Dr. Sunil Sabharwal: Hello and welcome to the Association of Academic Physiatrists podcast, featuring the American Journal of PM&R article from July, 2014 titled Factors Associated with Pressure Ulcer Risk in Spinal Cord Injury Rehabilitation. Today’s podcast will include a question and answer with lead author Dr. Gerben DeJong on research conducted at the Center for Post-Acute Innovation and Research at the MedStar National Rehabilitation Network in Washington, DC. I’m Dr. Sunil Sabharwal, chief of the spinal cord injury service at the VA Boston Healthcare System and assistant professor of physical medicine and rehabilitation at Harvard Medical School and I will be hosting this 15 minute podcast.

Welcome to the program, Dr. DeJong, let’s get started. Could you perhaps start by giving a brief summary of the main findings of this paper for those who may not have read it yet?

Dr. Gerben DeJong: Certainly. I should probably start with the purpose of the study and then back into the main findings here. The purpose of our study was to identify the variables that were associated with the onset of a pressure ulcer in spinal cord injury. Our main finding turned out that it was very possible to develop a very simple risk model to determine the individual patient’s risk for a pressure ulcer in rehabilitation. And what we found, basically, was that coming into rehabilitation with a pressure ulcer was the single best predictor of acquiring a pressure ulcer during rehabilitation. And also we found that simply a FIM transfer score of less than 3.5 was also a good predictor. And beyond that we didn’t find very many predictors.
And both of these things, that is a pressure ulcer on admission and FIM transfer score on admission, can be ascertained very quickly; upon admission, of course. And most pressure ulcer risk models such as a Braden Scale and others involve six to fifteen items, and here we only need two items to have a pretty good predictor of whether or not a person is going to acquire a pressure ulcer during their rehabilitation stay. Using this information rehab centers can develop an individualized risk assessment and deploy the prevention resources that they need to prevent such a pressure ulcer.

Dr. Sunil Sabharwal: So given all the work that has already been done on this topic of pressure ulcer and pressure ulcer risk, what motivated you and your team to conduct this study?

Dr. Gerben DeJong: I think it’s really the persistence of the problem and how little progress we’ve really made. I think we understand it better, but we still see it happening all the time. We see how disruptive it is for the individual; both in rehabilitation and beyond. And we really wanted to take a fresh approach to the problem. And more recently, also, the onset of a pressure ulcer during rehabilitation or during a hospital stay now is a major quality indicator for which there are now financial consequences, or at least there will be financial consequences in the future.

Dr. Sunil Sabharwal: It seems you had a pretty diverse study team, so can you go over who was on your study team and what each of them brought to the study?

Dr. Gerben DeJong: By all means. This was conducted at the MedStar National Rehabilitation Hospital. It was done under the auspices of the Model Spinal Cord Injury Center program. Dr. Suzanne Groah was the principal investigator. This program is funded by The National Institute (for) Disability and Rehabilitation Research. And I was really privileged to work with a great group of
collaborators. On our team – it was really two groups that came together. one was the MedStar National Rehab Hospital team and the other was ISIS/ICOR, which is a boutique clinical outcomes research group based in Salt Lake City, with whom we’ve collaborated over many years and they’re a stellar group.

Our team at the MedStar National Rehab Hospital included Ching Hsieh, who is probably the best project manager, I think, in the business, Dr. Pam Ballard, who is a spinal cord physician, a great clinician who stuck it out with us all the way. We also had a PT, Tara Bouchard, who was a great chart abstractor. And at ISIS/ICOR the lead investigator there was Dr. Susan Horn, who I’ve worked with for many years, and she’s also conducted a number of large national pressure ulcer studies, particularly in long term care. And also with her is Randy Smout, who is a great statistician and one of the best database managers that I know. And also working there is Patrick Brown, a statistician who is a more recent addition to the ISIS/ICOR team.

Dr. Sunil Sabharwal: What was different about your approach to this problem of pressure ulcers from studies that have been conducted in the past? And maybe you could also go over what the types of variables that you took into account were and how this was different from what you had seen before.

Dr. Gerben DeJong: Well, we wanted to take a very comprehensive approach and not just look at a single intervention. For example, you might do a randomized trial, for example, of pushups or on turning or seating systems and such. And everyone’s kind of looking for the magic bullet that will prevent pressure ulcers. We kept asking all the time, “What have we missed?” If you look at the guidelines for pressure ulcer prevention, they’re also pretty generic. The question is could we be more specific.
So what we did is we undertook an observational cohort study and really try to take a bootstrap approach; look at everything we possibly could. So in other words, this was not an interventional study, but an observational cohort study. And so we tried to take an approach that was very robust and we looked at a lot of variables. Pressure ulcer and flap data; we looked at injury data; the admission related data, including severity, functional status, BMI, comorbidities, nutrition, the type of health plan the patient was in, the various therapy activities they’d participated in as far as PT/OT and the kind of nursing care they got, the Braden Scale. We looked at various biomarkers such as albumin and prealbumin levels. And we also looked at things like clinical precautions such as weight bearing restrictions. So it was very, very, very comprehensive including very detailed characterizations of the various therapy activities and nursing activities in the rehab center.

Dr. Sunil Sabharwal: I have a question about how you divided your study groups. Your study included individuals who had a new spinal cord injury and then those who had acquired an earlier spinal cord injury and were rehospitalized for a new condition or complication. And in your analysis you divided the study group accordingly, but later you took a different approach and instead divided the group based on whether they came into rehabilitation with a pressure ulcer or without a pressure ulcer. So what led you to divide the group differently?

Dr. Gerben DeJong: Well that’s a very, very good question. And I think clinically you’d want to divide the group by new and earlier spinal cord injury. And we know that people with earlier spinal cord injuries and who have lived with a spinal cord injury for a while have not only gotten older, but also have anatomic and physiologic changes or responses to spinal cord injury; you know, bone loss, muscle atrophy, you know, changes in bowel and bladder and such. And we just thought that, well, clinically these are going to be somewhat different people.
So what we had was 99 people who came in with new injuries and 60 who had earlier injuries, for a total of 159. And of course, as we expected, the new spinal cord injured folks were younger and the earlier spinal cord injury folks were older. But yet they had remarkably similar demographic health and functional profiles. In fact, they actually had identical rates at which they acquired a pressure ulcer in rehab; exactly 13%. One was 13.1% and the other was 13.2%. So you look at that and you say there’s really not a whole lot of daylight between these groups.

But we found a much starker contrast between those who came into rehab with and without a pressure ulcer, and you can see that in figure one of the article. And among those who came in with a pressure ulcer on admission, 30% of them acquired a pressure ulcer during rehabilitation. And those who came without a pressure ulcer only had a seven percent chance. So in all of our analysis coming in with a pressure ulcer was the single most important marker or risk factor for a subsequent pressure ulcer. It also told us that a pressure ulcer problem is not mainly a rehab induced problem, but is a problem that comes in from the outside and into rehabilitation that then has to be dealt with.

Dr. Sunil Sabharwal: That’s interesting. I guess next can you tell us a little bit about the types of data analyses that you did and why you chose to take the path that you did?

Dr. Gerben DeJong: Certainly. And there are some really shortcomings in this approach and we may have a chance to get into that, but, you know, when you look at a pressure ulcer yes or no, basically we’re looking at a dichotomous outcome. It’s a binary outcome. And for that kind of analysis what you want to do is something like a logistic regression and look at what are the odds of
developing a pressure ulcer and look at the variables that best predict those odds.

We also used a recursive partitioning analysis, or what’s called R-part analysis. And the purpose here was to look at relationships within subgroups, because one of our thoughts was we didn’t see very many predictors when we did the logistic regression. And we wondered whether or not we were missing something and we may have to look into subgroups, even though the overall study group was pretty small, so to speak—only 159 individuals—and partitioning is a little tricky. And we did find some things, but not that much that was all that useful.

Dr. Sunil Sabharwal: That’s interesting; this re-part analysis seems like an interesting approach. I really hadn’t heard of that before. Was there anything that you found that surprised you?

Dr. Gerben DeJong: I don’t know if it’s a surprise, but how little was associated with the development of a pressure ulcer. We turned the tables upside down we looked at everything. And we looked at therapy and everything else in a very, very granular fashion and nothing seemed to shake out. But the only thing that we did really find was coming in with a pressure ulcer, as we mentioned before, and having admission FIM transfer score of less than 3.5.

Now again, these are things that we know upon admission, but there’s little that we found during the course of rehabilitation itself that seemed to be predictive in this particular case. It was, I think, quite surprising to us that for all the things that we looked at how little we uncovered as predictive of whether or not a person acquired a pressure ulcer.
And it also made us look at the literature again. You know, you go back and you wonder what is it that we’re missing, so you go back and you look at the literature. And we came across the Krause and Broderick study back in 2004 and they did a follow up study of 826 individuals and they were unable to demonstrate the efficacy of specific prevention behaviors, you know, doing pushups and all that. Instead, they found that a previous pressure ulcer was the single best predictor, and it’s very similar to what we found. In that case it was a community setting. In our case it was a rehabilitation setting. So that was, I thought, kind of striking and I think our findings in some ways were also corroborated by the literature and seemed to be pointing in the same direction.

Dr. Sunil Sabharwal: And then amongst the variables that you used you also mentioned the Braden Scale, and that has kind of become the gold standard in pressure ulcer risk assessment, but there have been some questions raised about its utility in spinal cord injury. So what did you learn about the Braden Scale with respect to SCI and what role did it play in your analyses?

Dr. Gerben DeJong: That’s a good question because the Braden Scale certainly has become the gold standard here. And the Braden Scale, for those in our audience who are not familiar with it, it consists of six different domains and a score of 6 to 23 and basically the score will determine what the pressure ulcer risk might be. And if you look at table four you’ll see the very small differences in the Braden score between those who did and did not acquire a rehabilitation pressure ulcer; very small standard deviations. And what was interesting, I think, is that all of sudden what you see at one point a person’s at risk and another point they are not at risk. So it was quite striking to me.

The other thing that we did, we did include it in our logistic regression analysis, and it did come in significant, but it added very little power to the
model and it was not as powerful as the other two variables that I mentioned earlier; that is to come in with a pressure ulcer and having a FIM transfer score of 3.5 or less.

Dr. Sunil Sabharwal: So what would you tell a clinician based on your study?

Dr. Gerben DeJong: Okay, I think the first thing I would say is that you only need to know a handful of things about the patient as to whether he or she will develop a pressure ulcer. And I would urge that people put these things into electronic medical record and right away compute a pressure ulcer risk score. And a risk score that might be ranked high, medium or low risk and you could color code it with red, yellow, green. And you want to red flag, of course, the very high risk patients. But also in looking at this, you can also begin to make some tradeoffs between false positives and false negatives. Because everybody who’s predicted to have a pressure ulcer will not get it and also those not predicted to get it may get it.

So in the case of pressure ulcers, you probably want to minimize the false negatives because the costs are so high. So an ounce of prevention is probably worth a pound of cure, so to speak. It’s not rocket science. And I think the beauty of this—this is very parsimonious—of the FIM transfer score is you're going to collect anyway because you need it for payment purposes in rehabilitation, so it’s going to be readily available. And you're going to know upon examination of the patient as to whether or not they’re coming in with a pressure ulcer. So this is pretty low-hanging fruit, so to speak, and it’s a great way to start evaluating patient risk.

Dr. Sunil Sabharwal: And is there anything you would tell policymakers who may want to use the onset or worsening of a pressure ulcer as a quality indicator for public reporting or to be used in a value based payment system?
Dr. Gerben DeJong: Yes, and I think you're very right that we’re using pressure ulcers as an important quality indicator, particularly in the Medicare program now. I think the first thing I’d say is that pressure ulcers are not nice linear, unidimensional phenomena. And not all pressure ulcers are created equal, in a sense. You know, one stage-two pressure ulcer is vastly different than multiple stage-four pressure ulcers. So I think we tend to treat pressure ulcers in kind of a dichotomous way, when in fact it’s a very multifaceted and multidimensional phenomenon. And I would be very careful about how we operationalize this as a quality indicator.

Dr. Sunil Sabharwal: And then do you have a message for researchers doing future studies in this area and any cautions based on what you learned from your study?

Dr. Gerben DeJong: Certainly, and I think the most important caution is to understand the limitations of the study. This was only one spinal cord injury rehabilitation center. And so you have to be careful when one generalizes. There were only 159 individuals in the study group. And it was too small to look at subgroups, but I would encourage other investigators to take the findings of this study and test the risk model that we developed and encourage people to make it better or come up with something even better. So I think that it’s a great study on which to build and do future research.

Dr. Sunil Sabharwal: Thank you very much, Dr. DeJong. Any closing thoughts?

Dr. Gerben DeJong: First of all what I want to say is that the problem that we observed is not mainly a rehabilitation problem. Its origins typically are in acute care or in the community. The other thing that we noticed is that the pressure ulcers that did develop during rehabilitation were stage-two pressure ulcers, and they were pretty much arrested at stage two. They did not progress. And so I think the
rehab team, at least our rehab team is very, very vigilant in this regard. I think the third thing I would say is that it was a very humbling project. Not straightforward at all. This was really hard work. It took enormous persistence. And I really want to thank all of those who persisted with me. And I personally owe a lot to my clinical colleagues, the therapists, the nurses and everyone and the physicians at the MedStar National Rehab Hospital who contributed so much. And I also want to thank the National Institute for Disability and Rehabilitation Research for having the confidence in us to conduct the study. So I think it really goes to show that this effort was a team sport.

Dr. Sunil Sabharwal: Thank you Dr. DeJong. On behalf of the Association of Academic Physiatrists we would like to thank you for listening to this podcast. More information on podcasts and the American Journal of PM&R, including the Journal iPad app, can be found on the AAP website at www.physiatry.org. This concludes today’s program. Thank you.

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