Wearables For Parkinson's Management Transcript

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Introduction to Parkinson's Monitoring

Hello, everyone, and welcome to The Parkinson's Solutions Summit 2.0. I'm your co-host, Dr. Barbara Pickut. In Parkinson's disease, from a clinical perspective, effectively managing motor symptoms and their complications requires a regular and thorough monitoring of how these symptoms evolve over time.

By consistently tracking symptom progression, health care providers can gain valuable insights into the patient's condition. This ongoing observation is crucial because it allows the health care provider to facilitate discussions with the patient about these treatment decisions, adjust medications appropriately, and implement interventions that can significantly improve a patient's quality of life.

Regular monitoring helps identify patterns, predict potential complications, and customized treatment plans to meet the unique needs of each person, with Parkinson's ultimately leading to more effective and personalized care.

Today, we'll be speaking with Dr. Dustin Heldman on wearables and their applications for Parkinson's disease. Dr. Dustin Heldman is the President and Chief Operating Officer at Great Lakes NeuroTechnologies, which is located in Cleveland, Ohio.

Challenges of Managing Fluctuating Symptoms

He received his bachelor's degree from Duke University, and his PhD in 2007 from Washington University, both in Biomedical Engineering at Great Lakes NeuroTechnologies.

Dr. Heldman is currently leading a team of researchers and engineers in a development, clinical evaluation and commercialization of next generation movement analysis systems.

Dr. Heldman has served as Principal Investigator on 12 grants with funding from the National Institutes of Health. Dr. Heldman is an inventor on 46 awarded U. S.

patents. Welcome. Welcome, Dr. Heldman Welcome, Dustin. Thanks, Barbara. I appreciate you having me. Thank you. So I think our viewers, would be curious about what some of the challenges are that they, face and the health care providers, their health care providers face when managing therapy for Parkinson's disease.

Can you tell me about some of those challenges from your point of view? Absolutely. As you and the viewers well know, Parkinson's disease is extremely complex.

symptoms fluctuate weight throughout the day. They can fluctuate across days, and every patient responds differently to therapy. When the patient visits, when a patient visits their doctor, it could be a good day or a bad day.

It could be a good time or a bad time. the the patient's, partner or caregiver may say, well, wait a minute. They're not like that at home. And sometimes patients will perform better when they're at the clinic.

And it can be very difficult for the doctor to get a really clear picture of how a patient is responding to their treatment. They may only see their, their neurologist once or twice a year.

And during that snapshot, it's very difficult to get a true picture of how they're doing at home during their daily activities. And then if the doctor recommends a change in therapy or a change in dosing, it could be a long time before they, they're seen at the clinic again.

And it could take a long trial and error process to get the medication. just right. And in the meantime, they're not responding as well as they could be.

That could be a better treatment, a better therapy, a better therapy schedule that works better for them. And the doctor doesn't know this until they see him during one of these, infrequent visits.

Yes. Yeah. A lot of good points that you brought up there. The motivation sometimes in the clinic, indeed, we as health care providers see that patients seem to outperform or or, as opposed to what is being told to us by, by their caregivers.

Yeah. Very important. So how would your solution look like and how was it developed?

Developing Wearable Symptom Tracking

Sure. So going back 20 years, we have done a number of clinical studies to develop wearable systems for monitoring Parkinson's disease symptoms throughout the day.

we used accelerometer and gyroscope. These are motion sensors that measure acceleration and angular velocity. And in the early 2000, that's when the Nintendo Wii came out.

These motion sensors became much more commonplace, so we were able to develop a system that uses these to quantify Parkinson's symptoms. To do this, we performed a number of studies with, we had patients, come into the clinic, come into the doctor's office, come into our office.

where are these motion sensors on various parts of the body and perform various, motor assessment tasks that are similar to what they would do, in the clinic during a clinical assessment.

some of you may have heard of the UPRS Unified Parkinson's Disease Rating Scale. This is one of the common assessment scales that clinicians will, use during a clinical visit.

It has items such as having the patients tap their fingers, hold their arms out, and so on to evaluate different aspects of the disease. So this is evaluating things like different types of tremor or bradykinin show or slowness.

And these various activities we had patients perform while wearing our motion sensors. We had them do these both when they were on their medication and off their medication, to get a wide variety of symptoms from hundreds of patients.

We videotaped them while they were performing these assessments and then had clinicians rate them, as they would do during a standard, clinical assessment.

And then we did various analysis on the motion data to extract features and the motion data that best represent, their, their symptoms. We then used the scores given by clinicians, combine and with the data from the motion sensors we collected to developed machine learning algorithms.

So these are algorithms now that use motion data to, to rate symptoms, just like a clinician would, during a clinical visit. Now, of course, doctors can't be with you all the time.

They, you know, they can't be following you 24 over seven. So this allows for additional information. And we started with this task based assessment similar to what patients do in the in the clinic.

And this is mainly used for clinical trials for providing an objective outcome measure to see if if a the therapy was was working or not or was effective or not.

So pharmaceutical companies and device companies would use this as part of their therapy, evaluation to get FDA approval to see if, to see if the therapy was working.

This goes back to 2007, when we first got, when our first system went on market and was first, cleared for market by the FDA. Well, that's very, very interesting.

does the system also account for postural instability? So right now, our commercial system doesn't measure postural instability, specifically. there are systems that do that.

That's something we may want to add. And we're getting more into some of the, additional systems, symptoms, and activities every day. We started with this task based, assessment and then moved into continuous passive monitoring, where it's just something that a patient can wear all day and during their activities of daily living.

Clinical Use and Remote Monitoring

And we're currently evaluating things like tremor, slowness and dyskinesia as dyskinesias are a side effect of, over, over medication. Yeah. Very interesting, very, very interesting.

Very, very important work. do you have have you heard from clinicians how how your technologies are helping patients clinically? Absolutely. So while we started being used primarily for research, we have more recently been moving into helping with using these to help with clinical care.

As I mentioned, symptoms fluctuate throughout the day. And what happened was a lot of the people who participated in these research studies versus systems where you said, well, wait a minute, I want to keep using this.

I want my doctor to see how I'm doing. I want to be able to see this. I want to be able to track it. Right. So we've done a few things to help. make this more applicable and more useful in the clinic as well as, improved, the, the use for patients.

So one example is while we started by making our, our own proprietary sensor, now that smartwatches are so commonplace. We instead of having to manufacture our own sensors, accelerometer and gyroscopes, we can use the, accelerometers and gyroscopes that are in common.

Smartwatches like the Apple Watch, the Samsung and Google Watch, and then use that motion data with our validated algorithm. So these are our algorithms still.

We're just using the wearable, the smartwatch, to collect the motion data to evaluate symptoms throughout the day. So we've done a number of studies where doctors have used this information to help with remotely monitoring their patients and adjusting their therapy remotely.

So when the patient when when a patient wears, the system at home, they can see on their phone how they're doing, which helps keep them engaged. But then all of this also gets sent remotely, to their doctor's office so the doctor can check in on them and see how they're responding.

So this way patients can get optimized faster. They can get on a better, therapy regiment, without having to come back and forth repeated times to the clinic.

And then also if the disease progresses or if a patient's not responding as well, doctors can see that remotely and determine if, an adjustment is needed.

Every patient responds differently to medication. So with this it's it's much easier. And it helps to determine a more personalized schedule specific for, for that for each patient.

Yes. Yeah. That's that's extremely important, to, individualize the therapy. And it's an ongoing process, to, to individualize it dynamically, moving forward actively and to have that information stored and also to be able to look back, I'm assuming that, that there's data collected that we can look back at past therapies for that particular person and, and analyze that.

is that the case? Is there is there history that we can absolutely. Everything's stored in a database so that, doctors can look back on this. Some other things that they're using this for to is seeing has symptoms progress.

And if they worsen and determining when someone might be ready for an advanced therapy such as deep brain stimulation or a drug pump. Yeah. We've done studies showing that when patients are monitored remotely, they're, doctors are more likely to recommend them for an advanced therapy than if they weren't.

And patients have, expressed they're more confident in their therapy when they know that their doctors, can track them and see how their see how they're doing over time.

Indeed.

Patient Engagement and Compliance Benefits

So you mentioned a benefit to patients and that they themselves can track. Are there any other benefits to patients that you've come across? It really helps keep them engaged.

when patients and everyone I've talked to with Parkinson's is really engaged, they're really, you know, they want to know about what the latest treatments are.

They want to be able to see how they're doing and when patients can see and track their symptoms over time, it really helps keep them engaged. They're more likely to continue with, with their therapy.

They're more confident in in therapy. And again, if they're if they know that their doctor is going to be monitoring them, they're more likely to want to want to try something, to try something new.

Right. And I'm assuming it would have an impact on compliance as well. Following the drug schedule as prescribed is that find that that's the case. Absolutely.

We've done studies that, even showed when patients can see their symptoms, can see when they're starting a new therapy, how their, symptoms, are gradually starting to improve, that they're more confident that if some new therapies can cause temporary side effects like nausea.

But when patients see that they're starting to improve, they're more likely to persist with this. And, and really, that continue with it to, to get the benefit of that, therapy.

Okay. It's very interesting. Thank you. how would you envision your technology being used in the future? Give us peek. Give us a peek behind the screen. Sure. Sure.

So we really envision this being a part of, precision medicine, where this can help determine personalized schedules. again, as each patient responds different, there's it shouldn't be that each patient has the same dose of medication every four hours.

You could have very individualized dosing that this could help automatically determine. So by using, artificial intelligence algorithms with this information, it could really help determine and individualized, dosing regimen for a specific, patient.

Future of Precision Dosing and Closed-Loop Therapy

Additionally, it can it, will be able to detect things like when symptoms wear off and if they're wearing off before the next scheduled dose, maybe it can notify them that it's time to either take their medication or try a rescue medication.

before it's time to take their, next, next scheduled dose. And then also something we're working on is a lot of therapies, such as deep brain stimulation, drug pumps that are provided continuously.

These need to be adjusted over time. And symptoms may vary with activity. So we're working to close the loop where our sensors can measure symptoms and then adjust therapy accordingly in real time.

So with this type of with with wearable sensors, patients could have therapy that responds and adjusts specific to what they're doing and how their symptoms are at that specific time.

That's, that's the future, right? That's where we're going. That's very interesting. And I'm assuming that the data that you collect, of course, is, protected information under HIPAA.

Absolutely. Yeah. both HIPAA and GDPR, we're we're also on market in Europe as well as the US. Okay. Wonderful, wonderful. How long have you been in the, in Europe with your, tech?

Oh, we back in 2007, we first got approved in the US, and then I think it was 2009 that we received our C mark and started in Europe. So, 2009, 2010, somewhere around somewhere around there.

So it's been a while. Okay. And in, in the function of clinical studies at that time or. primarily for or, research use, although our latest product, the one really targeted towards consumers, it's called kidneys.

Are you the one that uses the smartwatch that's only came out in the last few years as smartwatches became common? first in the US, maybe, I'm trying to remember in the last few years and then a little bit more recently in Europe.

Okay. But, we're cleared for sale in the US, Canada, EU, UK and Australia currently. Wonderful. How can patients get more information about this and and or health care providers?

How can they find you contact or. I would encourage them to visit our website. www.kinesiau.com for the product or. www.kinesiau.com Okay. Our company is Great Lakes Neurotechnologies glneurotech.com.

I will say that in the US the system does require prescription. So I would encourage you to talk to your doctor, about it. anyone can download the app from the, Apple App Store, but it'll just be a demo until, until that we receive a prescription.

Understood. Very interesting. Well, I want to thank you very much. I think this is, brought, a new perspective to, to many people, and, people curious can can find you find more information about it.

Privacy, Availability, and Cost

so it is available in the States on prescription. and people can talk to their healthcare providers about, the, Great Lakes NeuroTechnologies at kinesiau.com, they can look that up.

Dustin, I'm curious, how much does this cost people to, to have such a wearable? Sure. So one of the reasons we moved from making our own sensors to going to the common consumer smartwatches was to keep costs low.

So if you already have a compatible smartwatch like the Apple Watch, like the Google Pixel or Samsung Galaxy Watch, there's no additional, hardware to buy.

this is the standard watch that, you know, you can get commercially, and it's just an app that you're downloading. We are not charging patients at this time to, to install the app or to or to use it rather, it's the it's on the clinician side.

Doctors can access your data remotely through our portal. So instead we bill the doctors for access to the data. And then doctors can bill, your insurance under remote patient monitoring billing codes for their time spent reviewing the data.

for you using this remotely and for discussing the data with you. So we're not we're not charging anything to patients directly. Again, doctors will can bill for their time spent reviewing the data and and discussing with it with you and then our businesses with between the At and good clinical offices.

I see okay. Well thank you very much. That's very interesting. So thank you so much for being with us today. I've learned a lot and I appreciate your time.

Thank you. Barbara, I really appreciate the time as well.