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Reducing Length of Stay, Direct Cost, and Readmissions in Total Joint Arthroplasty Patients With an Outcomes Manager-Led Interprofessional Team

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The purpose of this quality improvement project was to determine whether an outcomes manager-led interprofessional team could reduce length of stay and direct cost without increasing 30-day readmission rates in the total joint arthroplasty patient population. The goal was to promote interprofessional relationships combined with collaborative practice to promote coordinated care with improved outcomes. Results from this project showed that length of stay (total hip arthroplasty [THA] reduced by 0.4 days and total knee arthroplasty [TKA] reduced by 0.6 days) and direct cost (THA reduced by $1,020 per case and TKA reduced by $539 per case) were significantly decreased whereas 30-day readmission rates of both populations were not significantly increased.

Baylor University Medical Center in Dallas, TX, is a not-for-profit hospital that was founded in 1903. Baylor Dallas Orthopedic department performs almost 5,000 orthopaedic surgeries annually, including approximately 900 joint replacements (Baylor Scott & White Health, 2015). Baylor Dallas has seen a high demand for total hip and total knee replacement surgeries over the years, which mirrors what is being seen nationally. The demand for hip and knee total joint replacements continues to rise steadily. On the basis of current projections for 2050, the number of primary total hip arthroplasties (THAs) is expected to be 1,859,553 cases whereas the number of primary total knee arthroplasties (TKAs) is expected to be 4,174,554 cases for that year (Bashinskaya, Zimmerman, Walcott, & Antoci, 2012). As the number of total joint procedures grows each year, insurers continue to push for lower costs with improved outcomes. The Centers for Medicare & Medicaid Services (CMS) and Accountable Care Organizations (ACOs) are beginning to link reimbursements with quality measures and patient outcomes. Controlling costs while maintaining high-quality outcomes led Baylor Dallas to implement a Collaborative Care Model (CCM) consisting of an interprofessional team led by an outcomes manager.

Collaborative Care Model

The CCM is an interprofessional team made up of physicians, floor nurses, pharmacists, dieticians, chaplains, physical therapists, occupational therapists, social workers, care coordinators, home health coordinators, and perioperative nursing staff. The CCM promotes a patient- and family-centered focus, interprofessional communication, coordination of care, and the measurement of team-based outcomes (Cipriano, 2012). Recent research has suggested that the use of interprofessional teams positively affects patient outcomes (Bareil et al., 2015; Hellquist, Bradley, Grambart, Kapustin, & Loch, 2012; Markle-Reid et al., 2014; Vanhaecht et al., 2010).

The interprofessional team is led by an outcomes manager who is a master's prepared nurse who oversees the team and manages outcomes by refining standardized practices while improving patient outcomes and controlling costs. The success of the interprofessional team is dependent upon a leader with well-defined roles, the support of leadership and a physician champion, and who is on-site and accessible (Whitebird et al., 2014). The outcomes manager leads the team in implementing process changes within the healthcare services across the continuum of care and identifies gaps in care to enhance operational improvements producing a CCM. Although findings are limited, evidence shows that developing an interprofessional healthcare model has positive effects on the orthopaedic population

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(Johnson, Abernathy, Howell, Brazil, & Scott, 2009; Moyers & Metzler, 2014; Pape, Thiessen, Jakobsen, & Hansen, 2013; Yan & Pogoda, 2013). It was recognized as far back as the 1980s that outcomes management with an interprofessional focus utilizing best practice and identifying process improvement promotes positive patient care delivery. The outcomes manager-led team enhances clinical quality through practice standardization and decreased fragmentation of care, which results in improved overall high-quality patient care (Langford, Tinker, & Martial, 2010). Even though outcomes management is not a new concept, there is limited research to suggest the infrastructure of outcomes management and the best practice for an outcomes manager-led interprofessional team (Andrawis, Chenok, & Bozic, 2013). In an effort to reduce length of stay (LOS), direct cost, and readmissions in the total joint population at Baylor Dallas, the outcomes manager-led interprofessional team was implemented.

Problem

Because of government-mandated programs such as bundled payments and ACOs that cap payments, stakeholders must provide high-quality coordinated care to control costs (Herman, 2016). Both payers and consumers of healthcare services are increasingly interested in the study of patient outcomes. Payers have empowered themselves in understanding healthcare, treatments, procedures, LOS, reimbursement, and 30-day readmissions (Jordan et al., 2012). This movement has led the healthcare organizations to reduce costs and produce competitive pricing. Outcome measures are essential for the enhancement of the patient's experience with a total joint replacement. Orthopaedics has historically been unsuccessful in defining and measuring patient outcomes compared with other specialties (Andrawis et al., 2013). With a new focus on quality and positive patient outcomes, rather than a focus on volume, innovative models for healthcare delivery and payment are emerging (Andrawis et al., 2013). During fiscal year 2000, Medicare paid $3.2 billion for major joint replacement; consequently, Medicare has made an effort to control healthcare expenditures for these procedures. The average payment to hospitals for a total joint replacement is decreasing each year. Subsequently, hospitals are experiencing strong financial pressure to reduce costs primarily through decreasing LOS and increasing quality outcomes (Lawson, 2009). There are many factors and variables that affect cost of care and LOS for a patient with total joint replacement. Having an interprofessional team led by an outcomes manager assists with reaching goals to improve quality outcomes by minimizing variation, thus reducing cost and improving efficiency without increasing 30-day readmissions.

Intended Improvement

The Hospital Readmissions Reduction Program, mandated by the Affordable Care Act, requires that CMS reduce payments to hospitals with excessive readmissions (Lake Superior Quality Innovation Network, 2014). The readmission measures of CMS added elective THA and TKA in fiscal year 2015. To address this, the total joint replacement program was identified to implement an outcomes manager-led interprofessional team with goals of decreasing cost and LOS without increasing 30-day readmission rates (Jordan et al., 2012). Recently, the U.S. healthcare system has focused on decreasing cost, decreasing LOS, and decreasing readmissions by implementing policy changes (Yan & Pogoda, 2013). Although coordinating care can have difficulties, it is one of the main goals in healthcare reform (Vanderlip, 2015). Innovative strategies were sought to explore, analyze, and implement different care delivery models to enhance care and lower cost.

With an intervention of an outcomes manager-led interprofessional team, the aim at Baylor Dallas was to bring individual disciplines together throughout the continuum of care working collaboratively instead of separately. The goal was to promote interprofessional relationships and collaborative practice for improved, more coordinated care (Moyers & Metzler, 2014). The purpose of this quality improvement project was to determine whether LOS and direct cost could be reduced without significantly increasing 30-day readmission rates with an outcomes manager-led interprofessional team.

Methods

This study was a quality improvement project with an intervention. Patients included in the project were 50 years or older who were admitted to an acute care facility for an elective total hip or total knee replacement (primary procedure code of 81.51 [THA] or 81.54 [TKA]). Only patients younger than 50 years or patients and who were having a bilateral joint replacement were excluded from the study. Baseline data were retrospectively identified through a chart audit obtained from medical records of patients admitted during a 6-month time period from July 2013 to December 2013, prior to the initiation of the intervention. This was a time-consuming process due to limitations with the electronic health record system. Implementation of the outcomes manager-led CCM team was a 6-month project from September 2014 to February 2015 that included patients who were admitted with the same procedure codes as the baseline data. During the time between the baseline data and the implementation of the intervention, the outcomes manager was hired, trained, and initiated interprofessional meetings for gap analysis and planning of the intervention. All patients received the same quality of care and treatment protocol upon implementation of the CCM.

All of the patients included in both the baseline data and the project study data were admitted for elective THA or TKA at the same acute care hospital on the day of the planned surgery. All patients underwent surgery in the same department of surgery, recovered in the same post-anesthesia care unit, and were transferred and bedded on the same orthopaedic unit of the hospital. Perioperative and bedside nurses cared for both cohorts of patients through the continuum of care. The ancillary staff included physical and occupational therapists, social workers, dieticians, chaplains, and pharmacists for

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both the baseline and project patients. The same group of orthopaedic surgeons performed all of the surgeries both in the baseline and in the project groups. The only new member to the team for the project was the outcomes manager.

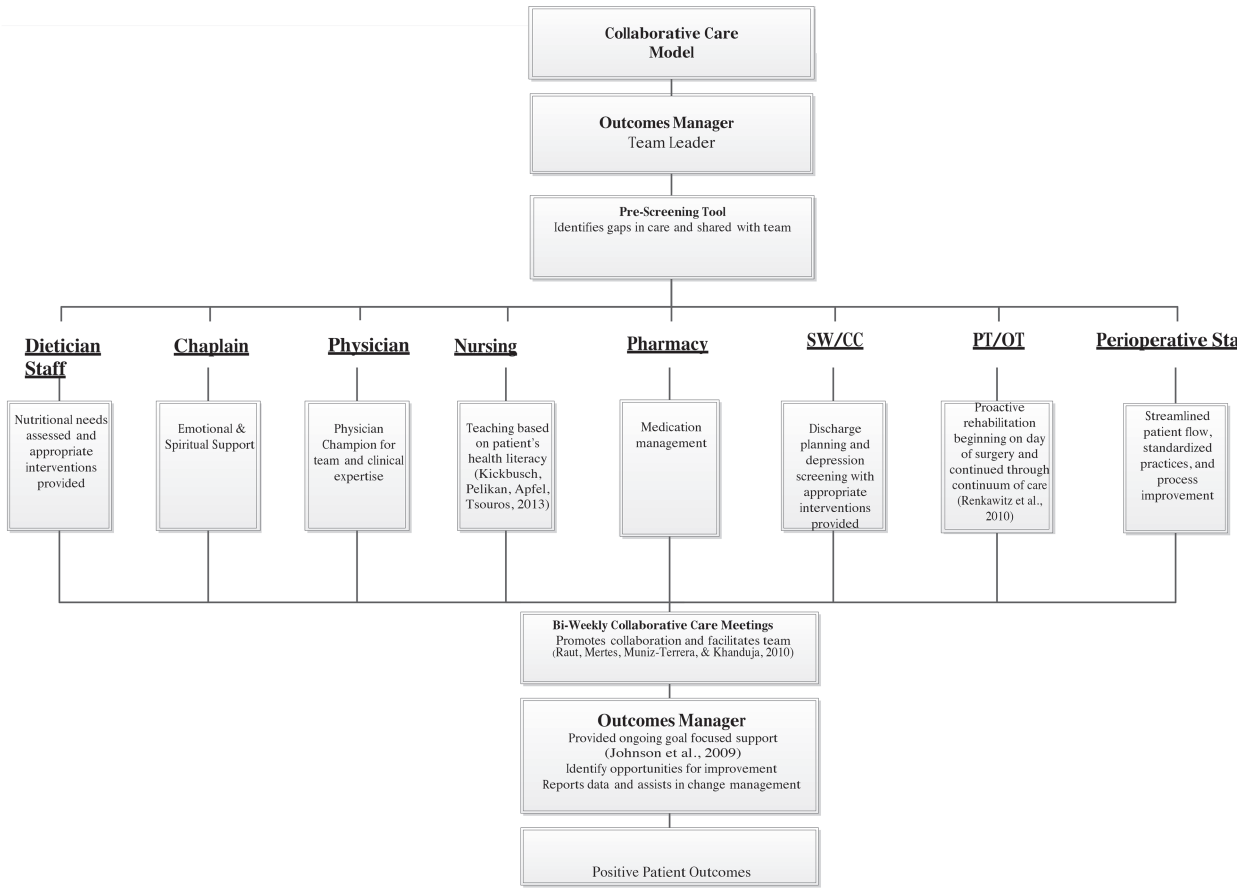
With the leadership of the outcomes manager, the interprofessional team was brought together to gain a common understanding of each professional's role and a gap analysis was conducted to determine areas for improvement. A time study was completed by the outcomes manager to produce a gap analysis. The team mapped current state processes, identified gaps in care, and utilized a fishbone diagram to identify issues. Then, the interprofessional team utilized a frequency–impact matrix to determine areas of needed focus. On the basis of the gap analysis, findings of current state issues, and agreed-upon goals, the team developed the CCM treatment protocol, with individual discipline interventions utilizing evidence-based practices. Each discipline had a new process that was initiated on the intervention go-live date. The outcomes manager also presented LOS, direct cost, and readmission data to the team and physicians each month, utilizing a proactive approach to identify the need for change. The data presented to the physicians were unblinded and allowed physicians to view their results as compared with peers (see Figure 1).

Evaluation

The outcomes manager received monthly reports from the hospital's electronic health record system. The data included demographics, direct cost, LOS, payer source, 30-day readmissions, and other variables that were used for this project. The database that the outcomes manager compiled included data regarding interventions implemented by each interprofessional team member. All project data were presented biweekly and at the end of each month to encourage achievement of goals. All project data were compared with the 6-month baseline data, with the same metrics collected retrospectively. None of the data were blinded by surgeons, and all data were calculated and tested for accuracy.

Statistical analysis

Data were analyzed by using SAS Enterprise Guide 6.1 (SAS, Cary, NC). A p value less than .05 was considered statistically significant. Demographic characteristics of each sample were compared between the pre- and postintervention groups using the t test for continuous variables, and the chi-square test and Fisher's exact test for categorical variables. Outcomes on LOS and direct cost were compared using t tests. The rates of 30-day readmission were compared using Fisher's exact tests. The relationships between the pre- and postintervention



Note: Outcomes Manager assesses patient needs for each discipline through a pre-screening tool and distributes information to each team member. Outcomes Manager manages outcomes of each disciplines intervention and analyzes, interprets, and reports data to the team.

Figure 1. Collaborative care treatment protocol. PT/OT = physical therapist/occupational therapist; SW/CC = social worker/care coordinator. (Courtesy of Melissa Arana, MSN, RN, CMSRN.)

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groups and LOS and direct cost were assessed using a multivariable linear regression adjusting for demographic characteristics.

Results

A total of 240 THA and 363 TKA patients were included in the study. The demographic information is summarized in Table 1. Patients with THA were comparable between the pre- and postintervention groups. However, TKA patients before the intervention were significantly older than those in the postintervention group (p = .0001), and the distribution in payer (p = .0001) and discharge status (p = .0001) was also significantly different pre- and postintervention. Table 1 shows the comparison in outcomes. Both LOS and direct cost were significantly reduced after the intervention for both THA and TKA samples. Also, the intervention did show a decrease in 30-day readmissions, although not significant (THA: p = .41; TKA: p = .73). This suggests that a shortened LOS did not lead to a significantly increased risk of readmission, which supports previous findings (Auyong et al., 2015). The results for the multivariable linear regression on LOS and direct cost are summarized in Table 2. After adjusting for age, sex, payer source, and discharge status, the intervention showed more powerful statistical significance, indicating that the intervention indeed had a significant effect in reducing LOS and direct cost. The CCM intervention contributed to an average savings of $539 per case for TKA. The average LOS showed a decrease in 0.6 days, resulting in a total of 117 patient-days saved over the course of 6 months. The CCM intervention contributed to an average savings of $1,019 per case for THA. The average LOS decreased by 0.4 days, resulting in a total of 60 patient-days saved over the course of 6 months.

Discussion

This quality improvement project reveals that when an outcomes manager-led interprofessional team utilizes a CCM approach in the care of patients with total joint replacement, a meaningful decrease in LOS and direct cost can be achieved. With the implementation of the CCM for both THA and TKA patients, a decrease of LOS was noted (THA reduced by 0.4 days and TKA reduced by 0.6 days). An overall cost reduction between both patient populations of $240,881 during the 6 months following the intervention is significant. In the current healthcare environment, all healthcare providers are charged with decreasing costs while improving patient outcomes (Auyong et al., 2015). Therefore, one goal of a healthcare system should be to prevent readmissions while improving costs and streamlining care. With patients discharging sooner, closely monitoring readmissions is imperative. The data presented here demonstrate that when interprofessional process improvements are utilized, improved efficiency can be achieved. Preintervention, each discipline worked independently, with little to no collaboration. Although care was provided for these patients, it was not in a collaborative manner. The outcomes manager facilitated relationships among the disciplines to create an

Table 1. Comparison of Demographic Characteristics and Outcomes

	Demographic Characteristics		
	Pre (n = 109)	Post (n = 131)	p
THA			
Age (years)	67.1 ± 10.6	67.6 ± 8.7	.703
Sex, male	40 (36.7)	47 (39.2)	.701
Payer			.117
Commercial	49 (44.9)	51 (42.5)	
Managed	4 (3.7)	13 (10.8)	
Traditional	56 (51.4)	56 (46.7)	
Discharge status			.330
Home health service	28 (25.9)	33 (25.2)	
Home, self-care	47 (43.5)	67 (51.1)	
SNF	19 (17.6)	22 (16.8)	
To another rehab	14 (13.0)	8 (6.1)	
Other	0 (0)	1 (0.8)	
	Pre (n = 164)	Post (n = 199)	
TKA			
Age (years)	70.3 ± 8.7	66.5 ± 8.5	.0001
Sex, male	72 (43.9)	79 (42.0)	.722
Payer			.0001
Commercial	47 (28.7)	101 (53.7)	
Managed	8 (4.9)	9 (4.8)	
Traditional	109 (66.5)	78 (41.5)	
Discharge status			.0001
Home health service	55 (33.5)	45 (22.6)	
Home, self-care	57 (34.8)	120 (60.3)	
SNF	38 (23.2)	25 (12.6)	
To another rehab	13 (7.9)	9 (4.5)	
	Outcomes		
	Pre (n = 109)	Post (n = 131)	p
THA			
LOS	2.8 ± 1.3	2.4 ± 0.9	.001
Direct cost ($)	11,746 ± 2,106	10,726 ± 1,957	.0001
30-day readmission, yes (%)	4 (3.7)	2 (1.5)	.415
	Pre (n = 164)	Post (n = 199)	
TKA			
LOS	2.8 ± 0.9	2.2 ± 1.0	.0001
Direct cost ($)	11,220 ± 1,630	10,681 ± 1,715	.002
30-day readmission, yes (%)	3 (1.8)	5 (2.5)	.734

Note. LOS = length of stay; SNF = skilled nursing facility; THA = total hip arthoplasty; TKA = total knee arthoplasty. The values for age are mean ± *SD* and *n* (%) for the other variables. The values for LOS and direct cost are mean ± *SD* and *n* (%) for 30-day readmission.

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Table 2. Multivariable Linear Regression: *p* Values for LOS and Direct Cost

	THA			TKA		
Source	*df*	LOS	Direct Cost	*df*	LOS	Direct Cost
Age	1	.719	.045	1	.059	.937
Sex	1	.003	.093	1	<.0001	.0006
Discharge status	5	.0002	.010	4	.0002	.006
Payer	2	.0005	.018	2	.208	.616
Pre- and postintervention (CCM model)	1	.0008	.0003	1	<.0001	.022

Note. CCM = Collaborative Care Model; LOS = length of stay; THA = total hip arthoplasty; TKA = total knee arthoplasty.

interprofessional team focused on efficient and effective care for THA and TKA patients.

The primary limitation of this quality improvement project is that the CCM treatment protocol consists of multiple processes. Unfortunately, it is difficult to determine which process intervention had the greatest impact on the reduction of LOS, direct cost, and 30-day readmissions. A second limitation is that variability such as age, payer source, and discharge status does exist within the TKA pre- and postintervention groups. Although these variables were taken into account in the multivariate linear regression, it is difficult to directly compare the data for the TKA samples. A future study should be designed to control for these variables to allow for direct comparison of all data.

The idea for interprofessional collaboration is not new, but allocating time for collaboration in a CCM meeting is an innovative approach to improve the continuum of care of THA and TKA patients in an orthopaedic ward (Pape et al., 2013). As a result, when implementing a CCM, the outcomes manager and the team will need to be flexible, trusting in each other's role, and have an understanding of change management to be successful. Furthermore, Suter et al. (2009) found that understanding and respecting professional roles and responsibilities and communicating effectively are core competencies for patient-centered collaborative care.

Improvements in LOS, direct cost, and 30-day readmissions were established as a result of effective collaboration of the interprofessional team, which resulted in improving overall efficiencies and decreasing waste. The collaboration of the outcomes manager-led interprofessional team contributed to the achieved results. The cost of hiring an outcomes manager was the only financial change, which was easily justified in the total cost reduction.

Conclusion

The outcomes manager-led interprofessional team with the implementation of the CCM treatment protocol contributed to a significant reduction in LOS and direct cost without significantly increasing 30-day readmissions for patients with total joint replacement. The outcomes manager and team approach can be applied to various patient populations, especially those involving planned surgical intervention. Although each discipline's process will be unique to the diagnosis and procedure, the results of this project suggest that this concept of the outcomes manager-led interprofessional team can be applied to improve outcomes and reduce costs for the overall benefit of patients and facilities alike.

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