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## Original Article

## What Is the Best Strategy to Minimize After-Care Costs for Total Joint Arthroplasty in a Bundled Payment Environment?

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## ABSTRACT

**Background:** The post-acute care strategies after lower extremity total joint arthroplasty including the use of post-acute rehabilitation centers and home therapy services are associated with different costs. Providers in bundled payment programs are incentivized to use the most cost-effective strategies.

**Methods:** We used decision analysis to examine the impact of extending the inpatient hospital stay to avoid discharge of patients to a post-acute rehabilitation facility.

**Results:** The results of this decision analysis show that extended acute hospital care for up to 5.2 extra days to allow for home discharge, rather than discharge to a post-acute inpatient facility can be financially preferable, provided quality is not negatively impacted.

**Conclusion:** The data demonstrate that because the cost of additional acute care hospital days is relatively small and because the cost of an extended post-acute inpatient rehabilitation facility is high, keeping patients in the acute facility for a few extra days and then discharging them directly to home may result in an overall lower cost than discharge after a shorter hospital stay to an expensive post-acute facility. However, this approach will have challenges, and future studies are needed to evaluate this change in strategy.

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Lower extremity total joint arthroplasty (TJA) is a cost-effective, quality-of-life improving procedure [1–3]. Despite studies demonstrating the cost-effectiveness of TJA [4], the increasing demand for TJA, combined with the need to curb health care expenditures, has necessitated efforts to decrease costs associated with these procedures. This has led to a variety of changes including payment reform, such as bundled payment programs. In a bundled payment program, providers receive a single payment for each TJA, covering all services for a defined period that includes not only the acute patient hospital stay but often some defined preoperative and postoperative period, comprising the period where patients receive post-acute care up to 90 days after surgery [5]. The post-acute care strategies, including the use inpatient rehabilitation and home

therapy and nursing services are associated with different costs, and providers in a bundled payment program are now responsible for these post-acute care costs and are incentivized to use the most cost-effective strategies. Given the large cost of post-acute inpatient facilities, a strategy for keeping patients in the acute care hospital for extra days to allow further progression with therapy, which in aggregate may be lower in cost than the cost of post-acute inpatient stays, has been considered as a way to allow a greater number of patients to be discharged home care services, which is significantly less costly than post-acute inpatient facility care. The purpose of this analysis was to examine these costs and to quantify the cost profile of different post-acute care strategies for joint arthroplasty patients.

## Methods

Our institution began a bundled payment program with The Center for Medicare Services (CMS), which includes the inpatient stay in the acute care hospital and all related services during the episode. The episode we selected ends 90 days after hospital discharge. Only unilateral primary procedures are included. We

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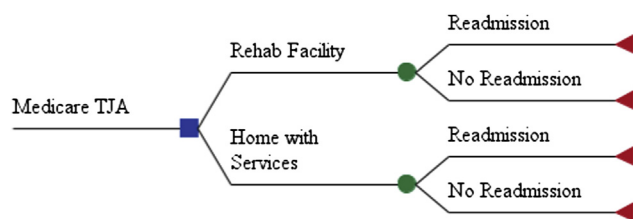
**Table 1**

Demonstration of the Average Cost of Post-Acute Care for the 90-Day Episode Based on Initial Discharge Plan, for the First Year of our Bundled Payment Program, Along With the Average Cost of Hospital Readmissions During the 90-Day Care Episode for 80 Readmissions in 721 Patients During this Period.

Place of Service	Average Payment (\$)
Home with health services	4657
Skilled nursing facility	11,719
Home health services after discharge from skilled nursing facility	3500
Readmission	9541

reviewed the costs obtained for post-acute care from our Bundled Payment Claims Data received from CMS, where all costs for the episode are captured and reconciled by CMS, for 2 groups: (1) patients discharged to a rehabilitation center and (2) patients discharged home with services. The entire cost of post-acute services for the 90-day episode of care from the payer perspective was included for each strategy. The standard length of stay was considered to be 3 days, which corresponds to our standard TJA pathway. Extra days were defined as stays longer than 3 days. The average cost per day for each hospital day from day 4 through day 11 was taken from our internal accounting database. The cost of additional hospital days beyond day 3 was estimated to be \$1600 per day for each day beyond day 3. This cost was determined from the costs attributed to those days for patients staying in our hospital using our hospital accounting system, and it includes direct variable costs such as medications and laboratory tests (which are easily determined) and indirect fixed costs, such as the cost of room and board and therapy services. Because the latter fixed costs are apportioned using generally accepted accounting principles, we used the term “estimate” to describe the total costs. The average payment for post-acute services during the 90-day episode of care was set at \$11,719 for patients initially discharged to a rehabilitation center. This represented the average cost for Medicare patients discharged to a subacute rehabilitation center, which was the more common discharge disposition for patients not discharged to home and lower than the cost of patients discharged to an acute rehabilitation facility. The average cost of home services for Medicare patients discharged directly home with services was \$4657. Patients discharged to rehabilitation facilities then had an additional average cost of \$3500 for additional home services in our Medicare bundled payment patient cohort, and this was included in the cost of discharge to a rehabilitation center in the model (Table 1).

We constructed a standard decision model and sensitivity analysis [6] using the costs described to evaluate the impact of keeping patients in the acute hospital setting for additional days to be able to discharge them home with services rather than to an inpatient facility on the cost of total hip and knee arthroplasty



**Fig. 1.** Medicare total joint arthroplasty (TJA) decision tree. The figure represents the decision analysis model used to model patients after total joint arthroplasty who were discharged to home with services or to a rehabilitation center. Each patient either has a readmission or no readmission, according to the probabilities in the model as reviewed in Methods section.

procedures (Fig. 1). The model was constructed using decision analysis software (TreeAge Pro 2007; Williamstown, MA).

## Results

Figure 2 demonstrates that using our cost data, patients could be kept for up to 5.2 extra days of acute care hospitalization, if they are discharged to home with services rather than an inpatient rehabilitation facility and still have a lower cost of care.

## Discussion

In this analysis, we examined the cost to bundled payment providers of 2 post-acute care strategies, discharge to a rehabilitation center, and discharge home with services. The decision analysis data demonstrated that because the cost of additional acute care hospital days is relatively small and the cost of an extended post-acute inpatient rehabilitation facility is high, keeping patients in the acute facility for up to 5.2 days results in an overall lower cost than discharge to a post-acute facility where patients often have more extended stays before being discharged to home. This is a strategic option that merits careful consideration and could necessitate a shift in focus and care strategy where the focus of the acute hospital stay becomes discharge to home rather than minimizing length of stay.

Historically, efforts to improve efficiency of TJA have focused in part in reducing length of stay. Shorter length of stay in the acute care facility was seen as more efficient because the cost of subsequent days was not incurred. In addition, an opportunity for increased revenue is created by freeing the hospital bed sooner. However, in this more modern environment, where the focus shifts from volume to value, and where providers bear direct financial responsibility for post-acute care, we considered the question of whether it is cost-saving to keep patients longer in the hospital, if it enables home discharge [7]. We do not intend to suggest that all TJA patients should be discharged to home. Rather, the analysis demonstrates that efforts to discharge as many patients as can safely be discharged home are cost-effective, even if it means keeping them in the acute hospital setting for a few extra days to allow enough therapy progression for discharge home rather than an inpatient facility. Currently, physician practices vary widely, and clear evidence that rehabilitation facilities, which are more expensive, improve outcomes is lacking [8,9]. Therefore, the focus should be on achieving a safe discharge to home, and length of stay should no longer be the primary focus of the inpatient acute hospital stay.

The potential change in strategy of focusing efforts on discharge to home rather than length of stay has many challenges. First, further studies are needed to more precisely determine which patients are in need of the extra support afforded by a post-acute rehabilitation center so that they are not inappropriately discharged home with inadequate support. Some patients will need the support of these facilities, and care must be taken that they are identified so that quality and patient outcomes are maintained. The best strategies to determine which patients are appropriate for the strategy of retaining patients in the acute setting for extra days to avoid the need for a post-acute rehabilitation facility remain to be precisely defined. The risk of attempting this strategy and then still requiring a post-acute rehabilitation facility also exists. In addition, the issue of bed availability at each institution needs to be considered carefully to ensure there are enough beds to provide for all patients if some patients are being kept longer than previously. There is a potential opportunity cost if beds for new patients are not available, and those cases cannot be performed. This is an important factor for institutions to consider and for overall access to patients to these procedures.

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