

Research Article

Integrating Patient-Reported Functional Outcome Measures in Determining Eligibility for Outpatient Total Hip Arthroplasty

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Background

Since the removal of total hip arthroplasty (THA) from the Medicare Inpatient-Only (IPO) list in 2020, there has been a growing trend towards outpatient procedures. Recent studies have demonstrated equivalent complications and patient-reported outcome measures (PROMs) among inpatient and outpatient THA patients, but existing selection tools primarily emphasize medical comorbidities. This study assessed the value of incorporating preoperative PROMs into clinical-decision making tools to adequately identify patients most suitable for outpatient THA.

Methods

Adult patients who underwent unilateral THA between 2018-2024 and used a web-based home therapy program were included in this retrospective cohort study. Patients were stratified by length of stay into outpatient (same-day discharge, LOS <24 hours from surgery to discharge) and inpatient (LOS ≥24 hours). Patient demographics, clinical characteristics, and preoperative PROMs were compared. Backward logistic regression and receiver operating characteristic (ROC) curve analyses were performed to identify preoperative parameters predictive of outpatient THA.

Results

Among 1,090 patients (mean age 68.6 years, 51% female), Outpatient THA patients had lower mean age (64.8 vs 69.3 years), Medicare insurance rates (31% vs 44%), preoperative assistive device use (21% vs 30%), and frailty (0.1 vs 0.2) (all $p < 0.05$). In addition, they had higher PROMIS Overall (34.1 vs 31.6), Physical (41.6 vs 39.1), and Mental (50.9 vs 48.2), and HOOS JR (52.5 vs 49.1) scores (all $p < 0.01$). Regression analyses identified age <75 years (OR=3.6, $p < 0.001$), PROMIS Overall >40 (OR=2.0, $p = 0.002$), and HOOS JR >40 (OR=1.6, $p = 0.042$) to be predictive of outpatient THA candidacy. ROC curve analyses incorporating these parameters showed good model discrimination (area under the curve=0.7, $p < 0.001$).

Conclusion

Patient age, PROMIS Overall and HOOS JR scores were independent predictors of outpatient THA. Functional outcomes should be integrated in traditional comorbidity-based tools when selecting patients for outpatient THA.

INTRODUCTION

Total hip arthroplasty (THA) is one of the most successful orthopedic surgeries and its utilization is increasing in parallel with the aging population (American Association of Hip and Knee Surgeons 2019). In the United States, annual volume is projected to reach approximately 850,000 procedures by 2030 (Cochrane, Klika, Mont, et al. 2023). Over the past decade, there has been a paradigm shift toward fast-track recovery protocols and outpatient-based THA, with studies estimating that over half of all primary hip and knee replacements will be performed outpatient by 2026 (DeCook 2019). The Centers for Medicare & Medicaid Services (CMS) further reinforced this trend by removing THA from the inpatient-only (IPO) list in 2020, allowing Medicare reimbursement of THA for hospital outpatient departments and ambulatory surgical centers (Horn, Reischl, Morton, et al. 2022). This policy change has accelerated the adoption of outpatient THA, and expanded eligibility beyond the historically healthiest patient populations (Jaibaji, Sawalha, Malahias, et al. 2020; Kort, van der Sijp, Clement, et al. 2017).

Existing literature has consistently shown that outpatient THA can be safely performed in appropriately selected patients without an increased risk of 90-day complications

or readmissions (American Association of Hip and Knee Surgeons 2019; LeBrun, Goodman, Friedman, et al. 2023; Lyman, Lee, Franklin, et al. 2016). In addition, outpatient protocols have been associated with reduced costs for health systems without compromising pain control or functional recovery (Lyman, Lee, Franklin, et al. 2016). However, most current outpatient arthroplasty selection tools utilize patient demographics and medical comorbidities, with little emphasis on functional status. The Outpatient Arthroplasty Risk Assessment (OARA) Score, as an example, incorporates comorbidity burden, lab values, and social factors to predict the need for a longer hospital stay (LeBrun, Goodman, Friedman, et al. 2023). While such an approach can provide valuable risk stratification, it largely neglects baseline physical function which can subsequently impact postoperative recovery from THA.

Patient-reported outcome measures (PROMs), such as the Hip Disability and Osteoarthritis Outcome Score, Junior (HOOS-JR) and the PROMIS (Patient-Reported Outcomes Measurement Information System), are increasingly recognized as valuable tools providing direct insight into patients' self-perceived health and function. They have additionally been validated in hip arthroplasty populations and offer prognostic utility in predicting which patients will achieve meaningful improvement after arthroplasty

(Migliorini, Eschweiler, Helmers, et al. 2021; Rosinsky, Kay, Cooper, et al. 2020; Stiegel, Sershon, Penrose, et al. 2019). However, while they are being more routinely collected, these PROMs are not systematically incorporated in perioperative planning to inform patient candidacy for accelerated recovery pathways (Xu, Li, Xu, et al. 2019).

Given this gap, the present study evaluated whether routinely collected preoperative PROMs can be used to identify candidates for outpatient THA. Integrating PROMs into preoperative decision-making could provide a more patient-centered and function-oriented assessment, complementing traditional comorbidity-based models.

METHODS

STUDY DESIGN

This retrospective cohort study utilized data from the Force Therapeutics platform (Force Therapeutics, New York, NY, USA), a web-based patient education and engagement system that collects PROMs before and after THA. Institutional review board approval was waived since no protected health information was collected and informed consent was obtained from all patients included in the database.

DATA EXTRACTION

Patient demographics, clinical characteristics, comorbidities, and PROMs were extracted for analysis. Demographic variables included age, sex, body mass index (BMI), and Medicare insurance status. Comorbidities included diagnoses of heart disease, depression, diabetes, respiratory conditions, and tobacco use, as well as modified frailty index 5-item score. Clinical characteristics comprised hospital length of stay (LOS), preoperative history of falls, use of assistive devices, use of pain medications, and 90-day postoperative emergency department (ED) visits. PROMs included the Patient-Reported Outcomes Measurement Information System (PROMIS) and Hip Disability and Osteoarthritis Outcome Score for Joint Replacement (HOOS JR).

PATIENT POPULATION

Adult patients aged 18 years and older were included in this study if they used the Force Therapeutics platform and underwent unilateral THA between 2018 and 2024. In total, 1,090 patients met the inclusion criteria. The mean age was 68.6 years, 50.8% were of female sex, and the mean BMI was 30.2 kg/m². Approximately 41.9% of patients had Medicare insurance. The most common comorbidities were depression (11.8%), heart disease (8.3%), and diabetes (7.7%), with an overall low burden of comorbidity as reflected by a mean modified frailty index 5-item of 0.2. At the surgical visit, 29.3% had a history of falls, 28.6% used assistive device use (28.6%), and 11.6% were on pain medications ([Table 1](#)).

STATISTICAL ANALYSES

Demographic, clinical, and preoperative PROMs data were summarized using means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. Patients were stratified by length of stay into outpatient (same-day discharge, LOS <24 hours from surgery to discharge) and inpatient (LOS ≥24 hours) cohorts. Discharges occurring after midnight, as well as admissions remaining overnight or for observation purposes, were classified as inpatient if they exceeded the 24-hour period. Comparisons between groups were conducted using Student's t-tests for continuous variables and chi-square (χ^2) tests for categorical variables. Multivariable logistic regression with backward stepwise elimination was performed to identify preoperative factors independently associated with outpatient THA status. All statistical analyses were conducted using STATA version 16.0 (StataCorp, College Station, TX), with a two-sided p-value <0.05 considered statistically significant.

RESULTS

PATIENT CHARACTERISTICS

A total of 1,090 patients met the inclusion criteria, including 908 inpatient and 182 outpatient THA cases. Outpatient THA patients were younger (64.8 vs 69.3, $p<0.001$), had lower rates of Medicare insurance (30.8% vs 44.2%, $p<0.001$), infrequently used assistive devices (21.4% vs 30.1%, $p=0.019$), and had lower mean modified frailty index scores (0.1 vs 0.2, $p=0.041$). No significant differences were observed between groups with respect to sex, BMI, comorbidities, pain medication use, history of falls, or postoperative ED visits ($p>0.05$ for all) ([Table 1](#)).

PATIENT-REPORTED OUTCOME MEASURES

Outpatient THA patients had significantly higher preoperative PROMIS Overall (34.1 vs 31.6, $p<0.001$), PROMIS Physical (41.6 vs 39.1, $p<0.001$), and PROMIS Mental (50.9 vs 48.2, $p<0.001$) scores. In addition, they also had higher HOOS JR scores (52.5 vs 49.1, $p=0.004$) than inpatient THA patients as well ([Table 2](#)).

PREDICTORS OF OUTPATIENT THA

Multivariable logistic regression identified age <75 years (OR=3.57, 95% CI=2.27–5.56, $p<0.001$), PROMIS Overall score ≥40 (OR=1.96, 95% CI=1.28–2.94, $p=0.002$), and HOOS JR score ≥40 (OR=1.56, 95% CI=1.02–2.44, $p=0.042$) as independent predictors of undergoing outpatient THA ([Table 3](#)). ROC curve analyses incorporating these parameters showed good model discrimination (area under the curve=0.7, $p<0.001$). No difference in Emergency Room Visits was noted between the outpatient and inpatient groups ([Table 1](#)).

Table 1. Preoperative Demographic and Clinical Characteristics of Inpatient and Outpatient Total Hip Arthroplasty Patients

Variable	Total (N = 1090)	Inpatient THA (N = 908)	Outpatient THA (N = 182)	P-value
Age (years)	68.56(11.36)	69.31(11.54)	64.79(9.65)	<0.001
Female Sex	554 (50.8)	465 (51.2)	89 (48.9)	0.569
Body Mass Index (kg/m ²)	30.20(6.42)	30.36(6.55)	29.39(5.73)	0.094
Medicare Insurance	457 (41.9)	401 (44.2)	56 (30.8)	<0.001
Clinical Characteristics				
Pain Medication Use	126 (11.6)	111 (12.2)	15 (8.2)	0.125
History of Falls	319 (29.3)	271 (29.8)	48 (26.4)	0.347
Assistive Device Use	312 (28.6)	273 (30.1)	39 (21.4)	0.019
ED Visits	70 (6.4)	62 (6.9)	8 (4.4)	0.210
Comorbidities				
Heart Disease	91 (8.3)	76 (8.4)	15 (8.2)	0.954
Depression	129 (11.8)	109 (12.0)	20 (11.0)	0.699
Diabetes	84 (7.7)	74 (8.1)	10 (5.5)	0.220
Respiratory Condition	75 (6.9)	67 (7.4)	8 (4.4)	0.147
Tobacco Use	67 (6.1)	58 (6.4)	9 (4.9)	0.460
Modified Frailty Index 5-item	0.16(0.20)	0.16(0.20)	0.13(0.17)	0.041

Abbreviations: THA = Total Hip Arthroplasty.

Table 2. Preoperative Patient-Reported Outcome Measures of Inpatient and Outpatient Total Hip Arthroplasty Patients

Variable	Total (N = 1090)	Inpatient THA (N = 908)	Outpatient THA (N = 182)	P-value
PROMIS Overall	32.05(7.23)	31.61(7.16)	34.10(7.19)	<0.001
PROMIS Physical	39.52(7.00)	39.08(6.89)	41.61(7.19)	<0.001
PROMIS Mental	48.64(9.37)	48.16(9.24)	50.92(9.65)	<0.001
HOOS JR	49.67(13.88)	49.07(13.74)	52.52(14.20)	0.004

Abbreviations: THA = Total Hip Arthroplasty, PROMIS = Patient-Reported Outcomes Measurement Information System, HOOS JR = Hip Disability and Osteoarthritis Outcome Score for Joint Replacement.

Table 3. Preoperative Predictors of Outpatient Total Hip Arthroplasty

Variable	Coeff	SE	OR	95% CI	P-value
Age >75 years	1.27	0.23	3.57	2.27 – 5.56	<0.001
PROMIS Overall <40 Points	0.67	0.22	1.96	1.28 – 2.94	0.002
HOOS JR <40 Points	0.45	0.22	1.56	1.02 – 2.44	0.042

Abbreviations: Coeff = Unstandardized Beta Coefficient, SE = Standard Error, OR = Odds Ratio, CI = Confidence Interval, PROMIS = Patient-Reported Outcomes Measurement Information System, HOOS JR = Hip Disability and Osteoarthritis Outcome Score for Joint Replacement.

DISCUSSION

Our study identified several key preoperative factors predictive of successful same-day discharge following THA. Patients younger than 75 years were significantly more likely to undergo outpatient THA, whereas older patients more frequently required inpatient recovery. In addition, higher preoperative patient-reported outcomes, specifically PROMIS Overall and HOOS JR, were independently associ-

ated with increased odds of discharge to home on the day of surgery. These findings suggest baseline functional and health status, as determined by PROMs scores, should be considered when selecting patients for outpatient THA.

In our cohort, roughly 17% of THA cases were managed with same-day discharge. All of the surgeries were performed at a single academic medical center where the option for inpatient admission was always available. Outpatient THA patients were generally younger, had lower

frailty scores, lower rates of Medicare insurance, and used assistive devices less frequently. These characteristics suggest that patient-level factors influenced assignment to outpatient pathways, reflecting real-world clinical judgment in selecting appropriate candidates. While the overall proportion may initially appear low, it likely reflects the gradual institutional adoption of outpatient protocols over the study time period and the removal of THA from Medicare's inpatient only list. Importantly, this rate is consistent with national trends, as by 2022 only around 16% of THAs were performed as same-day outpatient procedures (Fedorka, Srikumaran, Abboud, et al. 2024). These contextual factors suggest that our findings remain representative of broader practice patterns during this transitional era. They further support the notion that PROMs could play a valuable role in increasing this percentage by helping predict outpatient discharge.

Age emerged as a strong determinant of discharge disposition, with patients younger than 75 years being 3.6 times more likely to be discharged home on the day of surgery. Courtney et al. have previously reported that patients older than 70 years faced significantly higher risks of postoperative complications and 30-day readmission following hip arthroplasty, underscoring the association between advanced age and the need for inpatient care (Courtney, Molinari, Paprosky, et al. 2017). Similarly, Basques et al., have found that patients aged 85 years and older had increased odds of readmission after same-day joint replacement procedures (Basques, Tetreault, Della Valle, et al. 2017). In a multicenter study of outpatient THA, Lieberman et al. identified further older age as an independent predictor of failure to achieve same-day discharge (Lieberman, Hannon, Pelt, et al. 2021). These results are consistent with our findings, and studies adopting similar age thresholds have reported comparable outcomes in facilitating outpatient recovery (Goyal, Chen, Padgett, et al. 2017). As a result, most outpatient THA series are composed predominantly of younger, healthier patients (Scully, Kappa, and Melvin 2020). From a clinical perspective, advancing age is frequently accompanied by a higher comorbidity burden, reduced physiologic reserve, and limited early mobility, all of which hinder participation in accelerated recovery protocols. Our results reaffirm that chronological age, particularly beyond the mid-70s, remains one of the strongest predictors of discharge setting, and age should be a key consideration in outpatient THA selection criteria.

PROMs were also independent predictors of outpatient candidacy in our cohort. Higher HOOS JR and PROMIS Overall scores were independently associated with increased odds of same-day discharge. Specifically, PROMIS Overall score greater than 40 and HOOS JR score greater than 40 were linked to nearly twice the odds of outpatient THA. Padilla et al. previously demonstrated strong correlations between HOOS-JR and PROMIS Computer Adaptive Test (CAT) scores, suggesting that improved joint-specific function reflects better overall health status (Padilla, Lazaro, Maloney, et al. 2019). Similarly, Iwata et al. identified lower preoperative hip scores as independent predictors of non-home discharge following THA (Iwata, Momose, Mat-

suda, et al. 2023). Sutton et al. also reported that patients with stronger baseline PROMs were more likely to be discharged home, whereas those with lower scores were more frequently transitioned to extended care settings (Sutton, Austin, Keeney, et al. 2023). These findings support the concept that functional readiness, as perceived and reported by patients themselves, is an important determinant of safe outpatient management that may be neglected by existing outpatient arthroplasty selection tools, such as the Risk Assessment and Prediction Tool (RAPT) and the OARA score which primarily emphasize medical comorbidities. Importantly, low PROMs should not be interpreted as reasons to defer or deny surgery, but rather as indicators of the need for potential additional perioperative planning and support (Fu, Daines, Yang, et al. 2017). Incorporating PROMs into preoperative assessments may therefore enhance risk stratification, as studies have demonstrated that the inclusion of function status measures improves prediction of postoperative complication and resource utilization (Schmocker, Havlik, Bruce, et al. 2023).

The present study has several limitations. First, the data were derived from a single tertiary center with an outpatient pathway which may limit the generalizability to other institutions without similar infrastructure or outpatient pathways. Second, due to limitations in the dataset, we were unable to account for patients' social support systems, extent of radiographic degeneration, perioperative anesthesia techniques (such as type of anesthesia, use of local infiltration analgesia), surgical approach, and postoperative outpatient physical therapy availability, which could have influenced discharge timing and disposition. Third, as an observational study, there is a potential for selection bias, wherein surgeons may have preferentially selected healthier patients for same-day discharge. Although statistical adjustments were performed, the possibility of residual confounding remains. Fourth, secular trends over the 2018-2024 study period, such as the removal of THA from the CMS inpatient-only list in 2020 and the impact of the COVID-19 pandemic on hospital practice, could have influenced outpatient adoption rates but were not accounted for in the current analyses. This is because the number of outpatient cases in the early years of the study was limited, which could have led to unstable estimates if year of surgery were included as a covariate. Such temporal patterns could result in a correlation between PROMs and discharge disposition that reflects changing practice patterns rather than inherent predictive strength. Despite these limitations, the findings offer clinically meaningful insights for outpatient arthroplasty planning.

CONCLUSION

An age threshold of less than 75 years, combined with preoperative PROMIS Overall and HOOS JR scores above 40, was associated with significantly higher odds of successful same-day discharge following total hip arthroplasty. These findings indicate that baseline functional status, as measured by PROMs, provides practical and patient-centered criteria for outpatient candidacy. Unlike traditional comor-

idity-driven risk scores, this study highlights the under-recognized role of functional health in guiding perioperative decision-making Integrating PROMs into preoperative evaluation may improve risk stratification and help guide safe, evidence-based expansion of outpatient THA.

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