Impact of Auditory Cueing on Gait Outcomes in a Patient with Primary Progressive Multiple Sclerosis

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Purpose

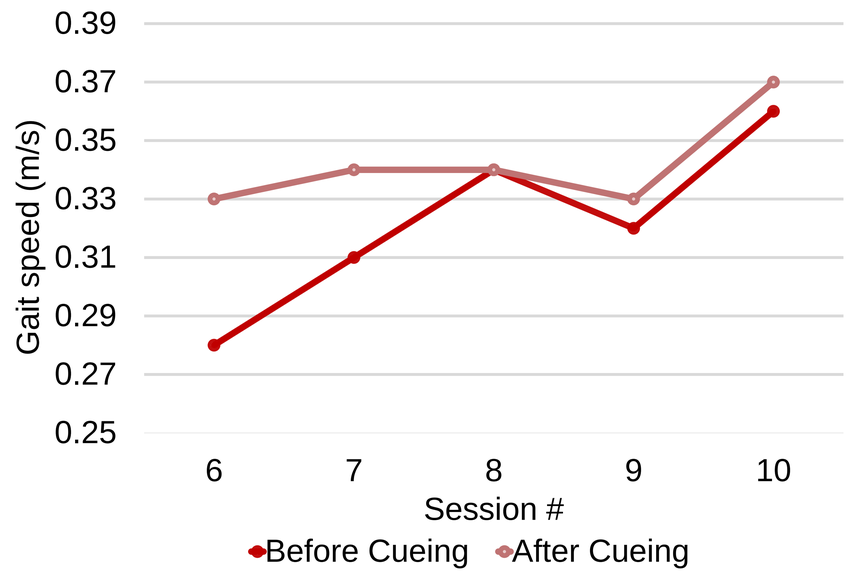
Relevant clinical symptoms of multiple sclerosis (MS) include fatigue, gait impairments, and weakness. While the less common sub-type, primary progressive multiple sclerosis (PPMS) leads to the accumulation and gradual worsening of these deficits, resulting in functional impairments that do not go through periods of remission. Gait dysfunction is noted as one of the primary features of the disease, as up to 75% of individuals with MS have been estimated to report mobility problems due to walking impairment. Some specific gait deficits observed in MS that are also positively impacted by auditory cues are decreased gait speed, cadence, and stride length. The purpose of this case study was to validate an auditory cue as an intervention to improve gait parameters in an individual with PPMS.

Case Description

- 74-year-old female with PPMS
- Admitted to inpatient rehabilitation facility due to complications from COVID-19
- Prior level of function: lived in a two-story home with her spouse, able to complete ADLs and ambulate independently at home and in the community with a rollator
- 6 Meter Walk Test (6MWT) at evaluation: 160', well below the age-matched norm of 471 meters (1545')
- 10 Meter Walk Test (10MWT) at evaluation: 0.24 m/s (limited household ambulator)
- MS-related fatigue contributed to decreased activity tolerance
- Poor static and dynamic balance
- Decreased right foot clearance during gait

Outcomes

	Initial Eval	Start of Cueing	Post-Cueing
Gait speed	0.24 m/s	0.28 m/s	0.39 m/s
6MWT	160'	---	380'
MSWS-12	---	55/60	49/60
ABC	---	54%	61%



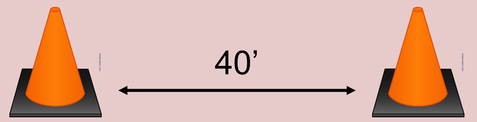
Clinical Merit

Current evidence for the impact of auditory cueing on gait parameters in the MS population is focused on relapsing-remitting MS (RRMS), limiting the application of this data to individuals with PPMS.

There are fewer treatment options for those with PPMS, further emphasizing the importance of finding mechanisms that lead to improvements in function and therefore quality of life for this population.

Intervention

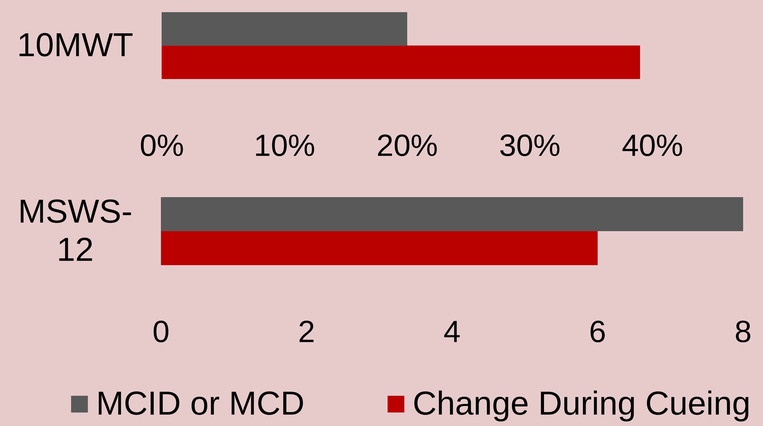
The first 5 sessions consisted of conventional physical therapy (PT), including strengthening, balance, and gait training with a device and therapist instruction. The second 5 sessions focused on auditory cueing during gait for 30 minutes of each session.



- 2 bouts without metronome
- 8 bouts with metronome (40-52 bpm)
- 2 bouts without metronome

Each session began at the patient's comfortable gait speed (~40 bpm), then was increased by 1-2 bpm after each bout without patient knowledge.

Results



Conclusions

- Auditory cueing intervention led to improvements in gait speed, patient-perceived walking ability, and confidence in a patient with PPMS.
- The patient demonstrated a carryover effect by increasing her gait speed each day.
- Auditory cueing is worth consideration to incorporate into PT treatment plans for this population and requires further investigation.