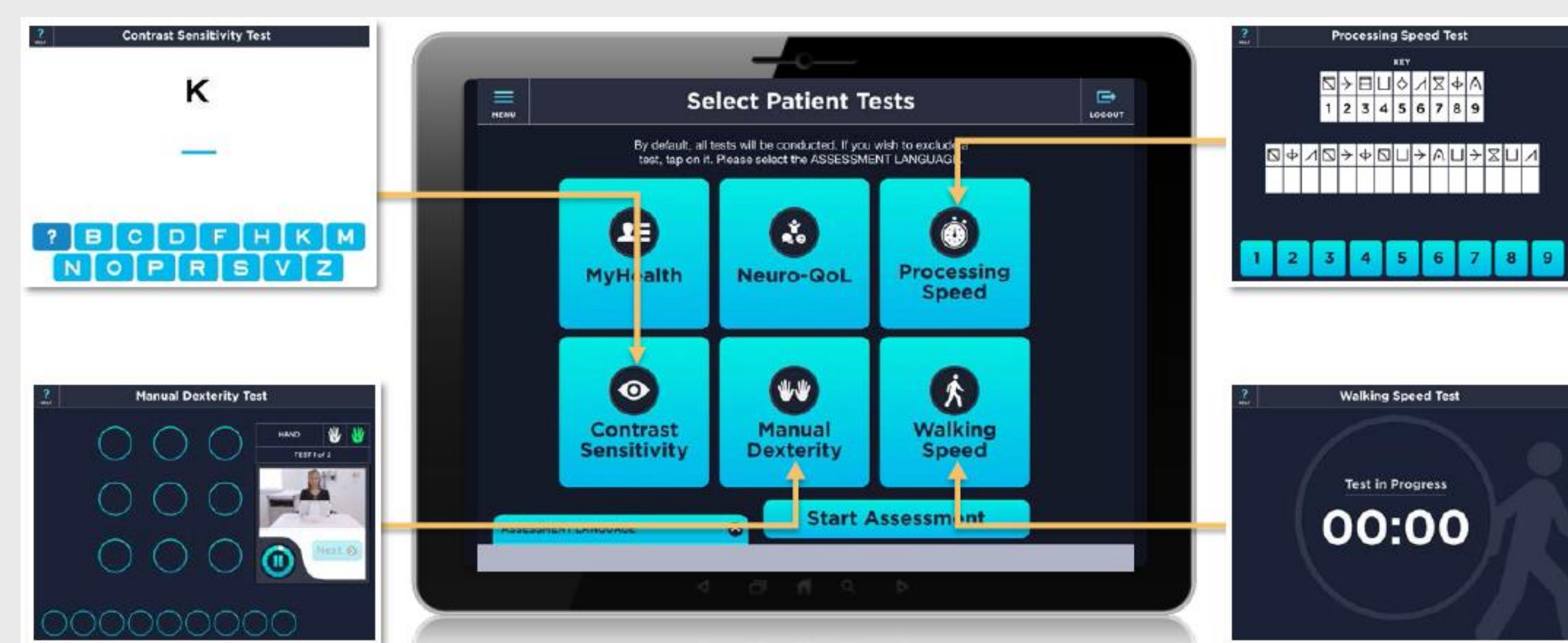


Claire Hara-Cleaver CNP, Charlene Fink CNP, Jeffrey A Cohen MD, David Schindler, Stephen Rao PhD, Jay Alberts PhD, Robert A. Bermel MD
Mellen Center for Multiple Sclerosis Treatment and Research, Cleveland Clinic, Cleveland, OH

Background

The Multiple Sclerosis Performance Test (MSPT) is an iPad-based assessment comprised of 2 patient-completed questionnaires and four objective performance assessments:

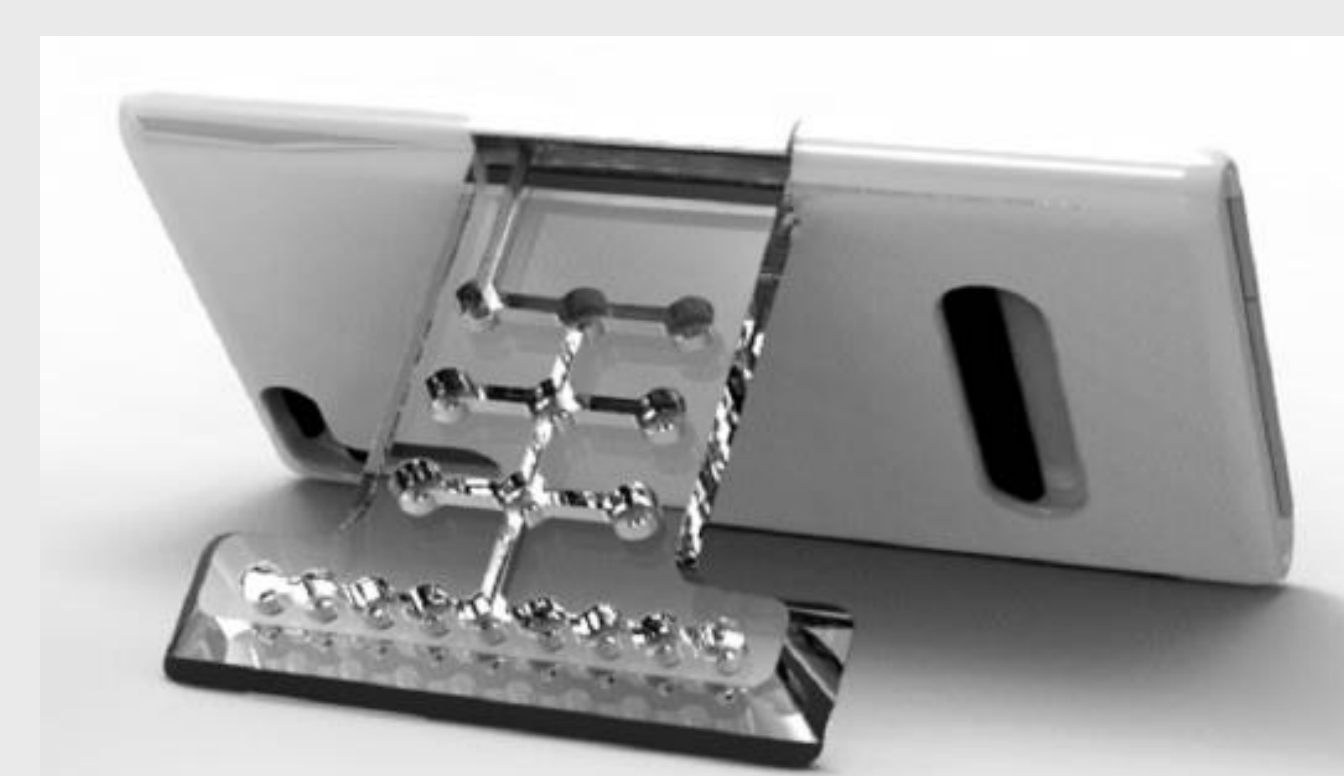
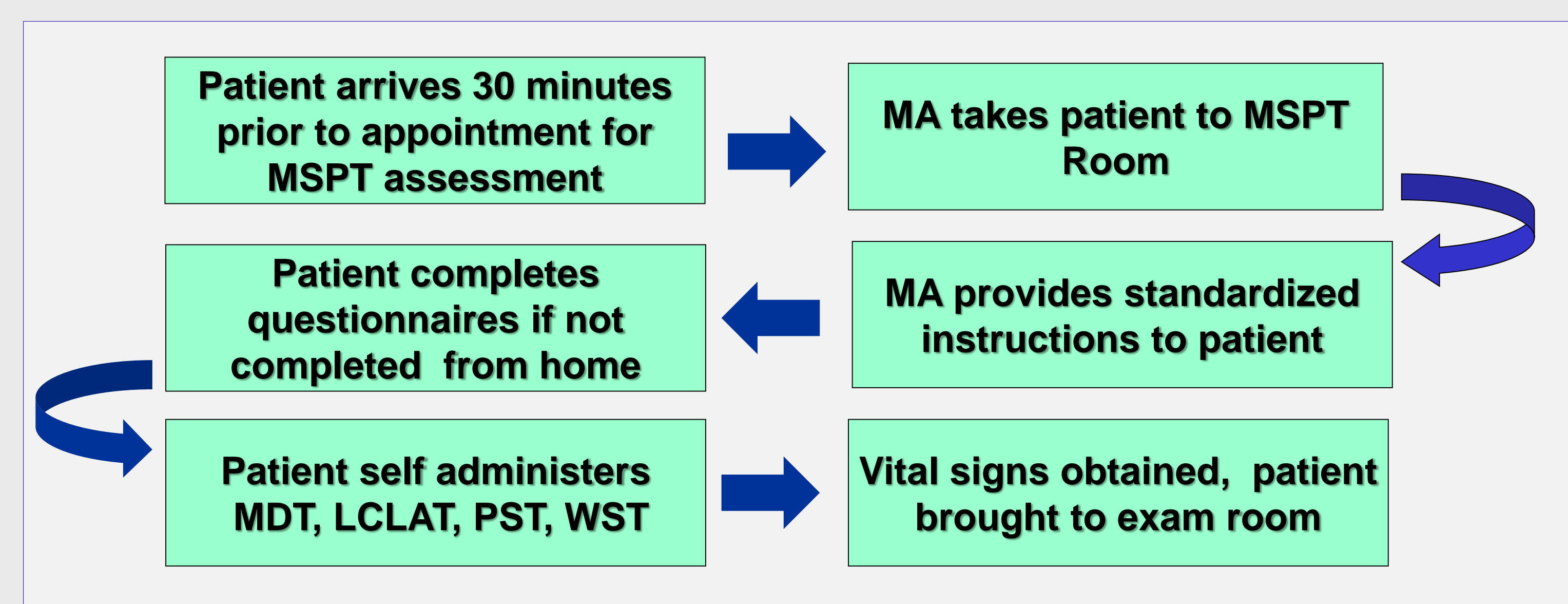
- MyHealth (MH) questionnaire
- Neuro-QoL (NQ) PRO
- Manual Dexterity Test (MDT)
- Low Contrast Letter Acuity Test (LCLAT)
- Processing Speed Test (PST)
- Walking Speed Test (WST)



Goals of incorporating the MSPT into the clinical workflow are to 1) enable routine structured data collection to inform individual patient care 2) minimize impact to clinical workflow through self-administered testing 3) allow aggregation of data that will facilitate research. In the initial pilot, 615 MSPT Assessments were obtained allowing us to understand the clinical implications of using MSPT in everyday clinical setting.

Methods

- In September 2015, implementation of the MSPT was initiated in 2 neurology practices with established patients having follow-up appointments for MS.
- The MSPT app and custom iPad enclosure were specifically developed for the purposes of neuroperformance testing.
- Audio instructions via headphones and screen prompts guide the patient through the testing.
- One Medical Assistant (MA) administered the MSPT to up to 2 patients simultaneously prior to the patient's office visit.
- Completeness of all MSPT components and assessment duration were analyzed.



Results

PATIENT DEMOGRAPHICS

| | |
|-------------------------------|-----------------|
| Number of Assessments | N= 667 |
| Number of Patients | N=615 |
| Percent female | 68.0% |
| Mean disease duration | 11.9 ± 8.6 yrs |
| Mean age | 49.1 ± 11.9 yrs |
| Number with repeat assessment | N=52 |

RESULTS BY DURATION AND COMPLETION PERCENTAGE

| | Total Assessment | MyHealth | NeuroQoL | PST | LCLAT | MDT | WST |
|----------------------------|------------------|----------|----------|-------|-------|-------|-------|
| Average Duration (minutes) | 27.7 | 8.8 | 7.5 | 4.6 | 6.6 | 4.4 | 2.3 |
| Percent completed | | 99.0% | N/A | 83.1% | 45.3% | 83.5% | 78.3% |

- **Complete PRO and Neuroperformance testing battery can be performed in a self-administered way, in less than 30 minutes**
- **Test results are available to clinicians in real time**
- **Patients only spent 3.4% of total assessment time navigating the application, demonstrating ease of use**
- **Performance on individual functional tests was predictive of overall assessment duration, the most significant predictors being PST, MDT (dominant hand) and WST.**

Conclusions

- The MSPT provides a mechanism to collect structured neuroperformance & patient-entered data in clinical practice with minimal assistance.
- Completeness & time spent on each component are measurable indicators for clinical workflow.
- By capturing patient data in this format we hope to improve patient engagement, improve clinical efficiency, and allow further advancements in MS care.
- Future efforts will also focus on decreasing total time for iPad assessments by improving proficiency and completeness of testing.
- Aggregate de-identified data will enable observational MS research embedded in practice.

References

- Rudick, R. A., Miller, D., Bethoux, F., Rao, S. M., Lee, J. C., Stough, D., et al. The Multiple Sclerosis Performance Test (MSPT): An iPad-Based Disability Assessment Tool. *J. Vis. Exp.* (88), (2014).
- Rao S, Schindler D, Mourany L, Mamone B, Reese C, Losinski G, Kemeny D, Rudick R, Alberts J. Processing speed test vs. symbol digit modalities test: test-retest reliability, practice effects, sensitivity, and convergent validity. *ECTRIMS* 2015.

A license for use of the MSPT in multiple sclerosis was acquired by Biogen, and future development of MSPT is a joint effort between Cleveland Clinic and Biogen. Drs. Alberts, Rao, Bermel, and Schindler are contributors to intellectual property utilized in the MSPT.