

# Patient Perspectives on the Cost of Hand Surgery

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**Background:** Health-care expenditures in the U.S. are continually rising, prompting providers, patients, and payers to search for solutions to reduce costs while maintaining quality. The present study seeks to define the out-of-pocket price that patients undergoing hand surgery are willing to pay, and also queries the potential cost-cutting measures that patients are most and least comfortable with. We hypothesized that respondents would be less accepting of higher out-of-pocket costs.

**Methods:** A survey was developed and distributed to paid, anonymous respondents through Amazon Mechanical Turk. The survey introduced 3 procedures: carpal tunnel release, cubital tunnel release, and open reduction and internal fixation of a distal radial fracture. Respondents were randomized to 1 of 5 out-of-pocket price options for each procedure and asked if they would pay that price. Respondents were then presented with various cost-saving methods and asked to select the options that made them most uncomfortable, even if those would save them out-of-pocket costs.

**Results:** There were 1,408 respondents with a mean age of 37 years (range, 18 to 74 years). Nearly 80% of respondents were willing to pay for all 3 of the procedures regardless of which price they were presented. Carpal tunnel release was the most price-sensitive, with rejection rates of 17% at the highest price (\$3,000) and 6% at the lowest (\$250). Open reduction and internal fixation was the least price-sensitive, with rejection rates of 11% and 6% at the highest and lowest price, respectively. The use of older-generation implants was the least acceptable cost-cutting measure, at 50% of respondents.

**Conclusions:** The present study showed that most patients are willing to pay a considerable amount of money out of pocket for hand surgery after the condition, treatment, and outcomes are explained to them. Furthermore, respondents are hesitant to sacrifice advanced technology despite increased costs.

Health-care expenditures in the U.S. are continually rising, prompting providers, patients, and payers to search for solutions to reduce costs while maintaining quality<sup>1-6</sup>. In recent years, health insurance policies have shifted costs to patients in the form of higher deductibles and copays. Thus, the opinion of patients regarding the cost of health care has become increasingly important.

In contrast with consumer goods, the cost and quality of health care are much less transparent. Patients often lack the information required to understand necessity and quality regarding tests, procedures, etc.<sup>6-8</sup>. Despite this, it has been theorized that increasing price transparency and cost-sharing could lead to cost reduction by stimulating price competition and encouraging patients to make cost-conscious decisions<sup>2,6,9</sup>.

There is a large body of hand surgery literature investigating the cost-effectiveness and cost variation for common hand surgical procedures and conditions<sup>4,10-12</sup>. Kazmers et al. demonstrated that a carpal tunnel release (CTR) performed under local anesthesia in a procedure room was associated with significantly lower cost<sup>11,12</sup>. The authors later found that implant

considerations had the greatest impact on the cost of surgically treating a distal radial fracture (DRF)<sup>11,12</sup>. Although these studies point out potential areas of cost savings, they do not account for patient preference.

As we move toward directing care toward patient preferences, a growing body of research has focused on patient perspectives regarding quality of care<sup>13-16</sup>. The transition from a fee-for-service model of reimbursement to a pay-for-performance model has emphasized the importance of patient-reported outcomes and satisfaction. The literature currently lacks a patient-centered perspective on health-care costs, as evidenced by a 2016 systematic review<sup>17</sup>, which showed that there was a lack of health-economic studies involving the patient perspective and that, among the studies that did include such a perspective, few also included data on patient costs<sup>17</sup>.

The purpose of the present study was to investigate patient willingness to pay for 3 representative hand surgical procedures. Secondly, the study examined aspects of hand surgical care (e.g., diagnostics, implants, etc.) that patients would be most and least willing to sacrifice on quality in order to save on cost. We

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hypothesized that patients would be less willing to pay as the price increased, regardless of the procedure.

### Materials and Methods

After obtaining institutional review board exemption, a digital survey was developed to query respondents regarding their willingness to pay for each of 3 hand surgical procedures: CTR, cubital tunnel release (CuTR), and open reduction and internal fixation of a DRF (ORIF DRF). These procedures were chosen with the intent to investigate a few points. First, we speculated that CTR is a “household name” and that most laypeople would have heard of this procedure. CuTR was chosen because cubital tunnel syndrome was similar to carpal tunnel syndrome, yet it was less well known, the diagnosis was not always as certain, and the treatment outcomes were less predictable (i.e., improvement rates from 65% to 75%<sup>18,19</sup> compared with 90% to 95% for CTR<sup>20,21</sup>). ORIF DRF was chosen because DRF causes immediate disability to the patient, which is easy to describe and understand. Furthermore, the procedure is more urgent than the others and can be technically challenging. Data collection adhered to STROBE (Strengthening and Reporting of Observational Studies in Epidemiology) guidelines.

### Participant Survey Process

Survey participants were recruited from an online crowdsourcing marketplace, Amazon Mechanical Turk (MTurk)<sup>22</sup>. Inclusion criteria were purposefully broad, with respondents needing to be ≥18 years old and residents of the U.S. The MTurk platform brings together “requesters,” who post tasks like surveys, and “workers,” who can browse the list of tasks and are compensated to complete them. The MTurk method of data collection has been previously validated for obtaining high-quality data in an inexpensive and rapid manner<sup>14,23–25</sup>.

An anonymous, online survey was utilized to efficiently recruit many respondents without risking protected patient information. Furthermore, the online survey allowed for a broad cross-section of respondents beyond the catchment area of our institution.

Prior to release of the final survey, a pilot survey was given to 100 participants to provide assurance that the survey was well-comprehended. It showed that <5% of respondents refused to pay for the surgery regardless of price and procedure. In response, the out-of-pocket costs of each surgery were increased in the final survey.

To be able to confirm the impact of price and procedure, a sample approaching 1,500 was needed to ensure that the standard error of proportions would be <3 percentage points. The respondents were compensated \$1.50 for taking the survey.

The survey description on Amazon MTurk was “How Much Should Hand Surgery Cost? The Patient Perspective.” The purpose of the title was to recruit survey respondents with some basic health-care knowledge and/or interest. This effort was successful, as nearly 50% of our respondents reported health-care work experience and 67% reported a history of upper-extremity surgery.

The survey gathered demographic data, including age, sex, income, assets, level of education, geographic location, insurance provider, and whether or not the respondent was a health-care worker or had ever undergone a surgical procedure.

Respondents were introduced to each condition in a random order with use of short vignettes that described the condition as well as its treatment options and expected outcomes (Fig. 1). Next, respondents answered questions in order to assess their understanding of the condition and to encourage continuous attention. Respondents were then asked to imagine that a surgeon had diagnosed them as having the condition and

#### CARPAL TUNNEL SYNDROME

The next set of questions will focus on a specific condition and operation, carpal tunnel syndrome. Please carefully read the following vignette. Questions will follow testing your comprehension of the information presented:

Carpal tunnel syndrome is a condition in which a nerve is compressed at the wrist causing pain and numbness in the hand, typically affecting the thumb, index, and middle fingers. Symptoms are often substantially troubling to patients. A common complaint is being woken up in the middle of the night by numbness and tingling in the hand resulting in lack of sleep. Severe cases of carpal tunnel can result in irreversible numbness and tingling in the fingers and weakness in muscles controlling motion at the thumb.

Carpal tunnel surgery is one of the most common surgeries performed. The operation involves cutting a tight band of tissue that causes constriction of the nerve at the wrist. This frees the nerve from compression and allows improved blood flow to it. The skin is then stitched closed and a bandage is placed. The risk of serious complications is considered to be less than 1%. The likelihood of symptom improvement or resolution after surgery is very high (90% or greater).

Fig. 1

The vignette for carpal tunnel syndrome from the MTurk survey, which briefly explained the condition, symptoms, results of severe cases, surgical treatment, risks of surgical treatment, and expected outcomes.

Let's suppose that your doctor has confirmed that you have severe carpal tunnel syndrome. You have tried a variety of non-operative treatments which haven't helped you. The condition substantially affects your daily life. Additionally, you wake up multiple times during the night with pain and numbness in your hand. **Your doctor recommends surgery.**

You are told by your doctor that you have less than 1% chance of a complication from the surgery (e.g. infection, nerve/vessel/tendon injury, worsening of your condition, etc.). There is a 90% chance or greater of substantial improvement in your symptoms with surgery. Your doctor counsels you that refusing surgery will likely result in **persistent numbness in your fingers and weakness in your thumb**, which may not be reversible.

Would you pay \$2,000 for the surgery?

Yes

No

Fig. 2

An example from the MTurk survey asking the respondent to imagine that he or she has been diagnosed with severe carpal tunnel syndrome, randomized to pay \$2,000 for the surgical treatment.

recommended surgical treatment. The proposed cost of that treatment was randomized at 1 of 5 levels: \$250, \$1,000, \$1,500, \$2,000, and \$3,000, and respondents were asked if they would pay that price. Figure 2 shows the vignette for carpal tunnel syndrome with the respondent randomized to the \$2,000 price option. Respondents then completed the same process for the remaining 2 procedures. The 5 treatment cost options were chosen according to responses from the pilot survey, in which there was a 95% acceptance rate with a price ceiling of \$1,500. We did not go higher than \$3,000 because of the economic phenomenon that the average American would have difficulty making ends meet if their monthly expenses increased unexpectedly by \$1,000 to \$3,000 in a month<sup>26</sup>.

After respondents had indicated whether they would pay the assigned cost, a total of 10 potential cost-cutting measures were presented, and respondents were asked to choose a maximum of 5 that they found most concerning. These cost-cutting options (Table I) represent choices in an episode of care

that could reasonably be adjusted to save costs, such as the use of generic medication or the avoidance of advanced imaging.

Finally, the survey asked participants to rate the ease or difficulty of the survey and to provide constructive feedback. The full survey is available in the Supplementary Materials (see Appendix).

### Statistical Analysis

Regression analyses were performed for each procedure. The outcome variable was the percent of respondents rejecting surgery at each of the 5 price options. An independent regression analysis was performed for each procedure. For each price point, the regression lines provided estimates of the linear change in refusal of surgery for every \$100 cost increase. The  $R^2$  values were calculated to show how well the data fit those regression lines. A post-hoc principal component analysis with a varimax rotation was performed for the 10 cost-cutting measures for the procedures. This analysis identified 2

TABLE I Cost-Cutting Options

The use of generic medications instead of name-brand drugs (e.g., anesthesia, postoperative pain medications, antibiotics, etc.)
Administration of anesthesia by a nurse anesthetist (CRNA) instead of by a physician anesthesiologist (MD/DO)
Having the surgery performed at a community hospital instead of at a major academic center
Having the surgery performed in a procedure room or free-standing surgery center instead of a hospital operating room
The use of older-generation versus the newest implants and devices
One visit with a hand therapist with instructions for a home-exercise program instead of weekly visits with a hand therapist during recovery
Postoperative visits with the physician assistant (PA) or nurse practitioner (NP) instead of the surgeon (MD) in the absence of a complication
Having video or telephone-based postoperative visit(s) instead of in-person postoperative visit(s) in the absence of a complication
Forgoing advanced imaging such as computed tomography or magnetic resonance imaging in favor of cheaper imaging such as radiographs
Relying on the physical examination for diagnosis instead of confirmation of the diagnosis with further testing, such as a nerve study

TABLE II Demographic Information

Characteristic	N	Percentage
Age		
18-25 yr	119	8.45%
26-30 yr	376	26.70%
31-35 yr	304	21.59%
36-40 yr	195	13.85%
41-50 yr	234	16.62%
51-60 yr	123	8.74%
≥61 yr	54	3.84%
Sex		
Male	924	65.63%
Female	480	34.09%
Marital status		
Single	313	22.23%
Married	1,037	73.65%
Widowed	11	0.78%
Divorced	41	2.91%
Race		
White	843	59.87%
African American	325	23.08%
Asian	61	4.33%
Native American	44	3.13%
Hawaiian	10	0.71%
Hispanic	190	13.49%
Geographic region		
Northeast	355	25.21%
Southeast	405	28.76%
Northwest	177	12.57%
Southwest	225	18.11%
Midwest	235	16.69%
Alaska/Hawaii	5	0.36%
U.S. territory	4	0.28%
Outside U.S.	1	0.07%
Level of education		
Less than high school	2	0.14%
Some high school	4	0.28%
High school graduate or equivalency degree	58	4.12%
Some technical school/community college	45	3.20%
Technical school/community college graduate	35	2.49%
Some college	108	7.67%
College graduate	677	48.08%
Some graduate school	59	4.19%
Master's graduate	396	28.13%
Doctorate graduate (MD, JD, PhD, etc.)	23	2.19%

continued

TABLE II (continued)

Characteristic	N	Percentage
Health insurance		
State/federal insurance	295	20.95%
Employer/spouse's employer	487	34.59%
Medicare	598	42.47%
Medicaid	250	17.76%
Veterans Affairs	68	4.83%
Other	53	3.76%
None	93	6.61%
Annual household income		
<\$25,000	138	9.80%
\$25,000-\$49,999	466	33.10%
\$50,000-\$99,999	605	42.97%
\$100,000-\$149,999	127	9.02%
\$150,000-\$199,999	52	3.69%
≥\$200,000	19	1.35%
Assets		
<\$25,000	242	17.19%
\$25,000-\$49,999	356	25.28%
\$50,000-\$99,999	428	30.40%
\$100,000-\$249,999	200	14.20%
\$250,000-\$499,999	98	6.96%
\$500,000-\$999,999	58	4.12%
≥\$1,000,000	25	1.78%
Worked in health care		
Yes	662	47.02%
No	745	52.91%
Personal history of surgery		
Yes	1,022	72.59%
No	385	27.34%
Previous upper-extremity surgery		
Yes	687	67.22%
No	335	32.78%

dimensions that accounted for 31% of the variation in the original data. Correlations then identified unique, significant relationships between patient characteristics and their factor scores on each of 2 dimensions.

### Source of Funding

The study was completed with an educational grant by the Piedmont Orthopaedic Society. The outside source of funds was utilized in data collection but was not utilized in the preparation or editing of the manuscript.

### Results

A total of 1,500 respondents participated in the survey. Of these, 92 respondents were excluded, including 44 for not completing the survey and 48 for completing the survey in under 3 minutes (compared with the overall average completion time

of 14 minutes). These respondents completed the survey in less time than it would take to read the words of the survey. Following these exclusions, a total of 1,408 respondents were included in the study. The demographic characteristics of the cohort are shown in Table II.

CTR was the most price-sensitive procedure, with a 17% rejection rate at the highest price point, which was significantly greater than the rates for CuTR (12%) and ORIF DRF (11%) ( $p < 0.05$ ; Fig. 3). The slope for the CTR curve was  $-0.0253$ , indicating that for every \$100 increase in price, the number of respondents unwilling to pay increased by 2.5 percentage points. The  $R^2$  value was 98%, indicating that the linear approximation accounted for most of the variance in the probability of choosing CTR across prices. For CuTR, the slope was  $-0.0149$ , with an  $R^2$  value of 82%. For ORIF DRF, the slope was  $-0.008$ , with an  $R^2$  of 40%. CTR had a significantly larger slope compared with the other procedures ( $p < 0.05$ ), whereas CuTR and ORIF DRF did not differ significantly from one another.

Respondents were shown to differ in terms of price sensitivity. Those who were least price-sensitive were more likely to be unmarried and to have careers in health care, government health insurance, greater income and assets, and more education.

Respondent reactions to cost-cutting options were not independent of each other (Table III). Principal component analysis revealed factors identifying 2 groups of 5 cost-cutting

measures with responses that were positively correlated with each other. The first factor focused on the need for “advanced technology,” and the second centered on “comprehensive systems” to deliver care. Table IV gives the 5 options, in order of importance, that define the 2 factors.

Respondents with high advanced-technology factor scores favored new implants, advanced imaging, and nerve tests, whereas respondents with high comprehensive-systems factor scores desired surgery at major academic centers in hospital operating rooms, availability of brand name drugs, and visits with the hand therapist and surgeon. The respondents with high advanced-technology factor scores were significantly more likely to be unmarried, white, female, and low-income, and to have less education, health-care work experience, and Medicare insurance ( $p < 0.05$ ), whereas respondents with high comprehensive-systems factor scores were significantly more likely to be married, under 35 years old, and male, and to have post-college education and Medicare ( $p < 0.05$ ; Tables V and VI).

## Discussion

The present study mostly rejects the hypothesis that patients would be substantially sensitive to the out-of-pocket costs of representative hand surgeries. Instead, the overwhelming majority of patients are willing to pay a substantial amount of

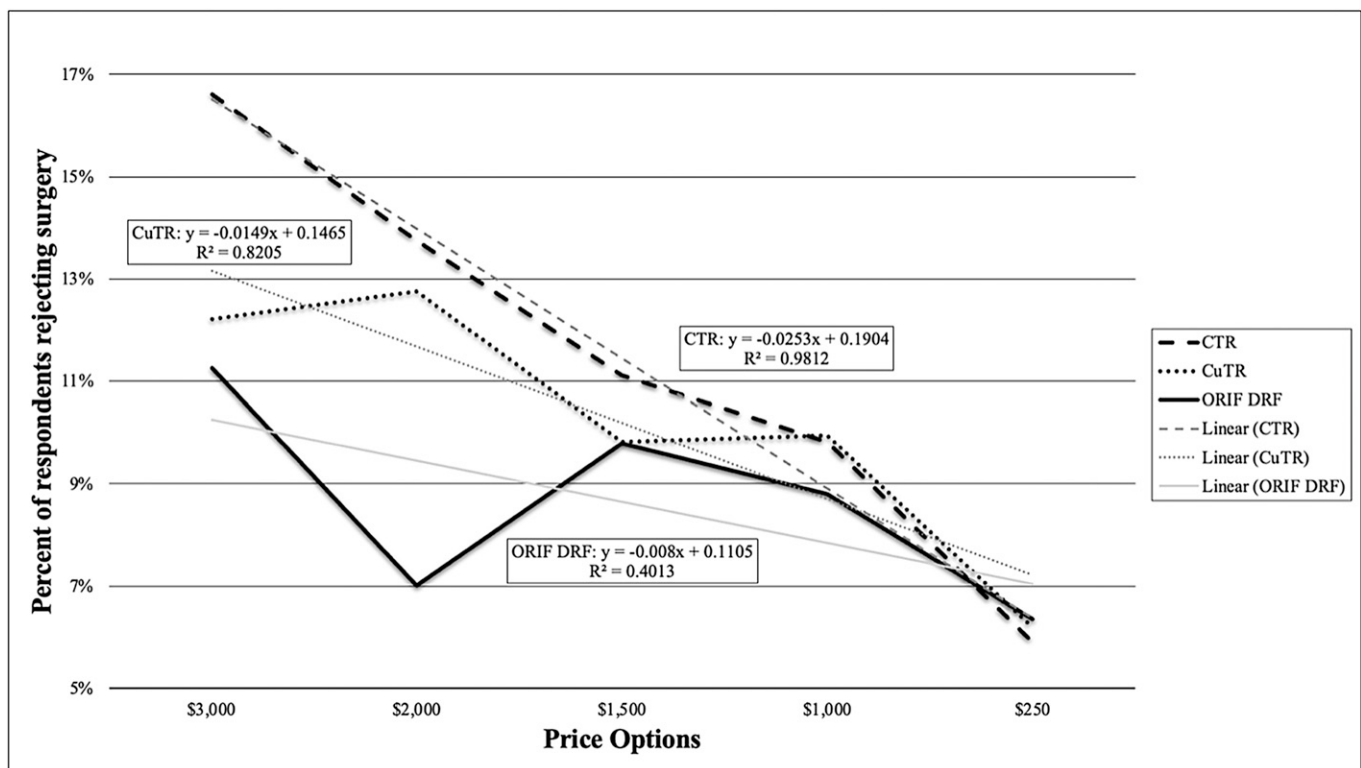


Fig. 3

Graph showing the percentage of respondents rejecting each surgery for each price option, with the respective linear regressions. CTR = carpal tunnel release, CuTR = cubital tunnel release, and ORIF DRF = open reduction and internal fixation of a distal radial fracture. Each straight line represents the best linear fit for the procedure, and the values in the corresponding box represent the equation for the line and the quality of its fit.

**TABLE III Percent of Respondents Uncomfortable with Each Cost-Cutting Care Option**

Cost-Cutting Option	Percent Uncomfortable
The use of older-generation versus the newest implants and devices	50%
Administration of anesthesia by a nurse anesthetist (CRNA) instead of a physician anesthesiologist (MD/DO)	42%
Having the surgery performed at a community hospital instead of at a major academic center	37%
Forgoing advanced imaging such as computed tomography or magnetic resonance imaging in favor of cheaper imaging such as radiographs	37%
The use of generic medications instead of name-brand drugs (e.g., anesthesia, postoperative pain medications, antibiotics, etc.)	35%
Having the surgery performed in a procedure room or free-standing surgery center instead of a hospital operating room	34%
Relying on the physical examination for diagnosis instead of confirmation of the diagnosis with further testing, such as a nerve study	32%
One visit with a hand therapist with instructions for a home-exercise program instead of weekly visits with a hand therapist during recovery	28%
Having video or telephone-based postoperative visit(s) instead of in-person postoperative visit(s) in the absence of a complication	27%
Postoperative visits with the physician assistant (PA) or nurse practitioner (NP) instead of the surgery (MD) in the absence of a complication	26%

money out of pocket after being educated regarding the condition, treatment, and outcomes.

At the lowest patient cost of \$250, all 3 procedures were rejected by 6% of respondents. At the highest cost of \$3,000, CTR was rejected by 17%, making CTR the most price-sensitive procedure. This may be because carpal tunnel syndrome is more well-known to the layperson and may, rightfully or wrongfully depending on severity, be considered a less serious condition than cubital tunnel

syndrome or DRF by someone with a casual knowledge of the condition. These findings are supported by the cancer literature, as people are less likely to consider costs when undergoing treatment for conditions that are unknown or unfamiliar to them, as such diagnoses seem threatening<sup>27</sup>. Those who were more price-sensitive were also more likely to have a lower level of education and lower income and assets. This finding follows common sense, as people with less resources will be forced to ration.

**TABLE IV Factor Weight of Cost-Cutting Options That the Groups Were Not Willing to Forgo**

Cost-Cutting Option	Factor Weight
<b>Advanced-technology group</b>	
Relying on the physical examination for diagnosis instead of confirmation of the diagnosis with further testing, such as a nerve study	0.67
Forgoing advanced imaging such as computed tomography or magnetic resonance imaging in favor of cheaper imaging such as radiographs	0.67
The use of older-generation versus the newest implants and devices	0.63
Having video or telephone-based postoperative visit(s) instead of in-person postoperative visit(s) in the absence of a complication	0.41
Administration of anesthesia by a nurse anesthetist (CRNA) instead of by a physician anesthesiologist (MD/DO)	0.32
<b>Comprehensive-systems group</b>	
Having the surgery performed at a community hospital instead of at a major academic center	0.63
The use of generic medications instead of name-brand drugs (e.g., anesthesia, postoperative pain medications, antibiotics, etc.)	0.57
Having the surgery performed in a procedure room or free-standing surgery center instead of a hospital operating room	0.44
One visit with a hand therapist with instructions for a home-exercise program instead of weekly visits with a hand therapist during recovery	0.42
Postoperative visits with the physician assistant (PA) or nurse practitioner (NP) instead of the surgeon (MD) in the absence of a complication	0.36



**TABLE V Characteristics of Those with Low Versus High Concern for Options in the Advanced-Technology Group\***

Quartiles	Married	White	Female	Income <\$50,000	Post- College Education	Medicare Recipient	Health-Care Work Experience
≤25th: low concern	84%	53%	30%	55%	41%	56%	62%
≥75th: high concern	58%	77%	41%	62%	24%	17%	24%

\*Sample size within quartiles was 350 respondents. Standard errors of all proportions <3%. All differences were significant ( $p < 0.05$ ).

Overall, the cost-cutting option that patients were most uncomfortable with was the use of older-generation implants, whereas the option that patients were most comfortable with was postoperative visits with a midlevel provider. This finding is interesting in light of the results of the 2018 study by Kazmers et al., who reported that implant choice most directly increased total cost for ORIF DRF<sup>11</sup>. This finding may reflect that patients do not understand the intricacies of medical implants or devices and assume that the newest implant or device is superior. In contrast, many patients are comfortable receiving postoperative care from a physician assistant or nurse practitioner.

The factor analysis of concerns regarding the 10 cost-cutting options revealed different reactions depending on whether the options related to advanced technologies compared with access to comprehensive surgical infrastructure. The respondents with high advanced-technology factor scores were significantly more likely to be unmarried, white, female, and low-income, and to have less education, health-care work experience, and Medicare insurance ( $p < 0.05$ ), whereas respondents with high comprehensive-systems factor scores were significantly more likely to be married, under 35 years old, and male, and to have post-college education and Medicare ( $p < 0.05$ ). Both groups expressed desire for options that were important to them despite increased cost<sup>10-12</sup>. The substantial difference in the characteristics associated with the 2 factor scores was not hypothesized, and without replication it should not be seen as a response to general health concerns. However, these results suggest that those with less medical knowledge were attracted to surgical practices featuring the latest technologies, whereas those with more education and greater medical needs were more likely to desire the comfort of comprehensive, flexible systems of surgical care.

A proposed solution to the exponential rise of health-care costs is to implement alternative payment models, or bundled care, as was initiated for hip and knee arthroplasty after the

Affordable Care Act was introduced<sup>28</sup>. Although the early data from bundled-care models mostly demonstrated reduced costs<sup>29</sup>, later studies revealed that the use of a bundled-care model for all patients may not be prudent. In a 2018 study from a large academic institution, Baumgartner et al. showed that patients with more complex medical histories, those requiring inpatient consultations, and those with perioperative complications exceeded the Centers for Medicare & Medicaid Services price target<sup>30</sup>.

Although hand surgery and joint replacement surgery cannot be compared directly in terms of patient population, procedure, cost, and perioperative complications, the bundling of some hand surgical procedures may occur in the future. However, the results of the present study place the bundled-care model and the value-based care model at odds. Not only are the majority of respondents willing to pay a considerable amount of money out of pocket for these procedures, they also are hesitant to sacrifice newer implants, imaging, and diagnostics, which will directly lead to increased cost<sup>10-12</sup>. Yet the results of the factor analysis could be helpful in setting up a bundled-payment system that allows patient selection of plans with the intent of reducing costs. With such a system, patients may choose between several plans, some of which offer access to more technology (e.g., implants, tests, etc.) and others of which offer care at centers with more overall resources (e.g., academic and/or tertiary institutions).

The present study had limitations. A survey study only presents hypothetical choices, and although most respondents reported a willingness to pay considerable amounts of money, in reality, this may be the result of response bias. An additional limitation is that the respondents were recruited with use of Amazon MTurk, with the heading: "How Much Should Hand Surgery Cost? The Patient Perspective," potentially introducing selection bias into the study. This title was utilized to attract respondents interested in health care who would care about the

**TABLE VI Characteristics of Those with Low Versus High Concern for Options in the Comprehensive-Systems Group\***

Quartiles	Married	<35 Years Old	% Male	Post-College Education	Medicare Recipient
≤25th: low concern	73%	53%	60%	33%	38%
≥75th: high concern	82%	60%	70%	40%	54%

\*Sample size within quartiles was 350 respondents. Standard errors of all proportions <3%. All differences were significant ( $p < 0.05$ ).


topic and, perhaps, were more likely to take the survey in full and to provide honest answers. A consequence of this recruitment method was that the results of the study may be less generalizable to the general population. Additionally, the MTurk population is younger and more educated and tends to have a lower average income than the general population<sup>23,24</sup>.

Another limitation was that the survey did not provide a literature review for the respondents that fully detailed the complexities of hand surgical care. For example, the literature suggests that cost reductions can come from the use of a procedure room and from forgoing electrodiagnostics<sup>10,12</sup>. Arguably, omitting this information is necessary to get more realistic results from the survey, as these topics are not commonly discussed during an office visit and patients are unlikely to have this knowledge on their own. A separate study could assess patient preferences following the presentation of these data.

The results of this study, in combination with the results of prior studies regarding costs of treatment<sup>27</sup>, could be utilized as a framework for future research that could be applied more broadly to orthopaedics. These studies could investigate the patient perspective on the cost of more expensive procedures, like spine surgery or oncologic reconstruction, and evaluate the

willingness of the patient to pay even higher out-of-pocket costs for these episodes of care.

## Appendix

 Supporting material provided by the authors is posted with the online version of this article as a data supplement at [jbjs.org \(http://links.lww.com/JBJS/G682\)](http://links.lww.com/JBJS/G682). ■

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