Validation of an IPAD based therapy for language and cognitive rehabilitation in individuals with brain damage

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INTRODUCTION

Individuals with language and cognitive deficits following brain damage likely require long-term rehabilitation.

Consequently, it is a huge practical problem to provide the continued communication therapy that these individuals require. In the present project, a large scale phase I clinical efficacy study was conducted to examine rehabilitation outcomes in patients who received continuous and self-paced rehabilitation language and cognitive program using iPADs.

RESEARCH QUESTIONS

Question: Does a structured therapy program that includes homework practice delivered through an IPAD result in significant gains in overall communication? We used Constant Therapy (www.constanttherapy.com) as the software platform.

Goal: Compare patients who receive a structured IPAD delivered therapy program that is practiced up to 7 days a week with patients who receive standard one-on-one individualized therapy that is provided 1 or 2 days per week by a therapist.

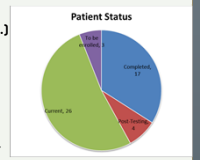
MEASUREMENT OUTCOMES

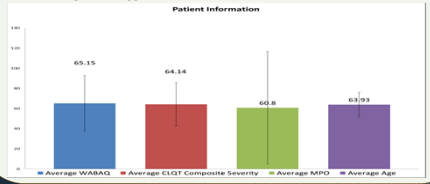
- **The level of patient compliance- Did patients practice the therapy?**
- **The extent of patient engagement – How long did they practice therapy?**
- **Percent change on each task for each patient and across patients was measured**
- **Improvement on standardized tests**

PARTICIPANTS

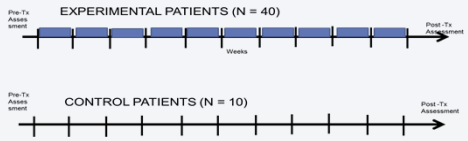
Forty-seven individuals with aphasia (goal is 50 patients)
All participants either suffered a stroke or a traumatic brain injury
Age Range: 38- 87 years (*M* = 63 yrs.)
At least one MPO (*M* = 63 months).
For each participant:

Western Aphasia Battery,
Boston Naming Test,
Pyramids and Palm Trees,
Cognitive Linguistic Quick Test,
ASHA FACS



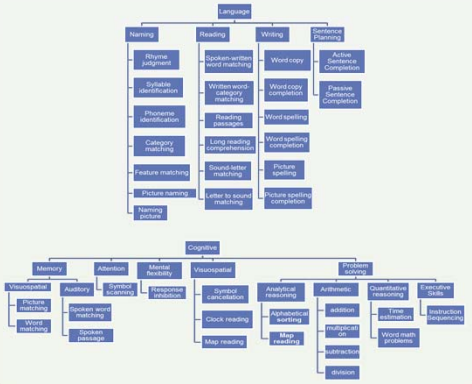


EXPERIMENTAL DESIGN



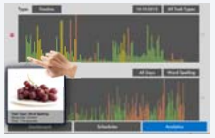
TASK WORKFLOW

THERAPY TASKS



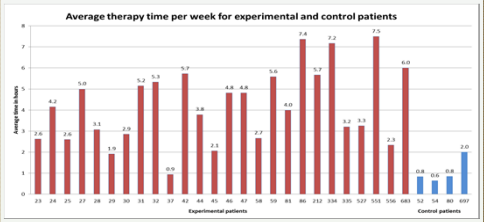
DATA ANALYSIS

Patient performance overview → **Detailed analytics on accuracy and latency**

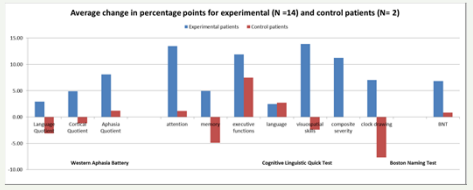


Overall patient performance on accuracy and latency relative to population mean

RESULTS



Result 1: Experimental patients practiced therapy an average of 4.2 hr./week. Control patients practiced approximately 1 hr./week.



Result 2: Average change in percentage points on standardized tests show changes for experimental patients but not for control patients

RESULTS

	Task	Number of tasks	Aggregate	Improvement In Accuracy Accounting for Language	Improvement In Accuracy Accounting for Cognition	Number of tasks	Aggregate	Improvement In Latency Accounting for Language	Improvement In Latency Accounting for Cognition
Language	Category Identification	409	√	×	×	498	×	√	√
	Category Matching	340	√	√	√	416	√	×	√
	Feature Matching	77	√	√	√	112	√	√	√
	Letter to Sound Matching	147	×	×	×	190	×	×	×
	Picture Spelling LV4	8	×	×	×	8	×	×	×
	Reading Passage LV1	334	×	×	×	353	×	×	×
	Reading Passage LV3	6	×	×	×	18	×	×	×
	Rhyming	471	×	×	×	484	√	√	√
	Sound Identification	155	×	×	×	164	√	√	√
	Sound to Letter Matching	150	×	×	×	154	×	×	×
	Syllable Identification	37	×	×	×	47	√	√	√
	Word Copy LV2	24	×	×	×	57	×	×	×
	Word Copy LV3	54	√	×	√	70	√	×	√
	Word Identification	203	√	√	√	232	√	√	√
Cognitive	Addition LV2	27	×	×	×	55	√	√	√
	Addition LV3	12	×	×	×	16	√	√	×
	Addition LV4	2	×	×	×	5	×	×	×
	Clock Reading	39	√	×	√	98	√	×	√
	Division LV1	36	×	×	×	52	×	×	×
	Map Reading LV1	29	×	×	×	53	×	×	×
	Map Reading LV2	12	×	×	×	16	×	×	×
	Multiplication LV1	36	×	×	×	52	×	×	×
	Picture Matching LV2	28	×	×	×	28	×	×	×
	Subtraction LV1	2	×	×	×	72	×	×	×
	Word Matching LV2	23	√	×	√	23	×	×	×

Result 3: Mixed logistical regression models show significant improvements over time for 13/25 therapy tasks even when the effect of language severity (WAB AQ) and cognitive severity (CLQT composite) are taken into account

CONCLUSIONS

- **The results of this study highlight that patients with brain damage are extremely motivated to practice therapy at home when provided with appropriate access to therapy (delivered via an iPAD) and monitored by a weekly session with a clinician.**
- **Preliminary results demonstrate the feasibility and preliminary success of such a structured continuous therapy in terms of determining language and cognitive treatment outcomes.**

REFERENCES AND EVIDENCE FOR TREATMENT

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Disclosure: SK owns equity in Constant Therapy and serves as the Chair of the Scientific Advisory Board for Constant Therapy.