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The Effect of Payer Type on Clinical Outcomes in Total Knee Arthroplasty

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ABSTRACT

This was a retrospective cohort analysis of 112 patients undergoing primary total knee arthroplasty, wherein baseline demographics, resource utilization, and outcomes were compared by insurance type: Medicaid, Medicare, or private. At the time of surgery, Medicaid patients were younger ($P < .0001$) and had lower preoperative Knee Society Scores than Medicare and private patients ($P = .0125$). Medicaid postoperative scores were lower than those of private patients ($P = .0223$). The magnitude of benefit received by Medicaid patients was similar to Medicare and private patients. Medicaid patients had a higher number of cancelled ($P = .01$) and missed ($P = .0022$) appointments relative to Medicare and private patients. Medicaid patients also had shorter average follow-up periods compared to private patients ($P = .0003$). Access to care and socioeconomic factors may be responsible for these findings.

Medicaid recipients have faced increased barriers to receiving healthcare services. At this time, a growing number of physicians do not accept or limit the number of Medicaid patients in their practice [1,2]. With fewer providers participating in the program, Medicaid patients may be required to travel greater distances to receive appropriate medical care [3–5]. In one study, 78% of Medicaid patients were referred to other medical centers for conditions that would normally have been treated locally. The authors concluded that these decisions were made solely on the basis of insurance status [5]. While declining reimbursements are frequently speculated as the cause for this trend, some physicians cite the complex social issues, communication barriers, and increased paperwork associated with caring for public aid patients [6,7]. Many physicians admit to treating patients of lower socioeconomic status outside of established standards of care but with the intent of optimizing care given limited resources and difficult circumstances [8]. When medical care deviates from established standards, it is important to assess the clinical outcomes associated with these changes. With many states looking to expand Medicaid coverage under the recent Patient Protection and Affordable Care Act [9], it is more important than ever to address disparities of care received by this vulnerable population.

A recent study demonstrates that Medicaid patients undergoing unilateral lower extremity total joint arthroplasty had lower preoperative WOMAC scores than patients with other insurance types [4]. Similarly, Medicaid patients undergoing unilateral total hip arthroplasty had lower preoperative and postoperative Harris Hip Scores [3]. The aforementioned barriers to healthcare access are apparent in these findings.

We are not aware of any study that compares clinical outcomes after unilateral total knee arthroplasty (TKA) on the basis of payer type. Given the extensive rehabilitation requirements after total knee arthroplasty, it is suspected that disparities in clinical outcomes may be even more apparent than after total hip arthroplasty. We hypothesized that the severity of preoperative knee pathology in Medicaid patients would be greater than in non-Medicaid patients. Additionally, we hypothesized that postoperative knee function would be poorer in Medicaid patients than in non-Medicaid patients. The goals of this study were: (1) to define cohort demographics based on payer type, (2) to determine patterns of utilization within payer cohorts, and, (3) to report the clinical outcomes of TKA based on payer type.

Materials and Methods

This was a retrospective cohort study. A billing query for all patients who underwent primary TKA by the senior authors between January 1, 2006 and April 1, 2010 was performed. Patients were then grouped according to payer type. We found 55 patients with Medicaid benefits and 818 patients with Medicare benefits that met these criteria. The most commonly held private, third party payer amongst our patients undergoing TKA was Blue Cross/Blue Shield (BCBS). Given the low numbers of patients with other third party payers, we

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Table 1a
Detailed Racial Distribution by Payer Type.

	White	African-American	Asian	Other	Total
BCBS	34 (81%)	5 (12%)	0 (0%)	3 (7%)	42
Medicare	29 (81%)	6 (17%)	1 (3%)	0 (0%)	36
Medicaid	13 (38%)	15 (44%)	2 (6%)	4 (12%)	34
Total	76	26	3	7	112

opted to use the BCBS group as a proxy for all patients with private insurance. We found 415 patients with BCBS insurance who underwent TKA during this time period.

Patients with Medicaid benefits represented our smallest population of interest. To establish cohorts of equal size, we used a random number generator (http://www.random.org/) to select a sample of 60 patients from the Medicare and BCBS groups. Given our interest in the differences between these populations, we elected not to age-match between the cohorts. Clinical charts were then reviewed. Abstracted data points included: baseline demographics (age, race, BMI, distance traveled for care, ASA score, Charlson Comorbidity Index), baseline knee and musculoskeletal function (pre-operative Knee Society Scores, Charnley class), operative outcomes (post-operative Knee Society Scores), appointments missed or cancelled, postoperative complications, and length of follow-up.

Exclusion criteria included patients who: (1) had undergone a previous, ipsilateral knee arthroplasty, (2) had an ipsilateral manipulation under anesthesia for any reason, (3) had a history of ipsilateral septic or traumatic arthritis, (4) had incomplete or unclear patient response forms that disallowed computation of Knee Society Score, (5) had age less than 18 years, (6) had prisoner or institutionalized status, and (7) had less than 180 days of follow-up. Patients with less than 180 days of follow-up were contacted by telephone and offered follow-up appointments. If they declined to be seen in follow-up, or were not able to be contacted, they were excluded.

Statistical analyses were conducted using SAS software (v9.2, SAS Institute Inc.), and cohorts were compared using the ANOVA procedure to evaluate overall difference and Tukey post-hoc tests for between factor level contrasts. Subgroup analyses stratified by race were conducted to identify the role race played in outcome metrics. Due to small numbers in the Asian and Other race categories, stratifications were simplified by comparing white patients to non-white patients.

Results

A total of 1695 primary total knee arthroplasty patients were identified within the given time period: 55 Medicaid, 818 Medicare, and 415 BCBS. After randomization, 60 patients were selected to form the Medicare and BCBS cohorts. After exclusion criteria were applied, 34 Medicaid patients, 36 Medicare patients, and 42 BCBS patients remained. Racial distributions of each cohort are depicted in Tables 1a and 1b. The racial distributions of the three payer groups were statistically significant ($\chi^2 = 22.079$, df = 6, $P = .011$). The most noticeable discrepancy between the cohorts is the African-American population comprising roughly 44% of the Medicaid cohort; whereas it only comprises 12% and 17% of the BCBS and Medicare cohorts, respectively. Additionally, both the BCBS and Medicare cohorts were comprised of roughly 81% white patients; whereas, the Medicaid cohort only had 38% white patients.

Table 1b
Simplified Racial Distribution by Payer Type.

	White	Non-White	Total
BCBS	34 (81%)	8 (19%)	42
Medicare	29 (81%)	7 (19%)	36
Medicaid	13 (38%)	21 (62%)	34
Total	76	36	112

Table 2
Baseline Demographics by Payer Type.

Variable	BCBS Mean	SD	Medicaid Mean	SD	Medicare Mean	SD	Significance *P*
ASA	2.3	(0.5)	2.2	(0.6)	2.4	(0.5)	0.2039
Charlson Comorbidity Index	2.3	(9.4)	1.4	(1.9)	2.4	(2.4)	0.7045
Age (years)	58[a]	(6)	53	(10)	71[a]	(6)	<.0001
BMI	36	(8)	35	(9)	33	(6)	0.2284
Distance traveled (miles)	28	(12)	24	(40)	38	(54)	0.2407

[a] Post-hoc significance (calculated in comparison to Medicaid values).

Baseline demographics of each cohort are depicted in Table 2. Our results demonstrate that Medicaid patients undergo total knee arthroplasty at a significantly younger age (mean = 53 years, SD = 10, $P < .0001$) compared to BCBS (mean = 58 years, SD = 6) and Medicare (mean = 71 years, SD = 6) patients. Further stratifying by race demonstrated that white Medicaid patients (mean = 48 years, SD 10) were significantly younger than non-white Medicaid patients (mean = 56 years, SD = 10, $P = .006$). Since non-white race correlated to increased age, the Medicaid cohort's increase non-white population does not explain the age discrepancy between payer types. Despite the aforementioned age discrepancy, all three cohorts had similar levels of medical comorbidity as measured by ASA, Charlson Comorbidity Index, and BMI. Medicaid recipients did not have a significantly greater distance of travel over BCBS or Medicare patients when receiving care at our medical center.

With a follow-up minimum of 180 days, 87.4% of patients were not excluded. The average follow-up was 32.4 months. Outcome metrics of each payer type are depicted in Table 3. Medicaid patients had significantly lower preoperative Knee Society Scores (mean = 39, SD = 15, $P = .0125$) than BCBS (mean = 46, SD = 10) and Medicare (mean = 47, SD = 11) patients. Subgroup stratification by race showed no significant difference between white Medicaid patients (mean = 36, SD = 16) and non-white Medicaid patients (mean = 42, SD = 14, $P = .625$) with respect to preoperative Knee Society Scores. Similarly, Medicaid patients had significantly lower postoperative Knee Society Scores (mean = 76, SD = 20, $P = .0223$) than BCBS patients (mean = 88, SD = 18). While Medicaid patients had lower postoperative Knee Society Scores (mean = 76, SD = 20) than Medicare patients (mean = 85, SD = 16), this only trended toward significance. Subgroup stratification by race showed no significant difference between white Medicaid patients (mean = 72, SD = 21) and non-white Medicaid patients (mean = 78, SD = 20, $P = .978$) with respect to postoperative Knee Society Scores. Medicaid patients have a similar magnitude of improvement in their Knee Society Scores after total knee arthroplasty (mean = 35, SD = 26,

Table 3
Outcome Metrics by Payer Type.

Variable	BCBS Mean	SD	Medicaid Mean	SD	Medicare Mean	SD	Significance *P*
Complications (avg #/patient)	0.13	(0.62)	0.36	(0.67)	0.05[a]	(0.21)	0.0282
KSS PreOP	46[a]	(10)	39	(15)	47[a]	(11)	0.0125
KSS PostOP	88[a]	(18)	76	(20)	85	(16)	0.0223
KSS Post-Pre	41	(19)	35	(26)	37	(17)	0.5174
Avg follow up (months)	40[a]	(17)	25	(13)	31	(21)	0.0003
Appt. canceled	1.3[a]	(1.9)	2.4	(2.0)	1.3[a]	(1.4)	0.0100
Appt. missed	0.4[a]	(0.6)	1.1	(1.5)	0.4[a]	(0.8)	0.0022

[a] Post-hoc significance (calculated in comparison to Medicaid values).