



# Optimizing the Use of Mobile Wireless Activity Sensors to Assess Postoperative Functional Recovery

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## Introduction

Mobile wireless sensors have the potential to provide objective, real-time clinical data relevant to management of a variety of diseases. One recent focus is the role of fitness activity tracking devices in measuring functional recovery. In the absence of standardized methods to use or interpret data from these devices, their clinical use has been limited. We present a single case comparing the data from wireless activity trackers to the clinical assessment of functional recovery in an effort to optimize use of this technology.

## Methods

An 84 year-old woman with right-sided weakness and hyperreflexia underwent C3-C7 laminoplasty for cervical spondylotic myelopathy. Activity trackers (FitBit Zip TM, FitBit, San Francisco, CA) (See Figure 1 and Table 1) were placed simultaneously at four locations on the patient postoperatively: one on each side of a waist belt and one above each ankle. The patient received routine postoperative care. Data from the devices was compared to assessment by physical therapists, neurological exam, and independent observation.

**Figure 1: FitBit Zip (FitBit, San Francisco, CA)**



Table 1: Characteristics of FitBit Zip™ (FitBit, San Francisco, CA)

Parameter	Description
Device	3-axis accelerometer
Weight	8 grams
Dimensions	25.5 x 28 x 9.65mm
Connection	Bluetooth®
Battery life	4-6 months

## Results

Postoperatively, the patient improved clinically with stable residual deficits noted in the right lower extremity. On postoperative day 3, devices were applied and the patient received routine physical therapy for 25 minutes. The patient ambulated 150 feet (178 steps reported by 2 independent observers), Right and left ankle devices reported 163 (8.5% underreporting) and 230 steps (29% overreporting), respectively. The devices on the waist recorded minimal steps. During the physical therapy session, she was noted to have decreased weight shift and swing phase of gait in the left lower extremity potentially explaining the differences recorded by the device.

## Conclusions

There may be variability in the reported metrics of activity trackers based on specific placement. In particular, placement on extremities with impaired function may result in underreporting of data. Accurate objective reporting requires optimized placement of activity trackers and determination of clinical factors that affect reliability, particularly in the evaluation of functional recovery.

## Learning Objectives

By the conclusion of this session, participants should be able to 1) Describe the importance of assessing functional recovery, and the importance of coming up with standardized methods of using activity sensors to provide objective measures of this recovery 2) Discuss, in small groups, the potential problems with variability in data measurement and interpretation when using the devices, and what the solutions might be 3) Identify an effective treatment in the future that would utilize data from activity sensors.

## References

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