Modern MS Management: Leveraging Technology to Support Brain Health

Announcer Intro:
You're listening to *On the Frontlines of Multiple Sclerosis* on ReachMD. And now, here's your host, Dr. Gates Colbert.

Dr. Colbert:
Welcome to *On the Frontlines of Multiple Sclerosis* on ReachMD. I'm Dr. Gates Colbert. Joining me to explore how new and emerging technologies are reshaping care for patients with multiple sclerosis, or MS, is Dr. Victoria Leavitt. Dr. Leavitt is the Director of the Leavitt Lab at the Department of Neurology as well as an Associate Professor of Neuropsychology at Columbia University.

Dr. Leavitt, thanks for being here today.

Dr. Leavitt:
Thank you so much for having me.

Dr. Colbert:
Well, Dr. Leavitt, let's dive right in. How has the use of technology in MS care shifted in recent years?

Dr. Leavitt:
Thank you for introducing this really exciting and important topic. I think that there are a lot of things to talk about under the umbrella of novel technology for MS and how it's affected care. I'm a neuropsychologist, and I study cognitive changes that come along as part of the symptomology of MS, so I'll focus on that.

But even before we get into that, I think that there's a lot of mystery surrounding the idea of digital technology, digital platforms, data-driven decision making, and all the types of terminology that we hear in medicine and healthcare these days. And so I want to try to quickly demystify this a little bit and hone in on a couple of the key areas.

First and foremost, we hear about artificial intelligence all the time, right? And close along with AI is machine learning. And these two things are very closely related. Artificial intelligence is really a broad umbrella term embodying the field that tries to create intelligent machines, mimicking human-like thinking and capabilities, whereas machine learning is a subset of AI allowing systems to learn from data that improve over time through modeling and through input of new data.

And I think that a lot of these methods are super exciting, but also a black box, where we push data in big data models, and it spits patterns out. And these patterns may not have been visible to us before. Because they're latent, they're underlying, and these modeling methods allow them to come to the surface. And that's exciting because we're able to recognize something that can potentially drive informed decision making.

But what I really want to highlight is that all of this always comes back to the end user, which is the clinician the human being and the decision making that happens between the clinician and the patient. So in a way, while we can be enamored with these new novel techniques, I like to use the analogy of the telephone. The telephone made communication a lot easier, but it didn't make the things that we were saying any smarter. So it's all going to come down to the user and what the questions we're asking of these models will be.

Dr. Colbert:
And more specifically, how are digital tools helping us better detect and monitor cognitive changes in patients with MS?

Dr. Leavitt:

We've been studying and working to understand cognitive decline in MS for about three decades now, and we use this collection of measurement tools that allow us to quantify somebody's cognitive status. At this point, we're getting up against a challenge that needs to be surmounted, which is that our measurement tools are limited in what they can tell us about change over time.

So I like to think about the measurement tools that we use in medicine that are most useful to us things like a blood pressure cuff or a body temperature thermometer. These are cheap, fast and easy. They're non-invasive. They're reliable and accurate, and we can use them as much as we want to get a reading that gives us something very important about the clinical status of our patients.

We need a tool like that for cognition that can serve as a proxy of brain health. Some of these traditional paper and pencil tools are falling short in that department. That's where digital tools might have an opportunity to fill in the blanks by providing us with something much more precise and beyond the things that we've been able to capture with these analog tools up until now.

Dr. Colbert:
For those just tuning in, you are listening to *On the Frontlines of Multiple Sclerosis* on ReachMD. I'm Dr. Gates Colbert, and I'm speaking with Dr. Victoria Leavitt about new technologies that can help us better manage MS.

So, Dr. Leavitt, I'd like to ask you about how these tools can help us personalize treatments for our patients with MS. When it comes to imaging, what new or emerging technologies are helping us better tailor treatment?

Dr. Leavitt:
I've done a lot of research with advanced imaging methods, and there's a lot of exciting tools that can be used in research. Things like magnetic resonance spectroscopy MRS which actually allows us to estimate brain temperature, which was work we were doing in my lab for some time. And then there are a lot of other novel advanced MRI techniques that are emerging now for research purposes.

It's not something that's been yet translated for clinical care, so I think that while there is a lot of reason for optimism and excitement, we have to temper that with the need to take careful steps as researchers to ensure the validity and the rigor behind these advanced imaging techniques before they're rolled out for clinical care.

Dr. Colbert:
Now, when it comes to engaging patients in their own care, what tools have you found particularly helpful?

Dr. Leavitt:
Many of my patients are most drawn to the types of things that we can exert some control over. As human beings, we want to have some control. And I think that one thing that MS robs people of is their sense of control because there's so much uncertainty. And you can do everything right, you can tick all the boxes, and you can sleep well, eat well, exercise well, and take care of yourself and still have an exacerbation and still feel terrible on a day-to-day basis for reasons that aren't known and understood.

So it's this unpredictability of the disease course that is the torture that people with MS live with. One of the ways that I like to work with my patients is by focusing on those aspects of life that we can have some control over in the hopes that we are optimizing our cognitive health. And the things that the evidence points to in regard to optimizing our cognitive health for all of us include exercise particularly, aerobic exercise. We want to elevate our heart rate. That is very good for our brain. There's very solid evidence to suggest that.

Social support is super important. So not being alone in this journey is something that people can actually initiate on their own. They can join a support group. They can reach out to friends and family. Just ensuring that there are people around to support us on our journey. Proactive engagement in our own healthcare of course, we always want to recommend diet and good sleep hygiene.

These are things that are very basic, but usually, if we itemize them all, we can see that there's one area that requires a little bit more attention. So those are the things that I think patients really can lean on in terms of taking their care into their own hands.

Dr. Colbert:
And finally, Dr. Leavitt, if we look ahead for a moment, what emerging technologies or trends are you most excited to potentially integrate into MS management?

Dr. Leavitt:
Thanks for that question. I'm really excited about some of the things that we're doing here in my lab, and it leverages work that's been done by other groups too, and it also leverages digital technology.

So with regards to cognition, I think there are a couple of hopeful directions. One is spontaneous speech analysis. So the words that come out of our mouth spontaneously can actually be captured. And variables from that speech can be quantified using algorithms, and it can show discriminative validity. So for instance, it can allow us to know whether somebody has MS or not. And this has been used ubiquitously across neurologic populations, and it's really quite exciting.

Now, most of the time the variables that are being extracted from spontaneous speech are giving us indications of motor speech. But in my lab, we've been extracting lexical and semantic features as well as parts of speech so that we can get at the language aspect of speech the cognitive aspect of speech so that spontaneous speech becomes a proxy of cognitive health. We think that this is a really exciting way to look at a naturalistic variable and know something about what's going on with folks outside of the context of formal objective cognitive tests.

What we've specifically been doing is recording a two-minute speech sample from patients and asking them to tell us the best day they ever had. We record that speech sample. We put it through a semi-automated pipeline and extract eight lexical and semantic features as well as 14 parts of speech. And what we're able to find is that the use of language among people with MS is different. It diverges from that of age- and education-matched healthy controls. We also find this to be very sensitive to change over time, and that's a really big one. We need to have outcome measures that detect change over time, and so these are variables that we're trying to develop in my lab that will give us an opportunity to capture that change.

We've also developed a digital cognitive test the language and memory test which takes four minutes to self-administer. It's an iPhone-based test right now. And we've administered this to over 1,000 people worldwide in 12 countries on five continents. And what we're finding is that it's very sensitive. It appears to be very sensitive to differences in cognitive status, even among people who don't speak English, people with low or no education. We're administering it right now to indigenous people in the Bolivian Amazon these are people who've never even seen technology.

All of this is being done in order to understand our brain's cognitive function beyond the types of things limit our ability to measure cognitive function, which are the confounds of things like educational attainment and cultural differences. All of this research is predicated on the notion that our brain has existed for hundreds of thousands of years, and the cognitive functions that our brains engage in extend well beyond the books that we've read, the education that we've had, and the occupation that we've engaged in. Our brain's cognitive functions are bioevolutionarily ancient, and if we could tap into that, we'd be getting at something that's very basic and very highly relevant to cognitive health, brain health, and overall health particularly for people with a disease like multiple sclerosis.

Dr. Colbert:
And with those key takeaways in mind, I want to thank my guest, Dr. Victoria Leavitt, for joining me to discuss new technologies in multiple sclerosis care.

Dr. Leavitt, it was great having you on the program.

Dr. Leavitt:
Thank you for having me.

Announcer Outro:
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