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Factors Influencing Patients' Willingness to Pay for New Technologies in Hip and Knee Implants

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ABSTRACT

Rising implant prices and evolving technologies are important factors contributing to the increased cost of arthroplasty. Assessing how patients value arthroplasty, new technologies, and their perceived outcomes is critical in planning cost-effective care, as well as evaluating new-technologies. One hundred one patients undergoing arthroplasty took part in the survey. We captured demographics, spending practices, knowledge of implants, patient willingness to pay for implants, and preferences related to implant attributes. When patients were asked if they would be satisfied with "standard of care" prosthesis, 80% replied "no". When asked if they would pay for a higher than "standard of care" prosthesis, 86% replied "yes". The study demonstrated that patients, regardless of their socio-economic status, are not satisfied with standard of care implants when newer technologies are available, and they may be willing to share in the cost of their prosthesis. Patients also prefer the option to choose what they perceive to be a higher quality or innovative implant even if the "out of pocket" cost is higher.

More than 750,000 total joint arthroplasty (TJA) procedures are performed each year in the United States [1]. TJA improves quality of life, function, and decreases pain for patients suffering from osteoarthritis [2]. However, the volume and the costs associated with these procedures are projected to increase dramatically over the next 20 years [3,4]. Rising implant prices and evolving technologies in TJA are important factors contributing to these increased costs. There is much debate regarding which types of implants can be defined as the standard of care in TJA, and the value of new implant technologies remains to be clearly defined [5–10]. Additionally, the incremental cost benefit of new technological "advances" is not known when they are introduced into the market and used in patients. The projected cost increases coincide with an era of reforms in Medicare and Medicaid payment structures, designed to curtail costs that are viewed as unsustainable, while patients are increasingly informed and active in their treatment decisions [5].

Value should be the metric we use to evaluate the performance of health care. However, value remains largely unmeasured and poorly understood, and depends significantly on the perspective from which it is calculated [11]. Value is defined as the health outcomes achieved per resource spent, or outcomes relative to cost [11]. Assessing how patients undergoing TJA value the procedure and how they value the implant choices is important in understanding how to fulfill patients' expectation.

While joint replacement is known to be cost-effective [12,13], difficult resource allocation decisions must be made in the environment of limited healthcare funding, and resources for total joint arthroplasty will likely decrease accordingly. In ordinary markets, consumers compare the different products available with regard to quality and price when making a purchasing decision about goods and services. Normally, the consumer makes a decision based on the perceived cost and quality and the relative importance of each of these factors. However, this is not the case in healthcare, where patients typically opt for what they believe is the best treatment regardless of incurred cost [11].

Willingness to pay (WTP) is an economic tool for measuring the value of healthcare interventions to our patients. It represents the value patients place on a healthcare service. Patients often have limited knowledge of the factors determining value (such as cost and quality) and the medical community has very limited data on patient's WTP for services. Although WTP has garnered modest attention in orthopaedics [5,6,14], it has been extensively employed in other medical fields and has provided important insights into the patient's perspective, as well as how they value different medical interventions [15–18].

Medical device companies are spending significant resources to develop new and innovative technologies to improve the functionality and longevity of total joint arthroplasty implants. However, despite

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the widespread adoption of many of these newer technologies, the choice of the implant is often not evidence based, and patients frequently have limited input or knowledge of the choices involved in selecting the implant. In addition, the incremental cost-benefit of these new technologies has yet to be determined.

Patient participation in the healthcare costs is becoming increasingly important as health insurers attempt to share the burden of rising costs with their patients. An example of this participation occurs when patients pay a larger co-payment for services or brand name drugs, or pay increased premiums to expand their access to different physicians. The same is true for uncovered medical services such as, reconstructive plastic surgery, bariatric surgery and cosmetic dentistry, where patients incur the full cost.

Meeting the needs for TJA in the expanding elderly population in the United States will require innovative approaches to financing and delivering quality care. The purpose of this study is to assess how patients value new implant technology and how this relates to their knowledge of implant costs, as well as their willingness to contribute to the cost in order to have access to new technologies. Our goal was to assess how patients value TJA and to understand the factors that determine patient's willingness to pay for implant "upgrades" and new technologies in total joint arthroplasty, as well as how this is affected by socio-economic status and patient spending practices. This is an attempt to assess the value patients place on new technology, rather than a proposal for the immediate institution of implant co-payments.

Methods and Materials

Participants

Participants were identified and recruited at NYU Hospital for Joint Diseases, New York, NY after approval by the Institutional Review Board. A standardized questionnaire was administered to patients who had elected to undergo total knee or hip arthroplasty. All patients who presented for total joint surgery during the study period were offered participation. Patients were identified by the research assistant on the day of surgery in the waiting area in the operating room suite. Selection of patients was done randomly on a convenience base. The survey was administered via an electronic data capture device (iPad, Apple Inc, Cupertino, CA), to facilitate patient enrollment and data integrity.

Survey Methodology

The survey (see Appendix 1 for complete questionnaire) contained four sections:

The first section of the questionnaire was designed to capture demographic data; the demographic variables collected in the survey included self-reported race/ethnicity (Caucasian, African American, Hispanic, other), age, education level (high school, 2 years of higher education, 4 years of higher education, Graduate degree), sex, insurance status (Medicare, Medicaid, private insurance), and household income. The second section explored the patients' spending practices. The third section examined patient knowledge and factors that patients held as important about surgical total joint implants. The final section of the survey was designed to determine the patients' willingness to pay and preferences related to different implant attributes.

For the purposes of this study, we used the "Checklist" method to determine WTP. The "Checklist" method, which has been shown to be suitable for self completed questionnaires [19–21], presents a range of prices to the responder, who indicates which price he is willing to pay for the product. Individuals were also asked about their spending practices for expensive items such as televisions and cars. Finally, they were asked about the costs associated with a total joint prosthesis and whether they would be willing to share the cost of a prosthesis that was considered to have potential benefits over the standard of care option.

Conjoint analysis is a research technique used to measure the trade-offs people make in choosing between products. It can also be used to predict their choices for future products. Conjoint analysis assumes that a product can be "broken down" into its component attributes. For example, a car has attributes such as color, price, size, miles-per-gallon, and model style. Using conjoint analysis, the value that individuals place on any product is equivalent to the sum of the utility they derive from all the attributes making up a product. Furthermore, it assumes that the preference for a product, and the likelihood to purchase it, are proportional to the utility an individual gains from the product. We designed a table to illustrate different hypothetical implants with different attributes relative to longevity, price, and risk of revision. Each implant profile had 3 different attributes described: associated revision rates (1%, 3%, 5%), longevity (10 yrs, 15 yrs, 20 yrs), and cost ($2,000, $4,000, $6,000). Participants were asked to rate each scenario on a scale of 1 to 10. After a description of the characteristics of each type of implant, patients were asked to choose between three different types of implants with different attributes. This was the basis for the conjoint analysis as each hypothetical implant was assigned a utility, and the conjoint analysis identified the most important attributes of the implant to the patients [22–26].

We then asked respondents to indicate how much they would be willing to contribute to the cost of an upgraded implant. Eight categories, starting with<$500, then $500-$1000, and $1000-$2000, and so on until $10,000<. The question asked respondents to consider how much they would realistically be willing to pay out of their own pocket for their THR or TKR, assuming there was no coverage from Medicare or private health insurance.

Statistical Analysis

Descriptive statistics were used to report patients' response to individual questions. Results are reported as a percentage of patients that answered the specific question. To examine the relationship between factors contributing to a patient's WTP for an upgraded prosthesis, we used multivariate regression models. In the simple linear regression model, the dependent variable was a patient's willingness to pay for a particular prosthesis. Independent variables in this model included gender, race, education level, income, and insurance type.

Conjoint Analysis was used to identify the most important attributes to the patient when evaluating different implant properties. Each implant profile had 3 attributes (longevity, price, and risk of reoperation). Each profile was assigned a "part-worth" utility value and conjoint analysis was used to identify what this patient cohort considered the most important attribute of the surgical implant (longevity, price, or risk of reoperation). All statistical analysis was performed using SPSS statistical software (SPSS Inc., Chicago, IL, USA). All significance tests were 2-sided with a p-value less than 0.05 assumed significant.

There was no external source of funding for this study.

Results

One hundred one patients undergoing total hip and knee arthroplasty completed the questionnaire. Fifty-three (52.5%) patients were scheduled for a TKA while 48 (47.5%) patients were scheduled for a THA. Of the 101 patients sampled 67 (66.3%) were female and 34 (33.7%) were male. Ethnicity was 64.4% Caucasian, 14.9% African American, 17.8% Latino/Hispanic, 2% Asian, and 1% other. Reported household annual income was: 29.8%<$50,000; 36.2%=$50,000-$100,000; 22.3%=$100,000-$200,000 and 11.7%>$200,000. Type of insurance was: 20.4% Medicare, 4.1%