



Original research

Do illness rating systems predict discharge location, length of stay, and cost after total hip arthroplasty?

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ABSTRACT

Background: As procedure rates and expenditures for total hip arthroplasty (THA) rise, hospitals are developing models to predict discharge location, a major determinant of total cost. The predictive value of existing illness rating systems such as the American Society for Anesthesiologists (ASA) Physical Classification System, Severity of Illness (SOI) scoring system, or Mallampati (MP) rating scale on discharge location remains unclear. This study explored the predictive role of ASA, SOI, and MP scores on discharge location, lengths of stay, and total costs for THA patients.

Methods: A retrospective analysis of patients undergoing elective primary or revision THA was conducted at a single institution. Multivariable regressions were utilized to assess the significant predictive factors for lengths of stay, total costs, and discharge to skilled nursing facilities (SNFs), rehabilitation centers, and home. Controls included demographic factors, insurance coverage, and the type of procedure.

Results: ASA scores ≥ 3 are the only significant predictors of discharge to SNFs (odds ratio [OR] = 1.69, confidence interval [CI] = 1.04–2.74) and home (OR = 0.57, CI = 0.34–0.98). Medicaid coverage (OR = 2.61, CI = 1.37–4.96) and African-American race (OR = 2.60, CI = 1.59–4.25) were additional significant predictors of discharge to SNF. SOI scores are the only significant predictors of length of stay (β = 1.36 days, CI = 0.53–2.19) and total cost for an episode (β = \$6,234, CI = \$3577–\$8891). MP scores possess limited predictive power over lengths of stay only.

Conclusions: These findings suggest that although ASA classifications predict discharge location and SOI scores predict length of stay and total costs, other factors beyond illness rating systems remain stronger predictors of discharge for THA patients.

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Introduction

After a sharp increase in the rate of total hip arthroplasty (THA) in 2005, annual growth in THA utilization has risen steadily [1,2]. The cost of total joint arthroplasty (TJA) also continues to rise, accounting for 4.6% of all Medicare hospital payments in 2008 [3]. A

primary driver of TJA expenditures is postdischarge cost. Previous literature indicates that postdischarge costs comprise between 35% and 55% of the total payment for an episode [4–6].

Discharge location is a major driver of these postdischarge expenditures. Studies show that anywhere between 29% and 49% of TJA patients are discharged to an extended care facility (ECF) [4,7–11]. Expenditures for ECFs comprise a significant total of postdischarge costs, so optimizing discharge location may control rising THA expenditures [4,12]. Previous literature has attempted to predict discharge location, finding that patient expectations may be the single greatest predictor (odds ratio [OR] = 13–170) of ECF discharge [9,13]. Caregiver support at home is also considered a significant predictor, in addition to the geographic variation among medical centers, which may influence practice styles and patient populations [7,9,14].

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Because patient expectations are difficult to measure, other literature has explored predictive clinical variables. Older age is strongly associated with ECF discharge [7,9,14]. In one study on hip and knee arthroplasties, patients older than 80 years (OR = 20) and patients aged 65-79 years (OR = 8.5) were more likely to be discharged to an ECF than patients under the age of 40 years [7]. Multiple demographic characteristics, including female sex, Medicare coverage, and 3 medical comorbidities (heart disease, diabetes, and chronic obstructive pulmonary disease) were associated with discharge to ECF [6,11]. The influence of revision TJA on discharge location relative to primary procedures remains conflicted [7,14,15].

The predictive value of existing illness rating systems on discharge location, lengths of stay (LOS), and total costs has not been thoroughly assessed. Although some studies suggest a correlation between American Society for Anesthesiologists (ASA) scores and hospital length of stay, other studies have not supported this association [16-19]. Few studies have examined the potentially positive relationship between ASA score and total cost for a THA episode [20,21]. Given its association with patient complications and mortality, ASA ≥3 may also be linked to discharge location [5,18,22-24]. Past research found that ASA class 3 (OR = 3.5) and ASA 4 (OR = 10.8) patients were more likely to be discharged to an ECF [7].

Additional rating systems may have the potential to predict discharge location but are limited by a paucity of supporting evidence. Severity of Illness (SOI) scores, which define the loss of organ system function, may be linked to TJA expenditures and lengths of stay [25-28]. Mallampati scores (MP scores), a preoperative rating system scaled from low (1) to high (4) risk, reflects the difficulty of intubation but has not been investigated as a

predictor of discharge location. If existing illness rating systems can be leveraged to predict discharge location after THA, then care teams can achieve more efficient bed procurement and a reduced hospital length of stay.

The purpose of this study is to explore the predictive role of 3 widely documented illness rating systems—ASA, SOI, and MP scores—in determining discharge location for THA patients treated at a single academic medical center. We also examined the role of each rating system in predicting length of stay and total costs for THA.

Material and methods

Patient selection

Patient medical records at a single academic center from May 2011 to April 2012 were retrospectively analyzed. The study cohort included patients with Current Procedural Terminology codes for both primary THA (27130) and revision THA (27132, 27134, 27137, and 27138). A total of 419 records were identified. Patients were excluded for incomplete records, including undocumented ASA score (3), MP score (10), or body mass index (BMI) (8); early postoperative death (1); and discharge to another hospital (3). Nonelective procedures for hip dislocation and periprosthetic fractures that were closed or open reduced (22) were also excluded. A total of 372 complete records were available for analysis (Fig. 1).

Data organization

Participants were classified into 3 discharge classes: postacute care in a skilled nursing facility (SNF), postacute care at an acute

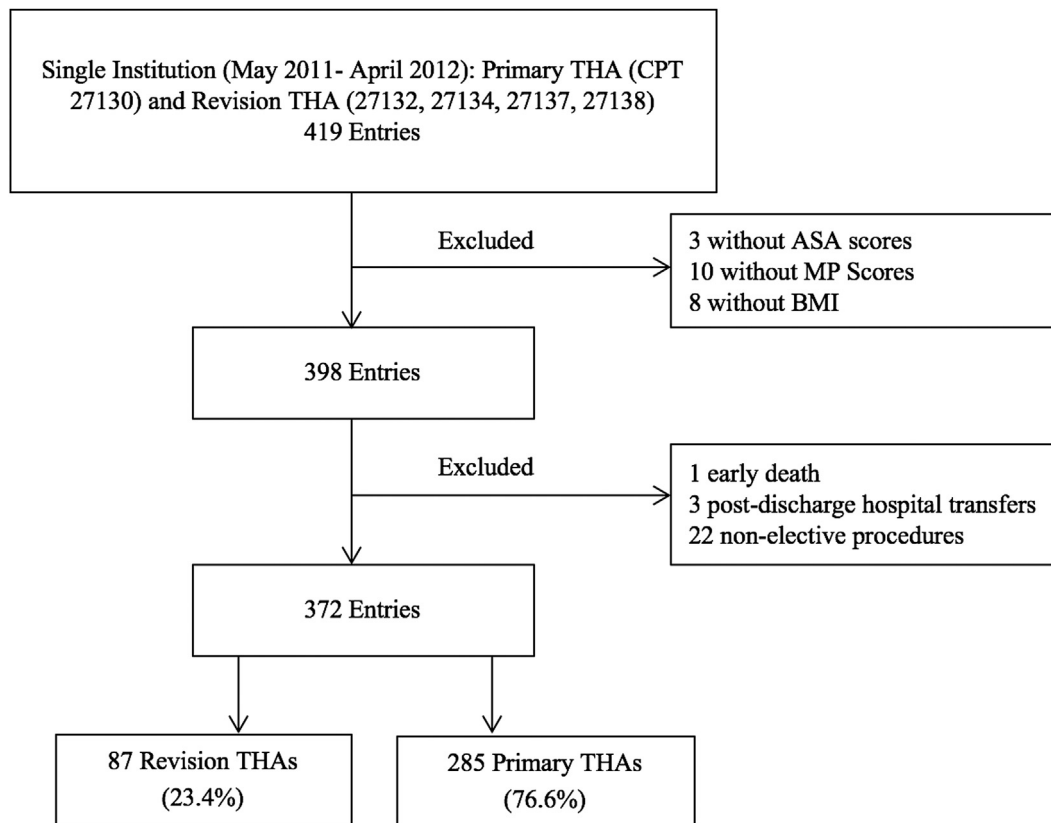


Figure 1. Selection of THA cohort.

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