



CENTER FOR DISRUPTIVE
MUSCULOSKELETAL INNOVATIONS

Using Technology to Monitor and Promote Progressive Mobility in Spine Patients

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Need and Industrial Relevance

- **Mobility** and Functional improvement is a primary goal of spine surgery
- **Physical Activity** is vital for long term musculoskeletal health
- **Post operatively** many patients do not increase physical activity
 - Sedentary lifestyles
 - Conflicting messages from practitioners
- **Progressive Mobility** may be achieved through
 - Education
 - Goal Setting
 - Support Group Involvement
 - Remote monitoring
- **Accurate monitoring** through technology is vital to quantify progress and evaluate with other **outcome measures**

Project Aims

- **Aims:**
 - To evaluate whether **progressive mobility education** is an effective intervention.
 - To quantify the correlation between **activity and outcomes**
 - To determine the effect of pre-surgery disability/health status, behavioral conditioning and sedentary culture on surgical outcomes
 - To evaluate **different techniques and technologies** to measure mobility and activity
- **Hypotheses:**
 - By **educating patients** and intervening with technological measurements of mobility we expect to improve quality measure including:
 - Length of stay/Discharge disposition to home
 - Readmission/Reoperation
 - Durability of their outcomes
 - Activity levels after surgery are positively correlated with outcomes, and are a sensitive measure of clinical outcome of care

- Study cohort is adults (age >60) treated with surgery for lumbar degenerative pathology (decompression with up to 2 levels of fusion)
 - Assign **50 patients** to either a test or control group.
 - ½ of patients will be educated about **progressive mobility**
- Patients will try the device at their pre-op visit to ensure they are comfortable wearing it
- Mobility/activity data will be **monitored remotely** to encourage ease of patient cooperation
- Data will be analyzed as daily averages from the following time points:
 - 1 wk Pre-operatively
 - Duration of Hospital stay
 - 0-1 week post discharge
 - 5-6 wks post discharge
 - 3 months post discharge (1 week worth of data)
 - 6 months post discharge (1 week worth of data)



- FitBit Flex
 - 3 axis accelerometer
 - Goal setting & tracker
 - 5 day battery life
 - 1-2 hour charge time
 - 7 days detailed data (minute by minute)
 - 30 Days daily data
 - Bluetooth sync
 - Water resistant
 - Compatible w/ 150+ devices

- Data Analysis:
 - The effect of progressive mobility education on activity level
 - The effect of early and progressive mobilization on outcomes
 - Length of stay
 - Discharge to home rates
 - Readmission/Reoperation
 - HRQoL
 - Improvement in mobility after surgery
 - Mobility data vs. HRQoL data
 - Effect of mobility on reoperation and complication rates

Milestones

- **Nov 15, 2015:** Obtain IRB (CHR) approval
- **Dec 31, 2015:** Complete enrollment
- **July 31, 2016:** Complete data collection
- **Aug 15, 2016:** Complete data analysis

Deliverables

- Raw data on activity levels of patients before and after surgery as well as surgical and HRQoL outcomes
- Demonstration of value in technologies to measure mobility
- Increased sensitivity to detecting changes in health status after surgery
- Methodology for improving quality of care for patients treated surgically for spinal disorders
- Publication

Proposed Budget

Personnel: \$ 25,500

Data Analysis: \$ 5,000

Wearable Devices: \$ 5,000

Educational Materials: \$ 500

Total Direct: \$ 36,000

+

Indirects: \$ 3,600

Total: \$ 39,600