

WHITE PAPER

Total Joint Partnership Program Identifies Areas to Improve Care and Decrease Costs

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ABSTRACT

The volume of total hip and knee replacements is projected to markedly increase over the next 30 years. Because of the high cost and unsustainable growth of healthcare in the United States, there will be a greater focus to contain costs, particularly for high volume cases. This white paper details the potential cost savings for a hospital that performs a combined total of 1,582 total hip and knee replacements annually. Data analysis, onsite observation, and in-house interviews were conducted to uncover opportunities to reduce costs and improve the contribution for these procedures. Emphasis was on pre-operative, perioperative and postoperative care processes and metrics. While the perioperative metrics were good overall, opportunities were identified to increase case volume in the same block of time by standardizing anesthesia protocols and improving turnover times. The hospital had substantial opportunities to reduce the number of instrument trays used for total hip and knee replacement cases, resulting in significant financial savings. In addition, the hospital's length of stay, discharge to home rate and clinical outcomes for total hip and knee replacements were all found to be below the 50th percentile when compared to a national database. In all, a financial opportunity of \$2.0 million exists for the hospital and an additional \$1.8 million for the payer.

INTRODUCTION

The demand for primary knee arthroplasty in the United States is projected to grow 673% to 3.48 million procedures annually by 2030. In this same time period, primary total hip arthroplasty is expected to grow by 174% to 572,000 procedures annually¹. Some studies have projected that this future demand will not be met since fewer orthopaedic surgeons are choosing to focus on total hip and knee replacements². The hospitals and surgeons that perform these surgeries will need to be more efficient to meet the population demands.

In the United States, the cost of medical care is currently 18% of the Gross Domestic Product and has increased steadily by 4 to 7% annually over the last five years. The main Medicare DRG for primary total hip and knee replacements (DRG 470) has consistently been the second highest volume DRG. Because of

the sheer volume of these cases, payers are continuously looking at how to care for this patient population more effectively and efficiently. This has manifested itself through decreasing reimbursement to hospitals and the creation of bundled payment programs. The end goal is to improve the coordination and quality of care while decreasing costs.

The initial Medicare bundled payment pilot began in 2008 and focused on total hip and knee replacement along with cardiovascular procedures. Since that time, Medicare and multiple other commercial payers have instituted bundled payment projects. In most of these programs, total hip and knee replacements have been a focus due to the high volume and relatively defined episode of care. In Medicare's recent Bundled Payment for Care Improvement project, 83% (361 hospitals) of

the participating hospitals are implementing bundled payment projects for total joint replacements. The vast majority of payers are defining the episode of care for these bundled payment projects from 30 days pre-surgery to 90 days post-surgery.

There continues to be emphasis on bundled payment programs for total joint replacements as a way to align payers, providers and physicians. Viewing the cost of a total joint replacement through the payers' lens requires understanding the payments that are made to providers during the defined episode of care. A recent study that reviewed Medicare payment data for total hip replacements revealed that the average payment to all providers collectively was \$20,835 with a \$6,909 difference between the highest and lowest quintiles. The biggest sources of variability were in post-discharge care and readmissions³.

As reimbursements continue to stagnate or decline and bundled payment programs drive cost reductions, hospitals must understand the primary cost drivers for total hip and knee replacement care. A review of the Accelero Health Partners hospital database shows that the average cost for total hip and knee replacements can be categorized in four areas: implant, perioperative, supply chain and service line. The average percentage of cost per category can be seen below in Figure 1.

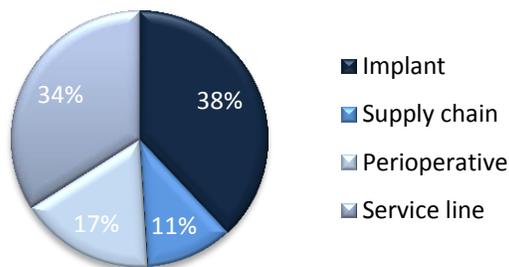


Figure 1. Cost distribution for total hip and knee replacements.

NOTE: Accelero Health Partners collects detailed data on an ongoing basis, adding over 25,000 joint replacement cases per year.

The implant, the largest single cost for a total hip and knee replacement, has been flat to decreasing over the past five years. Total hip implant prices have fallen by 1.8% and total knee pricing has risen only 1.0% in that time period³. While there needs to be continued focus on implant pricing, significant opportunities exist to save throughout the remaining 62% of the hospital cost for these procedures.

The first area most facilities look for improved efficiency and cost reduction is the perioperative environment. The total perioperative time ('patient in' to 'patient out' of the operating room) for a total hip or knee replacement at the hospital averages 129 minutes. Benchmark data has been established at 84 minutes using the Accelero Health Partner hospital database, representing a time savings of 45 minutes for each procedure. There are also opportunities within the supply chain to decrease costs. For example, it is common to have eight to ten trays of instruments per case for total hip or total knee replacement surgeries. With digital templating or other instrument tray consolidation initiatives, this number can be reduced to four trays or less, increasing perioperative efficiency and decreasing costs⁴.

The service line category represents the second highest percentage of the costs associated with total hip and knee replacements, and offers significant opportunities for savings. Service line includes the length of stay (LOS) management, complications, readmissions, blood utilization and discharge destination.

A vast majority of hospitals have successfully implemented a three day pathway for total hip and total knee replacement patients. Figure 2 shows that the highest performing hospitals in the database (90th percentile) discharge total

hip and knee replacement patients in three days or less 90% of the time, and in two days or less 47% of the time. There is opportunity for improvement, as evidenced by the difference between the 25th and 90th percentile.

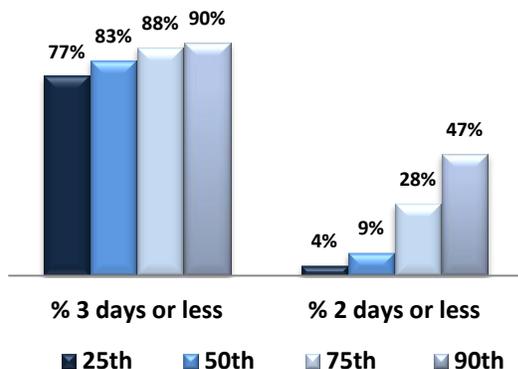


Figure 2. Hospital rankings by percentile with total hip and knee replacements of two days or less and three days or less.

While discharge destination does not directly impact a hospital's costs, it can impact the hospital and is critical to the overall cost of care. Payers are increasingly tracking costs of overall care and implementing bundled payment models based on these costs. In addition, more and more hospitals are part of an integrated delivery network (IDN), many of which include or are adding a payer component. In these cases the IDN is directly impacted by discharge to home decisions.

The purpose of this white paper is to illustrate the opportunities and processes used to improve care and reduce costs within the total hip and knee replacement program of a large Level I trauma center in the northeastern United States.

METHODS

The subject hospital is a full service, acute care hospital with over 650 beds and 27 operating rooms that conducted 1,582 joint replacements in 2012. As part of this analysis, an in-depth review of the joint replacement product line was performed. The process consisted of data analysis, onsite observation and in-house interviews.

Two years of data was provided by the hospital, including information from inpatient and outpatient cases, perioperative procedures, musculoskeletal clinical outcomes, joint replacement departmental data, sterile processing and documentation from 30 joint replacement charts.

Onsite observation was conducted by a team of individuals over the course of three days, focusing on the entire continuum of care from preoperative processes through the perioperative process to postoperative care and discharge. Central sterile processes were included in this observation. In-house interviews consisted of 31 one-on-one meetings with senior administration personnel, joint replacement surgeons, and key staff to gain a complete understanding of the current processes while documenting the insights, concerns and observations of the interviewees. This information was used to create a report detailing current data and trends, a comparison to the Accelero Health Partners hospital database, a gap analysis of current processes to best practices, and the quantification of opportunities, recommendations and key implementation steps.

RESULTS

Although the implant price represents a sizable portion of the hospital's direct cost for total joint replacement, this report is focused on operational and procedural improvements in non-implant areas. With this in mind, the results will be summarized as: perioperative, supply chain and service line.

Perioperative indicators for joint replacements were found to be favorable, including first case on-time starts (87% vs. 95% for the benchmark). Table 1 illustrates the actual combined average times of all orthopedic surgeries to benchmarking data from the Accelero Health Partners hospital database. The top five high volume joint replacement surgeons accounted

for 92.7% of all of the orthopedic surgeries. Comparing the actual data to the database shows a possibility to reduce direct procedural time by 24 minutes or 22%. The greatest opportunity is with 'patient in' to 'incision' time. Since the majority of surgeons were performing cases in a parallel room environment, turnover time was not shown to be relevant related to case efficiency.

Time (minutes)	'Patient in' to 'incision'	'Cut' to 'close'	'Close' to 'patient out'	Total time
Hospital	32	63	13	108
Benchmark	26	53	5	84
Variance	6	10	8	24

Table 1. Hospital key indicators vs. benchmark data.

One high volume joint replacement surgeon had a turnover time of 31 minutes between cases, as compared to a benchmark turnover time of 15 minutes, and did not use parallel operating rooms. Decreasing his turnover time by 16 minutes per case would allow for one additional joint replacement case per day in the same time period, increasing his volume and that of the hospital. Based upon the 'cut' to 'close' time, it would be possible for that surgeon to adopt a parallel room model which would lead to possibility of additional cases.

In addition to the metric comparison, perioperative processes were observed and compared to high performing hospitals. While multiple process improvement opportunities were identified, the focus was two areas that drive the above metrics. First, the hospital did not utilize a standard protocol for anesthesia for total hip and knee replacements. Anesthesia was determined on the day of surgery and often led to higher 'patient in' to 'incision' times. The lack of a defined anesthesia protocol may have impacted postoperative care around pain management and mobility. Second, it was observed that significant time savings could be gained by performing turnover tasks in a parallel manner, as opposed to a linear fashion. For example, the team observed cases being completely

setup prior to the patient entering the room, leaving the surgical tech idle from the time the patient entered the OR until the incision was made. The patient could have been brought into the room sooner, allowing the surgical tech to continue setup while the patient was being prepped for the surgery, improving room utilization.

At the time of the observations, two of the surgeons had already adopted digital templating and were able to eliminate two instrument trays for total hip replacements and four instrument trays for total knee replacements. Table 2 shows the projected overall savings if all surgeons adopted processes to decrease the number of instrument trays used for total hip and knee replacement cases. This reduction in trays was also identified as the prevailing reason these two surgeons had a lower turnover time (4 minutes) and 'patient in' to 'incision' time (2 minutes).

Procedure	Cases	Tray reduction per case	Cleaning cost per tray	Total Savings
Total hip	551	2	\$44.19	\$48,697
Total knee	1,031	4	\$44.19	\$182,240
Total	1,582			\$230,937

Table 2. Projected savings from reduced use of instrument trays.

Length of stay is one of the key metrics for the hospital. An extended average length of stay will adversely impact the financial standing of the facility or network, often being the difference between profitability or not.

The day of surgery or timing of events in the surgical process were found to impact the length of stay. Figure 3 shows the distribution of the hospital's average length of stay for total combined hip and knee replacements.

With 78% of the patients experiencing a length of stay of three days or less, the hospital ranks slightly above the 25th percentile. Only 5% of the patients had a length of stay of two days or less, also placing the hospital just above the 25th

percentile in the Accelero Health Partners database.

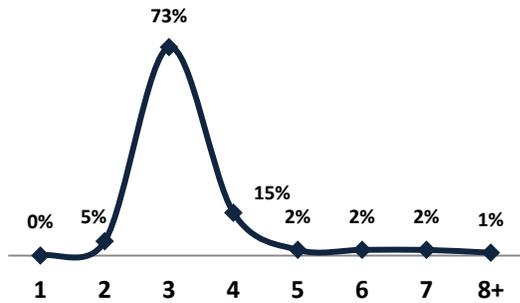


Figure 3. Dispersion of hospital length of stay by day.

Table 3 displays the percent of cases by day of surgery and the corresponding percent of cases with a length of stay of three days or less.

Day of surgery	Percent to total	3 days or less
Monday	17%	86%
Tuesday	29%	85%
Wednesday	7%	55%
Thursday	23%	72%
Friday	24%	77%

Table 3. Percentage length of stay 3 days or less, by day of surgery.

As shown above, the day of surgery at the hospital was found to impact the length of stay. Post-acute care and especially rehabilitation did not occur at the same frequency on the weekends, extending the rehabilitation process. For example, physical therapy was not initiated the day of surgery and rarely occurred twice daily during the hospital stay.

Numerous other process improvements were identified that would directly or indirectly impact the length of stay. Less than 60% of the total hip and knee replacement patients attended the hospital pre-admission class, and, for those that did attend, the class materials did not consistently set patient expectations for length of stay. To effectively manage length of stay, it is important to communicate the length of stay goals to both patients and staff, monitor the patient progress, and take action when a patient is not progressing appropriately.

An extended patient time in the PACU was also found. In most of these cases this longer PACU time was due to a lack of beds on the nursing unit, emphasizing the need for better coordinated post-surgery care and length of stay performance. On average, patients should be in the PACU for one hour following a total hip or knee replacement. Figure 4 displays the PACU time in minutes for total hip and knee replacement patients at the subject hospital.

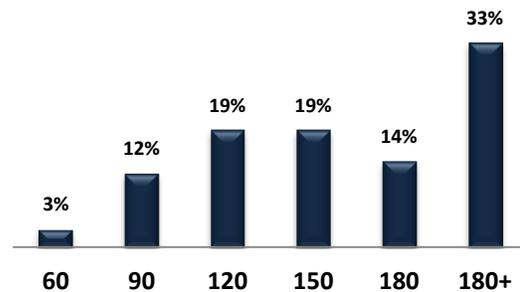


Figure 4. Total hip and knee replacement PACU time (minutes).

Discharge location and process also affect the length of stay at the hospital. The hospital discharged 65% of their total hip and knee replacement patients to home with either self-care or home care. Figure 5 shows the discharge home rate as compared to the Accelero Health Partners hospital database. Patient expectations as to discharge destination and timing were not effectively stated during preadmission education activities. This lack of communication affects the ability of patients or post-discharge care providers (i.e., home health agencies) to arrange for transportation and/or care in a timely manner.

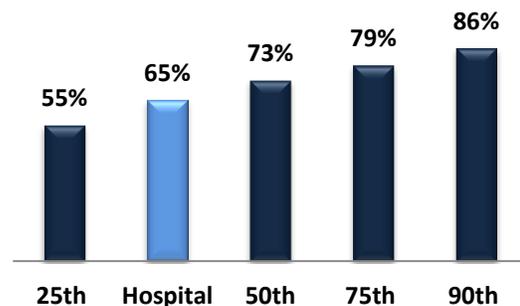


Figure 5. Hospital discharge to home rate.

Secondary diagnosis codes were collected to understand the coded complication rate for total hip and knee replacement patients. Figure 6 displays the hospital's coded complication rate compared to the Accelerero Health Partner hospital database. The vast majority of these complications did not impact length of stay. However, in cases where there was an increased length of stay, substantial comorbidities existed at admission. The hospital did not have an organized method of reviewing clinical outcomes data or sharing it with physicians. In addition, there were no risk reduction programs in place for patients with comorbidities.

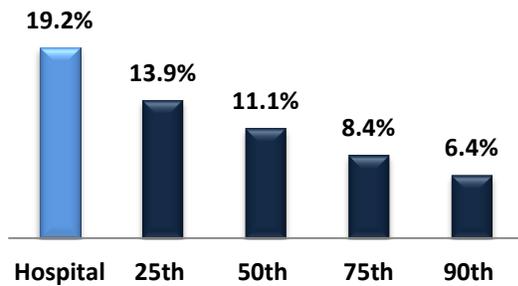


Figure 6. Coded complication rates for total hip and knee replacements.

Thirty patient charts were reviewed for coding accuracy and thoroughness of documentation. The chart sample represented 12 surgeons, eight insurers, and included seven MSDRGs (461-462,466-470). One bilateral joint replacement case was coded as a unilateral joint replacement case resulting in a potential revenue loss of \$7,913 (using 2012 Medicare Rates). In all, 27% of the charts were lacking documentation to meet medical necessity. Consistently deficient areas were lack of documentation of a joint examination with detailed objective findings, and documentation that did not clearly identify what conservative treatment had been tried and failed.

DISCUSSION

Numerous process improvements were identified in this hospital that could advance key total hip and knee replacement metrics and

drive cost savings. In the perioperative area, opportunities for time savings were identified between 'patient in' to 'incision', and room turnover. Hospitals typically allocate a direct cost of \$300 for every 15 minutes of operating room time. Analysis shows that an average of 24 minutes per case could be eliminated, representing savings of approximately \$480 per case. If this savings is allocated across all total hip and knee replacement cases, the total savings would equal \$759,360. Opportunity exists for one particular surgeon to add an additional case per operating room day, one day per week. By adding a fourth case in the same time that he performed three cases, the incremental contribution margin by this surgeon would translate to an additional \$9,727. If this surgeon was able to perform this additional case over 45 operating room days per year, the additional contribution dollars for the hospital would be \$437,715.

Key operational improvements needed to achieve this financial impact include improved turnover processes with emphasis on performing more activities in parallel to maximize time savings. Creating a consistent anesthesia protocol was recommended to eliminate wasted time on the day of surgery. Having all parties involved agree to anesthesia methodology that coincides with length of stay goals would also allow the patient to experience mobility and recovery sooner.

The average direct cost to clean an instrument tray was calculated to be \$44.19. Reducing the number of instrument trays through digital templating or other techniques would result in a reduction of cleaning costs by \$182,240. In this case and in other studies, fewer instrument trays have also been found to decrease operative times and turnover times, thereby decreasing overall perioperative costs.

Based on bed census issues at the hospital, bed day savings was an important overall initiative for the hospital. There were substantial opportunities to improve length of stay for total

hip and knee replacement patients, which would free up beds for new patients. Meeting benchmark length of stay metrics for total hip and knee replacement patients would provide savings of 1,017 bed days. On average, a bed day direct cost for the hospital is allocated at \$600 per day, resulting in a savings of \$610,068.

To achieve the benchmark length of stay, recommendations were made to improve consistency of attendance to preadmission classes, better communication of length of stay expectations to both the patient and the family, balance the surgery schedule with moderately more total hip and knee replacement cases on Monday and Tuesday vs. Thursday and Friday, adoption of early and consistent mobility of the patient regardless of the day of surgery, and consistent pain management protocols that allow the patient to meet mobility and length of stay goals. Length of stay data for inpatient surgical spine and hip fracture patients was also analyzed and compared to the Accelero Health Partners hospital database. In aggregate, there was an opportunity for a savings of 1,148 bed days in these two areas for a savings of \$688,855.

Sixty-five percent of the hospital's total hip and total knee replacement patients were discharged to home with either self-care or homecare. A recent study showed that discharge to a facility (mostly skilled nursing) increased the cost of a total hip or knee replacement by \$5,411 to the payer⁵.

Although this did not directly impact the hospital's cost, there could be substantial savings to the payer if a higher percentage of patients were discharged to home. The benchmark data suggests 86% or 332 additional patients could be discharged to home, resulting in a savings to the payer of \$1,797,642. Recommendations were made to the hospital about the need to better set the expectation with the patient and their family regarding home discharge, a coordinated day of discharge, involving home health providers in

process improvement to allow for a smooth transition to home and the need for a post-discharge phone call to ensure that post-discharge care has begun and is proceeding effectively.

Outcomes are becoming increasingly transparent to consumers, whether it is Medicare publishing quality indicators of complication rates and readmission rates or third party consumer rating and feedback sites. Outcomes are also known to impact the cost following total hip and knee replacement. In this case study, 19.2% of the total hip and knee replacement patients had a coded complication. While not all coded complications will cause an increase in the length of stay, in this case study, total hip and knee replacement patients with complications had, on average, a 1.8 day increase in length of stay. A recent study found that the presence of any complications resulted in 34% higher hospitalization costs and 65% higher cost over a 90 day span⁶. Recommendations that were made to the hospital to improve their clinical outcomes included: evaluating coded complications on a monthly basis, conducting retrospective chart reviews to determine coding opportunities, and implementing risk reduction protocols to mitigate the incidence of post-operative complications for those affected.

Medicare and other payers continue to scrutinize patient documentation to ensure candidates are qualified for a total hip or knee replacement. The hospital had already gone through a preoperative documentation review to ensure that they were meeting documentation requirements. However, when the chart audit was conducted, 27% of the cases reviewed did not have adequate documentation according to Medicare standards. Annualized, this would represent 427 cases that reimbursement could be at risk in payers that have preoperative documentation standards. Recommendations were made for further consistent documentation chart audits to reduce the risk of revenue penalties.

To achieve the above outlined improvements, an infrastructure consisting of a physician and hospital steering committee along with operations teams working on process improvement initiatives would be necessary. At the time of the evaluation, the infrastructure did not exist. It was also recommended that the hospital hire a joint replacement coordinator to serve as a patient and family liaison as well as to ensure smooth care transitions during the preoperative, immediate postoperative and post hospital discharge care.

SUMMARY

Although this hospital performed a large number of joint replacements, there was substantial opportunity to improve both their processes and overall cost structure.

Impact area	Financial impact
'Patient in' to 'close'	\$759,360 savings
One additional case/week	\$437,715 new margin
Instrument tray reductions	\$182,240 saving
LOS reduction	\$610,068 savings
Total impact to hospital	\$1,989,383 benefit

Table 4. Financial impact to the hospital.

Table 4 summarizes the cost opportunities discussed in this paper. There was \$2.0 million in financial opportunity identified for the hospital. By increasing the discharge to home rate the hospital could also reduce the total cost of care (and cost to the payer) by an additional \$1.8 million.

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About the Author

Joseph Tomaro earned his PhD in Health Sciences from the University of Pittsburgh and is Senior Vice President of Operations at Accelero Health Partners. In his current role Joe is responsible for product development and partner education programs. He has also worked with hospital and physician leaders to develop musculoskeletal programs in over 125 markets across the United States, Europe and the Middle East.