

Review Article

Preoperative Joints Education Class Decreases Length of Stay after Total Knee Arthroplasty

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Background

Preoperative education programs are increasingly recognized for their role in improving outcomes following total knee arthroplasty (TKA). This study examines the impact of such programs on postoperative outcomes, including length of stay, discharge disposition, and complication rates in a large, urban hospital setting.

Methods

This retrospective cohort study analyzed primary elective TKAs performed between 2014 and 2020. Postoperative outcomes between patients who attended a preoperative joints education class and those who did not, using univariate and multivariate analyses to

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[Conflicts of Interest Statement for Dr. Ali Mehaidli](#)

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[Conflicts of Interest Statement for Tahsin Rahman](#)

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assess the impact of preoperative education on length of stay, discharge disposition, and postoperative complications. Postoperative complications collected included deep venous thrombosis/pulmonary embolism, mortality, periprosthetic fractures, prosthetic joint infections, aseptic revisions, and all cause reoperations.

Results

A total of 18,541 patients were included, with 14,623 (78.9%) attending the preoperative education class. Attendance was significantly associated with a shorter postoperative length of stay (1.52 ± 1.3 vs. 1.70 ± 1.7 days, $P < 0.001$) and lower odds of discharge to a post-acute care facility (odds ratio 0.862, 95% CI: 0.770 to 0.965). However, patients who attended the class had a higher rate of aseptic revision within 90 days (3.1% vs. 2.3%; $P = 0.014$). No significant differences were observed in other major postoperative complications.

Conclusion

Engagement in preoperative joints education classes prior to TKA is associated with beneficial outcomes, including reduced hospital length of stay and improved rates of discharge home. However, the higher rate of aseptic revisions within 90 days warrants further investigation. These findings support the integration of preoperative education into patient care protocols to enhance recovery while highlighting the need to explore factors contributing to early revisions.

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INTRODUCTION

Total knee arthroplasty (TKA) is one of the most common orthopaedic procedures performed each year in the United States (Kurtz et al. 2007; Sloan, Premkumar, and Sheth 2018). TKA has increasingly transitioned from the inpatient setting to ambulatory surgery centers and outpatient procedures. In a study by Debbi et al, same-day discharge TKAs increased by an average annual rate of 11.1% from 2010 to 2017 (Debbi et al. 2022).

With this shift toward same-day surgery and enhanced recovery protocols, preoperative joint education programs provide patients an opportunity to prepare for surgery by addressing questions, setting expectations for the surgical day and recovery period, and improving rehabilitation readiness (Giardina et al. 2020; Prouty et al. 2006; Edwards, Mears, and Lowry Barnes 2017). These programs have been shown to reduce patient anxiety, improve pain management, and enhance postoperative functionality (Ho et al. 2022; Moyer et al. 2017; Kearney et al. 2011). Greater understanding of the surgical process empowers patients to take an active role in their recovery and improves their overall experience (Kearney et al. 2011; Lane-Carlson and Kumar 2012; Messer 1998).

Research indicates that preoperative joint education can reduce postoperative length of stay, the need for discharge to skilled nursing facilities, and the incidence of complications (Edwards, Mears, and Lowry Barnes 2017; Moyer et al. 2017; Cook et al. 2008; S. Jones et al. 2011; Kelmer et al. 2021; Marshall 2020; Sisak et al. 2019; Yoon et al. 2010). These reductions also lower overall healthcare costs (Edwards, Mears, and Lowry Barnes 2017; Kelmer et al. 2021; E. D. Jones, Davidson, and Cline 2022; Soeters et al. 2018). This study aimed to assess the impact of a preoperative joint education program on length of stay, discharge disposition, and postoperative outcomes in a large, database-derived cohort following TKA in an urban setting.

MATERIALS AND METHODS

Institutional review board approval was obtained prior to conducting this retrospective cohort study. All patients who underwent primary, elective TKA at a single multi-center urban hospital system between August 2013 and March 2021 were eligible for inclusion. Exclusion criteria included all patients who underwent revision TKA, unicompartmental knee arthroplasty including patellofemoral knee arthroplasty, or urgent or emergent procedures in the setting

of traumatic or pathologic indications. Cases were limited to the study period based on the initiation of Michigan Arthroplasty Research Collaborative Quality Initiative (MARCQI) database collection at the index hospital system.

Patient data was abstracted from the MARCQI database. Available demographic and medical history information were collected including age, sex, smoking status, alcohol use, marital status, ethnicity, race, insurance payer type, body mass index, history of diabetes mellitus, American Society of Anesthesiologists score, use of preoperative assistive devices, and history of deep venous thrombosis/pulmonary embolism.

Attendance of a preoperative joints education program was documented in the MARCQI database records. At this institution, preoperative classes are offered both online and in-person. The classes are approximately 2 hours in length, and patients attend typically within 2-4 weeks prior to their scheduled surgery. Topics discussed in the class include procedure preparation, surgery day expectations, pain management regimens, postoperative precautions, and physical therapy. Attendance of the course is at the discretion of the patient and their family, with surgeons variably emphasizing the importance of the preoperative program based on practice protocols. Classes are led by nurses and physical therapists with time provided for patients to ask questions. Instructors additionally vary based on course location.

The primary outcome of this study was to evaluate the postoperative length of stay, and discharge disposition for patients who attended a preoperative joints education class vs. those who did not. Secondary outcomes for this study included the incidence of 90-day postoperative complications. These complications, derived from the MARCQI database, include the need for blood transfusion, deep venous thrombosis, pulmonary embolism, return to the operating room, periprosthetic fracture, prosthetic joint infection (PJI), emergency department (ED) visits, hospital readmission, and death. To account for reoperations past 90 days, the database was cross-referenced for revision surgeries for the same patient and limb. If the patient had undergone revision at any point after 90 days, the procedure date and reason was documented.

DATA ANALYSES

Statistical analyses were performed using SPSS software version 26 (IBM, Armonk, NY). Univariate analyses were used to initially compare patients who did and did not attend the preoperative joints education program. Student's t-test or analysis of variance and Pearson's chi-square analyses were used to compare continuous and categorical variables, respectively. Backwards, stepwise, multivariate linear or binary logistic regressions were conducted for continuous or categorical variables, respectively, to further assess for correlations between outcomes and covariates. Threshold for exclusion in subsequent regressions was a p-value > 0.1. Alpha-level of 0.05 was used to determine statistical significance.

PATIENT COHORT

There were 18,541 primary, elective TKAs performed during the study period. Of these patients, 14,623 patients (78.9%) attended the joints education class while 3,918 patients (21.1%) did not. A significantly higher proportion of females attended the preoperative education class compared to those who did not ($P < 0.001$). Among patients who attended the class, 65.3% were female (9,556 out of 14,623), whereas only 61.8% of the non-attending group were female (2,423 out of 3,918). Conversely, males made up a larger proportion of the non-attending group at 38.2% (1,495 out of 3,918) compared to 34.7% (5,067 out of 14,623) in the attending group. Black patients were underrepresented in the patients who did not attend the joints education course (12.9%) compared with those that did attend (17.1%) ($P < 0.001$). There was no difference between the 2 cohorts with regards to age, body mass index, and smoking status. Demographics for the patient cohorts are presented in [Table 1](#).

RESULTS

DISPOSITION AND LENGTH OF STAY

Interpretation of odds ratio analyses demonstrated that patients who attended the joints education course were less likely to have a non-home discharge (odds ratio 0.862, 95% CI: 0.770 to 0.965) ([Table 4](#)). LOS for patients who attended a preoperative joints education class was 1.52 ± 1.3 compared to 1.70 ± 1.7 days in the non-participating cohort ($P < 0.001$) ([Table 2](#)).

POSTOPERATIVE COMPLICATIONS

The results for univariate comparisons of outcomes between patient cohorts are presented in [Table 2](#). Aseptic revisions within 90 days occurred more frequently in patients who attended the course (448 revisions, 3.1%) compared to those who did not (91 revisions, 2.3%; $P = 0.014$). There was no significant difference in the rate of ED visits, hospital readmission, death, deep venous thrombosis/pulmonary embolism, periprosthetic fracture, or PJI. The results for the multivariate analysis to assess risk of adverse events secondary to attendance of a preoperative course are presented in [Table 3](#). This analysis demonstrated that patients who attended the preoperative course had an increased risk of all-cause reoperation within 90 days (odds ratio 1.426, 95% CI: 1.114–1.824; $P = 0.01$). The results of odds ratios analysis to assess risk of adverse events are presented in [Table 4](#).

DISCUSSION

In this study of 18,541 patients, 78.9% attended a preoperative joints education class. Those who participated experienced a statistically significant reduction in length of stay ($P < 0.001$). However, they also had a higher rate of aseptic revision within 90 days (3.1% vs. 2.3%; $P = 0.014$). Enhanced

Table 1. Baseline demographics.

Variable	No Preoperative Course n = 3,918 (%)	Yes Preoperative Course n = 14,623 (%)	P-value
Age (years)*	66.51 ± 9.8	66.39 ± 9.3	<0.001
Sex			<0.001
Female	2423 (61.8)	9556 (65.3)	
Male	1495 (38.2)	5067 (34.7)	
Marital status			0.12
Married	2513 (64.2)	9240 (63.2)	
Single	505 (12.9)	2039 (13.9)	
Divorced	416 (10.6)	1650 (11.3)	
Widowed	441 (11.3)	1509 (10.3)	
Ethnicity			0.07
Hispanic or Latino	46 (1.3)	235 (1.7)	
Not Hispanic or Latino	3624 (98.7)	13730 (98.3)	
Race			<0.001
White	3134 (80.0)	11204 (76.6)	
Black	506 (12.9)	2494 (17.1)	
Other	278 (7.1)	925 (6.3)	
Body mass index (kg/m ²)*	33.1 ± 6.7	33.5 ± 6.7	0.78
Smoking status			0.27
Never	1948 (49.7)	7461 (51.0)	
Previous	1608 (41.1)	5896 (40.3)	
Current	360 (9.2)	1259 (8.6)	
History of diabetes mellitus	855 (21.8)	3547 (24.3)	0.002
Preoperative use of assistive devices	1209 (31.5)	4693 (32.4)	0.25
ASA score			<0.001
I	39 (1.0)	148 (1.0)	
II	1245 (31.8)	5471 (37.4)	
III	2501 (63.9)	8620 (59.0)	
IV	130 (3.3)	381 (2.6)	

ASA, American Society of Anesthesiologists; DVT, deep venous thrombosis.

*Continuous variables presented as mean ± standard deviation and categorical variables presented as number and percentage of cohort.

recovery programs have become standard in hip and knee arthroplasty and are shown to decrease length of stay and improve outcomes while remaining cost-effective (Ho et al. 2022).

Previous studies on preoperative education have reported mixed results. Kelmer et al. found a similar reduction in hospital stay, though outcomes were limited to 30 days (Kelmer et al. 2021). In contrast, McDonald et al. reported minimal advantages beyond standard care (S. McDonald et al. 2014). Notably, many studies used written, pre-recorded, or audio materials instead of live sessions (Butler et al. 1996; Clode-Baker et al. 1997; Cooil and Bithell 2009; Daltroy et al. 1998; Doering et al. 2001; D. D. McDonald and Molony 2004; Sjöling et al. 2003). This cohort study specifically evaluates the outcomes of patients who attended live, in-person or virtual preoperative education classes compared to those who did not.

PATIENT DISPOSITION AND LENGTH OF STAY

This study aligns with prior research by Crowe and Henderson, where patients who participated in preoperative education had a decreased length of stay compared to those who did not (Crowe and Henderson 2003). Beaupre et al. demonstrated a similar trend, though the reduction was not statistically significant (Beaupre et al. 2004). While this study did not find a statistically significant reduction in non-home discharge rates, patients who attended preoperative education had lower odds of discharge to a post-acute care facility (odds ratio 0.862, 95% CI: 0.770–0.965). Similarly, Pelt et al. reported a 59% relative reduction in such discharges after implementing a joint education program (Pelt et al. 2018). These findings suggest that preoperative education improves patient readiness, reduces anxiety, and promotes adherence to postoperative protocols, ultimately facilitating home discharge by addressing potential barriers

Table 2. Outcomes versus Attendance of a Preoperative Education Course prior to Total Knee Arthroplasty

Variable	No Preoperative Course n = 3,918	Yes Preoperative Course n = 14,623	P-value
Length of stay (days)*	1.70 ± 1.7	1.52 ± 1.3	<0.001
Non-home disposition	441 (11.3)	1442 (9.9)	0.290
Any reason emergency department visit	427 (10.9)	1682 (11.5)	0.252
Any reason hospital readmission	199 (5.1)	661 (4.5)	0.140
Death	6 (0.2)	29 (0.2)	0.563
DVT/PE	53 (1.4)	164 (1.1)	0.232
Periprosthetic fracture	10 (0.3)	27 (0.2)	0.379
Prosthetic joint infection within 90 days of surgery	15 (0.4)	60 (0.4)	0.810
Prosthetic joint infection beyond 90 days of surgery	5 (0.1)	39 (0.3)	0.112
Aseptic revision within 90 days	91 (2.3)	448 (3.1)	0.014
Aseptic revision beyond 90 days	32 (0.8)	142 (1.0)	0.374

ASA, American Society of Anesthesiologists; DVT, deep venous thrombosis; PE, pulmonary embolism.

*Continuous variables presented as mean ± standard deviation and categorical variables presented as number and percentage of cohort. Unless specified, all complications are documented within 90 days of surgery.

Table 3. Multivariate Analyses to Assess Risk of Adverse Events Secondary to Attendance of a Preoperative Education Course for Total Knee Arthroplasty

Variable	Odds Ratio	95% CI	P-Value
Non-home discharge disposition	0.893	[0.788, 1.012]	0.08
Visit to emergency department	1.058	[0.942, 1.189]	0.34
Hospital readmission	0.902	[0.761, 1.069]	0.90
Death	1.499	[0.577, 3.897]	0.41
DVT/PE	0.861	[0.618, 1.199]	0.38
Periprosthetic fracture	0.735	[0.340, 1.588]	0.43
Prosthetic joint infection within 90 days	1.069	[0.594, 1.925]	0.82
Prosthetic joint infection beyond 90 days	2.091	[0.821, 5.327]	0.12
All-cause reoperation within 90 days	1.426	[1.114, 1.824]	0.01
Aseptic revision beyond 90 days	1.208	[0.806, 1.810]	0.36

DVT, deep venous thrombosis; PE, pulmonary embolism.

Multivariate analyses were conducted with attendance of joints education and other covariates (age, sex, marital status, ethnicity, race, body mass index, smoking status, history of diabetes, preoperative use of assistive devices, and American Society of Anesthesiologists score) as independent variables.

such as social support, medical equipment, and transportation (Edwards, Mears, and Lowry Barnes 2017).

EMERGENCY DEPARTMENT VISITS AND HOSPITAL READMISSIONS

There is limited data on the impact of preoperative education on ED visits and hospital readmissions. In this study, similar to Beaupre et al., no significant differences were found in readmission rates or ED visits between patients who attended preoperative education and those who did not (Beaupre et al. 2004). Jones et al. also reported no improvement in readmission rates within 24 hours or 3 months post-TKA (S. Jones et al. 2011). Conversely, some studies have shown lower readmission rates with preoperative education (Edwards, Mears, and Lowry Barnes 2017; Pelt et al. 2018).

The lack of effect may be due to postoperative complications that cannot be prevented by education alone and broader factors such as social determinants of health, including transportation, socioeconomic status, and social support (Dubin et al. 2024). Additionally, the presence of a 24-hour joints hotline at our institution may have reduced ED visits and readmissions by providing timely postoperative support.

POSTOPERATIVE COMPLICATIONS

To our knowledge, there is limited data assessing preoperative education and the rate of postoperative complications, namely deep veinous thrombosis/pulmonary embolism, periprosthetic fracture, PJI, aseptic revisions, and death. This study did not find any significant relationship between attending a preoperative joints education class and any postoperative complications. These findings are

Table 4. Odds Ratios to Assess Risk of Adverse Events Secondary to Attendance of a Preoperative Education Course for Total Knee Arthroplasty

Variable	Odds Ratio	95% CI
Non-home discharge disposition	0.862	[0.770, 0.965]
Visit to emergency department	1.063	[0.949, 1.189]
Hospital readmission	0.885	[0.752, 1.041]
Death	1.296	[0.538, 3.123]
DVT/PE	0.827	[0.606, 1.130]
Periprosthetic fracture	0.723	[0.350, 1.495]
Prosthetic joint infection within 90 days	1.072	[0.608, 1.890]
Prosthetic joint infection beyond 90 days	2.093	[0.824, 5.313]
All-cause reoperation within 90 days	1.329	[1.058, 1.670]
Aseptic revision beyond 90 days	1.191	[0.810, 1.750]

DVT, deep venous thrombosis; PE, pulmonary embolism.

Columns of the cross-tabulation were based on patients attendance of a preoperative education course prior to total knee arthroplasty, with odd's ratios presented for the cohort that attended a course.

consistent with current literature involving mostly small studies investigating preoperative joints education (Cooil and Bithell 2009; Beaupre et al. 2004; D. A. McDonald et al. 2012). The association between preoperative education and higher aseptic revision rates within 90 days (2.3% vs. 3.1%; $P = 0.014$) and increased all-cause reoperation risk (odds ratio 1.426, 95% CI: 1.114–1.824; $P = 0.01$) is unlikely to be directly caused by the education itself. Several confounding factors may explain these findings. Surgeon-related variability could play a role, as patients attending education classes may be managed by surgeons who emphasize these programs, potentially differing in surgical technique, implant choice, or follow-up protocols. Implant characteristics may also contribute; certain implants with higher revision rates might be more frequently used by surgeons who encourage education attendance. Patient-specific factors are another consideration. Those who attend preoperative education may have more complex medical histories, greater health vigilance, or heightened awareness of postoperative outcomes. This may lead to earlier reporting of concerns and a lower threshold for precautionary revisions. Additionally, preoperative education may enhance surgeon-patient communication, encouraging more proactive follow-up care and intervention. These patients may also benefit from better healthcare access, leading to earlier detection and management of complications. Combining data on revisions within and beyond 90 days could help determine if this association reflects short-term vigilance or true complication risk. Future analyses controlling for surgeon, implant type, and patient demographics are necessary to better understand these relationships and distinguish correlation from causation.

LIMITATIONS

There were several limitations to this study. The retrospective nature of the study introduced a level of bias to the results. While this study included a rather large cohort, the incidences of complications remain low within the study. In addition, most of the longitudinal data was limited to 90

days. Furthermore, while the reoperations and postoperative complications, including revision surgery, fracture, and PJI were identified via cross-referencing with the hospital system electronic medical records, some of such cases may not have been accounted for because of treatment at a non-participating facility.

CONCLUSION

This retrospective study involving 18,541 patients undergoing TKA demonstrates that preoperative joints education may reduce postoperative length of stay and improve rates of discharge home instead of to a post-acute rehabilitation facility. However, attendance at these classes was also associated with a higher rate of aseptic revision within 90 days. These findings highlight the importance of preoperative education in preparing patients for surgery and facilitating recovery, while also emphasizing the need to investigate potential factors contributing to increased early revision rates. This reinforces the role of preoperative education as an integral part of enhanced recovery protocols in orthopaedic surgery, advocating for its broader implementation to optimize patient outcomes and healthcare efficiency. Further studies should explore the relationship between preoperative education and revision rates and assess the cost-effectiveness of these programs in relation to postoperative outcomes.

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