Enhancing Multiple Sclerosis Care Through Digital Cognitive Assessment

Announcer:

You're listening to *On the Frontlines of Multiple Sclerosis* on ReachMD. On this episode, we'll hear from Dr. Mark Gudesblatt, who's a neurologist at NYU Langhone Health. He'll be discussing his study that focused on how cognitive impairment can impact multiple sclerosis patients' quality of life. Here's Dr. Gudesblatt now.

Dr. Gudesblatt:

We've employed digital technology to help improve my insight into understanding what the patient's experience or the disease's impact is, and to help me understand if there's a change, because if I put you on a medicine, I want to know if it's working. When you look at multiple sclerosis, a 10 or 20 percent change in cognition or walking may be critical things, but don't think the doctor sees it. They spend 15, 20, 30 minutes with you. They're not in your life, and they don't see the day-to-day variability or the reservoir. So the first thing I was interested in was cognition, because cognition really runs the brain. The brain is the thinking computer. So we took this computerized battery that looked at multiple dimensions of how the brain thinks—attention, information processing, multitasking, verbal, visual, spatial, memory, motor planning—and we validated that battery against four-hour neuropsych testing, and it was 86 percent as sensitive and also added value.

So here's this battery which could quantify where you are today, and I also could look in a year. And like an MRI, it's 30 or 45 minutes. It's a point in time, and you can create a trajectory. So we even looked at fatigue and depression as it impacts the battery, and then we actually looked at the traditional way neurologists in clinical trials measure thinking in people with MS, and that's called the Symbol Digit Modalities Test, or SDMT, and that's a 90-second measure. And what we've discovered is that the SDMT misses multiple important domains in cognition in people with MS. It doesn't measure them. It can't tell if they're impaired or not, so using that as the gold standard doesn't really work. And so with this kind of testing, we've now collected information about cognitive impairment or profiles why someone won't be employed or can't drive a car. And then we look at multiple sclerosis where you've heard the expression "benign MS." You've had it so long, you're physically not impaired. Well, there's a good percent of people who are cognitively impaired and physically able—cognitively disabled, fatigued, or depressed—so benign MS is not so benign. And then we related that battery and physical disability, fatigue, and depression to quality of life. And for quality of life, you could factor out fatigue, depression, and physical disability. Quality of life is driven by cognition, which is not a surprise because cognition really is the difference between employment, driving, fall risk, independence, medication management, social role participation: all the things that doctors should be aware of, but never come up in the visit.

So when you look at quality of life being cognition, driving independence, fall risk, or crossing the street, it's more complex than an EDSS score. Life is complicated. So to understand disease impact, you need to measure people's functional performance, how they think, how that translates to their real world, how they walk, their driving safety, and their med management.

So we also took this computerized battery—which relates to fall risk, driving, and employment—and we related it to quantitative measures of MRI, brain volume, white matter volume, white matter damage, thalamic, and cortical, so it's a big spreadsheet of what the MRI is telling you. And so imagine doing this with MRI—walking or gait. You now get real information like GPS in an airplane. To make it even better, we took the cognitive data and created a model where the computer could recognize the patterns where we can't as humans, and—with 300 people over three years—taking the computer, making a model and then testing the model, and, on the last piece of the data identifying if this could help as a clinical advisor and help the doctor say to the patient, "You're falling off your trajectory; this is where you should be; this is where we want you to be. And I'll tell you what's going to happen if we continue to do nothing, and

the answer is, with a high degree of likely, we could tell if you are going to be employed, if you are going to drive, what your fall risk is, what your fatigue and depression is, and we could predict what your quality of life is."

Announcer:
That was Dr. Mark Gudesblatt talking about the impacts of cognitive impairment on multiple sclerosis patients' quality of life. To access this and other episodes in our series, visit *On the Frontlines of Multiple Sclerosis* on ReachMD.com, where you can Be Part of the Knowledge. Thanks for listening!