The Role of Remote Therapeutic Monitoring in Postoperative Rehabilitation Following Total Hip Arthroplasty

Bryan T Wall, Alison K Klika, Jason Scalise, Jackson Grant Woodrow, Wael K Barsoum, Thomas Harte

INTRODUCTION: Remote Therapeutic Monitoring (RTM) is an emerging digital health modality that enables remote engagement and oversight of patient rehabilitation using data-driven platforms. While RTM has been formally recognized by CMS for reimbursement, some payors remain resistant to reimbursing these services, and RTM's clinical utility and value in orthopaedic care remain undefined. Our practice implemented a digital health platform in 2023 to support patient education, guided rehabilitation, and RTM. The purpose of this study was to determine the impact of RTM on healthcare resource utilization, patient-reported functional outcomes, and complication rates following total hip arthroplasty (THA).

METHODS: We performed a retrospective cohort analysis of all primary THA patients treated at a single orthopedic practice. Patients were included only if their postoperative rehabilitation was performed entirely within the practice, excluding patients using outsourced physical therapy (PT). Beginning in 2024, our standard THA rehabilitation protocol was changed to use RTM-only care preferentially. Patients or surgeons could opt instead for PT-only or hybrid care (PT augmented with RTM). RTM consisted of patient education, surveys, and home exercises overseen by a physical therapist with occasional scheduled phone/telehealth encounters to review progress. Patients from the first 10 months of 2024 were divided accordingly into one of three cohorts: PT-only, RTM-only, or hybrid care. A fourth cohort was selected from all patients who underwent THA in 2022, prior to the option to use RTM at our practice as a historical control. All patients having THA in 2023 were excluded as RTM use was not standardized during this initial launch phase. All patients were followed for a minimum of 6 months. Variables assessed included expected reimbursement and number of postoperative rehabilitation encounters (PT and RTM). HOOS JR scores were collected preoperatively, 6 months, and 1 year postoperatively. Expected reimbursement was calculated using Medicare allowables for corresponding CPT codes. Statistical analysis included ANOVA with post hoc Tukey HSD testing and chi-square tests with pairwise comparisons for reoperation rates.

RESULTS:

A total of 1,031 patients met inclusion criteria, with 392 patients in the historical control (i.e. pre-RTM PT-only group), 134 patients in the PT-only group, 83 patients in the hybrid group, and 422 patients in the RTM-only group. Demographic variables were not significantly different across groups, apart from age (mean 66.8 years in RTM-only vs. 70.0 in PT-only; $p = 0.02$). The RTM-only group demonstrated the lowest mean total encounter count (2.0 ± 0.9) and expected reimbursement for rehab services ($177 ± 96), compared to both PT-only (10.4 ± 6.7; $1304 ± 779) and hybrid care (10.6 ± 5.2; $1232 ± 632) ($p < 0.001$ for all). All cohorts (PT-only, hybrid, and RTM-only) showed significant improvements in HOOS JR outcomes at 6 months, with no significant differences observed in HOOS JR outcomes between the RTM-only and the PT-only or hybrid groups (p=0.45). This trend persisted among patients with 1-year follow-up ($p = 0.55$). The overall rate of reoperation was 1.9% and did not differ significantly across groups ($p = 0.19$).

DISCUSSION AND CONCLUSION: This study supports the use of RTM as a primary modality for postoperative rehabilitation in THA patients. RTM as a stand-alone modality substantially reduced resource utilization—requiring less than one-fifth the visits and cost of traditional PT—while maintaining equivalent clinical outcomes and safety. HOOS JR outcomes were clinically equivalent across groups, and reoperation rates remained uniformly low. These findings demonstrate that RTM can serve not only as a supplement to in-person rehab, but as a stand-alone, lower-cost alternative in appropriately selected patients. As bundled payment models and outpatient THA continue to expand, the integration of RTM may offer a scalable solution to meet growing demand without sacrificing quality. Future prospective trials should focus on identifying ideal patient profiles, optimal engagement strategies, and long-term cost-effectiveness.

Patient Cohort	n	Mean Age (years ± SD)	Mean BMI (kg/m2 ± SD)	Gender (M/F)	Side (R/L)
PT-only	134	70.0 ± 9.5	30.2 ± 5.7	65/69	76/58
Hybrid	83	66.9 ± 11.2	30.1 ± 5.8	30/53	47/36
RTM-only	422	66.8 ± 10.4	30.2 ± 5.8	166/256	213/209
Historical control (PT-only)	392	67.5 ± 10.7	30.2 ± 5.8	175/217	200/192
All Patients	1031	67.5 ± 10.5	30.2 ± 5.8	436/595	536/495
		Significant difference between PT-only and RTM-only (p = 0.02)	*p = 0.99*	*p = 0.12*	*p = 0.48*

Patient Cohort	Mean Expected Reimbursement for Rehab Services (± SD)	Mean PT/RTM Encounters (± SD)	Mean Preop HOOS JR (± SD)	Mean 6 Month Change HOOS JR (± SD)	Reoperation (Rate)
PT-only	$1304 ± 779	10.4 ± 6.7	48.3 ± 15.5	+22.3 ± 16.4	4 (3.0%)
Hybrid	$1232 ± 632	10.6 ± 5.2	49.0 ± 13.5	+25.1 ± 20.4	1 (1.2%)
RTM-only	$177 ± 96	2.0 ± 0.9	45.6 ± 14.7	+31.6 ± 19.9	4 (0.9%)
Historical control (PT-only)	$1226 ± 673	11.1 ± 5.6	-	-	11 (2.8%)
All Patients	$807 ± 749	7.2 ± 6.3	46.4 ± 14.7	+30 ± 19.7	20 (1.9%)
	p < 0.001	p < 0.001	p = 0.16	p = 0.45	p = 0.19