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Perceptions of Physician Recommendations for Joint Replacement Surgery by Older Patients with Severe Hip or Knee Osteoarthritis

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Abstract

Objectives: To examine patient perceptions of physician discussions and recommendations around total joint arthroplasty [TJA].

Design: Prospective cohort study.

Setting: One large academic medical center and 4 community affiliates in Boston. Participants: 174 patients aged ≥ 65 with severe osteoarthritis of the hip or knee for at least 6 months not controlled with medications.

Measurements: Patient perceptions of primary care physicians [PCPs] and orthopedists communication about TJA were assessed at baseline for all patients and at 12 months for those that did not undergo surgery.

Results: Of the 174 patients, 49 were aged ≥ 80 ; 82% were non-Hispanic white; and 69% had knee osteoarthritis. Most (87%, 142/163) reported that they had discussed their hip or knee arthritis with their PCP at baseline; 26% (42/163) reported that their PCP discussed TJA as a treatment option. Of the 128 patients that saw an orthopedist, 65% reported that their orthopedist recommended TJA. Only 29% (51/174) of patients received TJA. Those that reported discussing TJA with their PCP at baseline were more likely to undergo TJA ($p < 0.01$). Few (36%, 44/123) of the patients who did not undergo TJA reported that their PCP discussed surgery as a treatment option at baseline or at 12 months follow-up.

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Conclusion: Patients with severe osteoarthritis of their hip or knee who report discussing TJA as a treatment option with their PCP are more likely to undergo TJA within the next year; however, few older adults report having these discussions. Improvement is needed in communication between PCPs and patients about TJA.

Keywords

older; joint replacement surgery; decision-making

Introduction

Approximately 10% of US older adults suffer from symptomatic osteoarthritis of the knee and/or hip.¹ Treatment options for knee and hip osteoarthritis include pain medications, physical therapy, weight loss, exercise, and joint replacement surgery. Experts recommend that clinicians refer patients with severe symptomatic osteoarthritis who have failed medical therapy to an orthopedic surgeon for consideration of total joint arthroplasty (TJA).²

TJA is a safe and highly effective treatment for severe hip or knee osteoarthritis. It is associated with marked improvements in pain and function and low (0-1%) mortality.^{3,4} Older adults, even those aged 80 and older, experience excellent outcomes after TJA.^{5,6} The majority recover independence in walking within 2 weeks and independence in performing household chores in just over 2 months.⁵ Despite the benefits of surgery and the low risk of mortality, few older adults with severe osteoarthritis of the hip or knee undergo TJA.

Multiple factors likely influence patients' decision-making around TJA, including patient preferences, beliefs about the benefits and risks of surgery, and costs of surgery.⁹⁻¹¹ Primary care physicians (PCPs) also likely play an influential role.⁹⁻¹¹ Juni et al. found in England that poor utilization of TJA may be related to both patient and general practitioners negative perceptions of surgery.⁷ Others have found that PCPs may need more training on when to refer older adults for TJA.¹² When compared to surgeons, PCPs are likely to report that disease severity must be more advanced before recommending TJA.¹²

The purpose of this study was to examine whether older patients with severe osteoarthritis report discussing joint replacement surgery as a treatment option with their physicians and whether having these discussions is associated with receipt of TJA. We also examined which clinical characteristics (e.g., age, health status) were associated with reporting having discussions with physicians about TJA.

Methods

We examined patient report of physician discussions and recommendations for joint replacement surgery as part of a prospective cohort study examining older adults (aged 65 and older) decision-making and clinical outcomes with severe osteoarthritis of the hip or knee. The study included baseline and follow-up telephone interviews. Participants who chose to have surgery during the study period were interviewed at 6 weeks, 6 months, and 12 months after surgery while patients that did not have surgery were interviewed 12 months after enrollment. A full description of the study design has been published previously.⁵ We give a brief summary below.

Patients were identified for this study using a radiologic database at Beth Israel Deaconess Medical Center in Boston, MA. The database contains full reports of radiographs performed at 5 clinical sites in Boston and the surrounding areas. The radiologic database was searched weekly between August 2001 and July 2005 for reports of radiographs of the knee or hip.

Patients aged 65 and older whose reports contained terms suggesting severe osteoarthritis were identified. For example, “severe” or “advanced” matched with “osteoarthritis” and/or “complete loss of joint space.” Sixty search terms (identified through a literature review) were included. Patients with acute fractures were excluded.

Patients identified using the methods above and whose primary care physicians agreed to have their patients contacted were sent a letter describing the study that included an “opt-out” card. Patients who did not decline participation were then called by an experienced professional interviewer to assess eligibility and to conduct baseline interviews. The WOMAC Osteoarthritis Index (Western Ontario and McMaster Universities Osteoarthritis Index), a well validated and widely used instrument in the evaluation of hip and knee osteoarthritis, was used to determine eligibility.¹³ The WOMAC has 3 subscales that measure pain (5 questions), stiffness (2 questions), and functional limitations (17 questions) experienced over the preceeding 48 hours. Each question is scored from 0 (none) to 4 (extreme). In attempt to identify patients for whom a discussion about joint replacement surgery would be clinically appropriate, patients were considered eligible if they reported “moderate,” “severe,” or “extreme” pain or stiffness in response to at least 1 of the pain questions or one of the stiffness questions *and* if they reported “moderate,” “severe,” or “extreme” difficulty with at least 1 of the 17 activities *and* had functional impairments for at least 6 months not controlled with medical therapy. Additionally, patients who scored 10 or less (out of 22) on the modified mini mental status exam (a validated telephone version of the Folstein mini-mental exam) were excluded from the study.¹⁴

To identify patients who had surgery at the two affiliated hospitals where the target population typically undergoes orthopedic surgery, electronic hospital information was assessed monthly. Patients were also contacted at 4 and 8 months to inquire if they had or were scheduled to have joint replacement surgery.

Surveys

The baseline interview and 12 month follow up surveys included a series of questions that assessed patient perception of physician communication about joint replacement surgery and patients' views of the risks and benefits of surgery. Patients were asked whether they discussed hip or knee arthritis with their primary care physician (PCP). If so, patients were asked whether their PCP discussed joint replacement surgery as a treatment option and then whether their PCP recommended TJA. Patients were also asked whether they had seen an orthopedist for their knee or hip osteoarthritis. If so, patients were asked whether their surgeon discussed joint replacement surgery as a treatment option and whether the surgeon recommended TJA. These questions were developed specifically for this study. Patient understanding of the meaning of the questions were tested through cognitive interviews. In cognitive interviews respondents are asked to “think aloud” about the process they use to answer questions and are probed about what they think the wording of the questions mean.¹⁵ Questions were revised based on the results of these interviews.

Patients were also asked about their perceptions of TJA, including how helpful they thought joint replacement surgery would be in 1) relieving pain and 2) improving stiffness; 3) how risky they felt joint replacement surgery would be; 4) how worried they would be of dying during or after surgery, or 5) of complications from surgery, or 6) of having a long recovery, or 7) of needing help from others during the recovery period. In addition, patients were asked about their desire for health information using the health information seeking component of the Krantz Health Opinion Survey.¹⁶ This component includes 7 questions and higher scores represent individuals who have greater desire to be informed about personal health issues. Finally, patients were asked about whether or not they were having difficulty deciding about joint replacement surgery using the Decisional Conflict Scale (DCS).¹⁷ Scores on the DCS

range from 0 [no decisional conflict] to 100 [extremely high decisional conflict]. All patients were asked the DCS at baseline and those that did not have surgery were asked the DCS again at 12 months.

The surveys also collected information on patient general health status using the SF-12 (including the physical and mental component summary scales),¹⁸ comorbidity using a telephone version of the Charlson Comorbidity Index (CCI),¹⁹ and functional status with a modified version of the Katz basic activities of daily living [ADLs]²⁰ and an instrumental activity of daily living scale [IADLs].²¹⁻²² Data were also collected on patient race/ethnicity, income, education, marital status and living situation, height and weight. Height and weight data were used to calculate Body Mass Index (BMI) for each patient. The study was approved by the Beth Israel Deaconess Medical Center's Committee on Clinical Investigations.

Statistical Analysis

We examined differences in sociodemographic characteristics (sex, race/ethnicity, education, income, marital status, living alone or with others) and perceptions around surgery by age (65-69, 70-79, and 80 and older) using the Mantel-Haenszel Test of Trend (TOT). We examined clinical factors (SF-12, WOMAC, IADLs, ADLs, CCI, BMI, Modified Mini Mental Exam) and factors related to decision-making (health information seeking component of the Krantz Health Opinion Survey, Decisional Conflict Scale) by age using the Analysis of Variance (ANOVA).

We then examined patient perceptions of having discussions with their physicians about TJA. We examined patient report of PCP discussions about TJA and patient report of PCP recommendations for TJA at baseline by age using the TOT. For patients who did not undergo surgery, we re-examined patient report of PCP discussions and recommendations around TJA at 12 months. We also examined which patients reported seeing an orthopedist and we examined patient report of surgeon discussions and recommendations for TJA by age using the TOT. We defined patients as having discussed surgery with their orthopedist if they reported having a discussion at the baseline interview or underwent surgery (since we assumed patients who underwent surgery discussed it with a surgeon). We defined patients as having received a recommendation for surgery from an orthopedist if they reported receiving a recommendation at baseline or underwent surgery. Finally, we examined whether having reported that a PCP or orthopedist discussed or recommended joint replacement surgery at baseline was associated with undergoing surgery over the next year.

In addition, we examined which sociodemographic characteristics and clinical factors were associated with reporting a PCP discussion or recommendation for surgery. We also examined which clinical characteristics were associated with seeing an orthopedist and which were associated with reporting that an orthopedist recommended TJA. We used Student t-tests for continuous variables and chi-square tests for categorical data in these analyses. Finally, we compared decisional conflict scores at baseline between older adults who chose to have surgery and those that did not using the student t-test and we used longitudinal analyses to examine changes in decisional conflict over time. All analyses were performed using SAS Statistical Software version 9.1.

Results

Of the 654 potentially eligible patients identified from radiology reports, 160 physicians did not give permission to contact patients, 6 patients died before contact, 41 patients were unable to be reached, and 134 patients declined participation. Of the remaining 313 patients, 139 did not meet enrollment criteria (75 had only mild osteoarthritis symptoms and 64 did not speak English). The final sample consisted of 174 patients; 48 (27.6%) were aged 65-69, 77 (44.3%)

were aged 70-79, and 49 (28.2%) were aged 80 and older. The majority of the sample was non-Hispanic white (82.2%), female (76.4%), had attended at least some college (54.9%) and had knee osteoarthritis (69.0%). Individuals aged 80 and older were more likely to be non-Hispanic white and not be married compared to younger participants. They were also more likely to be in better mental health (score higher on the mental component of the SF-12) and to suffer from more IADL impairments than younger individuals. Those aged 80 and older were less likely to be interested in seeking health information and scored lower on the Modified Mini Mental State Exam. A significantly higher proportion of adults aged 80 and older were extremely or very worried about dying during or after surgery or having a long recovery than younger individuals. Table 1 presents the sample characteristics and differences by age that were pertinent to this study. A more complete list of the sample characteristics has been previously described.⁵

Table 2 demonstrates patient report of physician discussions about joint replacement surgery by age and receipt of surgery by age. Most patients reported that they had discussed their hip or knee arthritis with their PCP at baseline (n=142). However, only 42 (25.8%) patients reported that their PCP discussed joint replacement surgery as a treatment option at baseline and this did not vary by age. The majority (81.0%) of patients who reported that their PCP discussed joint replacement surgery at baseline reported that their PCP recommended surgery.

Receipt of joint replacement surgery was uncommon (29.3% of participants underwent TJA) and adults aged 80 and older tended to be less likely than younger adults to receive TJA (p=0.06). Among the 123 patients who did not undergo TJA over the 12 months study period, 44 (35.8%) reported that their PCP discussed joint replacement surgery as a treatment option.

We found that several factors were associated with patients reporting that their PCP discussed TJA as a treatment option at baseline. Adults who thought that joint replacement surgery would be extremely or very important to relieving their pain were more likely to report that their PCP discussed surgery as a treatment option (34.5% vs. 17.5%, p=0.03). Meanwhile, patients who thought that joint replacement surgery was extremely or very risky were less likely to report that their PCP discussed surgery (13.1% vs. 33.3%, p=0.01); findings were similar for patients who were extremely or very worried about dying after surgery and/or suffering complications from surgery. Non-Hispanic whites were more likely to report that their PCPs recommended surgery than individuals of other races (29.3% vs. 10.0%, p=0.03), however these results were not significant when we adjusted for income (<\$25K vs. \$25K+) and education (high-school grad or less vs. some college and beyond) in a multivariable logistic regression model.

Nearly 2/3 of the patients who reported seeing an orthopedist reported that their orthopedist recommended surgery and this did not vary by age; however, a smaller proportion of adults aged 80 and older reported seeing an orthopedist. Being married was also associated with going to an orthopedic surgeon for osteoarthritis (82.8% vs 65.0%, p=0.01). Patients who considered surgery extremely or very risky (58.1% vs. 78.9%, p=0.01), or who were extremely or very worried about a long recovery (62.1% vs. 85.1%, p <0.01), or who had a greater number of dependencies in ADLs (p=0.02) were less likely to report seeing an orthopedist.

Adults aged 80 and older who saw a surgeon were as likely to report that their surgeon recommended TJA as younger individuals. Patients who thought that surgery would be extremely or very helpful in relieving pain were more likely to report that an orthopedist had recommended surgery (73.0% vs. 45.0%, p <0.01). Non-Hispanic whites were also more likely to report that their orthopedists recommended surgery compared to individuals of other races (70.6% vs. 42.3%, p=0.01), however these findings were also not significant when we adjusted for income and education in a multivariable model.

We found that patients who reported that their PCP discussed TJA as a treatment option at baseline, those that reported seeing a surgeon, and those who reported that a surgeon recommended TJA, were more likely to have undergone TJA by the end of the study (Table 3). We also found that decisional conflict scores were higher at baseline among those who did not choose to undergo surgery over the next 12 months compared to those who did choose surgery (40.9 vs 30.7, $p<0.01$). In analyses of patients who did not undergo surgery, decisional conflict declined significantly between baseline and 12 months (40.9 vs. 36.4, $p<0.01$).

Discussion

Among older adults with severe knee or hip osteoarthritis, those who reported having discussions with their PCPs about joint replacement surgery were more likely to receive TJA within the next year. Among patients who did not undergo surgery, only 36% reported that their PCPs had discussed TJA as treatment option. The prevalence of discussions around TJA did not vary by age; however, patients aged 80 and older were less likely to report seeing an orthopedist than younger patients. Our findings suggest that interventions may be necessary to increase and improve the quality of PCP discussions around joint replacement surgery for older patients with severe osteoarthritis.

Although undergoing TJA is a large endeavor in an older person's life, older adults generally do well after TJA and have significant improvement in symptoms.⁵ Experts believe that many more older adults would choose to undergo TJA if their physicians presented a balanced discussion of the benefit and risks.^{10,23} Our study suggests that PCPs may be missing opportunities to discuss TJA as a treatment option with patients with severe osteoarthritis. The majority (83%) of PCPs in one study underestimated the success rate of TJA which may partly explain why PCPs may not be initiating discussions about surgery.¹² We found that patients who thought of surgery as risky or were concerned about complications from surgery were less likely to report discussing TJA with their PCPs. It may be that PCPs choose not to discuss surgery with patients that they think will not be receptive. Studies have found that physicians are often unable to predict how patients will value a treatment option.²⁴ It may be that patients who are afraid of surgery are less likely to initiate discussions about TJA which may be all the more reason that PCPs need to bring up surgery as a treatment option. PCPs may omit discussing TJA simply because it is not a service that they directly offer. However, studies have found that how PCPs present a treatment option directly affects how patients perceive that treatment option.^{7,25}

Although it was reassuring that adults aged 80 and older were as likely to report that their PCPs and orthopedists recommended TJA as younger individuals, we found that adults aged 80 and older were less likely to see a surgeon and tended to be less likely to undergo surgery. On the surface this may appear that any "ageism" related to receipt of TJA may be based on patient preferences, however, our findings may also reflect older adults' greater difficulty navigating the health care system and need for more social support. The oldest adults in our study were less likely to be married and more likely to live alone than younger adults and may have been reluctant to have surgery due to concerns about not having enough help during recovery. The oldest adults in our study were more fearful of long recovery and death after surgery. Adults aged 80 and older may need additional counseling and reassurance about the benefits and safety of surgery and more information on systems in place to help them through the recovery period after joint replacement surgery.

We found that patients with lower decisional conflict at baseline were more likely to undergo TJA. Among individuals who chose not to have surgery, decisional conflict declined between baseline and 12 month interviews. Studies have found that decision-making around TJA may involve ongoing deliberation which may result in infinite deferring of surgery.²³ Our findings

suggest that patients become more comfortable with their indecision around surgery. However, there may be adverse effects to the continuous deferment of surgery since individuals with severe osteoarthritis who undergo TJA later in the course of their disease do less well than those who undergo TJA earlier.²⁴

Our findings suggest that interventions are necessary to help PCPs identify appropriate patients to discuss total joint replacement surgery and to improve the quality of these discussions. Improvements in discussions may be particularly important for patients of racial and ethnic minorities since we found that these patients were less likely than non-Hispanic whites to report that their physicians recommended TJA and other studies have found that patients of ethnic and racial minorities are less likely to undergo TJA than whites.²⁶ Some experts recommend CME or physician educational seminars focused on teaching PCPs when to refer patients for TJA.¹² Others suggest using decision aids.²⁷ Weng et al. found that an educational video combined with a tailored report predicting outcomes for knee replacement surgery based on patients' specific characteristics reduced disparities in knowledge and expectations about knee replacement among older adults.²⁶ Other experts encourage scientists and clinicians to think of new ways that discussions around TJA may be initiated and on how to improve patients knowledge and perceptions of TJA.²³

This study has several important limitations. The study is based on patient report which can lead to recall bias and misclassification. However, studies have found that patients can be accurate reporters of events that have occurred during a health visit and there is value in understanding patients perceptions of receipt of counseling.²⁸ Some patients who chose not to pursue TJA may have forgotten about discussions with their PCP. However, these patients were asked both at baseline and at 12 months follow-up about physician discussions. Also, patients' symptoms and/or disability may have changed between their PCP visits and when eligibility was assessed since the WOMAC asks patients to consider their symptoms only in the past 48 hours. Patients who were motivated to undergo TJA may have been more likely to report that their physician recommended and discussed surgery as a treatment option since such recommendations would be congruent with their own decision-making. The baseline survey may have triggered some patients to discuss joint replacement surgery with their physicians and our findings may overestimate discussions about TJA with physicians. In addition, we do not have information from physicians on reasons why they did or did not discuss TJA or their perceptions of these discussions. Finally, this study had limited power to detect small differences between groups.

In summary, few patients with severe osteoarthritis of their knee or hip reported that their PCP discussed joint replacement surgery as a treatment option. Those who did report discussing TJA with their PCPs were more likely to undergo surgery. Our findings suggest that there is significant need for PCPs to address joint replacement surgery as a treatment option with older patients with severe osteoarthritis to allow these patients to make informed decisions.

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References

1. Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. *Arthritis Rheum* 2008;58:26–35. [PubMed: 18163497]
2. NIH. Total Hip Replacement. NIH Consensus Statement 1994 Sep 12-14;2006 (5):1–31.
3. Harris WH, Sledge CB. Total hip and total knee replacement (2). *N Engl J Med* 1990;323:801–807. [PubMed: 2136367]
4. Parry M, Wylde V, Blom AW. Ninety-day mortality after elective total hip replacement: 1549 patients using aspirin as a thromboprophylactic agent. *J Bone Joint Surg Br* 2008;90(3):306–3077. [PubMed: 18310750]
5. Hamel MB, Toth M, Legedza A, Rosen MP. Joint replacement surgery in elderly patients with severe osteoarthritis of the hip or knee—decision-making, post-operative recovery, and clinical outcomes. *Arch Intern Med* 2008;168:1430–1440. [PubMed: 18625924]
6. Pagnano MW, McLamb LA, Trousdale RT. Total knee arthroplasty for patients 90 years of age and older. *Clin Orthop Relat Res* 2004;418:179–183. [PubMed: 15043112]
7. Juni P, Dieppe P, Donovan J, et al. Population requirement for primary knee replacement surgery: a cross-sectional study. *Rheumatology (Oxford)* 2003;42:516–521. [PubMed: 12649397]
8. Sanders C, Donovan JL, Dieppe PA. Unmet need for joint replacement: a qualitative investigation of barriers to treatment among individuals with severe pain and disability of the hip and knee. *Rheumatology (Oxford)* 2004;43:353–357. [PubMed: 14623947]
9. Hawker GA. The quest for explanations for race/ethnic disparity in rates of use of total joint arthroplasty. *J Rheumatol* 2004;31:1683–1685. [PubMed: 15338484]
10. O'Neill T, Jinks C, Ong BN. Decision-making regarding total knee replacement surgery: a qualitative meta-synthesis. *BMC Health Serv Res* 2007;7:52. [PubMed: 17425793]
11. Chang HJ, Mehta PS, Rosenberg A, Scrimshaw SC. Concerns of patients actively contemplating total knee replacement: differences by race and gender. *Arthritis Rheum* 2004;51:117–23. [PubMed: 14872464]
12. Ang DC, Thomas K, Kroenke K. An exploratory study of primary care physician decision making regarding total joint arthroplasty. *J Gen Intern Med* 2007;22:74–79. [PubMed: 17351843]
13. Hawker G, Melfi C, Paul J, Green R, Bombardier C. Comparison of a generic (SF-36) and a disease specific (WOMAC) (Western Ontario and McMaster Universities Osteoarthritis Index) instrument in the measurement of outcomes after knee replacement surgery. *J Rheumatol* 1995;22:1193–1196. [PubMed: 7674255]
14. Roccaforte WH, Burke WJ, Bayer BL, Wengel SP. Validation of a telephone version of the mini-mental state examination. *J Am Geriatr Soc* 1992;40:697–702. [PubMed: 1607586]
15. Willis, G.; DeMaio, T.; Harris-Kojetin, B. Is the bandwagon headed to the methodological promised land? Evaluation of the validity of cognitive interviewing techniques. In: Sirken, M.; Herrmann, D.; Schecter, S., et al., editors. *Cognition and Survey Research*. Wiley; New York: 1999.
16. Krantz DS, Baum A, Wideman MV. Assessment of Preferences for self-treatment and information in health care. *J Pers Soc Psychol* 1980;39:977–990. [PubMed: 7441487]
17. O'Connor AM. Validation of a decisional conflict scale. *Med Decis Making* 1995;15:25–30. [PubMed: 7898294]
18. Ware J Jr, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Med Care* 1996;34:220–233. [PubMed: 8628042]
19. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987;40:373–383. [PubMed: 3558716]
20. Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of illness in the aged. The index of ADL: a standardized measure of biological and psychosocial function. *JAMA* 1963;185:914–919. [PubMed: 14044222]
21. McDowell, I.; Newell, C. *Measuring Health: A Guide to Rating Scales and Questionnaires*. Oxford University Press; New York, NY: 1996. p. 464–472.

22. Multidimensional functional assessment: the OARS methodology. A manual. 2nd ed.. Duke University, Center for the Study of Aging and Human Development; Durham, North Carolina: 1978. p. 68
23. Hudak PL, Clark JP, Hawker GA, et al. "You're perfect for the procedure! Why don't you want it?" Elderly arthritis patients' unwillingness to consider total joint arthroplasty surgery: a qualitative study. *Med Decis Making* 2002;22:272–278. [PubMed: 12058784]
24. Fortin PR, Penrod JR, Clarke AE, et al. Timing of total joint replacement affects clinical outcomes among patients with osteoarthritis of the hip or knee. *Arthritis Rheum* 2002;46:3327–3330. [PubMed: 12483739]
25. Keisu KS, Orozco F, Sharkey PF, Hozack WJ, Rothman RH, McGuigan FX. Primary cementless total hip arthroplasty in octogenarians. Two to eleven-year follow-up. *J Bone Joint Surg Am* 2001;83-A:359–363. [PubMed: 11263639]
26. Skinner J, Weinstein JN, Sporer SM, Wennberg JE. Racial, ethnic, and geographic disparities in rates of knee arthroplasty among Medicare patients. *N Engl J Med* 349;14:1350–1359.
27. Weng HH, Kaplan RM, Boscardin WJ, et al. Development of a decision aid to address racial disparities in utilization of knee replacement surgery. *Arthritis Rheum* 2007;57:568–575. [PubMed: 17471558]
28. Brown JB, Adams ME. Patients as reliable reporters of medical care process. Recall of ambulatory encounter events. *Med Care* 1992;30(5):400–411. [PubMed: 1583918]

Table 1

Sample Characteristics

	Overall (n=174) [*]	65-69 (n=48)	70-79 (n=77)	80+ (n=49)	p value [†]
Age, median, range	74 (65-96)	67	74	83	0.37
Sex, N (%): Female	133 (76.4)	36 (73.5)	58 (75.3)	39 (81.3)	
Race/Ethnicity, N (%):					
Non-Hispanic White	143 (82.2)	33 (68.8)	67 (87.0)	43 (87.8)	0.02
Non-Hispanic Black	23 (13.2)	10 (20.8)	4 (8.2)	9 (11.7)	
Other	8 (4.6)	5 (10.4)	1 (1.3)	2 (4.1)	
Education, N (%)					
High School or less	74 (45.1)	21 (48.8)	29 (39.7)	24 (50.0)	0.88
Some college or beyond	90 (54.9)	22 (51.2)	44 (60.3)	24 (50.0)	
Income, N (%):\$25,000 or less	71 (40.8)	29 (46.3)	29 (43.9)	23 (56.1)	0.38
Over \$25,000	34 (19.5)	22 (53.7)	37 (56.1)	18 (43.9)	
Marital Status, N (%)					
Married	64 (39.0)	25 (58.1)	28 (38.4)	11 (22.9)	<0.01
Not Married	100 (61.0)	18 (41.9)	45 (61.6)	37 (77.1)	
Lives Alone, N (%)	76 (46.3)	17 (39.5)	31 (42.5)	28 (58.3)	0.07
Clinical Data:					
WOMAC (total), mean (SD) [‡]	56.3 (13.2)	58.8 (13.5)	56.3 (13.7)	55.5 (12.6)	0.63
SF-12, Mean (SD) [‡]					
Physical	33.2 (9.2)	32.9 (8.5)	34.9 (10.0)	31.0 (8.0)	0.28
Mental	41.2 (6.6)	40.0 (6.5)	41.1 (6.2)	43.0 (7.0)	0.03
Instrumental activities of daily living [‡] (physical subset), mean (SD)	2.4 (1.8)	2.0 (1.6)	2.2 (1.7)	3.1 (1.8)	<0.01
Basic activities of daily living [‡] Mean dependencies (SD)	0.2 (0.7)	0.1 (0.5)	0.2 (0.6)	0.3 (0.9)	0.10
Modified Mini Mental State Exam [‡] (Out of 22) mean, (SD)	18.9 (2.5)	19.4 (2.5)	19.2 (2.4)	17.9 (2.5)	<0.01
Krantz Information-Seeking Survey [‡] mean (SD)	3.3 (2.2)	3.6 (2.2)	3.6 (2.2)	2.5 (2.0)	0.02
Decisional Conflict Scale, mean (SD) [‡]	41.1 (13.0)	43.8 (15.4)	41.1 (12.3)	38.7 (11.4)	0.06
Perceptions of Surgery, N (%)					
Joint replacement surgery would be:					
1. extremely/very helpful in relieving pain	88 (60.7)	25 (62.5)	39 (61.9)	24 (57.1)	0.62
2. extremely/very risky	62 (40.8)	16 (40.0)	24 (33.3)	22 (52.2)	0.22
Extremely/very worried about:					
1) dying during or after surgery	52 (32.5)	12 (27.9)	16 (22.1)	24 (53.3)	0.01
2) complication from surgery	46 (31.9)	12 (30.8)	16 (25.0)	18 (43.9)	0.20
3) a long recovery from surgery	95 (58.6)	22 (51.2)	37 (51.4)	36 (76.6)	0.01
4) needing help from others during recovery period	78 (48.2)	17 (39.5)	33 (45.8)	28 (59.6)	0.06

SF-12: 12-Item Short-Form Health Survey; scores range: 0-100 on both the mental and physical summary scales (higher scores indicate less severe symptoms)

Instrumental activities of daily living (physical subset) [food preparation, household chores, going shopping, doing laundry, outside activities, driving or using public transportation; one point was assigned for each activity with which the patient required assistance]. Scores range: 0-6 (higher scores indicates more disability)

Basic activities of daily living [getting in or out of bed or chair, change night clothes, washing, eating, toilet or bathroom use, and walking; one point was assigned for each ADL with which the patient required assistance]. Scores range: 0-6 (higher score indicates more disability)

Modified Mini Mental Status; scores range: 0-22 (higher scores indicate better cognitive function)

Krantz Health Opinion Survey, Information seeking subset; scores range: 0-7 (higher scores represent individual who have greater desire to be informed about issues regarding their health)

Decisional Conflict Scale; scores range 0 [no decisional conflict] to 100 [extremely high decisional conflict].

* Ten patients did not complete baseline interviews and their responses were missing for all variables above except age, sex, race, and ethnicity.

[‡]The p values represent results from the Mantel-Haenszel Test of Trend when proportions are presented and from an Analysis of Variance when means are presented.

[#]WOMAC: Western Ontario and McMaster Universities osteoarthritis index; scores range: 0-100 (higher scores indicates more severe symptoms),

Table 2
Physician Recommendations for Joint Replacement Surgery

	Overall	Age groups			p value [†]
		65-69 (n=48)	70-79 (n=77)	80+ (n=49)	
Baseline Interview (n=163): [*]					
Discussed hip/knee arthritis with primary care physician (PCP)	87.1% (142/163)	%	%	%	0.66
PCP discussed joint replacement surgery as a treatment option	25.8% (42/163)	88.4	88.7	85.4	0.17
PCP recommended joint replacement surgery	20.9% (34/163)	18.6	26.4	31.3	0.45
By 12 months follow-up (n=174):					
Saw an orthopedist about hip/knee arthritis	73.6% (128/174)	20.9	16.7	27.1	
Orthopedist discussed joint replacement surgery as a treatment option	73.4% (94/128)	85.4	74.0	61.2	0.01
Orthopedist recommended joint replacement surgery	64.8% (83/128)	70.7	73.7	76.7	0.58
Received joint replacement surgery	29.3% (51/174)	65.9	61.4	70.0	0.78
Discussions during 12-month follow-up among patients who did not have surgery (n=123):					
Discussed hip/knee arthritis with primary care physician (PCP)	96.8% (119/123)	33.4	35.1	16.3	0.06
PCP discussed joint replacement surgery as a treatment option	35.8% (44/123)	93.8	98.0	97.6	0.39
PCP recommended joint replacement surgery	15.3% (25/163)	25.0	44.0	34.2	0.50
		21.9	18.0	21.9	0.96

^{*} 10 patients who did not have baseline interviews and 1 patient who did not have a PCP are not included.

[†] The p values represent results from the Mantel-Haenszel Test of Trend.

Table 3

Associations Between Discussions or Recommendations for Joint Replacement Surgery with Physicians and Receipt of Joint Replacement Surgery.

	Received Surgery %	P value
All patients (n=174)	29.3 (n=51)	
PCP discussed joint replacement surgery as a treatment option at Baseline *	42.9 (18/42)	<0.01
PCP did not discuss joint replacement surgery as a treatment option at Baseline *	19.0 (23/121)	
PCP recommended joint replacement surgery as a treatment option at Baseline *	32.4 (11/34)	0.28
PCP did not recommend joint replacement surgery as a treatment option at Baseline	23.3 (30/129)	
Saw an orthopedist about hip/knee osteoarthritis	39.8 (51/128)	<0.01
Did not see an orthopedist about hip/knee osteoarthritis	0.0 (0/46)	
Orthopedist discussed joint replacement surgery as a treatment option	54.3 (51/94)	<0.01
Orthopedist did not discuss joint replacement surgery as a treatment option	0.0 (0/34)	
Orthopedist recommended joint replacement surgery	61.5 (51/83)	<0.01
Orthopedist did not recommend joint replacement surgery	0.0 (0/45)	

* 10 patients who did not have baseline interviews and 1 patient did not have a PCP.