Evaluation of Cost Savings Using A Remote Monitoring Technology After Total Knee Arthroplasty

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INTRODUCTION: Wearable technologies provide the ability for patients to be remotely monitored by providers while allowing patients to manage their recovery at home in conjunction with home health or out-patient (OP) physical therapy (PT). With the current adoption of value-based, bundled arrangements or through the mandates defined by TEAM 2026, there is an incentive to constrain post-surgical cost savings by only utilizing human resources when necessary. Traditional fee for services models are also being challenged as reimbursement costs continue to be reduced and with less available human resources. In this analysis, a hybrid remote monitoring (RM) + PT model for managing patients post-total knee arthroplasty (TKA) was assessed by its effects on cost savings for the provider and the patient while also addressing the subjective and objective functional outcomes to population norms.

METHODS: The TracPatch system (a class 1 medical device) is a wearable system that utilizes sensors that are worn above and below the knee to quantify range of motion and activity while also providing guided exercises, pain scores and telemedicine features. Twenty-five patients were provided with the TracPatch technology to be remotely monitored and conduct at home exercises in conjunction with 6 home health sessions and no outpatient PT for 6 weeks. Out-patient PT was provided post-six weeks when required. A typical per session cost was calculated on expected billing codes for a typical OP PT session and then multiplied by the number of sessions utilized and compared to a standard of the current 24 OP PT sessions in this region. Costs to patients were expected to be a standard co-pay of $50 per session multiplied by the number of sessions saved. The median of flexion and extension by means of a seated heel slide test, steps and cadence as calculated by the technology were compared to previously published national norms by the manufacturer.

RESULTS: An average episode of care savings of $1900 dollars per patient was calculated by reducing an average of 20 outpatient PT sessions over 8 weeks. Patients saved approximately $1000 ($50 * 20) in co-payments during their recovery. The test population vs reference median at 6 weeks was approximately 115 vs 100 degrees and 1 vs 4 degrees for flexion and extension respectively (Figure 1). The test population vs reference median at 6 weeks was approximately 5000 vs 4000 steps and 100 vs 90 steps/mins for total steps and max cadence respectively (Figure 2). Patients reported high satisfaction with the protocol and cited ease of use, reduced co-pays and time saved as the primary benefits of participating. In this sample no ER or readmissions were observed. No manipulations were required.

DISCUSSION AND CONCLUSION: Healthcare organizations are either being directly capped through bundled arrangements or indirectly through reduced reimbursements. Concurrently, patients will have to increase their contribution to their healthcare costs. The data from this protocol demonstrates a way that organizations and patients can reduce the costs of post-surgical care while demonstrating similar objective outcomes. Furthermore, this remote monitoring tool enables an individualized patient approach while providing care teams with objective data for appropriate resource allocation through identifying individuals who may or may not need outpatient therapy following total knee replacement. Not all patients will recover at the same trajectory and it is expected that poor performing patients will be able to be identified early by comparing their data to the population medians and provide additional services to improve their recovery trajectory.