

## Should We Routinely Monitor Walking in Patients with Multiple Sclerosis?

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### Abstract

Walking is frequently affected by multiple sclerosis (MS), and mounting evidence demonstrates the impact of walking limitations on the lives of our patients, based on self-report measures and clinical assessments. While assessing the various aspects of walking can be complex and time-consuming, simple tools have been validated, which open the door to routine quantitative measurement of walking in the clinical management of our patients. The use of newer, widely available, and relatively affordable technologies, may improve the feasibility of such measurements, and potentially bring them into the patients' own environment.

### Keywords

Walking, outcome measurement, comprehensive management, multiple sclerosis

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A growing body of evidence demonstrates the importance of walking limitations in multiple sclerosis (MS). At the same time, there is increasing pressure on health care providers to monitor the outcomes of their interventions. Owing to its impact on our patients' functional status, quality of life, and health, walking appears as an essential parameter to measure and follow over time. However, there are practical obstacles and still unanswered questions regarding the measurement of walking in the management of MS.

### Walking is Commonly Affected by Multiple Sclerosis and Walking Limitations have an Impact on the Lives of our Patients

It is a well-known fact that MS frequently affects walking. Indeed, widely used instruments purporting to measure the severity of MS-related disability, such as the Expanded Disability Status Scale (EDSS) and the MS Functional Composite (MSFC), incorporate some characterization of walking limitations, such as decreased walking speed or walking distance, or the need for assistive devices. Recent publications have provided figures confirming our empirical knowledge. For example, in a survey of over 1,000 individuals with MS, 41 % reported difficulty walking, and 13 % of those stated that they were unable to walk at least twice per week.<sup>1</sup> Another cross-sectional study from Europe found that 36 % of over 2,000 MS patients reported problems with walking or mobility.<sup>2</sup> That study also sought information from physicians. Quantitative measurement of walking with the Timed 25 Foot Walk (T25FW) was available for only 5 % of the patient sample (the physicians were instructed to provide these data if available, but not to perform the T25FW solely for the purpose

of the study). This finding illustrates that, while walking limitations are commonly reported by patients, they are not frequently quantified using a validated measure.

Associations between walking limitations and various aspects of the life of individuals with MS were observed both from the individuals' perspective, and from clinical evaluations. For example, in the survey from Larocca mentioned above, a majority of individuals with walking limitations reported that this problem affected their daily life, and 70 % found that it was the most challenging aspect of their disease.<sup>1</sup> Several studies have shown correlations between quantitative measurements of walking (speed or distance) and major aspects of daily activities, (e.g. need for caregiver assistance, work/employment)<sup>3</sup> or health care utilization.<sup>2</sup> While these associations do not prove direct causality, and keeping in mind that other important consequences of MS (e.g. cognitive impairment) also impact functional status, they suggest that monitoring walking may provide information regarding our patients' challenges and needs. Other negative consequences of walking limitations should not be ignored, such as comorbidities linked to immobility (e.g. osteoporosis and obesity), and injury from falling.

### Which Aspects of Walking should be Measured?

Walking is defined by the World Health Organization as '...moving along a surface on foot, step by step, so that one foot is always on the ground, such as when strolling, sauntering, walking forwards, backwards, or sideways'.<sup>4</sup> The simplicity of this concept contrasts with the variety of means to identify and monitor walking limitations. These can be classified

into: clinical observations, performance tests, self-report measures, and ‘ecological’ measures. Clinical observations can be anecdotal or standardized as in a rating scale (e.g. Dynamic Gait Index). Performance tests typically involve asking the patient to walk at a fast or self-selected speed, on a pre-determined distance (e.g. T25FW, 10-meter walk) or during a prespecified time (e.g. 2- or 6-minute walk), or performing a more complex task involving walking (e.g. Timed Up and Go), and recording a quantitative measurement (most commonly time or distance).

Both clinical observations and performance tests are performed infrequently, in a controlled environment, and over a short time period, in the context of a clinical encounter. Therefore, they may not reflect fluctuations in walking performance, or challenges faced while performing various activities over the course of the day. Self-report measures, such as the MS Walking Scale-12, may provide some of this information. Ecological measurements quantify physical activity and walking, usually over the course of several days, by having the patients wear some type of motion sensor (e.g. oscillometer)<sup>5</sup> while carrying out their usual activities.

To further illustrate the complexity of the issue of walking, most of the global measures mentioned above fail to address the underlying neurologic deficits (e.g. weakness, spasticity, ataxia, sensory loss, cognitive dysfunction) or contributing comorbidities (e.g. musculoskeletal problems) causing the walking limitations. Nor do they characterize the patient’s gait pattern, which often yields important clues regarding these causal factors. Yet, this information is important to guide clinical decisions. However, global measures of walking can be seen as screening tools, which alert the clinician to a deficiency (as cross-sectional assessments) or to a change in status (as longitudinal assessments), which can lead to more in-depth questioning and evaluation.

## Pros and Cons of Routine Measurement of Walking in a Clinical Setting

There are many reasons to monitor walking in MS patients. Worsening of walking performance may be a sign of disease activity, which is an important consideration in the management of disease-modifying therapies (especially when taking into account the recently introduced concept of ‘disease activity-free status’). One study in progressive MS patients found that change in walking speed was significantly related to long-term (after 5 years or more) self-reported impact of the disease and self-reported walking limitations.<sup>6</sup> Since it is established that walking represents a significant component of MS-related disability, change in walking performance can be useful in assessing the need for other interventions, such as symptomatic

therapies, rehabilitation, and support services. Furthermore, walking is a meaningful parameter to follow in assessing the efficacy of these interventions, or potential side effects of various treatments (e.g. increased weakness from symptomatic medications for spasticity).

However, potential obstacles should not be ignored. Practical concerns include the lack of time or space to perform an evaluation of walking, particularly in terms of longer tests such as the 2- or 6-minute walk. Another consideration is the lack of consensus on which measure(s) to use. Several publications have proposed to combine a short walking test and a self-report measure as core measures of walking in a clinical setting,<sup>7,8</sup> while other measures can be added at the clinician’s discretion depending on the purpose of the evaluation. Furthermore, while values were proposed as to what constitutes a clinically meaningful change for some of these measures (e.g. 20 % change on the T25FW) in the context of research, further evidence is needed to determine what constitutes a threshold for potential treatment decisions in an individual patient, and to ascertain whether infrequent assessments (typically twice per year) are sufficient to detect a ‘true change’ within the inevitable ‘noise’ of any measurement tool.

Some of these matters may be addressed by using mainstream and relatively affordable technology, such as smart phones and electronic tablets, to perform standardized assessments in various settings, including potentially the patient’s usual environment, allowing more frequent measurements without involving clinician time, and transmitting the information directly into the patient’s medical record. Preliminary data from various groups suggest that this approach generates valid measurements, which compare favorably to traditional clinician-driven testing.<sup>9,10</sup>

## Conclusion

Lessons can be learned from other clinical populations. In the elderly, walking speed has been proposed as the ‘sixth vital sign,’<sup>11</sup> based on its correlation with concomitant and future functional and health outcomes. In MS, accumulating evidence, and the availability of user-friendly validated measurement tools, build a case for integrating quantitative monitoring of walking into the routine comprehensive care of our patients. Undoubtedly, obstacles remain, and important questions still need to be answered. However, large-scale ‘real world’ use of these tools will also help address these concerns, to the ultimate benefit of our patients and their loved ones. And we should not forget other aspects of mobility inside and outside the home environment (e.g. wheelchair mobility, driving, use of public transportation), particularly in patients who have lost the ability to walk. ■

- Larocca N, Impact of walking impairment in multiple sclerosis: perspectives of patients and care partners, *Patient*, 2011;4:189Y201.
- Pike J, Jones E, Rajagopalan K, et al., Social and economic burden of walking and mobility problems in multiple sclerosis, *BMC Neurol*, 2012;12:94.
- Goldman MD, Motl RW, Scagnelli J, et al., Clinically meaningful performance benchmarks in MS: timed 25-foot walk and the real world, *Neurology*, 2013;81:1856–63.
- d450 Walking, Sect. Activities and Participation, Chap. 4 Mobility, in World Health Organization International Classification of Functioning, Disability and Health (ICF). <http://apps.who.int/classifications/icfbrowser/> (accessed September 20, 2014).
- Snook EM, Motl RW, Gliottoni RC, The effect of walking mobility on the measurement of physical activity using accelerometry in multiple sclerosis, *Clin Rehabil*, 2009;23:248–58.
- Bosma L, Kragt JJ, Polman CH, Uitdehaag BM, Walking speed, rather than Expanded Disability Status Scale, relates to long-term patient-reported impact in progressive MS, *Mult Scler*, 2013;19:326–33.
- Bennett SE, Bethoux F, Brown TR, et al., Comprehensive Management of Mobility Impairment and Complex Symptoms in Multiple Sclerosis: A Focus on Walking, *Int J MS Care*, 2014;16(Suppl. 1):1–11.
- Gijbels D, Dalgas U, Romberg A, et al., Which walking capacity tests to use in multiple sclerosis? A multi-centre study providing the basis for a core set, *Mult Scler*, 2012;18:364–71.
- Rudick RA, Miller D, Bethoux F, et al., The Multiple Sclerosis Performance Test (MSPT): An iPad-based disability assessment tool, *J Vis Exp*, 2014;88:e51318.
- De Jager P, Prasad S, Paskavitz J, et al., MSCODES3, Towards the characterization of neurovisual function in multiple sclerosis using a smartphone platform, *Multiple Sclerosis Journal*, 2013;19:(S1):500
- Fritz S, Lusardi M, White paper: ‘walking speed: the sixth vital sign’, *J Geriatr Phys Ther*, 2009;32:46–9.