Gender and Ethnic Differences in Seeking Healthcare Plus Time of Recovery from Procedures for Shoulder and Knee Conditions

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Abstract

Background: Previous studies have demonstrated that females have more severe pain in more locations in the body than males but tend to wait longer to seek help which leads to worse postoperative outcomes. Also, physicians may have an unconscious bias in recommending surgery more often for men than women.

Methods: We analyzed 798 medical charts with chief complaints of shoulder or knee pain from 2007-2015. We categorized patients based on acute or chronic injury and then looked at time from referral to first orthopedic appointment, delay of time to surgery, and duration of recovery.

Results: Women were observed to have chronic injuries more often than men (61.2% vs. 54.1%) a difference that was statistically significant (χ² = 4.08, df = 1, p = 0.043). Men required longer recovery time after surgical cases (p = 0.0024).

Conclusions: Additional data from more broad geographic locations is essential to educate physicians on gender and ethnic differences in order to help eliminate healthcare bias.

Highlights:
- Musculoskeletal pain is an important public health issue that affects many patients.
- Women are more likely to present with chronic joint pain and at a later disease state.
- Men are more likely to have acute musculoskeletal injuries and visit their PCP quicker.
- Men take longer to recover from orthopaedic/shoulder and knee procedures than women.

Introduction

Pain is pervasive, subjective, individualized, and difficult to quantify objectively. Prior papers report gender differences in pain, both endogenous and experimentally induced. Females exhibit “more multiple points of pain” in different body sites than males [1-4]. Musculoskeletal pain is a major public health issue, since a greater proportion of the general population is affected. Painful conditions cause missed work days due to disability plus interfere with regular daily and social/recreational activities. Back, shoulder, arm and leg pain seem to be the most prevalent, with females reporting more severe pain than males [1,5,6]. Additionally, females tend to experience worse pain following procedures and surgeries [2]. As for orthopedic disorders causing painful joints, knee/hip osteoarthritis in females heads the list, particularly in those older than 50 years of age. They also report greater pain and are affected more adversely than males [7-9]. Furthermore, women present at a later disease state, are less likely to undergo arthroplasty, and receive less improvement in pain postoperatively [8-11]. Furthermore, other authors have shown that an unconscious bias may exist in primary care physicians and specialists (rheumatologists, orthopedic surgeons) regarding consultation and surgical recommendation for osteoarthritis, favoring males over...
females [6,12-15]. Similarly, there appears to be disparities in terms of different ethnic groups as far as osteoarthritis is concerned as well [10].

In our Orthopedic Surgery department, we receive countless referrals from primary care physicians in the surrounding West Texas and New Mexico areas. We set out with the goal to look at patients with common musculoskeletal complaints of shoulder or knee pain to ascertain whether gender/ethnic disparity exists and compare our results to the current existing literature. Specifically, we looked at ease of access to medical care, how readily are consultants utilized, the recommended management, recovery time, and functional outcomes. We hypothesized that both gender and ethnic disparities exist when it comes to musculoskeletal pain, especially upon dealing with orthopedic conditions involving shoulder and knee joints. If gender and/or ethnic disparities are found, our charge is to figure out ways to equalize the differences as best we can, in order to maximize healthcare for all patients in the future.

Materials and Methods

This study is a retrospective review of 798 patients (399 males, 399 females) who were seen in outpatient clinics of our three senior authors (GWB, MPF, & MZ). This number of patients was chosen in order to meet the threshold of achieving statistical significance. The patients were seen between 1/1/2007-1/1/2015. Institutional Review Board approval was obtained for all aspects of our study. The medical charts were filtered to exclude fractures, cancers, and other associated diagnoses, while focusing solely on joint pain (chronic nature or acute injury) in the shoulder and knee. Patients’ medical record numbers were utilized to look at pertinent findings and were de-identified to protect them in accordance with HIPPA rules. Final result analysis did not contain any personal patient identifying information.

We collected both demographic and study specific data. Demographic data included year of birth (age), gender, and race. Study specific data included site of pain, acute or chronic source, lag time until seen by the primary care physician (if there was an injury), referral time, if surgery was done, delayed time until surgical procedure, number of follow up appointments, length of recovery, and range of motion pre-operative vs. post-operatively. Referral time was defined as the duration between documented consult to a specialist by the primary care physician or emergency department healthcare provider, and the initial visit with an orthopedic surgeon.

Next, we looked at whether the patient underwent surgery, and if so, how long the delay was from point of initial visit with the orthopedic surgeon to the actual operation. Any patient who received surgery but waited longer than a year from their initial orthopedic appointment was excluded from the study. We recorded surgical recovery duration, defined as the time from operation to the date the patient was asked to return to clinic on an as needed basis by the physician. As a functional outcome, we examined the range of motion of each patient before and after sur-

Figure 1: Differences in time for female vs. male patients to see physician following joint injury.
and women ($p < 0.0001$).

At the onset, referral time did not appear normally distributed (Kolmogorov-Smirnoff, $p < 0.01$), nor could any single transformation simultaneously normalize it in both the male and female population. However, since the t-test is known to be robust against the assumption of normality in large samples such as this ($N = 399$ in each group), t-tests were also performed. Comparative boxplots demonstrate that the distribution of referral time was nearly identical between males and females (43.1 ± 33.1 vs. 43.5 ± 30.7, $p = 0.844$), with the Kolmogorov-Smirnoff test confirming that these empirical distributions were not significantly different ($p = 0.967$). Similar methods were applied to race/ethnicity, with similar conclusions. Unsurprisingly, knees and shoulders exhibited different referral times (40.8 ± 27.6 vs. 45.8 ± 35.6, $p = 0.026$, Figure 2).

Exploratory boxplots were used to probe for any differences between delayed time until surgery and recovery time after surgical cases. With time until surgery appearing to have the same medians across site and gender, no additional tests or statistics were employed. However, with time to recovery appearing different, we then analyzed the data by performing Kolmogorov-Smirnoff tests in order to determine if the data sets differed significantly.

**Results**

Women were observed to have chronic injuries more often than men (61.2% vs. 54.1%), a difference that was statistically significant ($\chi^2 = 4.08$, df = 1, $p = 0.043$), though chronic injuries did not appear to have longer wait times than acute trauma (43.1 ± 29.0 vs. 43.8 ± 35.7, $p = 0.772$). The delayed time until the patient saw their primary care physician was significant in acute knee and shoulder injuries (Figure 1). In knee injuries, women waited a median of 34 days while men waited 12 days with respective ranges of 300 days for both women and men (Table 1).

Shoulder injuries appeared even more disparate between women and men with women’s 66 median days to being seen by a physician and men’s 1 day, meaning that greater than 50% of men in the 95 subjects saw a physician within 24 hours for a shoulder injury. Kolmogorov-Smirnoff was used to compare the empirical distribution of time to physician visit with men and women ($p < 0.0001$).

**Table 1:** Analysis variable: Differences in time for female vs. male patients to see physician following injury of shoulder vs. knee.

<table>
<thead>
<tr>
<th>Analysis Variable: Time Until Physician Visit in Joint Injuries</th>
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**Figure 2:** Distribution range: Differences in time for patients to see physician following injury of shoulder vs. knee.
Discussion

Our results show that women have chronic injuries and wait longer to report their pain more often than men, and men seek out their primary care physician much more quickly after an acute injury as compared to women. Referral time was nearly identical between males and females at 43 days, which is much faster than the 7 months documented in another study. This could be attributed to a variety of differences between the cited study and ours. One of the most striking finding is that the majority of reported data in the cited study is from European countries where socialized medicine is the norm and wait times for specialty visits are significantly longer than in the United States [12]. There was no difference in time to surgery, but a difference did exist for recovery time with women recovering quicker than men. We found no differences in the functional recovery measured by joint ROM.

Our research on health disparities between genders and ethnicities of musculoskeletal pain is important because the need for total joint replacements continues to grow while their underuse, especially in women and
ethnics other than Caucasians continues to be problematic [5,7,10,12,13]. One article cites the degree of underuse of surgery in women is more than three times as it is in men [10]. Another paper documents that in 2006, the rate of TKAs in African-Americans was 39% lower than that for Caucasians [7]. There are many possibilities for these disparities but currently very limited evidence reports the reason why this gap exists, which further demonstrates the necessity of gender and ethnicity-based research [10,12]. Also, those women who do undergo TKAs tend to receive their treatment at a later diseased state, which sets them up for worse recovery outcomes and higher costs to society due to the debilitating nature of advanced osteoarthritis [7,12,13].

According to several studies, women undergo total joint replacements at an older age and at a later point in the disease process [2,5-7,9,12,14]. They are less likely than men to have discussed Total Joint Arthroplasty (TJA) with a physician, to have consulted an orthopedic surgeon, and to be on a TJA waiting list [12]. In our study, women with chronic musculoskeletal pain waited longer than men to visit their primary care physician. There are many postulated reasons to explain why women have elective joint replacement surgery performed later in the disease state. Some of the proposed explanations are patient preference, less research with women, patient-physician interaction, and unconscious gender bias of the treating physician/surgeon.

Some research studies report reasons that may prompt women to delay joint surgery include their demanding role as a caretaker; some women older than 65 may live alone which makes the recovery tough; increased anxiety about the procedure not being successful, and less likely to have been urged on or supported by close loved ones to pursue the operation. Men are more likely to undergo TJA earlier in the disease process when their pain interferes with more vigorous enjoyable recreational activities, as opposed to women who are more likely to wait until their activities of daily living are affected [12]. Also, men are more likely to have known someone who underwent a successful operation which instills more confidence in them that the surgery can be successful, and leads to them having more open conversations with their physicians about pursuing a TJA [12].

Another issue encountered on gender/ethnic disparity is the paucity of research involving women and underrepresented minorities. One study highlights this by stating only 24.6% of clinical trial participants in articles published by the New England Journal of Medicine were women, and gender specific analysis was available in only 14% of those trials [10]. They postulate that this may be due to excluding pregnant women but insist that clinician scientists must push for more studies with women that include gender data collection.

One of the most important aspects of the physician-patient relationship is trust. Some researchers believe that a lack of trust on the patient’s part may be an important factor in minorities opting out of TJAs. They base their claim on the reasoning that African-Americans are more likely to use acute care facilities instead of primary care physicians on a regular basis. African-Americans in their study who didn’t go to a primary care office reported a lower sense of trust in physicians. On the other hand, Caucasians are more likely to know someone who underwent a successful operation thus end up trusting their physician more.

An unconscious gender bias has been documented in the literature, and is believed to lead physicians to unknowingly be more likely to recommend TJA to white men. A couple of studies used standardized male and female patients who were similarly matched in all aspects except for their gender to detect if there was an unconscious bias on the part of physicians. The physicians reported that the patients’ sex had no impact on their decision to recommend surgery. However, the overall odds that TKA was recommended to a male patient was 4 times the odds for a female patient [5]. Another study found that surgeons were less likely to recommend TKA for women compared to men of the same age, employment status, symptom severity, functional status, and x-ray findings [2]. Interestingly enough, this bias holds with both male and female physicians and was characterized as “biases that are pervasive in society” by one study [12]. This may occur because men and women tend to communicate differently with their physicians. Women are known to talk more openly about their symptoms and value a physician who is a good listener, whereas men are more to the point with their conversation and expect their physicians to resolve their problems as quickly as possible [5,12].

In our study, women recovered at a faster rate than men, but there were no significant differences in pre and post-operative ROM. Our results are supported by a study that demonstrated a quicker recovery time in women due to lower rate of complications such as wound infections, revision surgeries, and mortality as compared to men [2]. In addition to this, we think the recovery duration could have been slower in men because they take more risks trying to get back to physically demanding jobs or activity quicker and end up sustaining another injury. In general, since women present with symptoms at a later stage in the disease state, they have worse post-operative outcomes than their male counterparts. Many studies found that after surgery, women improve the same amount as men but due to their late presentation, they have worse pre and post-op function [7,9,15]. One study in particular points out that men might have better post-op functional tests (6-minute walk, up and go
test, and stair climbing test) due to better quadriceps muscle strength [15].

We believe our study is important because the impact of gender and ethnic disparities on musculoskeletal conditions is not well-documented. Much more research is required in this area to learn how to best serve our patients. In the future, we would like to add onto this study by analyzing data on female vs. male and various ages of physicians to see if their recommendations differ in terms of patient treatment. We also recognize that this study has its limitations. First of all, we only surveyed one medical center in West Texas. Secondly, we included three physicians who may do things differently in their clinical practice. For example, ROM measurements can vary greatly between surgeons and aren’t always taken with a goniometer. Thirdly, we may not have had a large enough sample size of various ethnicities to find a statistically significant difference. Fourthly, we did not separate treatment beyond the broad categories of knee and shoulder operations. The surgeries could have ranged from arthroscopy to total joint arthroplasty, two very different surgical procedures with different post-operative courses. A higher number of one type of surgery over the other in either the male or the female groups may have confounded our data to a certain degree. Finally, we used broad categories of shoulder and knee pain which could have been due to other diagnoses besides osteoarthritis. The various number of conditions accounted for in these two broad categories are treated on very different timelines and could have skewed our data/results.

Conclusions

Musculoskeletal pain is an important public health issue faced by a large proportion of the population which can lead to negative economic consequences and overall decreased quality of life. The goal of our study was to look at patients with common musculoskeletal complaints of shoulder or knee pain to ascertain whether gender and/or ethnic disparity exists, and compare results to the current existing literature. We theorized that women tend to present with more chronic pain and have worse post-operative outcomes than men. Our data shows that women with chronic musculoskeletal conditions usually wait longer than men to see their primary care physicians, however, the time of recovery for men was longer as compared to women. Further studies are needed in order to expand on the limits of our data, such as using patients from more than three physicians at an academic hospital in one region. Additional data from more broad geographic locations is essential to educate physicians on gender and ethnic differences in order to minimize/eliminate healthcare bias, which will hopefully lead to improved post-operative outcomes and decrease the economic burden of musculoskeletal conditions on society.

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Conflicts of Interest

No conflicts of interest exist for any of the authors of or contributors to this paper.

References