Step Counts Decline to ~3,700 at 30 Days but Return to Baseline (~5,300) by 6 Months Post-TKA: A National Wearable Study

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INTRODUCTION:

Objective physical activity monitoring through wearable devices offers valuable insight into recovery patterns after total knee arthroplasty (TKA). The All of Us Research Program—a national precision medicine initiative—provides a unique opportunity to assess longitudinal real-world activity data via linked Fitbit records. This study aimed to quantify daily step count changes across the first six months following TKA and evaluate recovery trends across key demographic subgroups.

METHODS:

We conducted a retrospective longitudinal study using the All of Us Research Program Controlled Tier dataset (v8). Patients undergoing primary TKA with continuous Fitbit data spanning ≥180 days before and after surgery were included (n=46). Daily step counts were averaged over four predefined periods: preoperative baseline (–180 to 0 days), 0–30 days postoperative, 30-90 days postoperative, and 90–180 days postoperative. Paired t-tests compared step counts within individuals. Subgroup analyses were conducted by age, BMI, and gender.

RESULTS:

Overall step counts declined significantly from pre- to post-TKA (5,495 vs. 4,997 steps/day; $p<0.001$). A marked reduction occurred in the early recovery phase (3,716 steps/day; $p<0.0001$), followed by partial recovery at 30–90 days (5,079 steps/day; $p=0.0002$) and near baseline by 90–180 days (5,322 steps/day; $p=0.081$). Obese (3,762 vs. 3,590 steps; $p=0.065$) and >75-year-old patients (2,023 vs. 1,083 steps; $p<0.001$) had persistently low activity levels. Males showed increased steps postoperatively (4,970 to 6,185 steps; $p<0.001$), while females declined (5,532 to 4,652 steps; $p<0.001$).

DISCUSSION AND CONCLUSION:

Despite an expected early postoperative decline, daily step counts recovered to near baseline levels (~5,300–5,500 steps/day) by 90–180 days post-TKA. However, substantial variability was observed across subgroups: normal-weight and male patients demonstrated higher activity levels, while older adults and individuals with obesity showed persistently lower step counts. These findings highlight the value of wearable data as a scalable tool to track physical activity recovery and support individualized rehabilitation pathways. Integrating such data into care may facilitate precision recovery strategies tailored to demographic and functional risk profiles following TKA.