Assistive Device Training Results in Improved Functional Mobility and Altered Motor Network Connectivity in People with MS

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DATE: June 3, 2016 PRESENTED BY: Michelle H. Cameron, MD, PT, MCR

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Disclosures

- Dr. Cameron has no relevant disclosures
- No off-label use of medications will be discussed

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Outline

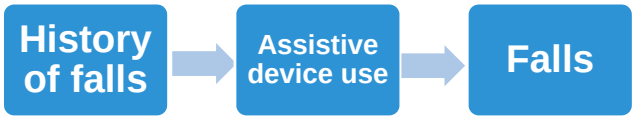
- Background
- Study Design
- Results
- Discussion

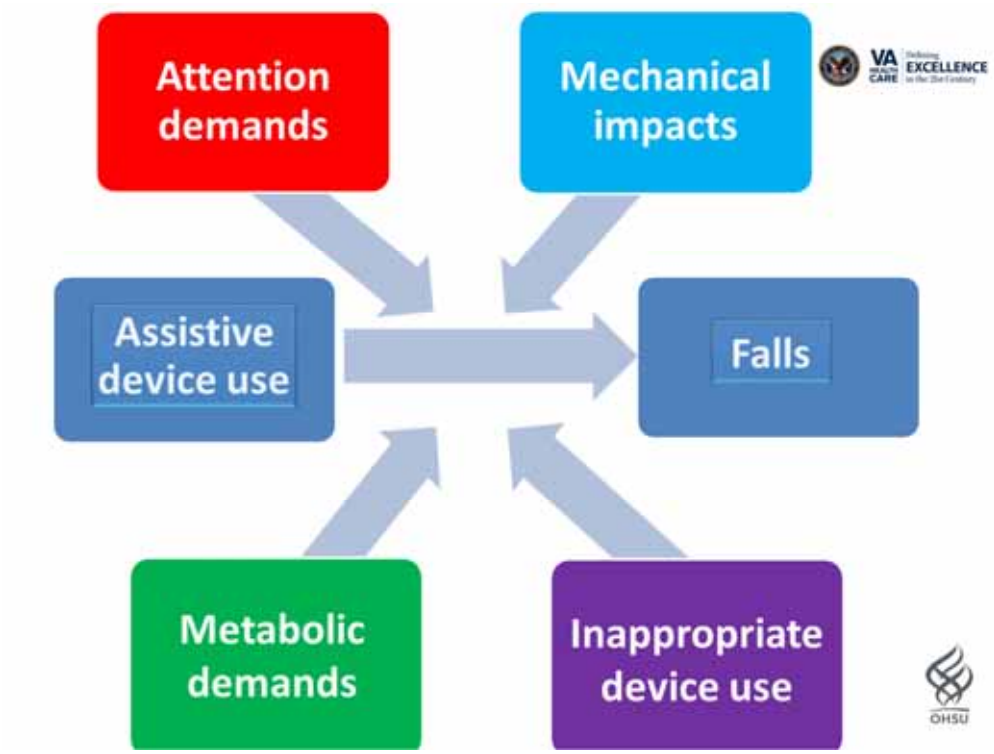
Background

- People with MS fall frequently and have impaired functional mobility
- Assistive device use is the most consistently associated risk factor for falls in people with MS
- People with MS have reduced functional connectivity within the supraspinal sensorimotor network, which contributes substantially to mobility impairments

Why are assistive devices associated with falls in people with MS? Conceptual models

Mengru Wang, MPH; Michelle H. Cameron, MD, PT





Study Design – Pilot study

To optimize study design and implementation and estimate effect size for a full scale trial

40 people with MS

Inclusion criteria

- 1 or more falls in the previous year,
- age > 18 yo,
- able to walk 25 feet,
- use an assistive device,
- right handed

Exclusion criteria

- significant UE weakness or tremor,
- more than 1 hour of assistive device training in the previous 3 years

Randomized to:

- 6 weekly 40-minute 1-on-1 assistive device training sessions, or
- wait list control

Outcome measures: at baseline, 6 weeks and 3 months later

- T25FW
- TUG
- 2MWT
- MSWS-12
- Four-square step test (FSST)
- Falls
- FcMRI

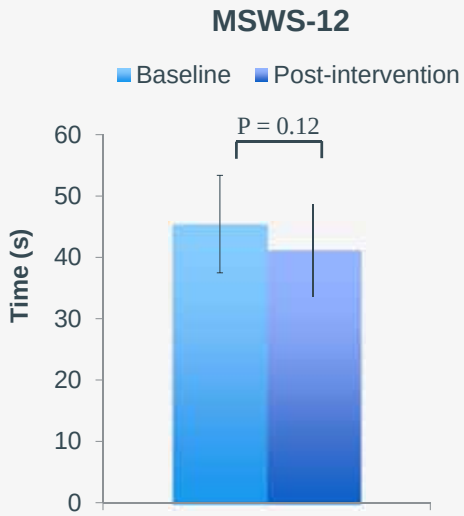
Assistive Device Training

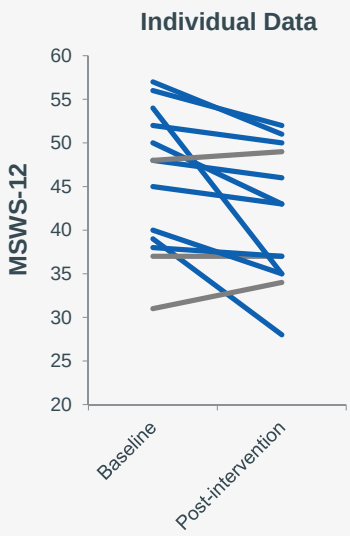
- Six 40-minute 1-on-1 sessions
  - Device selection and fitting
  - Training on level and unlevel surfaces
  - Training on stairs, while turning, and in small spaces
  - Dual tasking with visual and auditory distractions

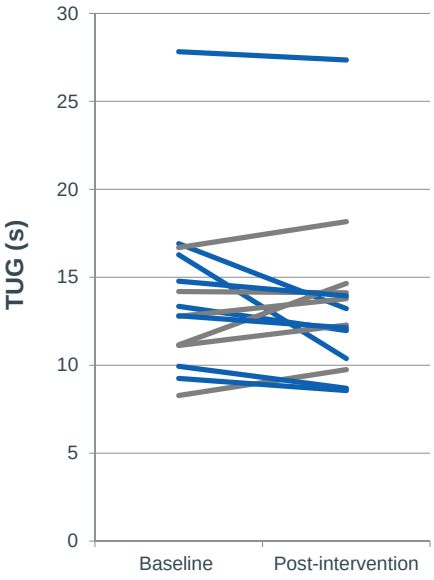
Results presented today – from the first 14 *active* subjects

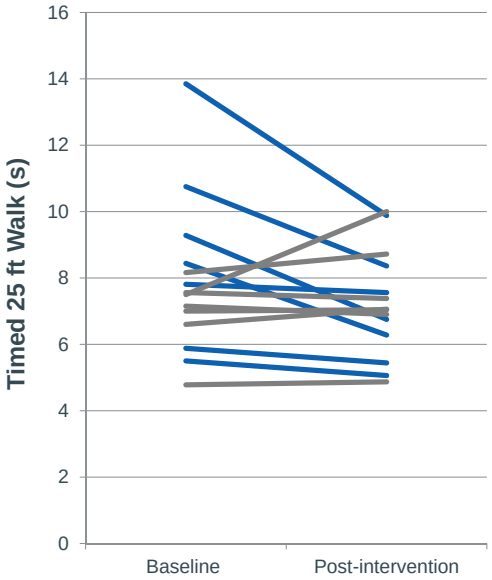
	Mean (s.d.)	Range
Age (yrs)	53.9 (10.6)	34 - 73
Gender (m:f)	5:9	---
Walking aid (uni:bilat)	10:4	---
EDSS	5.5 (1.1)	3 – 6.5

Behavioral Data






TUG (s)
30
25
20
15
10
5
0
Baseline
Post-intervention


Timed 25 ft Walk (s)
16
14
12
10
8
6
4
2
0
Baseline
Post-intervention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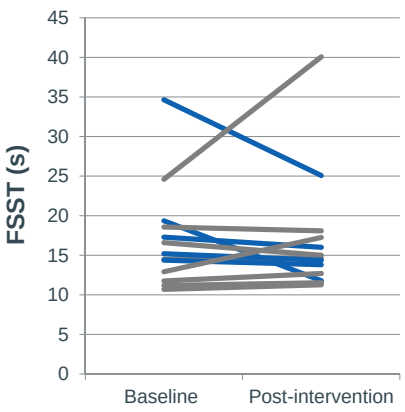
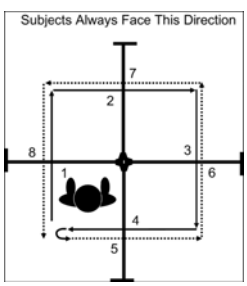
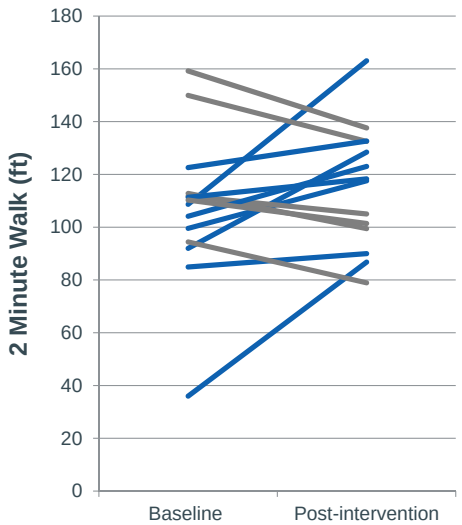

FSST (s)
45
40
35
30
25
20
15
10
5
0
Baseline
Post-intervention


Subjects Always Face This Direction
7
2
8
3
1
6
4
5


2 Minute Walk (ft)
180
160
140
120
100
80
60
40
20
0
Baseline
Post-intervention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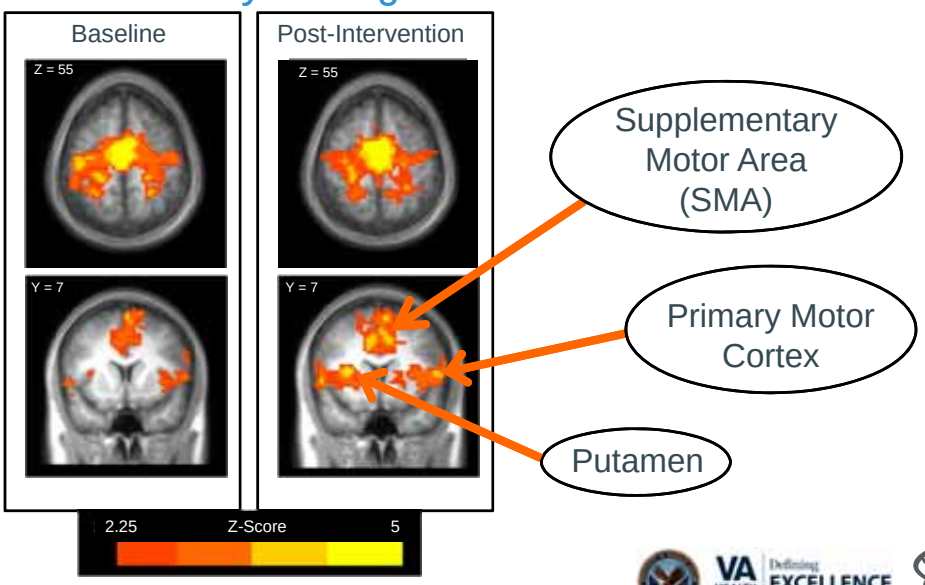
Summary of change in performance between pre and post

	Mean(SD)	Cohen's d	Estimated N for Power of 0.8
MSWS-12	- 4.3 (5.5)	-0.6	16
TUG (time in seconds)	- 0.5 (2.3)	-0.1	199
Timed 25ft Walk (time in seconds)	- 0.6 (1.6)	-0.3	75
FSST (time in seconds)	+ 3.4 (13.9)	0.1	128
2 Min Walk (distance in meters)	+ 8.4 (24.9)	0.3	75

Motor Network (SMA) Functional Connectivity Strength



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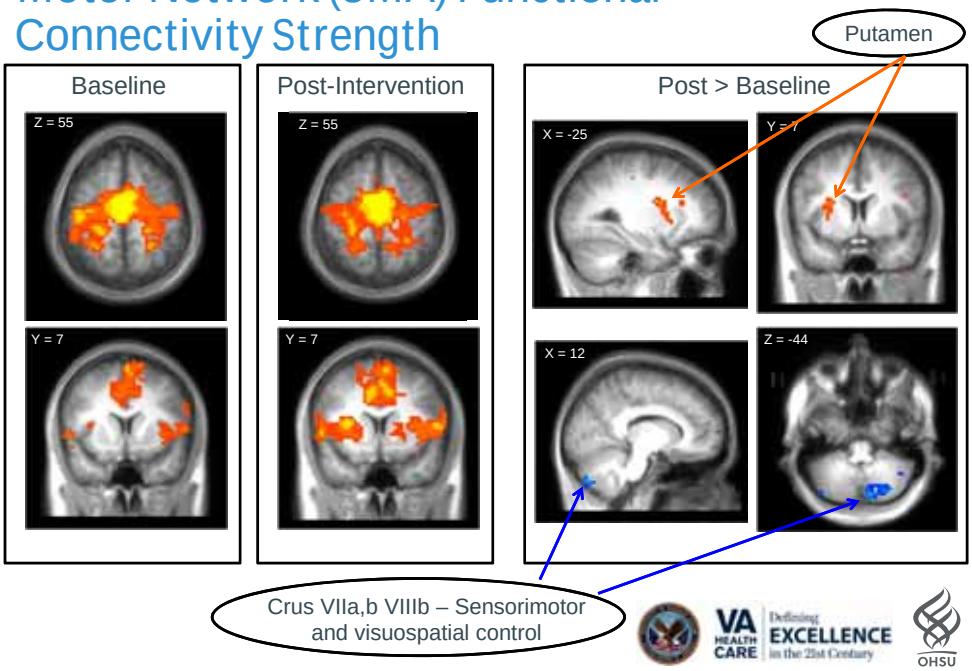

Results summary – first 14 subjects

- Trend for a reduction in self-reported impact of MS on walking (MSWS-12; p = 0.12) with an average change of over 5 points
- Improvements in many subjects in other walking measures
  - Need more data, likely a larger study
- Increased functional connectivity between supplementary motor areas and putamen
  - consistent with increased communication along the striato-thalamo-cortical motor pathway
- Reduced functional connectivity between supplementary motor areas and cerebellum
  - consistent with refined inhibitory motor control

Still to come

- All 40 subjects in this pilot trial
- Comparison with control group
- Fall data
- 3-month follow up of all functional measures
- ? Full scale study

Discussion

- Assistive device training appears to improve
  - Self-reported impact of MS on walking
  - Sensorimotor network functional connectivity
- More data are needed (and are being collected) to evaluate the impact of assistive device training on functional mobility in MS

Thank You

- This research was supported by the Department of Veterans Affairs, Veterans Health Administration, Rehabilitation Research and Development Service – award number N1918-P to Michelle Cameron, VA Portland HCS, MS Center of Excellence-West
- Volunteers with MS
- Advanced Imaging Research Center at OHSU