Disparities in joint replacement utilization: a quality of care issue

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ABSTRACT

Although total joint replacement is an effective treatment option for end-stage lower extremity osteoarthritis, racial disparities in joint replacement utilization have been well documented. These disparities may be due in part to patient-level factors such as willingness to consider joint replacement and worse expectations of joint replacement outcomes. In addition, African-Americans may have worse outcomes after total joint replacement and are more likely to have surgery performed by surgeons with lower volumes or in hospitals with lower volumes. All of these issues may be considered concerns with the quality of care delivered to African-Americans with osteoarthritis.

Introduction

Osteoarthritis (OA) is the most common form of arthritis and is among the most widespread chronic conditions in the United States (1). The prevalence of lower extremity OA increases with age, and the burden of OA is expected to grow with the rising proportion of the US population entering the ≥ 65 years of age category.

Lower extremity OA is associated with major morbidity and constitutes one of the leading causes of disability in the US (2-4). Lower extremity OA is the most common cause of difficulty in walking or climbing stairs, preventing an estimated 100,000 elderly Americans from independently walking from bed to bathroom. In addition, lower extremity OA often causes loss of earnings and work disability (5). However, studies have shown that disability and functional decline due to arthritis among the elderly disproportionately impact racial/ethnic minorities (5-7).

Although one study found that the prevalence of OA was lower in Hispanics than in whites and African Americans (AAs) (5), more recent work suggests that AAs have a higher prevalence of knee symptoms, radiographic knee OA, and symptomatic knee OA compared to whites (8-10). Additionally, a significantly higher proportion of AAs compared to whites suffer from severe radiographic knee OA (9). Furthermore, there is data to suggest that individuals with less than 12 years of formal education report chronic diseases such as OA more frequently than the general population. Although this finding did not appear to be directly related to race, the study sample was characterized by limited racial diversity (11). In a more recent study of 596 potential candidates for joint replacement surgery due to OA (262 AA, 334 white), 43% of AA subjects and 20% of white subjects had less than a high school education (P = 0.001) (12). Other studies suggest that racial minorities with OA have lower educational levels (12).

Unfortunately, there is no known cure for OA, and current pharmacologic and non-pharmacologic treatments are not able to modify the disease course; they can only alleviate the symptoms, such as pain and disability (13). However, total joint replacement (TJR) has been shown to be effective option for end-stage lower extremity OA when medical treatment has failed. The evidence for this has been summarized in National Institutes of Health (NIH) consensus statements (14) and systematic evidence-based reviews by the Agency for Healthcare Research and Quality (AHRQ) (15). Total knee arthroplasty (TKA) and total hip arthroplasty (THA) are associated with low mortality and morbidity (16-20). THA has been shown to increase quality-adjusted life-years among the elderly; it is cost-effective and results in greater life expectancy (2).

TKA and THA are two of the most commonly performed elective surgeries in the elderly. One in 500 Americans over

the age of 65 has had a joint replaced. In the fiscal year 2000, Medicare spent approximately $3.2 billion on joint replacements. The utilization of TJR is expected to increase over the next few decades. By 2030 it is estimated that there will be a 174% increase in primary THAs to 572,000 from 208,600 in 2005 and a 673% increase in TKAs to 3.48 million from 425,000 in 2005 (21).

Racial/ethnic differences in the use of joint replacement

Research has shown that there are differences among racial and ethnic groups in the utilization of many medical services and procedures (Table I). After adjusting for gender and age, minorities are less likely to receive preventive, diagnostic, medical or surgical interventions (22). Differences in healthcare utilization may reflect variations in the prevalence of a specific disease or patient preference. However, disparity points to inequity. Health equity signifies the extent to which inequality in healthcare utilization among groups of similar risk is minimized and the fairness with which health care is distributed (23). The Institute of Medicine defines "disparity" as a variation that is not due to access to care and that has implications for quality of care (24).

Numerous studies have documented the existence of racial/ethnic differences in the utilization of TKA or THA over the past 10 to 15 years (22, 25-32). Most of these studies have focused on the Medicare patient population, for which access to the procedure based on insurance status is not a significant issue. These studies reported that compared to AA men, white men were 2 to 5 times more likely to undergo TKA and 2 to 3 times more likely to undergo THA. These findings of racial/ethnic differences in the use of TJR have been replicated in studies that drew upon other databases including the National Health Interview Survey. A report by Skinner and colleagues found that AA men were markedly less likely than white men to undergo TKA, even after adjusting for regional variations (32).

The studies cited above, although important, have been limited by their use of administrative databases with scant clinical information. The denominator in these studies has been the total US population rather than a "population at risk." Recently researchers have sought to address some of these limitations. Dunlop and colleagues, using data from the "Asset and Health Dynamics Amongst the Oldest Old" database, reported the odds of undergoing TJR among AAs and Hispanics to be 0.46 compared to whites, even after adjusting for access to insurance and health status (26). Skinner *et al*. reported disparities in TKA for AA men (but not for AA women) using Medicare claims data, even after adjusting for income (based on zip code data) and the higher prevalence of knee OA among AAs, based on the National Health and Nutrition Examination sample (32).

Jones *et al*. examined racial/ethnic differences in the rates of TKA utilization in the Veterans Affairs (VA) system among patients with a diagnosis of OA (ICD-9-CM code 715.x) and in a sub-cohort of patients who also had a sub-specialty visit (*i.e*., with a rheumatologist or orthopedic surgeon). In this predominantly male sample, AAs were less likely to undergo TKA in the 2-year follow-up period of the study. The preponderance of the evidence here clearly demonstrates that racial/ethnic minorities utilize TJR less frequently than white patients (33).

As expected, with the increasing frequency of OA, the rates of THA and TKA are climbing, but disparities in the utilization of these procedures have worsened rather than improved (30), a situation that has led to calls that this imbalance be addressed. Both the 2003 NIH consensus statement (14) and the AHRQ systematic review on joint replacement highlighted the need for studies of the problem (15), and elimination of the disparity in the use of TJR is a priority in the strategic plans of both the National Institute for Arthritis, Musculoskeletal and Skin Diseases and the AHRQ (34).

Potential reasons for the disparity

The reasons for disparities in the use of

Table I. Summary of studies reporting racial/ethnic disparities in joint replacement (JR) utilization.

Author	Year	Study population	Findings
Hoaglund *et al*. (29)	1995	Population-based 1984-1988 San Francisco, CA	Latinos less likely to undergo hip JR
Baron *et al*. (25)	1996	Medicare from 1986 to1989	AAs half as likely to undergo hip JR
Escalante *et al*. (27)	2000	Medicare 1993-1995 Beaver County, TX	Hispanics less likely to undergo hip JR
Dunlop *et al*. (26)	2003	AHEAD Study 1993-1995	AAs and Hispanics half as likely to undergo JR
Skinner *et al*. (32)	2003	Medicare 1998-2000	AAs and Hispanics less likely to undergo TKA, but rates significantly lower only in males
Jha *et al*. (30)	2003	Medicare from 1992 to 2001	Male and female AAs less likely to undergo TKA and THA, gap increasing from 1992 to 2001
Escarce *et al*. (22)	2004	Medicare from 1986 to 1997	Male and female AAs less likely to undergo TKA and THA, gap increasing from 1986 to 1997
Jones *et al*. (33)	2006	VA Health System 2000-2001	AA men with osteoarthritis less likely to undergo TKA

AA: African-American; TKA: total knee arthroplasty; THA: total hip arthroplasty; AHEAD: Asset and Health Dynamics Amongst the Oldest Old; VA: Veterans' Affairs.

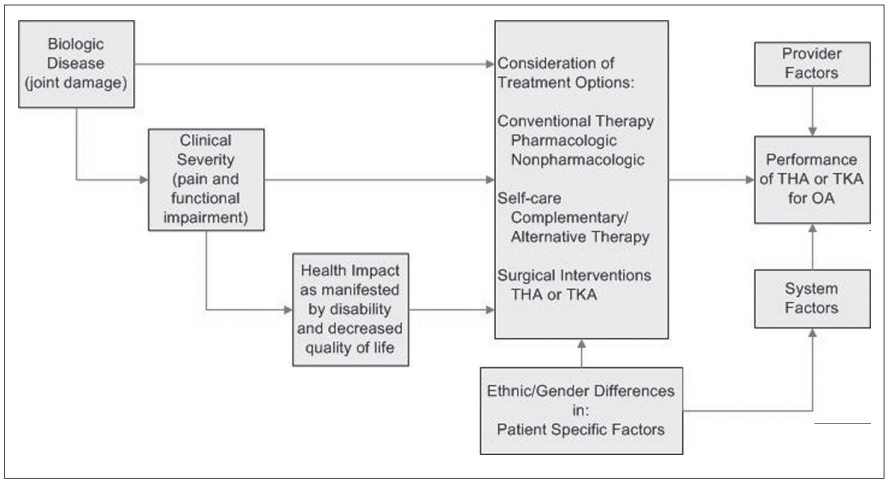

Fig. 1. A conceptual model of the potential reasons for joint replacement disparities.

TJR are likely to be complex and involve factors at the patient, provider, and system levels. Biologic factors, clinical severity and impact on health all affect decisions regarding the treatment for hip or knee OA. Patient-specific factors probably play a key role in the decision-making process. A conceptual model of potential reasons for disparities in the use of TJR is shown in Fig. 1.

Perceptions of the relative benefits of different treatment options

A number of studies have focused on racial/ethnic differences in patient perceptions of the treatment options for knee/hip OA. Self-care and the use of alternative/complementary medicine have been reported among urban and rural populations, as well as among whites and ethnic minority groups, and across socioeconomic strata (35, 36). Various studies have reported the use of prayer for OA, with higher usage found among AAs (35-37).

Ibrahim *et al*. found differences between white and AA veteran patients in their perceptions of the options available to treat their knee or hip OA (38). Importantly, AA veterans viewed TJR to be a less helpful treatment option than white veterans. In a separate study, AAs had lower expectations of TKA outcomes and were less likely to report that TKA would improve knee pain or their current health (39). AAs have been found to place more emphasis on difficulty in walking than on the level of pain, whereas whites considered these two factors to be of equal importance (40).

Familiarity with TJR and its risks and benefits

Ibrahim *et al*. were the first to report that AAs were less likely than whites to have heard of TJR as a treatment for OA, to have had a family member or friend who had undergone TJR, and or possess a good understanding of what happens to a patient when he/she undergoes TJR. With regard to the risks and benefits of TJR, AAs were more likely than whites to expect a prolonged hospital course after surgery, moderate or extreme pain after recovery from TJR, and moderate to extreme difficulty walking after recovery from TJR (12, 38). These findings were supported by Suarez-Almazor *et al*. in a comparison between whites and non-whites (AAs and Hispanics); they confirmed that AAs were less likely to have heard of TKA or to have a friend or family member who had undergone a TKA compared to whites (41). Blake *et al*. drew similar conclusions in a study of a community-based sample; AAs were less likely to report that they knew someone who had TJR or knew someone who had benefited from TJR (42).

Patient willingness: a potential mediator

The decision to undergo TJR usually requires clinical indications that shape the physician's recommendation for a procedure and the patient's willingness to undergo the procedure. The indications for TKA and THA are based on a combination of radiographic evidence of joint damage (*i.e*., biologic severity) and moderate to severe, persistent pain or disability (*i.e*., clinical severity) that is not substantially relieved by an extended course of non-surgical management (13, 14).

However, there are no criteria based on pain or disability for TJR. Studies have shown a lack of correlation between clinical priorities and waiting time for TJR (43). Other research suggests that there is a lack of agreement between and within the categories of primary care physicians, rheumatologists, and orthopedic surgeons as to when TJR is indicated (44-46). Although patient perceptions of pain and disability play an important role in the decision-making process, patients with similar indications may place a higher or lower value on the relief of pain or improved physical function, and such differences will influence the decision to undergo TJR (47, 48). Furthermore, willingness to consider TJR has been shown to be the strongest predictor of the time leading up to TJR (49). Therefore, variations in patient preferences toward treatment options and attitudes toward TJR may be significant factors in the variability of TJR utilization.

Patient willingness may be an important factor explaining the disparity in TJR utilization (12, 38, 50-52). Ibrahim *et al*. reported that AAs were less willing than whites to undergo TJR even if their condition warranted it (38). Hawker *et al*. reported that variations in TJR utilization rates in two different areas of Toronto, Canada could be explained in part by differences in the willingness to undergo TJR (51). In the high use area there were more patients who met the indications for TJR and more patients willing to undergo TJR than in the area with low utilization rates. The variation in willingness by race/ethnicity was not discussed since the sample was 96% white. Overall, the reported rate of willingness to consider TJR among those who met the criteria for the operation was low in this population-based sample (50). Similar findings emerged in a

study conducted in the UK, with lower than expected rates of willingness to undergo TJR among patients who met the criteria for surgery (52). In a study that examined the readiness to pay for TKA among a sample of patients in the Houston, Texas area, AAs were less willing than whites to pay for TKA even after adjusting for age, income, educational level and other factors (53). All of these findings suggest that there is substantial under-utilization of TJR based in part on a lower willingness to undergo the procedure.

Factors associated with race in the decision regarding TJR

Few studies have examined specific factors that may contribute to racial/ethnic differences in considering TJR as a treatment option. According to Ibrahim *et al*., AAs were more likely to expect a negative outcome from TJR than whites, and this difference mediated the relationship between ethnicity and the willingness to undergo TJR (38). A correlation between outcome expectations and the willingness to undergo TJR has been reported in other settings including Ontario (Canada) and England, but ethnically diverse populations were not studied (52, 54). Among whites and AAs with knee OA, racial differences in the patients' views on TKA were associated with perceptions of efficacy, perception of risk, and whether or not a friend or family member had undergone a TKA (41).

Ang *et al*. reported that, while among OA patients who perceived prayer to be somewhat or very helpful in relieving their symptoms, AAs were less willing than whites to undergo TJR (37), among patients who did not consider prayer to be helpful there was no significant difference between AAs and whites. The relationship between ethnicity and the acceptance of surgery was therefore mediated by perceptions of the "helpfulness of prayer." The association between ethnicity and readiness to undergo TJR diminished and was no longer significant upon the addition of "helpfulness of prayer" to a model adjusting for a number of covariates. Importantly, the association between "helpfulness of prayer" and willingness remained significant in this model.

Several qualitative studies have attempted to examine the reasons for the decreased willingness to consider TJR among AAs with knee or hip OA. Elderly patients from different ethnic groups may place a different value on difficulty in walking and other health attributes. For example, AAs may regard joint pain and reduced mobility as a part of the normal aging process and not as a disease. If this is true, such individuals would logically be less interested in undergoing procedures that might entail significant pain, a financial burden, or even the chance of death. Accommodating OA by restricting their activities and "learning to live with the pain" were the principal strategies used by patients in a study by Clark *et al*. (55).

Data from focus groups indicate that one reason why AA patients refuse knee or hip surgery is reports from friends or relatives of poor outcomes. In contrast, an important factor in making a positive decision was providing the patient with a clear explanation as to what they could expect from surgery (56). These findings suggest that a discussion of the risks, benefits, and anticipated pre-operative and post-operative course is important in the decision-making process for AA patients.

Quality of care issues

Some studies have demonstrated poorer quality of care for AAs compared to whites, although the care of OA patients was not specifically addressed in these studies (57). Furthermore, while quality of care indicators for OA have been developed (58, 59), they have not been evaluated with regard to racial differences in the quality of OA care.

Physician-patient communication, the decision-making process, and the patient's acceptance of treatment recommendations all may contribute to disparities in the utilization of TJR. Problems relating to physician-patient communication can be considered a quality of care issue. Using survey responses, Laine *et al*. compared the opinions of patients and physicians on several elements of healthcare. They found that patients placed a significantly higher emphasis on the provision of information than did physicians (60). This suggests that engaging patients in the decision-making process after effective communication of health-related information could improve the quality of care (61). Saha and colleagues found that racial concordance between patient and physician affected how non-white patients perceived their quality of care and influenced their use of healthcare (62). Thus, the under-representation of AAs and Hispanic Americans in the health professions in general and in rheumatology and orthopedic surgery specifically could contribute to the disparities in TJR utilization.

There is limited data on racial/ethnic differences in THA and TKA outcomes. AAs have been reported to have a higher 90-day mortality and a longer length of stay after THA (63). Ibrahim *et al*. published a study on the racial/ethnic differences in surgical outcomes following TJR in the VA health system. They found that adjusted rates of both infection- and non-infection-related complications after TKA were higher among AA patients than white patients. Hispanic patients had a significantly higher risk of infection-related complications after TKA compared to otherwise similar white patients. Interestingly, race was not significantly associated with the risk of infection or non-infection-related complications after THA. The reasons for the difference in outcome between knee and hip joint procedures are unclear. Post-operative mortality, defined as death from any cause inside or outside the hospital within 30 days of surgery, was low with no significant differences observed by race/ethnicity for either THA or TKA.

A number of studies have reported that patients who undergo THA or TKA performed by surgeons with low surgical volume or at hospitals with low surgical volume are more likely to have worse outcomes (64, 65). In addition, non-whites were more likely to have surgery performed by low volume surgeons and low volume hospitals (66, 67). This topic is to be reviewed in greater detail in the paper by Katz *et al*. in this supplement.

Research shows that within the VA health system, AAs and whites with knee/hip OA have similar access to care, usage of pain medications, and referral to specialist care (68). Comparable findings were reported for a racially/ethnically diverse population with knee OA in Texas. In that study, investigators found that after adjusting for differences in socio-demographic variables and severity of OA, no significant differences were observed with respect to physician recommendations for TJR (41). These findings suggest that socio-demographic or disease severity factors may be more important than race/ethnicity in explaining variations in access to care. Alternatively, these findings could argue that racial differences in referrals to orthopedic care for knee or hip OA may not constitute the bottleneck in the path to TJR.

Racial/ethnic disparities in TJR utilization are likely to be more prevalent and quality of care for AAs with OA is likely to be worse than what has been reported in the literature. Recent data indicate that AAs have a higher prevalence of severe radiographic knee OA than whites (9). Fortin *et al*. presented data showing that individuals referred for TJR late in the course of their disease do less well than those referred earlier (69, 70). As described above, TJR is under-utilized in the population as a whole, and many patients who could benefit from surgery are not being offered the procedure.

Conclusions

The prevalence of OA is increasing, and the numbers of patients undergoing THA and TKA are rising as well. However, data from various studies suggest that, while the incidence of OA in racial/ethnic minorities is increasing, the racial/ethnic disparities in the utilization of TJR are not decreasing. This represents a quality of care issue. In addition, there is both direct and indirect evidence of poorer outcomes after TJR in AAs compared to whites. Patient-specific factors appear to be important in the decision-making process regarding TJR, and therefore developing culturally sensitive information materials and tools targeted at individuals with disabling hip or knee OA must be a priority. Such approaches have the potential to improve general awareness of the role of TJR and may reduce variability in the utilization of this effective treatment option. Ultimately, this strategy will improve the quality of healthcare in general.

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