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Total Joint Arthroplasty: A Granular Analysis of Outcomes in the Economically Disadvantaged Patient

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ABSTRACT

Background: Poor patients experience more serious complications and worse outcomes after surgery than higher-income patients. Our objective was to study detailed patient sociodemographic characteristics and preoperative/postoperative patient-oriented outcomes in economically disadvantaged and non-economically disadvantaged primary total joint arthroplasty patients.

Methods: From a consecutive series, 213 economically disadvantaged patients and 1940 non-economically-disadvantaged patients were statistically analyzed. Baseline sociodemographic characteristics and pain visual analog scale, Quality of Well-Being Index 7, Short Form 36, and Western Ontario and McMaster Universities Arthritis Index scores recorded before and after surgery were compared between both groups controlling for baseline differences. Minimum follow-up was 1 year.

Results: Economically disadvantaged patients were significantly younger, more likely to be disabled, and had worse preoperative and postoperative scores.

Conclusion: When compared with non-economically disadvantaged patients, economically disadvantaged patients consistently had lower function and worse quality of life before and after total joint arthroplasty.

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It has been reported that economically disadvantaged patients experience higher risk for certain complications and use more resources after primary total joint arthroplasty when compared with non-economically disadvantaged patients [1]. The association of Medicaid payer status with complications and worse outcomes is not restricted to total joint arthroplasty [2–4]. Elderly patients with lower socioeconomic status have even higher rates of adjusted operative mortality than patients with higher socioeconomic status after various surgical procedures [5]. In total hip arthroplasty, economically disadvantaged patients have been reported to have lower preoperative and postoperative Harris Hip Scores when compared with Medicare or commercial insurance patients [6]. In

total knee arthroplasty, lower knee society scores have been reported for economically disadvantaged patients when compared with Medicare and private patients [7].

The association between socioeconomic characteristics with outcomes in total joint arthroplasty is complex and not fully understood. The association between insurance type and preoperative status of hip and knee patients merits further investigation. Our objective was to study the impact of insurance payer status, as a proxy for economic baseline patient characteristics, on outcomes before and after primary total joint arthroplasty, making use of a large single-surgeon case series of primary total hip and knee arthroplasties. Data were prospectively collected in a joint registry and retrospectively analyzed; we did not rely on administrative data for the current investigation. This makes our series particularly unique and of high quality when it comes to the outcomes of interest. Therefore, we wanted to compare (1) the demographic, comorbidity, and socioeconomic characteristics of economically disadvantaged and non-economically disadvantaged patients; (2) the preoperative and postoperative pain intensity and frequency as measured by a visual analog scale (VAS; 0–10); and (3) the Quality

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of Well-Being Index 7 (QWB-7), Short Form 36 (SF-36), and Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores of these 2 groups of patients.

Materials and Methods

Making use of our joint registry database, we retrospectively reviewed the records of 3247 consecutive primary total hip and knee arthroplasties performed by a single surgeon from August 1992 to December 2014. Revision cases and hemiarthroplasties were excluded.

Patients at their first visit routinely completed a new patient standardized questionnaire that included baseline demographic and socioeconomic characteristics (such as marital status, occupation, level of education, and income). Baseline demographics, socioeconomic characteristics, and patient-oriented outcomes are routinely collected in our joint registry database in a prospective and standardized fashion 2 weeks preoperatively and postoperatively at 3 months, 6 months, 1 year, and annually thereafter.

Specifically, demographic data studied include age, gender (female/male), race (White/African-American), ethnicity (Hispanic/non-Hispanic), and body mass index (kg/m^2) [8]. Comorbidity indices include the American Society of Anesthesiologists physical status classification system [9] and the Charlson Comorbidity Index [10]. Socioeconomic characteristics include marital status (unmarried vs married), level of education (elementary, high school, higher), income ($< \$13,000/\text{y}$; $\$13,000$ – $\$100,000/\text{y}$; $> \$100,000/\text{y}$; no answer), and occupation (disabled, employed, retired, unemployed, homemaker). Patient-oriented outcomes included pain intensity and frequency as measured by a VAS (range, 0–10), the QWB-7 total score [11] which is a measure of quality of well-being, the SF-36 [12] which measures general health, and the WOMAC [13] which is a disease-specific instrument frequently used to evaluate hip and knee arthroplasty patients.

Complete insurance type information was available for all subjects. Preoperative and postoperative outcomes at a minimum follow-up of 1 year were available for 2776 procedures. In patients with > 1 joint replaced, one knee and/or hip was excluded. Subsequently, the total cohort consisted of 2153 cases in the same number of patients. Based on insurance type, 2 groups were set apart: economically disadvantaged patients (Medicaid; $n = 213$) and non-economically disadvantaged patients (non-Medicaid; $n = 1940$). The non-economically disadvantaged group included patients who had Medicare, private insurance, or who were self-pay. In total, 2153 cases or patients were finally included in the statistical analysis. Mean follow-up was 5.6 years (range, 1–20 years).

Statistical Analysis

Depending on the data type, independent t tests, Fisher's exact test, and chi-square tests were used to assess for differences and association between economically disadvantaged patients and non-economically disadvantaged patients for demographics, comorbidities, preoperative diagnosis, and socioeconomic characteristics. To assess for differences on preoperative and postoperative pain and patient-oriented outcomes, a multivariate analysis of variance was used. Age, race, ethnicity, and preoperative diagnosis were used in the final models as covariates (multivariate analysis of covariance). A P value $< .05$ was considered statistically significant. All statistical analyses were completed using SPSS, version 17.0, for Windows (Armonk, NY).

Results

There were significant differences between both groups for most basic demographics (Table 1). Mean age in the economically

disadvantaged group was 59.5 ± 12.9 years vs 68.8 ± 11.2 years in the non-economically disadvantaged group. A higher proportion of patients in the economically disadvantaged group were African-Americans and Hispanics; patients in this group also had a higher proportion of secondary osteoarthritis as the preoperative diagnosis.

Concerning baseline socioeconomic characteristics, all variables studied were significantly different between the 2 groups (Table 2). A higher proportion of economically disadvantaged patients were disabled, while a lower proportion of these patients were married, had a college degree, or had an income $\geq \$13,000/\text{y}$. No patient in this group had an income $> \$100,000/\text{y}$.

All preoperative measures were found significantly different between the economically disadvantaged and the non-economically disadvantaged groups except for the role physical, vitality, social functioning, and physical component summary scales of the SF-36 as well as the WOMAC stiffness score (Table 3). Economically disadvantaged patients presented to surgery with consistently worse scores when compared with patients in the non-economically disadvantaged group.

Regarding postoperative outcomes, the economically disadvantaged group had significantly worse scores on the QWB-7 total, multiple scales of the SF-36, and all dimensions of the WOMAC (Table 4).

Discussion

The objective of this investigation was to determine the baseline demographic, comorbidity, and social characteristics of economically disadvantaged patients undergoing primary TJA and to study their impact on outcomes before and after surgery.

Our results should be interpreted in light of several limitations. First, our sample was limited to a practice with a predominant Hispanic population; consequently, our results might not be extrapolated to other groups of patients. In addition, the ethnic composition of Miami is becoming increasingly similar to the one of many locations in the United States. Second, although the data were

Table 1
Comparisons Between the Economically Disadvantaged and Non-Economically Disadvantaged Groups on Baseline Demographics, Body Mass Index, Comorbidities, and Preoperative Diagnosis.

Baseline Patient Characteristics	Economically Disadvantaged (Mean \pm SD)	Non-Economically Disadvantaged (Mean \pm SD)	P Value
Age (mean in years)	59.48 \pm 12.9	68.83 \pm 11.2	$< .001^*$
Gender (% within insurance)			.4
Female	70.9	68.1	
Male	29.1	31.9	
Race (% within insurance)			$< .001^*$
White	80.9	92.4	
African-American	19.1	7.6	
Ethnicity (% within insurance)			$< .001^*$
Hispanic	83.6	73.5	
Non-Hispanic	16.4	26.5	
Body mass index (mean in kg/m^2)	29.8 \pm 6.3	29.8 \pm 5.5	.8
Charlson Comorbidity Index (mean)	1.02 \pm 1.4	1.28 \pm 1.5	.07
ASA I (% within insurance)	0.0	0.8	.3
ASA II (% within insurance)	60.3	52.1	
ASA III (% within insurance)	36.5	45.6	
ASA IV (% within insurance)	3.2	1.5	
Osteoarthritis primary (% within insurance)	67.2	85.2	$< .001^*$
Osteoarthritis secondary (% within insurance)	32.8	14.8	

* $P < .05$.

ASA, American Society of Anesthesiologists physical status classification system; SD, standard deviation.

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