions-- the probability of at least one unintentional fall related injury we expect that you have in the next year.

And also we compare one ratio here, it is the individualized risk over the average risk. And here, for instance here, the average risk of fall related unintentional injury is 10.7%, so basically 2.36% over 10.7% is 0.2. This is the ratio. And also, at the bottom, we have very general-- we give general information here about the prevalence of risk of fall related unintentional injury. As mentioned before, the average prevalence of fall related unintentional injury is 10.7%. And also we gave the prevalence of the risk in terms of the three groups of walking status, for instance, for people who can walk independently, the risk is 13-- the average risk is 13.3%. And for people who can walk but need assistant, the prevalence of the risk is 26.5%. And for people who can not walk at all, the risk was 8.2%.

OK, and then next, let's see some choose different characters to see how if each was different options, what the difference will be. We can just refresh the page. OK, here we go. This time we still choose male, the same age, same years post injury, but this time let's choose I can walk but need and at least one person's assistant. And then change the injury label to thoracic. And all the rest we choose the same characters-- average weight, no binge drinking, no substance use, no prescription use.

And let's see how it looks. Now, we can see the risk of fall related unintentional increased to 8.12%. And it means if we-- for people who can walk and need at least one person's assistance, they have more risk of fall related injury than people who cannot walk.

And this time, let's choose people who can walk independently to see how it looks. Similar male here, 50 years old, 10 years post injury. And then we choose I can walk without others assistance, as same thoracic injury, non-Hispanic white, same income, and everything be the same.

And let's see, now, the risk is 4.6%, which is lower than the people who can walk, but they need assistance. So in other words, people who can walk but need assistance, have the highest risk of fall related unintentional injury.

Next, let's see if we choose some high risk behaviors. Male, 50 years old, 10 years post injury. And let's see, people who can walk but need assistance, thoracic injury, non-Hispanic white, average weight. Now, let's choose for binge drinking, let's choose the highest level of binge drinking and then keep the rest as negative. And then, we can see the rates changed from 8% to about over 12%. And we can see if they have binge drinking, they have more likely to get unintentional injury related with fall.

Next, let's change our choice to a more risky behavior for substance misuse. So similar here-- male, 50 years old, 10 years post injury, they can walk but need assistance, thoracic injury, non-Hispanic white, middle income, average weight, and now they still do binge drinking. And they use substances. And for prescription, let's see, for now, we just choose them as never. And now, once we hit the Calculated button, see the risk changed from about 12% to 18%.

Now, we can see the substance use variable can make a big difference here.

OK, next one, let's choose yes to the prescription drugs. And so this time we use all of the risk behaviors. And the male, 50 years old, 10 years post injury, walk but need assistance, thoracic injury, non-Hispanic white, middle income, average weight, they do binge drinking, they use substances, and they use prescription on a daily basis for spasticity, for sleep, for pain, and for depression. And they use their prescribed medication for other symptoms. Now, we can see a dramatic increase of risk from about 18% to 58%. And we can see the prescription drug played a very critical role here. And the ratio compared to the average is greater than 1, 5.5.

OK, that's pretty much for the fall related unintentional injury calculator. Next, let's take a look at the non-fall related unintentional injury calculator. Similarly, we have the same set of variables here, except we change the outcome variable from fall related unintentional injury to non-fall related unintentional injury. And for this calculator, we use, as mentioned before, we use the same set of variables. We just change the estimates and then the algorithm would be different than the fall related.

For a simple example, let's just choose male, 50 years old, 10 years post injury, and they can walk but need assistance, thoracic injury, non-Hispanic white, middle income, average weight, they do binge drinking, and substance use, and also did a prescription medication use. And then we can see the risk of non-fall unintentional injury is 25.92%.

Yeah, but when we do the fall related calculator, the risk was about 58%. We can see that we're using the same characters, but fall related injury has higher risk than non-fall related injury.

All right, that's pretty much what we have today for the two calculators. And thank you very much for your time and attention.

ANN OUTLAW: Thank you so much, Dr. Li and Dr. Cao, for sharing about your new calculators. We heard a little bit about these as they were being developed in a previous version of this webcast in this series presented by Dr. James Kraus. So it's great to see the work that you've been doing in the last few months. It's really taken off.

Can you share with us how practitioners and people with SCI can access these calculators?

CHAO LI: Yeah, sure. We will post our calculator online. And this is the link to our web page. And once we post it, and people can have access, and use our calculators.

ANN OUTLAW: Excellent. Thank you so much. We'll be sure to include this in on the information on our web page, so audience members of today's webcast can have access to that link. Again, you're welcome to download the slides where that link is, as well, and to find more information about today's webcast.

So thank you, again, Dr. Cao and Dr. Li, for sharing this update about your project. Before we close, I'd like to invite you all to fill out a brief evaluation form of this presentation. You can find the link here on the slide. And you can also find it on our website at kter.org.

You may ask your questions for Dr. Li and Dr. Cao for following this presentation, and I'll be sure to relay those questions to them. If you'd like a response to these questions, please put in your email address, and I'll get back to you as soon as I'm able to.

So again, thank you so much for participating today. Thank you both for your time, Dr. Li and Dr. Cao. And I'd like to thank NIDILRR. I'd like to thank NIDILRR for their support for this presentation and for all of our center's activities. So thank you and have a good day.

YUE CAO: Thank you.