

# Orthopedic Assessment Identifies System-wide Savings for Total Joint Replacement Program



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As the volume of hip and knee replacement cases increases over the next 20 to 30 years, hospitals and health systems will need to find cost effective ways to care for this population. In addition, the escalation of mergers and acquisitions within healthcare often results in hospitals located in close proximity to on another offering the same services. This white paper details a situation where two hospitals within the same health system had substantial variation between how care was delivered to total hip and knee replacement patients. In addition to the different care processes and outcomes observed between the two hospitals, their definition of “best practice” varied significantly. Data analysis, on-site observations and interviews were conducted to uncover opportunities to reduce costs and improve the financial margins for hip and knee replacement procedures. Emphasis was on preoperative, perioperative and postoperative care processes and metrics. Recommendations were made to the health system to decrease variability in the care of hip and knee replacement patients between the two campuses. This process improvement approach is a necessary first step before the health system can determine the best way to market and position their program or whether to consolidate these services into a single location. Over \$2.5 million in financial opportunity was identified for the hospitals’ joint replacement services alone. By increasing the discharge to home rate, the hospital could also lower the total cost of care (and cost to the payer) by more than \$1.75 million.

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# Introduction

Between January 2007 and June 2013, 602 hospitals have either been acquired or merged with another hospital, which represents nearly 2% of all hospitals annually. While each of these trends is unique in nature, for the most part, the goals of these alliances can range from cost savings to consolidation of services, to targeted geographic expansion. Often these mergers are the result of “convenience” to combat market threats from other health systems in the region. Because of this reactionary action, there is usually a limited benefit as much of the work to make these alliances beneficial occurs well after the merger. In some cases, hospitals that now find themselves as partners have historically competed against each other for the same services. At a finite level such as joint replacement services, there are often different groups of surgeons serving each hospital within the system and in many cases these surgeon groups have competed against each other for market share. Therefore, gaining true alignment and consistency of a service can be challenging for health systems.

More and more, these health systems will either have a payer as part of their network or have a strong payer connection. This payer connection is often the driver in creating high value services; consistently delivering the best care at the lowest possible cost.

When mergers and acquisitions occur, hospitals must evaluate whether duplicative services should be offered at each campus. There are many factors that go into this decision such as the service area, operating room and bed capacity, physician alignment, hospital’s reputation and the quality of outcomes for a particular service, to name a few.

Whether a health system decides to consolidate a service such as primary total hip and knee replacement to one location or to provide these services at multiple locations, the first step needs to be centered around the consistency in care and the delivery of service. This is critical to both the community and referral sources, and often a driver of case volume.

In addition to these internal forces that drive a system’s strategy for a joint replacement program, there are external forces that also influence the strategic direction. Between 2005 and 2030, the demand for primary knee replacement in the United States is projected to grow by 673% to 3.48 million procedures annually. In this same time period, primary total hip replacement is expected to grow by 174% to 572,000 procedures annually. Some studies have projected that this demand will not

be met in the future since fewer orthopaedic surgeons are choosing to focus on hip and knee replacement.

In 2011, DRG 470, the primary DRG for hip and knee replacement, was the number one Medicare DRG. Considering an average Medicare payment of \$10,231/case to the hospital and a Medicare population of 512,000 joint replacements annually, the government paid well over \$5.2 billion for hospital care of these patients. In addition, approximately 46% of primary hip and knee replacements are non-Medicare and the hospital payment generally represents only 62% of the total cost. This has caused most hospitals and payers to think about primary hip and knee replacement surgery in terms of the total cost for an episode of care with a bundled payment reimbursement. Therefore, as health systems determine their strategy for hip and knee replacement services, they will need to consider these external forces in addition to the internal dynamics mentioned previously.

This case study focuses on a health system that has recognized the need to improve the consistency of their joint replacement services as well as the importance of evaluating opportunities for improving both their care and cost. Their initial plan was to provide primary hip and knee replacement services at all campuses with some consideration to consolidate these services in the future. The Accelerio Health Partners “Total Joint Partnership” analysis was performed to identify and quantify the care and cost opportunities for the health system.

## METHODS

There were two hospitals in the health system with a third hospital that was scheduled to open six months after the completion of the analysis. One of the existing hospitals is a large community hospital with 489 beds and the other is an academic medical center with 649 beds. The two existing hospitals are within two miles of each other. There is also a separate heart hospital and children's hospital as part of the system. The third hospital, a 110-bed community hospital, will be approximately 20 miles from the existing hospitals.

Both existing hospitals performed primary total hip and knee replacements, with the larger community hospital performing 537 primary total hip and knee replacement cases and the academic center performing 678 cases in the most recent fiscal year. The vast majority of the primary total hip and knee replacement cases at the large community hospital were performed by members of an independent (non-employed) orthopedic surgery practice while the majority of the cases at the academic medical center were performed by an academic group that was affiliated with the hospital. Recently, two private practice surgeons moved their cases from the academic medical center to a community hospital that was not part of the health system. This created a loss of approximately 400 primary hip and knee replacement cases over a two year period. The goal of the health system was to perform primary total hip and knee replacements at the new hospital. Members of both the existing private practice group and academic practice will be performing these cases.

The primary joint replacement surgeons from the existing groups had little interaction with each other, and therefore, there were easily identifiable differences in the care of primary hip and knee replacement cases between the two campuses. Recently the hospital formed a network of employed and affiliated practices that served as a vehicle to drive quality improvement and consistency of care throughout the health system. Prior to the Total Joint Partnership analysis, a lead joint replacement surgeon from each group had started an initiative to improve quality and consistency of care for joint replacement cases throughout the health system.



Three years of data was provided by the hospital, which included information from inpatient and outpatient musculoskeletal cases, musculoskeletal perioperative data, musculoskeletal clinical outcomes and joint replacement departmental data.

Onsite observation was conducted by a special team of Accelero experts over the course of four days, focusing on the entire care continuum: from preoperative processes, through day of surgery, to postoperative care and through discharge. One-on-one interviews were conducted with 37 individuals that included senior administration, joint replacement surgeons and key staff members. The purpose of these interviews was 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 trends, provide benchmarking information and comparisons from the Accelero Health Partners database, perform a gap analysis of current processes and best practices, quantify opportunities, and provide recommendations with actionable implementation steps.

## RESULTS

Although the implant price represents a portion of the direct cost for total joint replacements, this analysis focused on operational and procedural improvements in non-implant areas. With this in mind, the results are summarized by key areas of opportunity: length of stay, discharge destination, outcomes, perioperative efficiency and documentation.

There were substantial differences between the preoperative processes at both hospitals. The academic hospital had a more organized program with well-defined pre-admission testing protocols and education. However, neither hospital was definitive as to length of stay and discharge goals during their pre-admission processes. In addition, neither hospital had risk reduction protocols in place to assist in the prevention of complications in high-risk patients. The academic hospital did have defined post-operative pathways while the community hospital did not. However, the academic hospital had not reviewed or advanced their postoperative care protocols over the past three years.

Even though the academic hospital had a more organized pre-admission program and defined postoperative care, both hospitals were below the Accelerero database 50th percentile with regard to length of stay of three days or less (FIGURE 1).

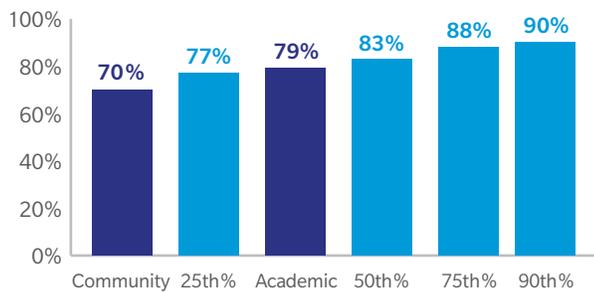


FIGURE 1 | Length of stay three days or less for total hip and knee replacements.

FIGURE 2 represents the length of stay distribution for total hip and knee replacement patients at the hospitals. Not only was there variation between hospitals, but within them as well. Some surgeons at the community hospital had lengths of stay of three days or less 85% of the time while partners in their practice used different protocols with longer lengths of stay.

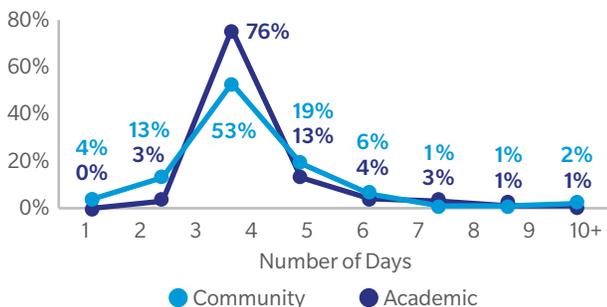


FIGURE 2 | Length of stay for total hip and knee replacements.

Neither hospital's discharge to home was above the 50th percentile in the Accelerero database (FIGURE 3). The health system did have a homecare component that had a goal of evaluating primary hip and knee replacement patients the day after discharge. They also had a sub-acute unit that may have influenced the discharge disposition.

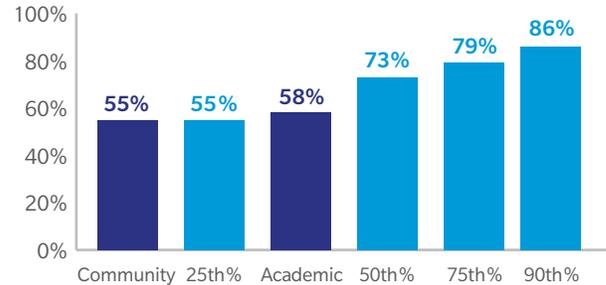


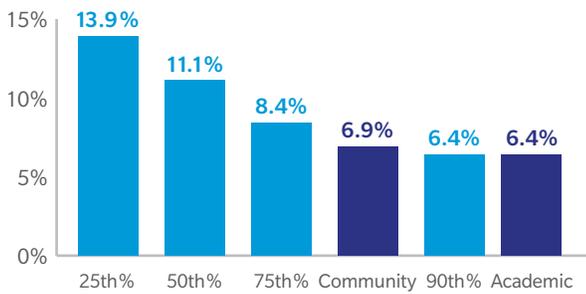
FIGURE 3 | Percentages of total hip and knee replacement patients discharged to home.

TABLE 1 demonstrates the HCAHPS domains for the total hip and knee replacement patients for both hospitals compared to the HCAHPS 50th and 95th percentiles. There were substantial differences between the two hospitals with regard to customer service. It was speculated that the lack of pre-admission education and consistent care pathways at the community hospital had an influence on the sub-standard customer service scores.

Domain	Community	Academic	50th %	90th %
Nurse Communication	57%	57%	57%	57%
Doctor Communication	25%	25%	25%	25%
Staff Responsiveness	19%	19%	19%	19%
Pain Management	13%	13%	13%	13%
Medicine Communication	6%	6%	6%	6%
Discharge	6%	6%	6%	6%
Overall Rating	6%	6%	6%	6%

TABLE 1 | HCAHPS for total hip and knee replacement patients. Red ratings are below the 50th %, yellow between 50th and 90th %, and green ratings are above the 90th %.

FIGURE 4 demonstrates the hospitals coded complications as compared to the Accelerero database. Both hospitals were above the 75th percentile with regard to clinical complications. However, the lack of a consistent pre-admission testing protocol at the community hospital and the lack of risk reduction programs at either hospital placed both hospitals at risk for higher complications.



**FIGURE 4** | Coded complication rates for total hip and knee replacements.

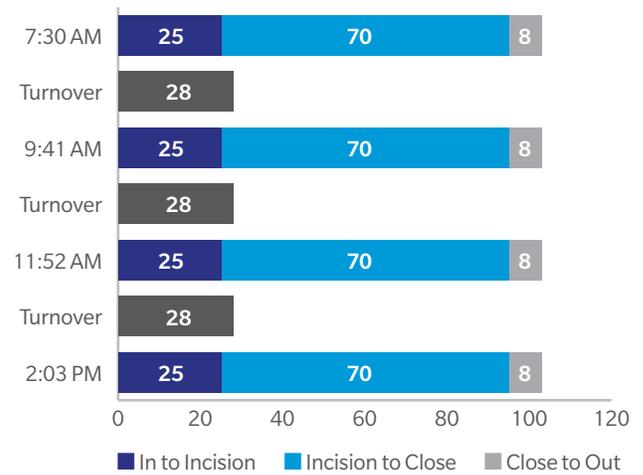
There were opportunities identified to improve the hip and knee replacement perioperative processes at both hospitals. However, there was excessive capacity at the academic hospital due to the loss of cases over the past two years by exiting surgeons. At the community hospital, there were several surgeons that had a substantial case backlog due to the hesitancy to schedule more than two to three joint replacement cases per day because of perioperative inefficiencies.

During the evaluation, perioperative processes at the community hospital were focused on a way to increase the joint replacement cases and relieve the backlog. **TABLE 2** demonstrates the hospital’s key perioperative indicators for total hip and knee replacements. The table also displays the projected time savings per case that could be realized with process improvement.

Time (minutes)	‘Patient In’ to ‘Incision’	‘Incision’ to ‘Close’	‘Close’ to ‘Patient Out’	Total Time
Hospital	42	93	7	142
Benchmark	25	70	8	103
Variance	17	23	(1)	39

**TABLE 2** | Community hospital perioperative indicators for total hip and knee replacements.

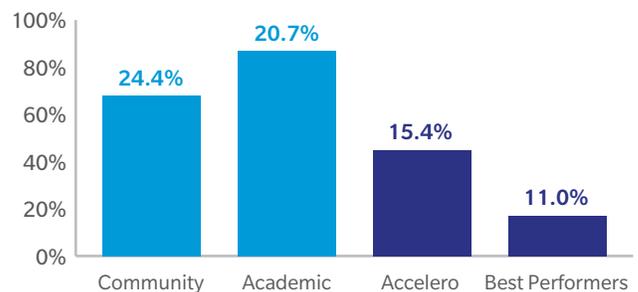
**FIGURE 5** illustrates a model for four (4) joint replacement cases per day in a single operating room with these time savings.



**FIGURE 5** | Model of four joint replacements per day, completed by 3:46 pm.

The greatest opportunity for time savings was during the in to incision and incision to close portions of the case. Observed “waste” within the in to incision portion of the surgery included staff leaving the room to find equipment, waiting to transport the patient to the table, waiting for the anesthesia, waiting for the patient to be draped and positioned, and waiting for the patient to be brought into the operating room because the surgical site had not been marked. During the incision to close portion of the surgery “waste” was identified in the following areas: the surgeon turning away from the field to accept instruments, the surgeon having to point to needed instruments, delays due to unfamiliar instruments/systems, delays for sizing discussions, delays due to multiple holes in tray wrappers and waiting for trays that had to go through immediate use sterilization.

**FIGURE 6** shows the number of times the surgeon’s eyes left the field during the observed total hip and knee replacement cases compared to the Accelero database mean and benchmark.



**FIGURE 6** | Number of times surgeon’s eyes left field during total hip and knee replacement surgeries.

## DISCUSSION

Numerous process improvements were identified in the two hospitals that could advance total hip and knee replacement metrics and drive cost savings. Overall the hospitals had significant opportunity to improve their length of stay. FIGURE 7 shows the current combined length of stay distribution for the health system compared to a reasonable goal based on current industry standards.

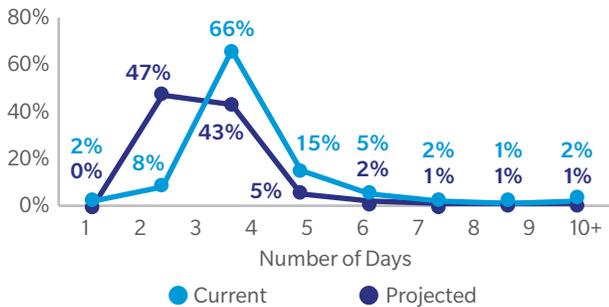


FIGURE 7 | Current length of stay distribution for total hip and knee replacement of health system v. target.

Achieving this length of stay would result in a savings of 588 bed days. At \$600 per bed day this would equate to \$353K in cost savings.

Although this study focused on primary hip and knee replacements, length of stay data was also received for hip fracture and surgical spine cases. There was a moderate amount of opportunity for hip fracture length of stay with an identified savings of 367 bed days or \$220K in cost savings. There were also substantial opportunities in the surgical spine length of stay. The health system's average length of stay for their mix of surgical spine patients was 1.64 days above the Medicare defined Geometric Mean Length of Stay. Achieving the identified length of stay opportunity (Medicare Geometric Mean) for surgical spine cases would result in a savings of 1,643 bed days or \$986K in cost savings.

The health system discharged 45% of their total hip and knee replacement patients to a skilled nursing facility. Benchmark performers discharge only 14% of their total hip and knee replacement patients to a skilled nursing or other facility. If the health system reached benchmark status, an additional 313 patients would be discharged to home. It has been shown that the cost of a total hip and knee replacement patient going home vs. transferring to a skilled facility results in a cost savings to the payer of between \$5,700 and \$7,000 per case.

Using the conservative estimate of \$5,700 per case, if the health system reached benchmark status and discharged an additional 313 patients to home, the payer savings would be over \$1.8 million.

The final cost opportunity was in creating perioperative efficiency at the hospital where the current perioperative environment limited two key surgeons to perform two or three joint replacement cases per OR block. These two surgeons had a backlog of cases and were booking their cases four to five months in advance and the surgeons wanted to increase their joint replacement volume. Based on the time savings identified during the perioperative portion of the assessment, if these time savings were realized, it would be reasonable for each surgeon to add one joint replacement case to each of their two weekly scheduled blocks resulting in approximately 200 additional joint replacement cases. Achievement of the perioperative efficiency and the additional cases would substantially lessen the financial loss of the 400 case void created by the two orthopedic surgeons that left the health system. These additional 200 cases would result in over \$2.1 million of incremental margin to the health system.

To achieve these cost savings, several recommendations were made. First and foremost, the pre-admission processes needed to be improved. The academic hospital had an established preoperative testing and education program and some methodology around identifying high-risk patients. The community hospital was beginning some of these processes but generally lacked surgeon support for the pre-operative education class. A large portion of the issues throughout the remainder of the care continuum (extended lengths of stay, lack of home discharge) stemmed from not having clearly defined preoperative processes. Extensive recommendations were made to improve the pre-admission education process, to better define the scope and timing of preoperative testing and to establish a joint replacement multi-disciplinary preoperative planning meeting. A large component of the preoperative process is reliant upon consistent communication to the patient and their family members/support individuals as it relates to the length of stay expectations and discharge planning.

In order to achieve an improvement in length of stay, there were key elements of post-operative care that needed improvement. Recommendations were made around more aggressive therapy given on the day of surgery,

decreasing physician variation in the postoperative order sets, focusing on pain management protocols and reviewing the LOS to identify the root causes of extended stays.

The perioperative indicators identified that there was opportunity to improve efficiency at both campuses. The greatest opportunity was in improving patient in to incision and incision to close processes. Achieving these time savings would increase surgeon satisfaction and allow for additional joint replacement cases to be performed in the same block time. Recommendations were made around effective scheduling procedures and improved flow from patient in to incision. Most of these process flow recommendations focused on determining activities that could be performed in parallel in order to save valuable minutes. There was the need for dedicated teams to help to improve the incision to close time. Although the joint replacement volume would not warrant fully dedicated teams, establishing some consistency was possible since the joint replacement cases were staggered throughout the week.

More payers are conducting audits to ensure that patients are appropriate candidates for various elective surgeries. While most of these audits are post-payment, there are a few that have financial penalties to providers. However, as the volume of joint replacement cases increases, the overall cost to payers will continue to escalate. It is reasonable to assume that this will further increase either pre-payment review/approval or post-payment penalties if it is deemed the patient is not an appropriate candidate for hip or knee replacement surgery. The current Medicare reimbursement guidelines for total joint replacement are rather simple in nature. However, 33% of the charts audited in this assessment did not meet these basic guidelines. In a situation where a reimbursement penalty could be assessed to either the surgeon or the hospital based on lack of evidence of the need for the surgery, the financial impact to both could be substantial.

To achieve any of the savings outlined in this report, the health system must implement a management structure that involves both current campuses and the new campus. The multi-disciplinary team needs to create dashboards that allow the staff and surgeons to track and improve key outcomes. There is also the need to realign the responsibilities of the current joint replacement coordinator to create better alignment across the three campuses.



The goal of the health system is to create consistency between their joint replacement programs at each campus. Implementing the recommendations will also help the new hospital launch a joint replacement program minimizing additional variability. The health system can either brand and market all three joint replacement programs or combine the two current programs into one site. Achieving benchmark status and decreasing the variability between the programs will be essential to reaching their desired goal.

Finally, approaching joint replacement services from a total episode of care mindset will be crucial for this health system. Already one of their major competitors in the market is a participant in the Medicare Bundled Payment for Care Improvement Initiative. As other payers continue to migrate toward a bundled payment model for total hip and knee replacement cases, the health system will need to adapt and compete against providers that have experience in this area.

## SUMMARY

Although the hospital performed a large number of joint replacements, this assessment identified areas where the health system could substantially improve the value (better care at the lowest appropriate cost) of their joint replacement program.

Over \$2.5 million in financial opportunity was identified for the hospital in joint replacement services alone. By increasing the discharge to home rate the hospital could also reduce the total cost of care (and cost to the payer) nearly \$1.8 million more. Doing so could elevate the hospitals' standing with area payers, and result in more patients being referred to the network.

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