Chapter 17
Outcome Metrics: What to Measure Now and in the Future

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Introduction

Recognition that total joint arthroplasty (TJA) represents the highest single expenditure for the Centers for Medicare and Medicaid Services (CMS) has been a catalyst for the implementation of alternative treatment and cost containment initiatives for total hip and knee replacement, irrespective of payer [1]. Interest in outpatient TJA has paralleled changes at the Federal level, particularly with a shift towards Alternative Payment Models (APMs), such as the mandatory Comprehensive Care for Joint Replacement (CJR) model started in 2016 or the voluntary Bundled Payments for Care Improvement (BPCI) Advanced model [2]. Furthermore, there is a growing use of ambulatory surgery centers (ASCs) for outpatient TJA in appropriately indicated patients [3, 4]. These broad shifts in both the method of healthcare delivery (outpatient TJA) and the method of reimbursement (APMs) make it incumbent on the surgeon to know which clinical and nonclinical data is collected and tracked. Outcome metrics can be extremely helpful for informing decisions regarding patient selection, protocol development, surgical techniques, site of care, and appropriateness of outpatient TJA. Equally, if not more important, outcomes assessment is critical to ensure that the shift to outpatient TJA does not increase readmissions or complications and that indirect costs are not increased as a result.

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Assessing Success: Patient-Report Outcomes and Satisfaction Scores

Patient-reported outcome measures (PROMs) are the foundation of assessing clinical outcomes following TJA. Although there are numerous PROMs to choose from, the authors routinely obtain Lower Extremity Function (LEF), Knee Injury and Osteoarthritis Outcome Score (KOOS)/Hip Disability and Osteoarthritis Outcome Score (HOOS), 12-Item Short Form Mental and Physical Component Survey (SF-12 MCS and PCS), and New Knee Society Scores both at the initial visit and at subsequent follow-up visits. These outcome metrics represent both disease-specific and general health scores and have historically been utilized primarily for research purposes. More recently, some of these have been used by payers to quantify the quality of care and determine value-based payments. It is anticipated that value-based care payment initiatives will increasingly rely on PROMs to influence compensation for care. Collection of PROMs enables the surgeon and care team to monitor their own TJA patient outcomes longitudinally. Common validated outcome measures such as KOOS, HOOS, Oxford Knee Scores, and New Knee Society Scoring systems are useful surgery-specific tools for knee and hip arthroplasty [5, 6].

The utility of disease-specific PROMs such as Western Ontario and McMaster University Osteoarthritis Index (WOMAC), Oxford Hip Score, and Knee Society Clinical Rating Score (KSCRS) was demonstrated by Halawi et al. to have a higher correlation with patient satisfaction than general health scores (e.g., SF-12), activity (e.g., UCLA Activity Score), or perceptions of normalcy [5]. More specifically, the authors observed that of disease-specific PROMs, the pain domain was most closely correlated with patient satisfaction [4].

Patient satisfaction is increasingly recognized as an important measure of outcome after TJA, which was often ignored in classic PROMs. Patient satisfaction with ASC care is collected through a CMS program termed Consumer Assessment of Healthcare Providers and Systems Outpatient and Ambulatory Surgery Survey (OAS CAHPS), which mirrors the inpatient side of hospital satisfaction reporting (HCAHPS). However, unlike its inpatient cousin, OAS CAHPS is a voluntary program started by CMS in 2016. As of 2022, it remains a voluntary initiative per CMS. Although ASCs at this time are not monetarily penalized for low satisfaction scores (unlike inpatient procedures which are monitored via HCAHPS), this type of revenue-penalty model, which has been termed Value-Based Purchasing (VBP) by CMS, was mandated to be implemented for ASCs as well by the Affordable Care Act (ACA).

Pain management has been well-documented to impact satisfaction scores; therefore, surgeons should collect metrics that include patient satisfaction, particularly since it is tied to HCAHPS (and likely OAS CAHPS in the future) and hospital reimbursement via the VBP program. Prior studies have demonstrated that low HCAHPS scores were primarily correlated with poor pain control, which led to increased emphasis on pain management. Thus, the measurement of patient satisfaction, as it relates to pain management, will become increasingly important in the

future as VBP programs transition from the inpatient side to ASCs. In a recent study assessing the correlation between pain and low patient satisfaction scores, Jung et al. demonstrated that patient satisfaction was actually better correlated with a shorter length-of-stay (LOS) than pain [7]. Data is now emerging showing that the inherently shorter LOSs with ASCs are translating into higher patient satisfaction compared to inpatient TJA. A recent study by Kelly et al. demonstrated that compared to inpatient surgery, outpatient TJA patients were more satisfied—particularly with regards to pain management, nurse responsiveness, and thoroughness of discharge planning—and preferred the outpatient procedures [8].

While we do not expect any clinically meaningful changes in longer term joint-specific outcomes measures when TJA surgeries are transitioned to the outpatient setting, cost of care and patient satisfaction may be improved. Additionally, attention to outcomes metrics should assist the surgeon and institution in informing patient selection and perioperative protocols, mitigating risk, controlling costs, and improving outcomes in outpatient TJA. The onus is on us to ensure that the shift to outpatient care does not increase readmissions, complications, or indirect costs, and it is our responsibility to carefully track these particular outcomes with regards to outpatient TJA.

Assessing Safety: Complications

It is recommended that surgeons routinely track their complications and need for hospital readmissions, ensuring that they are not occurring with greater frequency in the outpatient compared to the inpatient settings. Healy et al. and Iorio et al. have published comprehensive standardized lists of complications of both TKA and THA that may serve as useful resources (Table 17.1) [9–11].

Complications are recorded, tracked, and publicly reported by CMS. For the inpatient setting, there are currently eight complications with mandated reporting and public disclosure (Table 17.2). The complications are then compared to other hospitals in the local region to identify statistical outliers (defined as outside of the 95% confidence interval bounds for the region) and publicly reported on a per-hospital basis using a color-coded scheme (Table 17.3).

Similar reporting models apply to ASCs, where reimbursement is tied to compliance with CMS reporting requirements, including provisions for public reporting, via the Ambulatory Surgical Center Quality Reporting Program (ASCQR). If ASCs do not comply with reporting requirements, they may incur a 2% reduction to any future ASC Medicare payment update thereby decreasing revenues. Although not TJA-specific, some of these complications do pertain to hip and knee replacement including wrong site surgery, patient falls, and transfers to acute care hospitals (Table 17.4). Certainly, the latter two risks are of great concern in the outpatient setting and may be mitigated with careful patient selection and meticulous perioperative management.

Table 17.1 Complications for knee and hip arthroplasty as defined by the Knee Society [9] and Hip Society [11]

Complications for total knee arthroplasty	Complications for total hip arthroplasty
1. Bleeding	1. Bleeding
2. Wound complication	2. Wound complication
3. Thromboembolic disease	3. Thromboembolic disease
4. Neural deficit	4. Neural deficit
5. Vascular injury	5. Vascular injury
6. Medial collateral ligament injury	6. Dislocation/instability
7. Instability	7. Periprosthetic fracture
8. Malalignment	8. Abductor muscle disruption
9. Stiffness	9. Deep periprosthetic joint infection
10. Deep periprosthetic joint infection	10. Heterotopic ossification
11. Periprosthetic fracture	11. Bearing surface wear
12. Extensor mechanism disruption	12. Osteolysis
13. Patellofemoral dislocation	13. Implant loosening
14. Tibiofemoral dislocation	14. Cup-liner dissociation
15. Bearing surface wear	15. Implant fracture
16. Osteolysis	16. Reoperation
17. Implant loosening	17. Revision
18. Implant fracture or tibial insert dissociation	18. Readmission
19. Reoperation	19. Death
20. Revision	
21. Readmission	
22. Death	

Table 17.2 Complications tracked and reported by CMS

Complication	Reporting period
Acute myocardial infarction (AMI)	7 days of admission
Pneumonia	7 days of admission
Sepsis/septic shock	7 days of admission
Surgical site bleeding	30 days of admission
Pulmonary embolism	30 days of admission
Death	30 days of admission
Mechanical complications	90 days of admission
Periprosthetic joint infection/wound infection	90 days of admission

Assessing Failure: Readmissions

Readmissions or transfers following outpatient TJA, if performed in the outpatient hospital setting, or transfers/admission to the hospital from the ASC setting, are both tracked and publicly reported by CMS. Again, these occurrences, regardless of payer, should be closely followed by surgeons in order to maintain a high level of patient care and ideally should be reviewed on a month-by-month basis to ensure that patient selection and perioperative protocols are acceptable [12].

Table 17.3 CMS reporting criteria for complications

Category	Better than the national rate	No different than the national rate	Worse than the national rate	The number of cases is too small
Criterion	The entire 95% interval estimate surrounding the hospital's rate is lower than the national rate	The 95% interval estimate surrounding the hospital's rate includes the national rate	The entire 95% interval estimate surrounding the hospital's rate is higher than the national rate	Fewer than 25 cases

Table 17.4 Ambulatory surgery center reporting mandates pertaining to TJA

Reporting Code	Complication
ASC-1	Patient burn
ASC-2	Patient fall
ASC-3	Wrong site, wrong side, wrong patient, wrong procedure, wrong implant
ASC-4	All-cause hospital transfer/admission
ASC-13	Normothermia

CMS tracks six procedures (including hip and knee replacement) and levies a penalty if the readmission rate is above a certain threshold, except for exempt institutions (such as VA, rural hospitals, Children's hospitals, among others) [13]. If TJA is performed in a hospital outpatient setting, the institution may be liable for readmissions for a maximum penalty of 3% Medicare revenue per year under the Hospital Readmissions Reduction Program (HRRP). [13, 14] A recent study by Springer et al. demonstrated a higher readmission rate for outpatient TJA (11.7%) compared to inpatient TJA (6.6%). Many of these readmissions were either due to poor pain control at home or wound complications. Interestingly, despite higher readmission rates, patients who underwent outpatient TJA were significantly more satisfied than inpatients [15].

On the ambulatory side, CMS tracks the number of patients that require transfer/admission to a hospital from an ASC (Table 17.4). Another proposed rule in 2019 has evaluated the possibility of adding a further tracked metric for Emergency Department (ED) visits and admissions within 7 days of various ASC procedures, including TJA. However, at this time the proposed rule is limited to General Surgery procedures only, for tracked diagnoses such as bleeding or DVT/PE. Currently, no financial penalties have been levied (CMS currently only requires compliance with reporting outcomes via the ASCQR program). However, it is possible that revenue may be withheld with future CMS rule changes if ASC transfer and/or admission rates are above a certain threshold, similar to the HRRP. While CMS has formalized some of these policies, and though CMS-insured patients are not the common demographic for outpatient TJA, private payers often follow the lead of CMS and may eventually impose similar penalties for admissions.

While there is some incentive for surgeon practices with bundled payment arrangements with private insurances and CMS to transition TJA to an outpatient setting in ASCs, complications and hospital admissions or transfers can have a large financial impact given the practices' assumed risk for costs for the entire episode of care. Surgeons will need to keep a close eye on both their readmission rates, but also their transfer and post-discharge ED visits particularly if performing outpatient TJA in an ASC. Better screening of patients preoperatively to optimize patients and appropriately select patients for the outpatient setting, optimized perioperative management protocols, as well as perioperative navigation and access to the care team, may help decrease complications, unnecessary ED visits, and readmission rates [16].

Assessing Costs: Healthcare Costs in the CJR Era

Across a broad spectrum of procedures, Medicare estimated savings of almost $7 billion between 2007 through 2011 and up to $12 billion between 2012 through 2017 by shifting outpatient surgical procedures from hospitals to ASCs for patients considered low-risk [17]. While the typical targeted demographic for outpatient TJA is not necessarily the Medicare-aged population, but rather the younger patient cohort, the general message is the same. Payers may stand to save a great deal of money if carefully selected TJA cases are transitioned to the ASC. In APM and bundled care arrangements, hospitals and physicians may be held accountable for costs for an entire 90-day episode of care and are required to pay a penalty if spending following TJA exceeds what is termed the quality-adjusted spending benchmark [18, 19]. Although the CJR model was designed in an era of inpatient TJA, in the future surgeons need to be prepared for ongoing CMS rule changes, and shifting models of reimbursement by private payers, to align reimbursement models between inpatient and outpatient procedures. [20]

Surgeons also need to be aware of the difference in reimbursement for TJA in the inpatient versus ambulatory setting, which can range anywhere from 18 to 28% less if performed in an outpatient setting. One further layer of added complexity is differentiating between the hospital outpatient department (HOPD) and an ASC which also have further reimbursement differentials, with similar procedures performed in an ASC reimbursed at rates ~20% lower than if done in a HOPD [18, 19]. In many non-Medicare bundled care arrangements, total costs per episode of care after total and partial joint arthroplasty may also prove a beneficial cost impact from transitioning to outpatient cases, as long as complications and indirect costs are mitigated during the episode of care.

The ability to accurately measure costs will be paramount for efficient operation in the ambulatory setting. A recent study by Palsis et al. evaluated two different methods of accounting for TJA: traditional accounting and what is termed time-driven activity-based costing (TDABC) [20]. The authors noted that while fixed costs such as implant costs or surgeon's fees were accurately accounted for with traditional accounting, indirect costs and space/equipment costs were substantially

overestimated with traditional account methods. The authors concluded that for total knee arthroplasty traditional accounting produced a negative margin of 36%, when CMS payments were used as a revenue source, and a positive margin of 22% when TDABC methods were used. Thus, it is critical that surgeons, particularly those with ownership or gain-sharing arrangements with ASCs ensure they have a robust accounting capability that accurately manages the costs of care.

Conclusion

Outcomes metrics is a term that represents a vast array of potential data that can be collected and analyzed for patients undergoing TJA. Although there is some overlap, outcomes metrics that are of primary interest to the surgeon to help inform and guide improvements in perioperative surgical care may not align with the metrics that are preferred by regulatory agencies such as CMS or commercial insurance providers. Surgeons may find it informative, effective, and efficient to adopt systems to effectively track useful outcomes measures while remaining in compliance with regulatory bodies for patient data reporting. In the case of outpatient knee and hip arthroplasty, the key outcomes measures to assess are costs of care, patient satisfaction, and the risks of complications, Emergency Department visits, and hospital transfers/admissions. While functional outcomes measures will likely not show obvious differences when surgery is performed on an outpatient or inpatient basis, our responsibility is to confirm that we can deliver outpatient TJA safely and cost-effectively in the outpatient setting, and that patients are equally, if not more satisfied compared to those receiving inpatient TJA. These are important outcomes measures for us to track longitudinally and frequently, as we work to refine indications for outpatient surgery, inform patient selection criteria, influence perioperative protocols for patient care and access to the care team, and expand the numbers of knee and hip replacements performed in ASCs.

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