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Patients' Willingness to Contribute to Cost of Novel Implants in Total Joint Arthroplasty

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ABSTRACT

As health care organizations adapt to more accountable financial models, it is increasingly important to assess how patients value new technologies, and their willingness to contribute to their cost. A questionnaire described features of a 'standard' implant including its longevity and risk of complications. We asked if participants would be willing to contribute to the cost of 3 novel implants with differing longevity and risk of complications. Our cohort included 195 patients, 45% were willing to add a co-pay to increase the longevity. Willingness to pay decreased to 26% with increased risk of complications, and 29% were willing to pay for a decreased risk of complications. Patients with higher education level, private insurance and males were more willing to contribute for a novel prosthesis. This study demonstrated that 26%–45% of patients are willing to share costs of a novel prosthesis. Willingness to pay was associated with the proposed implant benefits and with patient characteristics.

Total joint arthroplasty (TJA) is performed frequently as a treatment for patients with end stage arthritis [1]. The benefits of total joint arthroplasty have been well documented. Following total joint arthroplasty, patients experience significant improvement in both their physical function and quality of life [2,3]. Furthermore, TJA is one of the most cost-effective procedures for patients who are suffering from severe osteoarthritis of the hip or knee [4,5]. Current projections in the United-States predict an increase of 174% to nearly 600,000 total hip arthroplasty procedures, and an increase of 600% to nearly 3.5 million total knee arthroplasty procedures annually by 2030 [6,7].

The health system costs associated with TJA are projected to increase dramatically over the next 20 years [8,9]. Rising implant prices contribute to the growing costs of health care [10]. These increased costs of TJA coincide with proposed reforms in our health care system including value-based purchasing when integrating new technologies. Hand in hand with these changes our patient population is becoming much more informed and active in their treatment plans.

In traditional economics, consumers are viewed as rational actors who make decisions based on calculations about risks and benefits [11]. Consumers compare the different products available with regard to quality and price when making a purchasing decision on goods and services [12]. In reality however, especially in healthcare and medical services, patients' decisions are influenced by a variety of emotional effects and subconscious psychological biases which compromise their ability to act as rational consumers [13–16]. The cost and quality of procedures and devices are not readily available to healthcare consumers and the medical community has very limited data on patient's willingness to pay (WTP) for such services [17,18].

In terms of prosthesis costs and patient willingness to pay, previously published studies found that a majority of patients would be willing to pay a higher fee out-of-pocket for a better prosthesis than their insurance provider was willing to cover [19,20]. The purpose of this study is to assess whether patients' willingness to contribute to the cost of the joint arthroplasty implant is associated with the reported implant performance and with patient socio-demographic characteristics. We draw from the evolving field of patient participation in health cost, particularly "out of network" physician choice, in which patients are willing to pay out of pocket costs that enable them to seek care from a physician of their choosing [16,21–23]. We seek to examine if this model can be transferred to "out of network implant choice".

In this study we examined patients' willingness to pay for various prosthesis options in the context of total joint arthroplasty. Our hypothesis is that patients may be willing to pay an additional fee out-of-pocket for a prosthesis that promises greater longevity or reduced surgical complications, but these preferences may be influenced by socioeconomic status and patient attitudes toward

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new technologies. Understanding which types of patients may be interested in paying extra for innovative prosthesis design and in what circumstances could prove useful to hospitals, surgeons, and insurance providers as they select their prosthesis offerings and design payment models.

Methods and Materials

Design and Sample

We conducted a cross-sectional survey among patients attending tertiary medical center Orthopaedic and Arthritis Center. All the patients that were surveyed were visiting the rheumatology specialty clinic, and none of them were scheduled for joint replacement surgery at the time of the survey (we did not verify if the patients were surgical candidates or if surgery was discussed with the patient in the past). Inclusion criteria consisted of: presenting to the Orthopaedics and Arthritis Center, able to comprehend English, being between the ages of 18–89 years old, willing and able to fill out the questionnaire, and not having a history of joint replacement surgery. All patients that met inclusion criteria were invited to participate by a research assistant on the day of the clinic visit in the waiting area in the clinic suite. Patients willing to participate were asked to complete the questionnaire while waiting to see their physician. Completed questionnaires were returned to the research assistant. We did not discuss or offer any educational material about implant prices or cost of the procedures.

Our institutional review board considered the study exempt from IRB oversight and written consent was not required.

Survey Instrument (Appendix I)

Features of subjects collected in the survey included: self-reported race/ethnicity (Caucasian, African American, Hispanic, other), age, education level, sex, insurance status, and household income.

Patient willingness to pay and their preferences related to different implant attributes were assessed (Table 1). We described features of a 'standard' implant including longevity of about 15 years and risk of short-term complications (e.g. infection, fracture, dislocation, or nerve injury) estimated at 3% during the first postoperative year. We asked whether study participants would be willing to contribute, as well as the amount, to the cost of three 'novel implants' that had the following characteristics: 1) longevity of 25 years accompanied by the same 3% risk of short-term complications; 2) longevity of 25 years associated with an increased (5%) risk of complications; and 3) standard longevity (15 years) associated with a lower 1% risk of complications. No price points were presented to the patients. The amount the patients were willing to add as a co-payment was entered as free text into the survey.

Statistical Analysis

We described the percentage of patients who were willing to pay for the innovative implants in each of the scenarios, and the results were stratified by sex, age groups, education levels and income levels. The association between these covariates and willingness to pay was tested with the χ^2 test. All analyses were performed using SAS 9.3 (Statistical Analysis Software, SAS Institute Inc. Cary, NC, USA).

Table 1
Characteristics of Devices Presented to Patients in the Willingness to Pay Questionnaire.

Device	Longevity (Years)	Early Complications Risk (%)
Standard implant	15	3
Novel implant 1	25	3
Novel implant 2	25	5
Novel implant 3	15	1

Results

Two hundred and fifty-one patients at the Orthopedic and Arthritis Center were screened for study eligibility and approached in clinic. Of those, 210 (84%) agreed to participate and 195 (78%) completed the questionnaire. Out of the 195 study participants recruited from the offices of 4 clinicians in the 9 months, 32% were male; average age was 56 years (22–89 years); 51% were <60 years old, 35% between 60 and 70 years old, and 14% ≥70 years old. Eighty-one percent were Caucasian (Table 2). Thirty-four percent of study participants were obese (defined as BMI >30 kg/m^2). Education level was reported as less than college for 13%, some college for 19%, and college degree for 67%. Nineteen percent reported an annual income <$30,000, 36% between $30,000 and $100,000, and 39% >$100,000 (Table 2). Nineteen percent of participants were insured by Medicare health insurance, 5% by Medicaid and 52% by private insurance, 23% by more than one type of insurance, and 1% were uninsured (Table 2).

Patients were asked to respond to "How comfortable would you be with your insurance company/hospital/surgeon selecting your implant?" with their degree of confidence (on a scale of 0–100, 100 being the highest). Patients reported the most confidence in having their surgeon decide which implant to use (85/100), moderate confidence in having their hospital make the decision (41/100), and the least confidence in having their insurance company choose their implant (14/100).

When patients were asked whether they were willing to pay an added co-pay to increase the longevity of their implant from 15 years to 25 years without any increase in the risk of complications, 45% of subjects were willing to pay an added co-pay (Table 3). Willingness to pay an added co-pay for increasing the longevity of the implant from 15 years to 25 years decreased to 26% if the added implant longevity was accompanied by an increased risk of complications from 3% to 5%. When the study participants were asked if they were willing to

Table 2
Patient Characteristics.

	(n = 195)[a]
Age group	
<60 years	99 (51%)
60–70 years	68 (35%)
70+ years	27 (14%)
Sex	
Male	62 (32%)
Female	132 (68%)
Race	
White	158 (81%)
Others	31 (16%)
Obesity	
Obese	66 (34%)
Not obese	125 (64%)
Education	
Less than college	26 (13%)
Some college	38 (19%)
College graduates	130 (67%)
Income	
<$30,000	38 (19%)
$30,000–$50,000	31 (16%)
$50,000–80,000	23 (12%)
$80,000–100,000	16 (8%)
$100,000–150,000	35 (18%)
>$150,000	41 (21%)
Insurance type	
Medicare	38 (19%)
Medicaid	10 (5%)
Private insurance	100 (52%)
Not insured	1 (1%)
More than one type	45 (23%)

[a] Percentages may not add up to 100% in each category due to missing values.