Published in final edited form as:

Jt Comm J Qual Patient Saf. 2013 March ; 39(3): 136–144.

Decision Dissonance: Evaluating an Approach to Measuring the Quality of Surgical Decision Making

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Abstract

Background—Good decision making has been increasingly cited as a core component of good medical care, and shared decision making is one means of achieving high decision quality. If it is to be a standard, good measures and protocols are needed for assessing the quality of decisions. Consistency with patient goals and concerns is one defining characteristic of a good decision. A new method for evaluating decision quality for major surgical decisions was examined, and a methodology for collecting the needed data was developed.

Methods—For a national probability sample of fee-for-service Medicare beneficiaries who had a coronary artery bypass graft (CABG), a lumpectomy or a mastectomy for breast cancer, or surgery for prostate cancer during the last half of 2008, a mail survey of selected patients was carried out about one year after the procedures. Patients' goals and concerns, knowledge, key aspects of interactions with clinicians, and feelings about the decisions were assessed. A Decision Dissonance Score was created that measured the extent to which patient ratings of goals ran counter to the treatment received. The construct and predictive validity of the Decision Dissonance Score was then assessed.

Results—When data were averaged across all four procedures, patients with more knowledge and those who reported more involvement reported significantly lower Decision Dissonance Scores. Patients with lower Decision Dissonance Scores also reported more confidence in their decisions and feeling more positively about how the treatment turned out, and they were more likely to say that they would make the same decision again.

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Appendix 1 (Standardized Table 5). Predicting Decision Dissonance with the Decision Process Score, Patient Knowledge About Treatment, and Demographic Characteristics

Appendix 2 (Standardized Table 6). Predicting Patient Belief About Confidence That the Right Decision Was Made, Whether They Would Make the Same Decision, and Feeling About How the Treatment Worked Out Based on Decision Dissonance

Conclusions—Surveying discharged surgery patients is a feasible way to evaluate decision making, and Decision Dissonance appears to be a promising approach to validly measuring decision quality.

The ethical argument for informed and involved patients when decisions are made has long been established.^{1,2} However, there is also growing interest from a quality of care perspective in improving the quality of medical decision making and particularly in ensuring that decisions are patient centered. Definitions of decision quality focus on two key components—that (1) patients are well informed and (2) the treatments received reflect patients' goals and preferences.³ Shared decision making is one means of achieving high decision quality. It is among the defining standards for patient-centered medical homes^{4,5} and has been cited as a key component of good medical care by the American Medical Association.⁶

In the last few years, numerous formal steps have been taken to improve decision making. For example, Section 3506 of the Patient Protection and Affordable Care Act (Pub L 111148) calls for programs (1) to award grants or contracts to develop, update, and produce patient decision aids to assist health care providers and patients; (2) to provide for the phased-in development, implementation, and evaluation of shared decision making using patient decision aids to improve patients' understanding of their medical treatment options; and (3) to award grants for the establishment and support of Shared Decision-making Resource Centers and for the establishment of criteria for the certification of decision aids.⁷ Although that provision is authorized but not yet appropriated, Section 3021, which created the Center for Medicare & Medicaid Innovation (CMMI), has moved forward. One of the mandates for CMMI was to study new models of health care delivery, including shared decision making. One of the first large grants issued by CMMI, in spring 2012, was for a demonstration of the value of the routine use of decision aids by patients in 15 major health delivery systems.⁸ Independently, the Centers for Medicare & Medicaid Services (CMS) has specified shared decision making as a desired feature of the new Accountable Care Organizations (ACOs).⁹ In parallel to federal efforts, Washington State passed legislation in 2007 encouraging the use of certified decision aids for patients facing preference-sensitive surgical decisions as an alternative to informed consent.¹⁰ In August 2012 the state of Massachusetts passed legislation to foster the routine use of decision aids,¹¹ and at least three other states (Minnesota, Vermont, and Maine) have legislation promoting the study of shared decision making. Thus, it is fair to say that at the federal and state levels there is a groundswell of activity aimed at making the use of decision aids and shared decision making, particularly for surgery, a routine part of medical care.¹²

If shared decision making is going to be a standard of care, then it has to be measurable.¹³ We describe the following three elements essential to assessing the quality of a decision^{14–16}:

1. How informed was the patient? (requires measures of knowledge)
2. Was the patient meaningfully involved in the decision? (requires a measure of the decision process)
3. Was the resulting decision consistent with the patient's goals and concerns? (requires a methodology for calculating the degree of alignment between a decision and a patient's stated goals)

Conceptually, a high-quality decision is one that is clinically appropriate, informed, and aligned with an informed patient's goals, concerns, and preferences.¹⁵ The model of how and why shared decision making works is straightforward: Patients need to be informed to understand their options, and they need to be involved in the decision-making process to

have their views reflected in the final decision. If both conditions are met, the resulting decision should be a good one, because it should reflect the patients' goals and concerns. However, creating a valid measure of decision quality that is feasible to implement as a measure of provider or health system performance has proven to be a challenge.^{16–18} In particular, there is a great need for rigorous and practical methods for determining whether treatments are consistent with patients' goals. A recent systematic review of approaches to measuring concordance found significant variability in how researchers defined and calculated this construct.¹⁶ The key issues are how to measure patients' preferences and how to calculate the "match." For example, one of the simplest approaches assessed patients' preferences via a direct question ("Which treatment do you prefer?"), whereas others used more complicated approaches such as standard gamble and adaptive conjoint analysis to elicit utilities. In the latter cases the "preferred" treatment was then determined via a decision model. Another approach is to use regression modeling to assess how much of the variance in decision making can be associated with patient-reported goals and concerns.¹⁹ It turns out that each of these approaches has some important limitations and that there is no commonly agreed-on approach that produces a credible and interpretable assessment.¹⁶

Measures of decision quality will almost certainly become part of the routine assessment of the experience of surgical patients. A recent survey of Medicare beneficiaries who had one of four major surgical interventions may provide one model for how to measure the quality of surgical decisions. Patients were sampled and surveyed on the basis of claims for the target procedure, a sampling protocol that is feasible to replicate in other settings. In this article, we describe a new approach to calculating the match (or concordance) between patients' goals and concerns and the decision that was made. This new approach measures what we are calling Decision Dissonance—namely, the extent to which goals and concerns that were important to patients did not line up with the treatments received. We then evaluate the validity of Decision Dissonance as a measure of decision quality.

Methods

Survey

A mail survey was conducted of Medicare beneficiaries whose claims indicated that they had one of four surgical procedures during the last half of 2008. Each procedure was prototypical of "preference-sensitive" interventions in that for most patients there were reasonable alternative approaches to treatment of the underlying disease, and the treatment approaches differed, often markedly, in how they would affect the patient's life. Although there are other surgical procedures that fit that profile, these four were chosen because they are common, are treatments for potentially life-threatening conditions, involve major quality-of-life issues, and constitute interventions for which patient preferences should play a major role. The survey focused on how decisions were made to have procedures.

The study was approved by the Institutional Review Boards of the Dartmouth Medical School and the University of Massachusetts, Boston and performed in cooperation with CMS.

Sampling

Medicare care claims from August 2008 through December 2008 were searched for evidence indicating that a person had had coronary artery bypass graft (CABG) surgery to treat coronary artery disease, a lumpectomy or mastectomy to treat localized breast cancer (invasive or ductal carcinoma in situ), or a radical prostatectomy for prostate cancer. Patients living in nursing homes were excluded, as were those in managed care (because claims data are not available for health maintenance organization patients) and those younger than 66

years of age (to permit searching claims for up to one year before the surgery). Lists of selected individuals were sent to CMS, where decedents were identified and dropped from the sample frame. The names and addresses of the selected individuals were sent to the Center for Survey Research (University of Massachusetts, Boston), which conducted the survey. The sampling procedure follows a well-established methodology that is routinely used for quality assessment, such as the Hospital CAHPS (Consumer Assessment of Healthcare Providers and Systems) surveys.²⁰

Measures

The survey instrument included four main kinds of variables that were used in this analysis: Patient goals and concerns, patient knowledge of facts related to the decision, patient reports describing the process of decision making, and patient reports of three retrospective perceptions related to the decisions that were made. The items, many of which were drawn from previous studies, were subjected to cognitive testing to identify problems with question wording and to assess how well answers reflected what patients had to say.²¹

Patient Goals and Concerns—Goals and concerns were measured with a set of questions asked in the form of: “When you were thinking about (surgery), what number (from 0 to 10) would you use to rate how important it was to you (EXAMPLE: to keep your breast)?” Some of the goals and concerns were clearly consistent with the choice that was made, while others were dissonant. The goals and concerns were taken from the Heart Disease Decision Quality Instrument, the Breast Cancer Surgery Decision Quality Instrument, and the Prostate Cancer Decision Quality Instrument.^{17,22–24} The dissonant goals and concerns for each procedure are listed in Table 1 (above). A Decision Dissonance Score was created for each procedure by taking the average of the importance ratings of the dissonant goals for each patient. Scores range from 0 to 10, with 0 indicating lowest and 10 highest dissonance. The higher the dissonance score, the more the importance ratings of goals and concerns ran counter to the treatment that the patients received.

Patient Knowledge of Facts Related to the Decision—Patient knowledge was measured with sets of 7 to 19 questions, depending on the decision. These questions were developed by clinical experts, with input from patients who had had the procedures, and focused on information the experts thought that it was important for patients to know. The items were taken from three previously cited instruments.^{17,23,24} Knowledge questions covered risks, benefits, and what the treatments entail. A sample question for the breast cancer patients was, “On average, which women with early-stage breast cancer live longer: Women who have mastectomy, women who have lumpectomy, or is there little or no difference?”

A Knowledge Score was created by dividing the number of questions correctly answered for each procedure by the total number of knowledge questions. Missing responses were scored as incorrect. A total Knowledge Score was created only for those who answered at least half of the items because of concerns that respondents who skipped that many items were essentially refusing to answer rather than skipping questions to which they did not know the answers. Eight percent of the Knowledge Scores were missing.

Patient Reports Describing the Process of Decision Making—The decision-making process was measured with items that focused on four elements that are essential to shared decision making. Patients reported the extent to which their health care providers (1) presented at least one alternative to the procedure as something to seriously consider (yes or no); (2) discussed the reasons to do the procedure “a lot” or “some” (versus “a little” or “not at all”); (3) discussed the reasons a person might not want to have the procedure “a lot” or

“some” (versus “a little” or “not at all”); and (4) asked what the patient wanted to do (yes or no). These items were adapted from those used in the DECISIONS study, a national survey conducted by the University of Michigan of how people made nine common medical decisions,¹⁸ and have also been evaluated as part of other decision-quality instruments.^{17,22,24,25} A Decision Process Score was created by giving respondents one point for each of the above four elements of a good decision process they reported. Scores ranged from 0 to 4, with higher scores indicating more involvement in the decision-making process.²⁶

Patient Reports of Three Retrospective Perceptions Related to the Decisions That Were Made

Three questions were asked that related to the respondents’ perceptions of the decisions and how they turned out: How confident they were that they made the right decision (on a scale of 0, “not at all,” to 10, “extremely confident”); whether they would make the same decision again (“definitely no,” “probably no,” “probably yes,” and “definitely yes”); and how they felt about how the treatment turned out (responses ranged from delighted to terrible).

The survey also collected demographic information, including age, gender, educational attainment, race/ethnicity, and marital status.

Data Collection Protocols

In November 2009, selected subjects were first sent a letter signed by the CMS Privacy Officer describing the study and providing a toll-free number to call to opt out. Two weeks later, subjects who had not opted out were sent a cover letter, a questionnaire, a postage-paid return envelope, and a \$5.00 cash incentive. This was followed, in two- to four-week intervals, by a postcard reminder, another mailing of the complete packet, and then a reminder telephone call to those for whom we could find a number. All respondent contact materials were offered in both English and Spanish.

Data Analysis

We tabulated frequencies and percentages and/or unconditional means and standard deviations of the Decision Dissonance Scores and of all covariates for each procedure.

We examined three main hypotheses to evaluate the validity of the Decision Dissonance measure. One of the core tenets of shared decision making is that having patients informed and involved in the decision will improve decision quality. Hence we hypothesized the following:

1. More-informed patients would have lower Decision Dissonance Scores.
2. Patients who had a “better” decision-making process, as reflected in the Decision Process Score, would have lower Decision Dissonance Scores.
3. Patients who had higher Decision Dissonance Scores would have more negative assessments of their decisions as reflected in patients’ confidence that the right decision was made, reports of whether or not they would make the same decision again, and their feelings about how the treatment decision worked out.

To address the first two hypotheses, we used separate ordinary least squares regression models to examine how well knowledge, respondent education, and the Decision Process Score predicted the Decision Dissonance Score for each procedure. Hierarchical linear models were used to calculate the average effects across all procedures.²⁷ For these models, level 1 equation represented the patient level and included terms describing the main predictors, the demographic characteristics, and the constant term. In the level 2 models

(procedure level), each level 1 coefficient represented a separate outcome. Each level 2 equation included its own constant term, as well as a term describing the random effects of the individual procedures.

To address the third hypothesis, we repeated the analyses conducted for the first two hypotheses, now using the Decision Dissonance Score to predict each of the outcomes separately for each procedure and on average across all procedures. Although these outcome variables are technically ordered categorical variables, ordinal logistic regression models displayed consistent results, which indicates that violations of the linear regression model assumptions did not substantially influence our findings. We ultimately decided to report results from the linear regression models because the results were consistent with the ordinal models and easier to interpret. In addition, we included the same models with standardized linear regression coefficients, as shown in Appendixes 1 and 2 (available in online article).

All regression models were adjusted for patients' age, education, and marital status and, in the case of CABG, for gender. Independent variables were centered so that the constant terms would represent the average value in each group. To maximize the sample size, multiple imputation by chained equations²⁸ was used to impute values for all variables in the regression models with missing data (8.5% for Knowledge Scores, 6.8% for Decision Dissonance Scores, and < 5% for all other variables). All analyses were conducted in Stata version 11 (StataCorp LP, College Station, Texas).

Results

Samples and Response Rates

The sample sizes varied by procedure because of differences in the number of cases originally selected from claims, different rates at which selected patients were found to be ineligible, and differences in response rates. Sample sizes ranged from 407 (mastectomy) to 685 (prostate cancer surgery (see Table 2 [page 140]). Response rates, calculated as American Association for Public Opinion Research Response Rate 1 ("minimum response rate"),²⁹ which assumes that all selected people who are not specifically determined to be ineligible are eligible, ranged from 74% (lumpectomy) to 86% (prostate cancer surgery).

Table 2 describes the demographic characteristics of the samples. The prostate cancer patients stood out as being the youngest, the most highly educated, and the most likely to be married. The mastectomy patients were the oldest, the least educated, and the least likely to be married. Twenty-eight percent of the CABG patients were women.

Table 3 (page 141) presents the distribution of ratings of the dissonant issues for each procedure. At least some of the patients highly valued each of the goals and concerns that conflicted with the treatment received. For example, many CABG patients gave a rating of 10 ("extremely important to me") to avoiding risk of memory problems (62%), to avoiding a long recovery time (49%), and to avoiding an operation that involved cutting open the chest (27%). More than 30% of the lumpectomy patients gave ratings of 10 both to the importance of avoiding the side effects of radiation and to avoiding living with a breast that once had cancer. About 20% of the mastectomy patients rated the importance of having the least invasive treatment possible as a 10. More than 30% of prostatectomy patients rated avoiding urinary problems as extremely important to them (10).

Table 4 (page 141) presents the average Decision Dissonance Scores and the distributions of the key measures used to examine the validity of the Dissonance Scores. The average Dissonance Score for CABG was the highest, at 7.1 out of 10 (standard deviation [SD], 2.5), while the least dissonance was reported for mastectomy decisions: 3.4 out of 10 (SD, 3.0).

All the Knowledge Scores were low, with the highest score being 58% correct (lumpectomy), but CABG patients had the lowest levels of Knowledge Scores (33%) and the lowest Decision Process Scores (1.3 out of 4). The prostate cancer patients had the highest Decision Process Score (3.2 out of 4). Across all four surgeries, solid majorities of patients felt positively about how the procedures turned out, were confident in their choices, and would do the same things again.

Hypotheses

Hypothesis 1—Hypothesis 1 stated that more-informed patients would make less dissonant decisions. When the results are averaged across all the procedures, higher knowledge had a statistically significant ($p < .001$) association with a lower Decision Dissonance Score. Higher knowledge was also the best predictor of low dissonance for lumpectomy ($p < .001$), but it was not a statistically significant predictor for the other procedures (Table 5, page 142). It is worth noting that level of respondent education (which may be a surrogate for knowledge) was also a statistically significant predictor of lower Dissonance Scores for three of the four procedures, and overall.

Hypothesis 2—Hypothesis 2 was that a “better” decision process would be associated with less dissonance. When the results are averaged across all four procedures, the Decision Process Score was significantly ($p < .01$) related to the Decision Dissonance Score in the expected direction. A higher Decision Process Score also was significantly associated with less dissonance for the prostate cancer decision, but was not statistically significant for the other procedures (Table 5).

Hypothesis 3—Hypothesis 3, the key test of the measure’s construct validity, was that a higher Decision Dissonance Score would predict negative perceptions relevant to the decision. Table 6 (page 143) presents the model results for each procedure as well as across all four procedures. The Decision Dissonance Score was a significant inverse predictor of how confident respondents say they are that they made the right decision, how positively they feel about how things worked out, and whether or not they would make the same decision again for at least three of the four procedures individually and when they are combined.

Discussion

In many medical situations, all possible options have downsides. If patients did not think that the alternative was worse, no one would choose to have any of the procedures we studied. Yet all the patients in our study, like most patients facing major interventions, did have alternatives. Mulley et al. recently labeled the failure to give proper weight to informed patient preferences in medical decisions as the “silent misdiagnosis.”³⁰ The challenge is to ensure that patients are informed and have a significant voice in the decision so that they are the ones making the trade-offs. The Decision Dissonance Score requires patients to rate the importance of the goals and concerns relevant to their options and then identifies ratings that are not consistent with the option that is chosen. It appears to be a feasible strategy for measuring how inconsistent a surgical decision is with patient values.

Across these four surgical decisions, the Decision Dissonance Score was significantly related to how knowledgeable patients were and how involved they said they were in making the decision. It also was consistently related to three different measures of how patients perceived the decision. The results provide evidence of validity for using the Decision Dissonance Score as a measure of decision quality.

Although the results were statistically significant across all the procedures as predicted, the Decision Process and Patient Knowledge measures did not significantly predict Decision Dissonance for most of the procedures, perhaps largely because the Decision Process and Patient Knowledge Scores were low and had limited variation. It is noteworthy that the prostate cancer patients, who had by far the highest Decision Process Scores, were the ones for whom this score was most highly related to the Dissonance Score; the same was true for the lumpectomy patients, who had the highest Knowledge Scores.

The outlier in the results tended to be the CABG patients, who had by far the highest dissonance, the least knowledge, and the worst decision processes. CABG patients reported very little discussion of the cons of the procedure, were seldom given alternatives, and were not asked for their input. In essence, these patients thought that their lives depended on having this procedure and hence were willing to undergo a procedure about which they had a lot of reservations. We believe that CABG is the extreme example of low variances in predictors producing low correlations with Decision Dissonance.

More attention is being devoted to shared decision making,^{4–12} and as more patients experience a better decision process with access to better information, we are confident that the associations with the Decision Dissonance Scores will increase. Additional validation studies should attempt to examine these relationships in populations that include patients who have stronger decision support than the experiences reported here.

It might be argued that the protocol of surveying only those who had the procedures is a weakness of the study. However, for an approach to be considered for adoption as part of performance measurement on a large scale, it must be based on a protocol that is replicable and feasible to implement with currently available data. In the long run, it would be desirable to find ways to identify and survey patients who choose conservative management, as well as those who have surgery, and this task may become easier as health information technology develops. It will be important for health information technology to support the identification of patients at decision points to support this kind of measurement. At this time, surveying those who actually had a procedure is a much easier protocol to reliably implement.

The fact that patients were surveyed an average of 14 months after the sample procedure is also a potential concern. In this case, the lag was mainly due to the time it took to work with CMS to obtain the information needed to conduct the survey. A shorter time lag would be desirable to maximize recall of the decision-making process and to measure the knowledge and the goals and concerns as close to the time of the decision as feasible. If anything, one would expect that dissonance would be less as time passed after the procedure, as the forces of cognitive dissonance reduction³¹ work to support the decision that was made. Yet, as shown in Table 3, many respondents reported highly dissonant goals and concerns even 14 months after the procedure.

It also should be noted that the conditions addressed by all of these decisions were potentially life threatening, and symptom relief was not the reason for surgery. CABG was the only procedure that potentially could be for symptom relief, but fewer than a quarter of the patients rated pain relief as important, while more than 90% said that they thought the procedure “definitely” or “probably” extended how long they would live (data not shown). For those numerous decisions that are driven primarily by a desire for symptom relief, we believe that a Dissonance Score is still an appropriate measure of decision quality but that a full picture of the decision quality would also have to include a patient rating of the importance of symptom relief.

Finally, there are other ways to score the answers about the importance of potentially dissonant issues. For example, instead of the average rating of all the dissonant items, one could use the highest rating given to any dissonant items as the basis for the score. We examined this latter approach and obtained essentially identical results from our models. We think that the basic idea of measuring dissonance is robust and will yield similar answers with any reasonable approach to scoring.

Conclusion

This study presents evidence that suggests that the Decision Dissonance Score is both a practical and valid method for assessing how well a decision regarding surgery reflects the goals and concerns of the patient. It is based on a small number of questions, which are easy for respondents to answer, and calculation of a score is simple and transparent.

To periodically survey patients who undergo surgery about their decisions would be a crucial step to improving the quality of surgical decision making. It is only by implementing surveys like this that we can begin to hold providers and hospitals accountable for the quality of decision making for the procedures they perform.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The work reported in this paper was supported by Grant No. PO1-AG19783 to Dartmouth Medical School from the National Institutes on Aging (NIA). The Medical Decisions Foundation has a commercial agreement with Health Dialog, which pays royalties to the Foundation for use of its intellectual property and distributes decision aids as part of the patient-support services it provides through health plans and employers.

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Table 1

Dissonant Goals by Procedure *

CABG	Lumpectomy	Mastectomy	Prostatectomy
<ul style="list-style-type: none"> ■ Avoid possible memory problems ■ Avoid long recovery ■ Avoid having operation that involves chest cut open 	<ul style="list-style-type: none"> ■ Avoid hassle of radiation treatment ■ Avoid side effects of radiation ■ Avoid anxiety of living with breast that once had cancer 	<ul style="list-style-type: none"> ■ Keep breast ■ Have least invasive procedure ■ Have most natural looking breast possible 	<ul style="list-style-type: none"> ■ Avoid problems with urination ■ Avoid sexual problems ■ Avoid active treatment until it is needed ■ Avoid surgery

* CABG, coronary artery bypass graft.

Table 2Frequency of Demographic Characteristics of Respondents by Procedure (%)^{*}

Gender (Female)	CABG (n = 517) 146 (28.2)	Lumpectomy (n = 507) 507 (100.0)	Mastectomy (n = 407) 407 (100.0)	Prostatectomy (n = 685) 0 (0.0)
Age (years)				
65–69	66 (12.8)	83 (16.4)	69 (17.0)	275 (40.1)
70–74	177 (34.2)	157 (31.0)	97 (23.8)	307 (44.8)
75–79	149 (28.8)	123 (24.3)	94 (23.1)	97 (14.2)
80–84	125 (24.2)	144 (28.4)	147 (36.1)	6 (0.9)
Education				
LT HS	90 (17.8)	62 (12.7)	66 (17.4)	63 (9.5)
HS Grad	171 (33.9)	203 (41.6)	171 (45.1)	154 (23.3)
Some College	135 (26.7)	130 (26.6)	77 (20.3)	181 (27.4)
College Grad	109 (21.6)	93 (19.1)	65 (17.2)	262 (39.7)
Married/Living with Partner	368 (72.6)	265 (52.8)	172 (42.7)	598 (88.2)

^{*} CABG, coronary artery bypass graft; LT, left high school; HS Grad, high school graduate.

Table 3

Ratings of Importance of Various Dissonant Issues by Procedure*

	N (%)					Mean (SD)
	0 Not at All Important	1-3	4-6	7-9	10 Extremely Important	
CABG						
Avoid treatment that might cause memory problems	19 (4.0)	9 (1.9)	58 (12.3)	91 (19.4)	293 (62.3)	8.5 (2.6)
Avoid long recovery time	21 (4.5)	19 (4.1)	101 (21.9)	93 (20.1)	228 (49.4)	7.7 (2.9)
Avoid having an operation where your chest is cut open	103 (22.1)	59 (12.6)	124 (26.6)	53 (11.3)	128 (27.4)	5.2 (3.8)
Lumpectomy						
Avoid radiation hassle	142 (32.5)	62 (14.2)	97 (22.2)	40 (9.2)	96 (22.0)	4.3 (3.9)
Avoid radiation side effects	98 (22.8)	39 (9.1)	111 (25.8)	45 (10.5)	137 (31.9)	5.5 (3.9)
Avoid anxiety of living with cancerous breast	99 (22.2)	58 (13.0)	80 (18.0)	41 (9.2)	167 (37.5)	5.7 (4.1)
Mastectomy						
Keep breast	157 (45.4)	61 (17.6)	75 (21.7)	23 (6.6)	30 (8.7)	2.8 (3.3)
Least invasive	96 (30.5)	41 (13.0)	85 (27.0)	34 (10.8)	59 (18.7)	4.3 (3.7)
Natural-looking breast	154 (47.7)	39 (12.1)	62 (19.2)	31 (9.6)	37 (11.5)	3.1 (3.7)
Prostatectomy						
Avoid urine problems	66 (10.0)	55 (8.3)	190 (28.7)	138 (20.9)	212 (32.1)	6.5 (3.3)
Avoid sexual problems	79 (12.0)	60 (9.1)	219 (33.2)	134 (20.3)	168 (25.5)	6.0 (3.3)
Avoid treatment until needed	191 (30.3)	102 (16.2)	126 (20.0)	72 (11.4)	140 (22.2)	4.4 (3.9)
Avoid surgery	248 (38.8)	146 (22.8)	131 (20.5)	47 (7.4)	67 (10.5)	3.1 (3.4)

* SD, standard deviation; CABG, coronary artery bypass graft.

Table 4

Responses Related to Quality of Decision Making by Procedure *

	CABG (<i>n</i> = 517)	Lumpectomy (<i>n</i> = 507)	Mastectomy (<i>n</i> = 407)	Prostatectomy (<i>n</i> = 685)
Decision Dissonance mean (SD)	7.1 (2.5)	5.3 (3.4)	3.4 (3.0)	5.1 (2.8)
Knowledge About Treatment				
(% Correct) mean (SD)	33.1 (17.3)	57.7 (20.6)	51.4 (21.1)	52.3 (17.2)
<i>n</i> (%)				
0–25	86 (18.6)	15 (3.3)	25 (7.1)	24 (3.6)
26–50	292 (63.1)	135 (29.3)	142 (40.2)	228 (34.6)
51–75	82 (17.7)	258 (56.0)	163 (46.2)	336 (51.0)
76–100	3 (0.6)	53 (11.5)	23 (6.5)	71 (10.8)
Decision Process Summary Score				
mean (SD)	1.3 (1.1)	1.8 (1.2)	1.9 (1.3)	3.2 (1.0)
Confident Right Decision Made <i>n</i> (%)				
0 Not at all	9 (1.8)	5 (1.0)	3 (0.8)	2 (0.3)
1–3	8 (1.6)	6 (1.2)	4 (1.0)	8 (1.2)
4–6	34 (6.8)	29 (6.0)	29 (7.3)	34 (5.1)
7–9	142 (28.5)	140 (28.8)	83 (20.8)	220 (33.1)
10 Extremely	305 (61.2)	306 (63.0)	281 (70.3)	400 (60.2)
Would Make the Same Decision <i>n</i> (%)				
0 Definitely No	8 (1.6)	6 (1.2)	3 (0.8)	14 (2.1)
1 Probably No	23 (4.6)	14 (2.9)	9 (2.3)	40 (6.0)
2 Probably Yes	95 (18.8)	68 (14.0)	69 (17.9)	168 (25.4)
3 Definitely Yes	379 (75.0)	397 (81.9)	305 (79.0)	440 (66.5)
Feel About How It Worked Out <i>n</i> (%)				
0 Mixed-Terrible	46 (9.1)	28 (5.8)	35 (9.2)	98 (14.8)
1 Mostly Satisfied	77 (15.2)	63 (13.1)	92 (24.3)	158 (23.9)
2 Pleased	168 (33.1)	210 (43.7)	144 (38.0)	244 (36.9)
3 Delighted	216 (42.6)	180 (37.4)	108 (28.5)	162 (24.5)

* SD, standard deviation; CABG, coronary artery bypass graft.

Table 5

Predicting Decision Dissonance with the Decision Process Score, Patient Knowledge About Treatment, and Demographic Characteristics^{*}

	Linear Regression Coefficient (95% Confidence Interval)				Total Sample
	CABG	Lumpectomy	Mastectomy	Prostate Cancer	
Decision Process Score	-0.10 (-0.31,0.11)	0.00 (-0.26,0.25)	-0.14 (-0.39,0.10)	-0.30 [‡] (-0.52,-0.07)	-0.14 [‡] (-0.26,-0.03)
Knowledge About Treatment	0.00 (-0.02,0.01)	-0.07 [‡] (-0.09,-0.04)	-0.02 (-0.04,0.00)	-0.01 (-0.02,0.01)	-0.02 [‡] (-0.03,-0.01)
Age	-0.03 (-0.07,0.01)	0.03 (-0.03,0.08)	-0.03 (-0.08,0.02)	0.00 (-0.07,0.06)	0.00 (-0.03,0.02)
Gender	-0.31 (-0.86,0.24)				-0.25 (-0.83,0.32)
Education	-0.51 [‡] (-0.74,-0.29)	-0.20 (-0.53,0.14)	-0.48 [‡] (-0.83,-0.13)	-0.55 [‡] (-0.77,-0.33)	-0.48 [‡] (-0.62,-0.35)
Married/Partner	0.09 (-0.46,0.63)	0.32 (-0.31,0.95)	0.16 (-0.53,0.86)	-0.36 (-1.01,0.29)	0.04 (-0.28,0.35)
Constant[§]	7.15 [‡] (6.92,7.37)	5.26 [‡] (4.96,5.55)	3.58 [‡] (3.25,3.91)	5.07 [‡] (4.86,5.28)	5.33 [‡] (3.89,6.77)

^{*} CABG, coronary artery bypass graft.

[‡] $p < .001$.

[‡] $p < .01$.

[§] All independent variables were centered, thus the constant represents the mean value in each group.

Table 6

Predicting Patient Belief About Confidence That the Right Decision Was Made, Whether They Would Make the Same Decision, and Feeling About How the Treatment Worked Out Based on Decision Dissonance*

	Linear Regression Coefficient (95% Confidence Interval)					
Outcome	Regression Term	CABG	Lumpectomy	Mastectomy	Prostate Cancer	Total Sample
Confidence that right decision was made (0–10 scale)	Decision Dissonance	−0.03 (−0.11,0.04)	−0.08 [‡] (−0.13,−0.03)	−0.17 [‡] (−0.23,−0.11)	−0.14 [‡] (−0.18,−0.09)	−0.11 [‡] (−0.13,−0.08)
	Constant ^{//}	8.85 [‡] (8.67,9.02)	8.96 [‡] (8.80,9.11)	9.13 [‡] (8.96,9.30)	9.03 [‡] (8.92,9.15)	8.92 [‡] (8.80,9.05)
Would you make the same decision? (0–3 scale)	Decision Dissonance	−0.02 (−0.04,0.00)	−0.02 [‡] (−0.04,−0.01)	−0.05 [‡] −0.07,−0.03)	−0.08 [‡] (−0.10,−0.06)	−0.04 [‡] (−0.05,−0.04)
	Constant ^{//}	2.67 [‡] (2.61,2.72)	2.76 [‡] (2.71,2.81)	2.75 [‡] (2.70,2.80)	2.56 [‡] (2.51,2.61)	2.69 [‡] (2.63,2.76)
Feeling about how treatment worked out (0–3 scale)	Decision Dissonance	−0.04 [§] (−0.07,0.00)	−0.04 [‡] (−0.06,−0.02)	−0.10 [‡] (−0.13,−0.07)	−0.10 [‡] (−0.12,−0.07)	−0.07 [‡] (−0.08,−0.05)
	Constant ^{//}	2.09 [‡] (2.01,2.17)	2.11 [‡] (2.04,2.19)	1.86 [‡] (1.77,1.95)	1.71 [‡] (1.63,1.78)	2.08 [‡] (2.01,2.16)

* CABG, coronary artery bypass graft.

[‡] $p < .01$.

[‡] $p < .001$.

[§] $p < .05$.

^{//} All models are adjusted for age, gender, education, and partner status. All independent variables were centered, thus the constant represents the mean value in each group.