

# The Correlation Between Activity Levels And The Functional Outcomes Of Patients Affected By Stroke At An Inpatient Rehabilitation Center

Veronica Valencia Victoria, SPT and Steven Franks, SPT  
Mollie Venglar, DSC, MSPT, NCS; Renee Jeffreys-Heil, PhD, RCEP

## Introduction

- Strokes are the most prevalent and disabling neurologic condition of adult life.<sup>1</sup> They are characterized by brain cell death, which can ultimately lead to brain damage, long-term disability, and even death.<sup>2</sup>
- Currently, inpatient rehabilitation is recommended for survivors of stroke who are too disabled to return home, but who have adequate cognition and fitness to participate in therapy for three hours a day.<sup>3</sup>
- Several studies have shown the inverse relationship between physical activity and all-cause mortality in the general population.
- Increased levels of physical activity have been proposed as a possible contributing factor for the reduced patient morbidity and improved likelihood of returning home that is associated with inpatient rehabilitation.<sup>4</sup>

## Objectives

- A careful review of the literature showed that there were a limited number of studies monitoring the physical activity levels of patients affected by stroke at inpatient rehabilitation hospitals through the use of activity monitors.
- This pilot study explored the activity levels of stroke survivors at an inpatient rehabilitation center through the use of activity monitors (FitBit Charge and CamNTEch MotionWatch8).
- Activity levels were then compared to each participant's outcome measures (FIM and BIM)

## Methods

- Over a period of 8 months, patients admitted to Brookdale post stroke were considered for this pilot study.
- After consent into the study, research assistants equipped participants with 2 activity monitors. Activity monitors used were CamNTEch MotionWatch8 (Boerne, TX) and the Fitbit Charge (San Francisco, CA). These monitors were worn by participants for a duration of 7 days.
- Participants' steps were recorded by the Fitbit Charge. The CamNTEch MotionWatch8 recorded the time spent in vigorous level activity, and moderate level activity.

## Results

- 5 participants were recruited for this pilot study.
- From those, one participant (patient 3) was excluded from all analyses because the data was collected during a significant natural disaster when Brookdale functioned as a medical shelter instead of a rehabilitation facility
- From those recruited, 2 participants were male, 2 participants were female.
- The participant ages ranged in age from 58 to 86, with a mean of 76.75 (Standard Deviation (SD) = 12.69).
- Participant Body Mass Index (BMI) ranged from 25.9 to 31.1 kg/m<sup>2</sup>, with a mean of 28.38 (SD = 2.36).
- The average LOS for these cohort of patients was 14 days (SD = 4.83).

**Table 1. Functional Outcomes and CamNTEch Activity Data**

Participant	FIM @ Admin	FIM @ Discharge	Change in FIM	Avg. Vigorous Activity / Day (min)	Avg. Moderate Activity / Day (min)	Avg. Vigorous Activity / Week (min)	Avg. Moderate Activity / Week (min)
1	68	107	39	13.3	62.9	186	440
2	87	113	26	46.8	112.3		
4	53	89	36	29.58	69.97	213.5	511.25
5	69	105	36	172.7	165.23	1308	1159.5

**Table 2. Functional Outcomes and FitBit Data**

Participant	FIM @ Admin.	FIM @ Discharge	Change in FIM	Avg. Steps Per Day
1	68	107	39	964.26
2	87	113	26	1135.83
4	53	89	36	425.5
5	69	105	36	4311.67

**Table 3. Change in FIM and Types of Therapy Units**

Participant	Change in FIM	Total PT (min)	Total OT (min)	Total ST (min)
1	39	1290	1110	465
2	26	655	510	310
4	36	895	1080	870
5	36	840	1050	1728

## Data Analysis

- Data was analyzed using Microsoft Excel (Redmond, WA) and SPSS (Chicago, IL).
- The functional outcome measures were performed at participant admission (FIM and BIM) and discharge (FIM). The functional outcome measures data was regarded as aggregate data.
- Data from the CamNTEch Motion Watch 8 and the FitBit Charge was collected and converted to daily and weekly averages.

## Discussion

- This pilot study aimed to explore the trends between patient activity level and scores on functional outcome measures.
- The ACSM recommends 5 days/ week of moderate intensity aerobic activity or 3 days/ week of vigorous intensity for adults. Duration recommendations are 30 to 60 minutes per day of moderate intensity ( $\geq 150$  minutes per week) or 20 to 60 minutes per day of vigorous intensity ( $\geq 75$  minutes per week).<sup>5</sup>
- The participants of this study met the total activity time recommendations, but the bouts of activity were not continuous for a minimum of 10-minutes.
- The subacute stroke population require more frequent rest breaks due to elevated energy costs with movement following stroke.<sup>6</sup>
- The average FIM score for participants upon admission was 69.25 (out of possible 126). This scores indicate lower physical function and inability to participate in higher levels of physical activity for prolonged periods of time.
- Limitations for this study included the small sample size (n=4), which did not allow for the calculation of the correlation coefficient between functional outcome measures and activity levels. Further limitations included missing FitBit data.

## Conclusions

- The results of this study showed a trend that a longer LOS was associated with greater changes in FIM scores. In addition, those who had the greatest positive changes in FIM scores also received the most total minutes of therapy.
- Further research, with larger sample sizes, is necessary in order to evaluate the correlation between activity levels and outcome measures. In addition, more research can help to determine whether moderate-to-vigorous activity in less than 10-minute bouts provides health benefits to stroke survivors.<sup>7</sup>
- The use of activity monitors is a practical medium to measure activity levels, in order to provide more insight about the mechanisms for recovery at inpatient rehabilitation centers.