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Gender Disparities in Osteoarthritis-Related Health Care Utilization Before Total Knee Arthroplasty

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ABSTRACT

Objectives: Women older than 50 years have higher prevalence of knee osteoarthritis (OA) and experience greater functional disability than men. No studies have examined large populations to identify knee OA-related health care utilization differences. The purpose of this investigation was to evaluate gender differences in the utilization of OA-related health care resources in the 12 months preceding total knee arthroplasty (TKA).

Methods: Truven Health MarketScan Commercial Claims and Encounters and Medicare Supplemental and Coordination of Benefit databases were reviewed from 2005 to 2012. Subjects were included if they underwent TKA, had associated diagnosis of lower leg OA, and were continuously in the database for 12 months preceding TKA. Patient-specific OA-related health care utilization was identified. Multivariate logistic regression analysis controlling for age, region, and Charlson Comorbidity Index was performed to isolate the influence of gender.

Results: A total of 244,059 patients with a mean age of 64.8 years consisting of 61.2% women were included. Multivariate logistic regression adjusted odds ratios showed that when compared to men, women were 30%, 20%, 31%, 18%, 19%, 29%, and 39%, more likely to receive a narcotic analgesic, non-narcotic analgesics, corticosteroid injection, hyaluronic acid injection, knee magnetic resonance imaging, a physical therapy evaluation, and occupational therapy evaluation in the 12 months preceding TKA, respectively.

Conclusion: Women have a significantly higher utilization of knee OA-related health care in the 12 months preceding TKA. Although the precise cause for this discrepancy in care cannot be determined from this study, it highlights a potential bias in management of advanced knee OA and directions for further investigation.

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Osteoarthritis (OA) is the leading cause of functional disability and compromised quality of life in adults. Recent estimates show approximately 46.4 million people in the United States have symptomatic OA, and by 2030, that number is expected to grow to

67 million people or approximately 20% of the population [1,2]. Women older than 50 years have higher prevalence of knee OA and experience greater functional disability than men for reasons that are not completely understood [3–5].

Knee pain associated with OA limits mobility and impairs quality of life. In patients with end-stage knee OA, total knee arthroplasty (TKA) is a safe and cost-effective treatment that reliably relieves pain and restores function [5–7]. In 2008, more than 615,000 TKAs were performed in the United States, and the number rises each year [8]. By 2030, it is projected that approximately 3.48 million TKAs will be performed in the United States, the most of those on women [9].

Gender disparities in health care are widespread. Investigations have revealed that women are less likely than men to undergo coronary angioplasty, coronary artery revascularization, and renal transplants [10–13]. Despite OA being more prevalent among

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women, fewer women with symptomatic OA report discussing treatment options with a physician or orthopaedic surgeon as compared to men [6]. Furthermore, females have been found to seek treatment at later stages of OA than men and have more severe OA and increased functional disability at the time of surgery [6,14]. This variation is unlikely due to surgeon preference, as patient gender has not been shown to change the likelihood of recommending a total joint arthroplasty [15,16]. TKA for symptomatic knee OA has been shown to be underutilized by both men and women; however, the rate of underutilization is 3 times greater in women [2]. This finding is further corroborated with studies from the United States and Canada showing that even though the absolute number of total joint arthroplasties in women is higher, women are still undertreated when compared to the prevalence of OA in men and women [6,17].

Recent recommendations suggest at least 6 months of nonoperative management for symptomatic knee OA before considering a TKA [18]. Guidelines for the management of advanced knee OA are generally well-defined and principally include physical and occupational therapy, intraarticular corticosteroid injections, and analgesic medications [18–20]. Despite numerous meta-analysis studies demonstrating their lack of efficacy, intraarticular hyaluronic acid injections are frequently administered as well [19,21,22]. In addition, knee pain can be managed with assistive durable medical equipment (DME), such as a cane, or with knee bracing.

To our knowledge no studies have looked at gender differences in utilization of knee OA-related treatment modalities in the period leading up to a TKA. The purpose of this investigation was to evaluate gender differences in the utilization of knee OA-related health care resources in the 12 months preceding TKA, specifically the use of corticosteroid injections, hyaluronic injections, analgesic medications, office visits, knee imaging, physical and occupational therapy, DME, and knee bracing.

Methods

Data Source

A retrospective cohort study was conducted using the Truven Health MarketScan Commercial Claims and Encounters (commercial insurance) and Medicare Supplemental and Coordination of Benefit (Medicare with commercial supplement) databases (Truven Health Analytics, Ann Arbor, MI). The databases provide deidentified, integrated, person-specific claims data for approximately 17–51 million individuals per year. The commercial insurance database includes health care claims for individuals with insurance through a commercial provider or a self-insuring employer under fee-for-service, fully capitated, or partially capitated health plans. The Medicare with commercial supplement database includes claims information for individuals who have both Medicare and commercial employer-sponsored coverage. All claims from the Medicare with commercial supplement database reflect the coordination of benefits between the commercial insurer and Medicare such that all payments made by either entity are captured within the database. The age distribution in the Medicare with commercial supplement database is representative of the overall Medicare population. These databases, when combined, constitute approximately 20% of the overall insurance market. The International Classification of Disease, Ninth Revision (ICD-9), diagnoses codes and Current Procedure Terminology (CPT) codes can be identified in individual claims. The data include claims made from both inpatient and outpatient clinical encounters as well as prescription medications. Information on DME and certain injections can also be identified using Healthcare Common Procedure Coding System codes. National Drug Codes (NDC) are used to organize prescription

medication claims. The NDC can specify both the type and dosage of the medication prescribed. The study received institutional review board exception because the data provided by the MarketScan databases are deidentified in compliance with the Health Insurance Portability and Accountability Act regulations.

Study Sample

The databases were reviewed from 2005 to 2012 for subjects with a CPT code for TKA (CPT = 27447). In addition, subjects were required to have prescription medication information included in the database, be continuously enrolled in the databases for at least 12 months preceding TKA, and have an associated diagnosis of OA of the lower leg and/or knee. Patient-specific knee OA-associated health care information was gathered on the study sample for the 12 months preceding TKA. Data collected included utilization information on outpatient office evaluations specifically for lower extremity OA, analgesic prescriptions, intraarticular corticosteroid knee injections, hyaluronic acid knee injections, knee x-rays, knee magnetic resonance imaging, physical and occupational therapy evaluations, walking assistance DME (including canes, crutches, wheelchairs, walkers), and knee braces. Analgesic prescription medication information was collected and subdivided into narcotic and nonnarcotic medications. Specific medications used to search for NDC codes are included in [Supplementary Table 1](#). Information specific to each patient for these claims was collected for the 12 months preceding TKA. This information included number of claims and date the claim was made. Specific CPT, ICD-9, and Healthcare Common Procedure Coding System codes are provided in [Supplementary Table 1](#).

Charlson Comorbidity Index (CCI) scores were calculated for each subject in the study population using ICD-9 codes for comorbidities as previously described [23]. Multivariate logistic regression analysis controlling for the effects of age, CCI, prevalence of OA, and geographic region was performed to isolate the influence of gender on utilization in the 12 months preceding TKA. Chi-squared tests were performed for categorical variables, and Student t-tests were performed for continuous variables. All statistical analyses were performed with SAS software, version 9.3 (SAS, Cary, NC).

Results

A total of 244,059 subjects met the inclusion criteria. The cohort was composed of 38.8% men and 61.2% women; 55.7% were covered under commercial insurance and 44.3% under Medicare with commercial supplement ([Fig. 1](#)). Population characteristics are presented in [Table 1](#).

Multivariate logistic regression analysis controlling for the effects of age, insurance status, CCI, and region found no differences in outpatient evaluations between genders (odds ratio [OR] = 1.015; 95% confidence interval [CI], 0.998–1.033). Likewise no differences between men and women were observed in the rate of knee x-rays (OR = 1.004; 95% CI, 0.986–1.033). Women were 18.6% more likely to undergo knee magnetic resonance imaging (OR = 1.186; 95% CI, 1.158–1.211). Females were 29.8% more likely to receive prescriptions for narcotics (OR = 1.298; 95% CI, 1.274–1.323) and 20.4% more likely for nonnarcotic analgesics (OR = 1.204; 95% CI, 1.183–1.225). In addition, females were 31.0% more likely to receive intraarticular corticosteroid injections (OR = 1.310; 95% CI, 1.288–1.332) and 18.3% more likely to receive hyaluronic acid injections (OR = 1.183; 95% CI, 1.156–1.211). Physical therapy and occupational therapy were prescribed to women 28.5% (OR = 1.285; 95% CI, 1.255–1.315) and 39.2% (OR = 1.392; 95% CI, 1.262–1.536) more often, respectively. Walking assistive DME was 16.9% more likely to be given to females (OR = 1.169; 95% CI, 1.127–1.212).

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