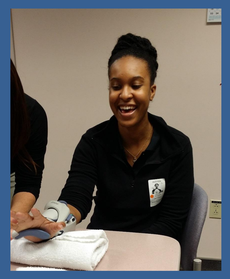
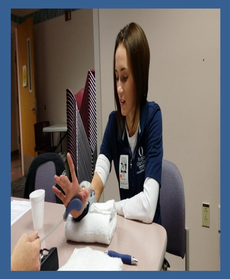



A Comparison of Treatment Approaches to Improve Upper Extremity Function in Patients Post CVA: A Pilot Study

Student Researchers: Kevin Aguirre, Katherine Hines, Elizabeth Peller & Kristen Ryan




ABSTRACT

The purpose of this study was to determine if electrostimulation neuroprosthesis (Bioness – Ness H200®) when combined with conventional treatment is more effective in improving upper extremity (UE) function in patients post-stroke than conventional treatment alone. The research was designed to compare post-stroke rehabilitation between clients who used Bioness- Ness H200® in conjunction with conventional therapy and those who were treated with traditional methods alone. This study is a quasi-experimental design using systematic random assignment.

INTRODUCTION & RELEVANCE OF STUDY

- According to the National Stroke Association, stroke is the leading cause of serious long-term disability in adults ("Impact of stroke," 2012).
- In Lee County from 2010 to 2012, there were 7,173 reported hospitalizations as a result of stroke ("Hospitalizations from stroke," 2012).
- Addresses a gap in current stroke research by conducting an upper extremity, Bioness Ness-H200® specific study within an inpatient rehabilitation hospital.
- Contributes to the body of research that utilizes the Bioness Ness-H200®, yet it is not endorsed by the device manufacturer, Bioness Inc.

BIONESS NESS-H200®

- "The H200 Wireless System uses functional electrical stimulation (FES) to activate the nerves that control the muscles in the hand and forearm" (Bioness Inc.)
- Use of device may help restore function (grasp, release, open/close hand), assist with circulation, ROM, muscle spasms, and muscle atrophy (Bioness Inc.)
- Muscles activated: Extensor Digitorum, Extensor Pollicis Brevis, Flexor Digitorum Superficialis, Flexor Pollicis Longus, and Thenar muscles (Page et al 2009)

MEASURE: ACTION RESEARCH ARM TEST (ARAT)

- Founded on the assumption that most upper extremity activities of daily function are comprised of grasp, grip, pinch, and gross movements of extension/flexion at the elbow and shoulder.
- Consists of 19 items grouped into 4 subtests:
  - Grasp (6)
  - Grip (4)
  - Pinch (6)
  - Gross movement (3)
- Each item scored on a four point ordinal scale from 0 (cannot perform) to 3 (performs normally in less than 5 seconds)
- Total scores range from 0 to 57
- Higher scores indicate greater UE function
- High inter-rater reliability: 0.98
- Can be completed in 8 to 10 minutes (van der Lee, 2001)

METHODOLOGY

Study Design:
- Quasi-experimental design
- Systematic random assignment
- Single-blind: Students were blind to treatment group assignment

Inclusion Criteria:
- Cognitive ability to give informed consent and understand a command
- Diagnosis of ischemic or hemorrhagic CVA as ascertained from neuro-images or written medical reports
- Functional upper extremity PROM
- First onset of CVA
- Inability to achieve full reach and open hand when upper extremity is unsupported
- Able to tolerate three hours of daily therapy five times per week

Exclusion Criteria:
- Shoulder or hand pain (acute or chronic)
- Contraindications of using Bioness Ness-H200®
- Un-resolvable language barrier

Treatment Groups:
- Control group received two, 45 minute conventional therapy sessions daily.
- Experimental group received two conventional therapy sessions daily and wore the Bioness Ness-H200® device during one of the 45 minute sessions.

Procedure:
1. ARAT inter-rater reliability for student researchers was determined (0.998)
2. Therapist obtained informed consent, completed chart review and participant information sheet, and fit the Bioness Ness-H200® for participants in the experimental group.
3. Students administered pre-test (ARAT)
4. Therapists conducted appropriate treatment session per assigned treatment group
5. Students administered post-test (ARAT)
6. Students conducted data analysis

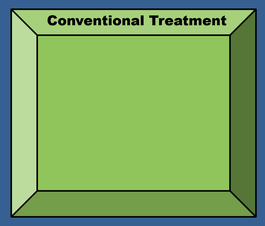
PARTICIPANTS

Demographic Data		
	Bioness	Conventional
Gender		
Females	1	3
Males	2	0
Age		
	49	72
	67	77
	92	80
Ethnicity		
White/Causian	1	3
Black	1	0
Hispanic	1	0
CVA Type		
Ischemic	2	3
Hemmoragic	1	0
Affected Side		
Left	3	2
Right	0	1

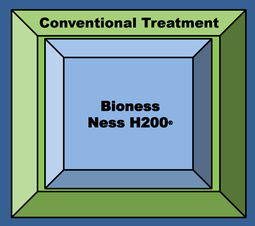
Sample size: 6
- 32 Chart reviews were conducted
- 9 Individuals enrolled in the study
- 3 Participants were unable to complete the study

Comparison of Treatment Days	
Experimental	Control
12	7
14	6
16	7
Average Number of Days/Participant	
14	6.66

TREATMENT GROUPS



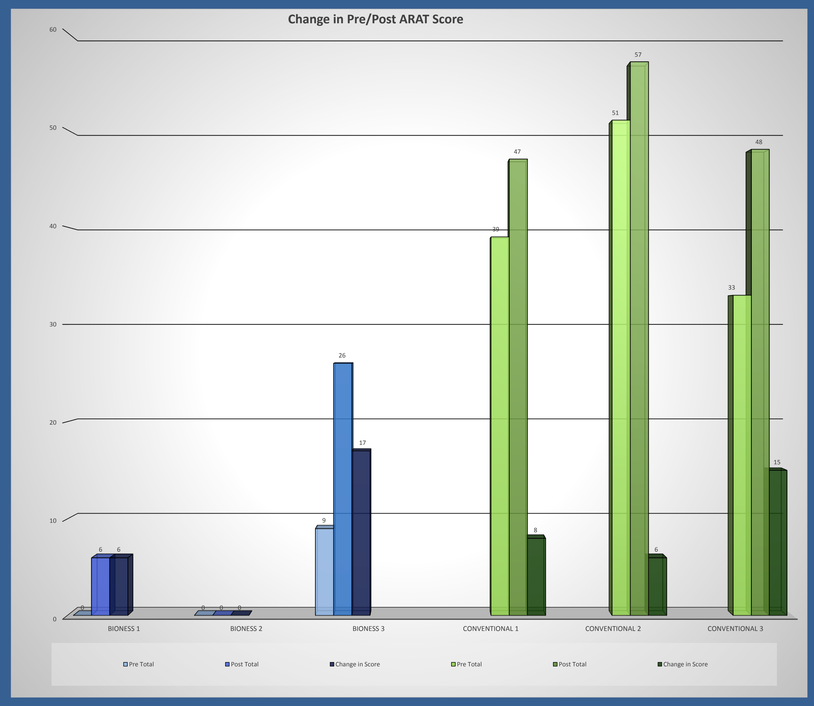
Control Group



Experimental Group

RESULTS

- Due to the small sample size, descriptive statistics and a graphical display are used to show results.
- According to pre- and post- intervention ARAT scores, 5 of 6 participants who completed the study displayed an increase in performance on the ARAT. One participant showed no change.



DISCUSSION

Due to the small sample size, the results of this pilot study are inconclusive. Factors and limitations contributing to inconclusiveness of the study include: the small sample size, variations in treatment administration, disparities in functional levels of the two treatment groups upon entering the study, mechanical complications with the electrostimulation neuroprosthesis (Bioness Ness-H200®), and inability to achieve ideal fit of the device for all patients. Despite these limitations, the strengths of this study include: a single-blind study design, high inter-rater reliability on ARAT scoring (.998), pre-study device training by a Bioness Inc. representative for the therapists, occurrence in a clinical setting instead of a laboratory, licensed therapists facilitating treatment, and the study was not endorsed or funded by the device manufacturer, Bioness Inc.

Replication of the study should aim to obtain a larger sample size, provide an ideal fit of the Bioness – Ness H200®, use a more reliable device with fewer mechanical malfunctions, improve data collection sheets to obtain more accurate information about time spent in therapy, and ensure consistent adherence to the treatment protocol.

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