Smartphone Based Step Count Measures Correlate with HOOS12 Function and UCLA Activity PROMs During Early THA Recovery

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INTRODUCTION:

Passive smartphone-based apps are becoming more common for measuring patient progress after total hip arthroplasty (THA). Optimum activity levels during early THA recovery haven't been well documented. Correlations between step-count and patient reported outcome measures (PROMs) during early recovery were explored. This study also investigated how demographics impact step-count during early post-operative recovery.

METHODS:

Smartphone captured step count data from 287 THA patients was retrospectively reviewed. Mean age was 64±10yr. 56% were female. Mean BMI was 29±13kg/m^2. Mean daily step count was calculated over three time windows: 2 months prior to surgery (preop), one week prior to 6 weeks postop (6wk), and one week prior to 12 weeks postop (12wk).

Linear correlations between step-count and HOOS12 Function and UCLA activity scores were performed. Patients were separated into three step-count levels: low (<2500steps/day), medium (2500 to 5500steps/day), and high (>5500steps/day). Age >65years, BMI >30, and sex were used for demographic comparisons.

Student's *t* tests determined significant differences in mean step-counts between demographic groups and in mean PROMs between step-count groups.

RESULTS:

UCLA correlated with step count at all time windows ($p<0.01$). HOOS12 Function correlated with step-count preoperatively and at 6wk ($p<0.01$). High step□count individuals had improved UCLA scores compared to low step□count individuals preoperatively ($\Delta 1.8, p<0.001$), at 6wk ($\Delta 1.1, p<0.05$), and at 12wk ($\Delta 1.6, p<0.01$). High step□count individuals had improved HOOS12 Function scores compared to low step□count individuals preoperatively ($\Delta 8.4, p<0.05$), and at 6wk ($\Delta 8.8, p<0.001$), Figure 1.

Younger patients had greater step count preoperatively (4.1±3.0k vs. 3.0±2.5k,$p<0.01$) and at 12wk (5.1±3.3k vs. 3.6±2.9k,$p<0.01$). Males had greater step count preoperatively (4.1±3.0k vs. 3.0±2.7k,$p<0.001$), at 6wk (4.5±3.2k vs. 2.6±2.5k,$p<0.001$), and at 12wk (5.2±3.6k vs. 3.4±2.5k,$p<0.001$). Low BMI patients had greater step count at 6wk (4.3±3.3k vs. 2.6±2.7k,$p<0.01$) and 12wk (5.0±3.6k vs. 3.6±2.6k,$p<0.05$), Figure 2.

DISCUSSION AND CONCLUSION:

High step count had improved PROMs scores compared to low step count. Early postoperative step count was significantly impacted by age, sex, and BMI. Generic recovery profiles may not be appropriate across diverse populations.

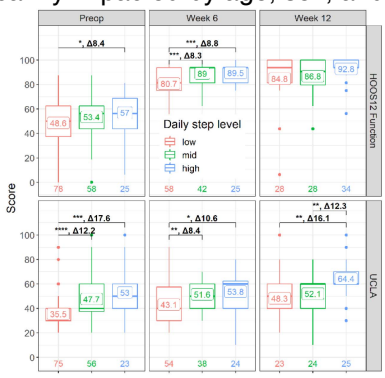

Figure 1: PROMs score comparisons between step-count groups across the three time-windows. Note the high step-count group had greater PROMs scores compared to the low step-count group at all time points. Statistically significant differences are indicated by ""=p<0.05, "**"=p<0.01, "***"=p<0.001, "****"=p<0.0001*

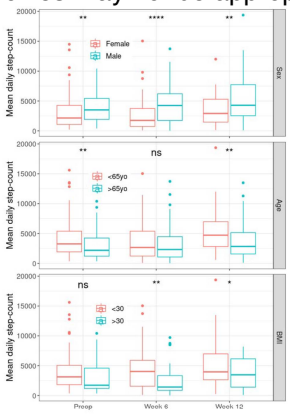

Figure 2: Demographic comparisons of mean daily step-count across the three time-windows. Young patients, males and low BMI patients had greater step-count across many time points. Statistically significant differences are indicated by ""=p<0.05, "**"=p<0.01, "***"=p<0.001, "****"=p<0.0001*