Can the FitBit Wearable Activity Tracker Measure Caloric Expenditure in an Inpatient Ischemic Stroke Population?

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Background

- Stroke = Leading cause of disability\(^1\)
- Post acute multi-disciplinary rehabilitation
  - Effective and necessary step in recovery for stroke patients
- Systematic reviews have found multi-disciplinary rehab:\(^2,^3\)
  - Odds of death
  - Institutional care
  - Long-term dependency
Background

• Growing evidence for cardiorespiratory training and increased therapy time\textsuperscript{4,5}
  – Improved activities of daily living
  – Faster walking speed
  – Greater walking capacity

• Lack of evidence on relationship between calorie expenditure and patient outcomes
Study Goal

To examine the relationship between calorie expenditure and Functional Independence Measure (FIM) scores and discharge location.
Fitbits

- Wearable, wireless activity trackers
- Portable, easy to use
- Reliability and validity of Fitbit has been studied\textsuperscript{6-8}
  - Found to underestimate energy expenditure
- Not been used widely in rehab setting
Study Purpose

To determine whether the FitBit Charge 2 device can be used in a post stroke population in the in-patient rehabilitation setting.

Study Hypothesis

Stroke patients will be able to use the FitBit Charge 2 device to measure caloric expenditure, and higher caloric expenditures will be related to better Functional Independence Measure (FIM) scores at discharge and greater likelihood of being discharged to the home setting.
Objectives

Primary objective:
To determine whether the FitBit Charge 2 device can be used to measure caloric expenditure in an in-patient rehabilitation stroke population.
Objectives

Secondary objectives:

1. To examine the relationship between caloric expenditure during in-patient rehabilitation and changes in Functional Independence Measure (FIM) scores between baseline and discharge

2. To examine the relationship between caloric expenditure during in-patient rehabilitation and disposition destination (e.g., home, skilled nursing facility)

3. To examine the relationship between caloric expenditure during in-patient rehabilitation and length of stay
Study Design

- Pilot Feasibility Study
- Prospective
- Single-Arm, Non-Randomized
Setting

• In-Patient Rehabilitation

• Genesis Medical Center, Davenport
  – West Campus
Inclusion/Exclusion Criteria

Inclusion criteria:

a) Acute ischemic stroke
b) First stroke
c) $\leq 15$ on the National Institutes of Health (NIH) Stroke Scale
d) Participant willing to sign informed consent for the study
e) Participant willing to wear FitBit, as directed, for the length of their stay

Exclusion criteria:

a) Hemorrhagic stroke
b) $\geq 2$ strokes
c) Eczema or history of skin irritation
d) Active Clostridium difficile (C. Difficile)
Study Procedure

• Fitted with Fitbit Charge 2

• Display blacked out

• Remove only at bath and meal times
  – Charge during meals

• Fitbit Connect Software
Patient Instructions for Care

- Keep it clean
- Keep it dry
- Don’t wear it too tight
- Give it a rest
- Recharge it
Discharge Process

- Fitbit collected & disinfected

- Fitbit not reused if:
  - BLOOD
  - STOOL
  - MRSA
Potential Risks

• Skin irritation
• General discomfort
• Infection
• Loss of confidentiality
Study Outcomes

Primary Outcome:
1. The number of calories expended by in-patient rehabilitation stroke patients

Secondary Outcomes:
2. The change in FIM scores from admission to discharge
3. The disposition destination at discharge
4. The inpatient rehabilitation length of stay from admission to discharge
5. The number of participants that develop adverse effects
Feasibility Data

1. Recruited but did not enroll
2. Did not wear their FitBit as instructed
3. Incomplete data
4. FitBits with a dead battery
5. Complaints about wearing the FitBit
6. FitBits with the black tape removed or disturbed
7. Drop out rate and reasons for drop out
## Data Collection

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calorie Expenditure</td>
<td>Number of calories burned in a day</td>
<td>Daily</td>
</tr>
<tr>
<td>Active Minutes</td>
<td>The number of minutes spent in activity more strenuous than regular walking – calculated using metabolic equivalents. Minutes of activity at or above 3 METs are counted as active minutes by the FitBit Charge.</td>
<td>Daily</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>Average heart rate</td>
<td>Daily</td>
</tr>
<tr>
<td>Sleep</td>
<td>The number of hours and minutes spent sleeping each night.</td>
<td>Daily</td>
</tr>
<tr>
<td>Steps</td>
<td>The number of steps taken each day</td>
<td>Daily</td>
</tr>
<tr>
<td>Distance Traveled</td>
<td>The distance in miles traveled each day</td>
<td>Daily</td>
</tr>
<tr>
<td>Floors Climbed</td>
<td>The use of an altimeter sensor to detect when a person climbs ten feet at one time (10 feet = 1 floor)</td>
<td>Daily</td>
</tr>
</tbody>
</table>
Results To-Date

Number enrolled = 7

Number screened = 34

Number of declines = 4
Results To-Date - Feasibility

Did not wear their FitBit as instructed = 0

Incomplete data = 1

FitBits with a dead battery = 0

Complaints about wearing the FitBit = 1

FitBits with the black tape removed or disturbed = 0

Drop out rate and reasons for drop out = 1
Observations To-Date

• Enrollment slower than anticipated
• Reaching all eligible participants
• Protocol adherence = GOOD!
• No lost Fitbits or cords
• THANK YOU to Rehab Staff
References


References


