

Measurement of Decision Quality in Coronary Artery Disease

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Structured Abstract

Purpose: To develop a conceptual framework and instrument to measure decision quality in patients with stable coronary artery disease (CAD).

Scope: For patients with CAD, clinical equipoise of treatment options suggests that decisions should reflect the preferences of well-informed patients. However, current decision-making practices may not be optimal. An instrument to measure decision quality may help prompt care that is more aligned with patients' values and preferences.

Methods: Development of a preliminary decision quality instrument included 1) literature review examining extant concepts and measures of decision quality to inform development of a conceptual model, 2) analysis of a national survey of Medicare patients undergoing PCI to examine the current state of patients' knowledge and decision-making processes, and 3) development and testing of potential questionnaire items using cognitive interviewing methods.

Results: Analysis of Medicare data demonstrated that patients had poor knowledge but that more complete decision-making processes correlated with increased knowledge. Based on results of the literature review, a conceptual model of decision quality was developed containing three domains: knowledge, patient preferences, and patient communication and involvement. Items reflecting the three domains were generated, reviewed by an expert panel and cognitively tested. The result of the process was a 23-item questionnaire.

Key Words: decision quality, coronary artery disease, survey development, shared decision-making, measurement

Purpose: The main objective of this grant was to develop a conceptual framework and preliminary instrument to measure decision quality in patients with coronary artery disease (CAD).

Scope

Background

For patients with stable coronary artery disease, the main available treatments, optimal medical therapy with or without percutaneous coronary intervention (PCI), do not differ in their efficacy with regard to mortality or prevention of future cardiovascular events. PCI may improve symptoms in the short term but carry the potential of periprocedural complications, such as acute kidney injury, bleeding, myocardial infarction, and the need for emergency bypass surgery. Thus, treatment for stable CAD represents a classic “preference-sensitive” situation, in which the choice between treatment options involves tradeoffs that may be valued differently by the patient and the physician. In such situations, for care to be truly patient centered, patient preference should be a critical input into the decision-making process so that unnecessary and unwanted procedures are not performed. Unfortunately, there is abundant evidence that patients often do not understand that there is more than one therapy option and that current practice fails to educate or engage many patients in the decision-making process.

The most direct evidence that current decision making is not fully patient centered is from surveys of patients after PCI. Most believe they would have died without PCI, even when their physicians believed there was no survival benefit. In addition, after PCI, many patients think they are cured, have little knowledge of their risk factors, and do not adhere to risk factor modification. On the other hand, interventions that increase patient knowledge substantially change the choices patient make compared to usual care (e.g., viewing a decision aid decreases the probability that a patient undergoes PCI by 17%).

There is also marked regional variation in utilization of PCI, which has been interpreted as an indication that physicians are driving care decisions. Data from various sources demonstrate up to 8-fold regional variation in PCI utilization. In addition, not all PCIs appear to conform to accepted indications – up to 12% of PCIs in the National Cardiovascular Data Registry’s CathPCI database did not meet appropriate use criteria, and another 38% were classified as uncertain. This has been taken to indicate absent or incomplete informed discussions. However, there is an important alternative explanation for this variation: it may at least in part reflect regional variation in the preferences of a well-informed patient. This approach is consistent with the Institute of Medicine’s call to make care more patient centered and also has been endorsed by the American College of Cardiology.

However, there is currently no valid, sensitive tool for understanding whether the decision to pursue PCI for patients with CAD is consistent with a well-informed patient’s preference – i.e., a high-quality decision-making process. Without such a tool, we cannot understand the variation in care, identify best practices, or improve the process of decision making so that care can be more closely aligned with patients’ values and preferences. Documenting that patient-centered decision making is taking place is important in ensuring that PCI is being performed in appropriate situations. There are, however, few studies addressing the measurement of decision quality, and existing measures often do not completely evaluate the multiple dimensions of decision quality (e.g., measuring patient satisfaction with the decision but not testing whether patients truly understood the available options). Without an instrument that fully reflects the multiple dimensions of decision quality, it is difficult to assess accurately whether treatment decisions for CAD and other preference-sensitive conditions are reflective of patients’ underlying values and preferences.

In this project, we proposed to identify the necessary elements to capture decision quality and construct a questionnaire to measure the quality of the decision-making process for patients with CAD.

Methods

Study Design, Data Sources, and Measures

Literature Review

Construction of decision quality tool consisted of several stages. First, a literature review of extant decision quality concepts and measures was done, including searching the Medline, EMBASE, CancerLit, CINAHL, ClinPSYC, and AIDSLINE, Science Citation Index, and the Cochrane Library from 1966 to 2007 for eligible articles. MeSH terms included *decision-making, health knowledge, attitudes, and practice, patient satisfaction, decision support technologies, shared decision-making, participatory decision-making, informed decision-making, informed medical decision-making, informed patient decision-making, patient-centered communication, physician patient relations*, along with *quality, process, outcome, instrument, tool, assessment, evaluation, intervention* for searching for decision-making literature, combined with *cardiology, angioplasty, percutaneous coronary transluminal, angina, coronary angiography, coronary artery bypass, and stents*. The reference lists of articles were also searched for additional references, as were conference proceedings focusing on cardiology, internal medicine, physician-patient communication, and medical decision making as well as clinical trials registries. Information abstracted from the articles included study design, population studied, study intervention (if applicable), concept or definition of decision quality, and measures used specifically relating to the process of decision making (e.g., knowledge, values clarification, satisfaction with decision, decisional conflict, symptom and quality of life status, attitudes toward decision making).

Assessment of CAD Patient's Current Decision-making

The second stage of measure development involved assessing CAD patients' current views on the decision-making process to identify important domains to measure. This was done through analysis of data from the Medicare Health Survey, a cross-sectional 77-question survey of 461 randomly sampled Medicare beneficiaries who underwent percutaneous coronary intervention for stable CAD between August and December 2008. Because the focus was on the decision-making process of patients having an elective procedure, patients were excluded if they had been admitted through the emergency department, had either an acute myocardial infarction or unstable angina ICD-9 code associated with the claim for the procedure, or had a claim for a PCI or coronary artery bypass grafting (CABG) during the year prior to the sampled procedure. Survey items covered patient demographics, clinical and symptom data, experience with heart disease, characteristics of the decision-making process, sources of information used in the decision-making process, importance of treatment goals, aversion toward treatment side effects, and outcomes of the decision-making process, including knowledge.

The primary outcome measure was patient knowledge. Patients were asked a series of seven multiple choice questions that asked patients to compare the effects of PCI, CABG, and medical management on longevity, mortality, and symptom relief as well as potential side effects from PCI and CABG. A knowledge score was calculated based on the number of questions the patient answered correctly out of seven and converted to a percentage to facilitate interpretation. Predictors of knowledge included sociodemographic variables – age, sex, education, race, marital status, and self-rated health status – that may relate to a patient's ability to learn information.

We also included variables relating to experience with disease (prior heart attack, stent procedures, bypass surgery), with the underlying hypothesis that prior experience with CAD would lead to a greater amount of knowledge. Information seeking behavior was measured through use of individual sources of information, including physician, family/friends, media, and the internet. The quality of the decision-making process was evaluated through a series of five questions asking the patient to recall a) whether optimal medical therapy alone was presented as an alternative to PCI; b) whether CABG surgery was presented as an alternative to PCI; c) whether or not the physician discussed the reasons to have PCI; d) whether or not the physician discussed reasons not to have PCI; and e) whether the physician asked the patient what he or she wanted to do.

Knowledge was calculated and reported as a percentage, with a range of 0-100%, and knowledge differences were compared using the Student's t-test. Bivariate analyses of all predictors were performed, and we checked the degree of multicollinearity for the independent variables using Pearson's correlations. The association between various predictors and knowledge score was evaluated using multivariate linear regression techniques. Tests were two tailed, and p values <.05 were considered statistically significant. We also checked for interaction between demographic variables (age, sex, education) in the regression and those interaction terms were nonsignificant. All analyses were done using STATA/MP 11.1 (Stata Corp, Cary, NC).

Development of Conceptual Model and Decision Quality Questionnaire

The next stage of measure development was to build a conceptual model of decision quality. We integrated concepts of decision quality from the literature review with results from the analysis of the Medicare Health Survey. We also recruited 21 prominent experts in cardiology, cardiac surgery, decision science, nursing, health services research and a patient expert to assist us in reviewing our conceptual model of decision quality and candidate decision quality survey items. The panel members represented not only a spectrum of disciplines but also a variety practice settings (academic, community, and safety net practices). We also had patient representation on the panel, ensuring that all discussions by the expert panel included the patient's perspective.

Based on our literature review, we chose the most relevant domains and subdomains to measure decision quality for potential inclusion into a conceptual model. Domains and subdomains were presented to the expert panel, who were asked to review the conceptual model as well as candidate domains and subdomains for the proposed decision quality survey and rate them for relevance, usefulness, and importance to decision quality for patients with CAD. We used a modified Delphi process, in which panelists give independent ratings and then, through discussion, form a consensus regarding the topics they were asked to rate. We then compiled responses and during the first conference call, discussed the results of the ratings, and discussed changes to the conceptual model and domains and subdomain.

Once consensus was reached on the conceptual model, an item pool of potential items to include on a patient-reported decision quality survey was generated. Items were drawn from the existing literature and, if no items representing an included domain or subdomain were found, items were generated to fill the gap. The pool of potential items was then presented to the expert panel to rate item importance and relevance, and consensus on items to include in the initial questionnaire was reached using a modified Delphi technique.

Cognitive interviewing was conducted on the questionnaire. We used a "verbal probing" technique, in which respondents answer survey questions, and then the interviewer asks for specific information relevant to the question or to the specific answer given.

A cognitive interview guide was developed and revised accordingly throughout the process based on changes in the questionnaire. Patients with coronary artery disease were recruited from the cardiology clinics and cardiac catheterization lab. All interviews were audiotaped. Changes to the questionnaire were made throughout the cognitive interview process according to feedback from patients and revised questions underwent repeat cognitive testing.

Limitations

For development of the conceptual model, limitations include that our literature review may have missed concepts related to decision quality or that concepts related to decision quality may have emerged after we completed our review. Thus, our conceptual model may not include all possible domains of decision quality. In addition, because the conceptual model was formed based on our interpretation of the literature and input from our expert panel, others may disagree with our definition of decision quality. However, the main domains are concordant with the current understanding of decision quality in the literature.

There are limitations to our study using Medicare Health Survey data. First, all the information collected was via patient self-report, which may not accurately reflect the actual decision-making processes that occurred prior to PCI. However, our results are consistent with prior studies documenting incomplete decision-making processes, particularly in the information transfer involving risk information and options available. Future studies in which patient-physician conversations are either directly observed or taped may be needed to further characterize the decision-making process. Also, this was a retrospective survey at 1 year or more after the procedure, so recall of facts, particularly knowledge, may be worse than at the time that the decision was made. In addition, the survey was conducted on patients who had procedures in 2008. Practice may have changed since then based on new data, although our results are consistent with the most recent survey of patient knowledge about PCI. We had a relatively high response rate; however, we did not collect information on non-respondents, so we do not know whether or not they differed from our respondents. The survey was conducted in English and the sample had limited ethnic and racial diversity. Finally, we only surveyed patients who underwent PCI, so our population may not reflect the general population of patients with stable CAD. Although it is important to measure the knowledge of all CAD patients making a treatment decision, it is especially crucial to capture those patients who underwent procedures, because they may have made a decision without fully understanding the risks and benefits of the procedure.

We had a multi-step development process to develop an initial decision quality questionnaire, including consulting a diverse expert panel (including cardiologists, cardiac surgeons, primary care physicians, decision scientists, nurses, patients) and patients (through representation on the expert panel and the cognitive interviewing process) to ensure comprehensibility and relevance of the questions. However, because we used a convenience sample of patients for our cognitive interviewing process, our sample may not have reflected the general concerns and abilities of all CAD patients. In addition, we used a verbal probing technique to extract information during the cognitive interview. Such techniques may be subject to the bias of the interviewer due to the scripted nature of the probes.

Results

Literature Review

After reviewing searches based on our key words, we reviewed 555 abstracts related to concept or measures of decision quality. Though initially we restricted our search to articles related to coronary artery disease, there were very few relevant articles in this area.

Therefore, we broadened our search to include other conditions and general articles on decision quality as well. We found 32 unique instruments that measured at least one aspect of decision quality, including knowledge, preferences, and communication/involvement. We found 10 instruments that covered more than one dimension of decision quality. The majority of instruments were patient self-report; however, three instruments required direct observation of an encounter and one instrument measured provider attitudes toward the decision-making process. Table 1 lists the results of the review; Table 2 contains a listing of all instruments extracted during the literature review.

Table 1. Measures from literature review

Type of measure	Number found
Knowledge	3
Preferences	2
Communication/Involvement	13
Multidimensional	10
Direct observation	3
Provider attitudes	1

Table 2. Instruments that measure at least one domain of decision quality

Measure name	Measure type	Reference
Genetic testing knowledge questionnaire	Knowledge (objective)	Lerman et al., J Natl Cancer Inst 1997;89(2):148-57
Genetic testing knowledge questionnaire (revised)	Knowledge (objective)	Green et al., Am J Med Genet. 2001;103(1):16-23
CAD knowledge questionnaire	Knowledge (objective)	Morgan et al., J Gen Intern Med 2000;15(10):685-93
Patients Preferences for Angina Treatment	Preferences	Bowling, Qual Saf Health Care 2010;19(6):e9
Preparation for Decision-making scale	Preferences	Bennett et al., Patient Educ Couns 2010;78(1):130-3
Patients' Perceived Involvement in Care (M-PICS)	Communication/Involvement	Smith et al. J Pain Symptom Manage. 2006;32(1):71-81
Autonomy Preference Index	Communication/Involvement	Ende et al. J Gen Intern Med. 1989;4:23-30
Locus of Authority scale	Communication/Involvement	Beisecker and Beisecker, Med Care 1990;28(1):19-28
Deber-Kraetschmer Problem-Solving Decision-Making scale	Communication/Involvement	Deber et al. Arch Intern Med. 1996;156(13):1414-20.
Decision-making and information-seeking scales	Communication/Involvement	Catalan et al. AIDS Care 1994;6(3):349-56
Control Preferences Scale	Communication/Involvement	Degner and Sloan. J Clin Epidemiol.1992;45(9):941-50.
Patient Preferences Tool	Communication/Involvement	Mazur et al. J Gen Intern Med 1997;12(2):114-17
Patient Attitudes and Beliefs Scale	Communication/Involvement	Arora et al. Med Care 2005;43:865-72
Desire for Information scale	Communication/Involvement	Beisecker and Beisecker, Med Care 1990;28(1):19-28
Facilitation of Patient Involvement Scale	Communication/Involvement	Martin et al. Behav Med. 2001;27(3):111-20
Desire for Involvement Questionnaire	Communication/Involvement	Thompson et al. Patient Educ Couns. 1993;22(3):133-40
Information Styles Questionnaire	Communication/Involvement	Cassileth et al. Ann Intern Med. 1980;92(6):832-36
Kranz health opinion survey	Communication/Involvement	Krantz et al. Journal of Personality and Social Psychology 1980;39_5):977-90.
COMRADE scale	Multidimensional	Edwards et al., Patient Educ Couns 2003;50:311-22

Satisfaction with Decision Instrument	Multidimensional	Holmes-Rovner et al. Med Decis Making 1996;16:58
Decisional Conflict Scale	Multidimensional	O'Connor, Med Decis Making 1995;14:25
Shared Decision-making Questionnaire	Multidimensional	Simon et al. Patient Educ Couns 2006;63(3):319-27
Decision Regret Scale	Multidimensional	Brehaut et al. Med Decis Making 2003;281-92
Satisfaction with breast cancer treatment scale	Multidimensional	Lantz et al. Health Serv Res 2005;40(3):745-67
The Decision Evaluative Scales	Multidimensional	Stalmeier et al. Patient Educ Couns 2005;57(3):286-93
Decision Attitude Scale	Multidimensional	Sainfort et al. Med Decis Making 2000;20(1):51-61
A measure of informed choice	Multidimensional	Marteau et al., Health Expect. 2001;4(2):99-108
Decision-making Process Questionnaire	Multidimensional	Morgan et al., J Gen Intern Med 2000;15(10):685-93
OPTION scale	Direct observation	Elwyn et al. Qual Saf Health Care 2003;12:93-99
Elements of Informed Decision Making	Direct observation	Braddock et al. JAMA 1999;282:2313-20
Rochester Participatory Decision-Making Scale	Direct observation	Shields et al. Ann Fam Med. 2005;3(5):423-42
Provider Decision Process Assessment Instrument	Provider attitudes	Dolan JG. Med Decis Making 1999;19(1):38-41

The three standalone knowledge measures tested objective knowledge, either with true/false statements or multiple choice questions. Multidimensional measures that included some assessment of knowledge mainly included perceived knowledge (e.g., "I am satisfied that I am adequately informed about the issues important to my decision"). All objective knowledge questions were condition specific, which may limit their generalizability.

There was one preferences measure specific to preferences of CAD patients (Patient Preferences for Angina Scale, Bowling et al., Qual Saf Health Care 2010;19(6):e9). This instrument contains 18 statements about the various risks and benefits of each treatment option (medical therapy, angioplasty, and bypass surgery) and asks patients to rate their preferences on a Likert scale ranging from strongly agree to strongly disagree.

We found a multitude of instruments to measure patients' preferences for communication and involvement in care, covering such domains as patient autonomy, desire for information, information-seeking behavior, risk disclosure, attitudes and beliefs about level of participation in decision making, and decision-making style. These instruments used a variety of methods to assess patient preferences, including presenting patients with clinical vignettes and card-sorting techniques, along with patient-reported measures.

We found several instruments that measured one or more aspects of decision quality. Instruments not only covered the domains mentioned above (knowledge, preferences for care, preferences for involvement) but also additional domains, such as patient satisfaction, decision regret, and decisional conflict. There was one cardiac-specific measure (Morgan et al. J Gen Intern Med 2000;15:685-93), which rated subjective knowledge and the patient's perceptions of the decision-making process.

Finally, there were several instruments that measured whether shared decision making took place during an encounter based on observation. These instruments asked observers to specifically rate the provider on multiple decision-making behaviors. Assessments using third-party observation may yield different assessments of whether shared decision making took place compared with patient-reported instruments.

However, at the time of the review, we found no direct comparisons between the observer measures and patient-reported measures.

Assessment of CAD Patients' Current Decision Making: Results from Medicare Health Survey

The Medicare Health Survey is a 77-question, condition-specific survey that asked questions about the patient's desired and actual involvement in the decision-making process, influences on the decision-making process (e.g, physician, family, friends, internet), experiences with disease and prior treatments, and factual knowledge about the different treatment options. Surveys from 461 patients who underwent elective PCI were analyzed. We found that patient knowledge overall was uniformly poor, with a mean correct score of 31.1% (SD 19.4%), and the majority of patients answered three or fewer of seven questions correctly. Patients who had prior CABG surgery had slightly higher mean knowledge scores than those who had not (36.7% vs. 29.4%, $p < 0.01$). Less than 1% of patients got six questions right, and no patient answered all the questions correctly. The percentage of patients answering each question correctly varied from 19.1% to 51.2%.

Patients undergoing PCI had variable experiences with the decision-making process. The majority of patients (85%) considered the physician as a very or extremely important source of information. More than 70% of patients reported that their physician discussed with them the reasons to undergo PCI at least a little. In contrast, only 17.6% of patients reported that their physician discussed with them reasons not to undergo PCI. Very few patients (11.7%) reported that physicians discussed managing heart disease without a stent, and only 14.3% of patients recalled that their physician asked their preference for treatment. The vast majority of patients (92.6%) reported having conversations that included two or fewer of the five elements considered important in the decision-making process.

In a multivariate regression model, younger age and a history of prior CABG surgery were significantly associated with having a higher knowledge score. Educational level did not correlate with knowledge scores, nor did the patient's subjective rating of feeling informed. However, patients who recalled that their decision-making process included all five critical elements of decision making, including the physician talking to the patient about the reasons for and against the procedure, discussing alternatives, and asking patient preferences, were significantly more likely to have greater knowledge than those patients who recalled fewer elements of the decision-making process taking place ($p = 0.03$). Results did not change significantly if the knowledge score was limited to the five questions directly related to PCI; the mean correct score was 30.4% (SD 19.5%), and only 25% of patients ($N = 69$) answered more than three questions correctly. Patients with prior CABG still had greater knowledge.

In conclusion, we found that Medicare patients who underwent elective PCI are poorly informed about the benefits and risks of PCI, in part due to incomplete discussions about treatment options and patient preferences for treatment. Thus, patients with CAD making treatment decisions may not be adequately prepared to meaningfully engage in a shared decision-making process. These results suggest that efforts to increase shared decision making in practice should in part focus on improving the patient-physician discussion.

A Conceptual Model of High Quality Decision-Making in CAD

Based on information from the literature review and the Medicare Health Survey, we developed a revised conceptual model. The figure below shows the key elements in and steps to a high-quality decision.

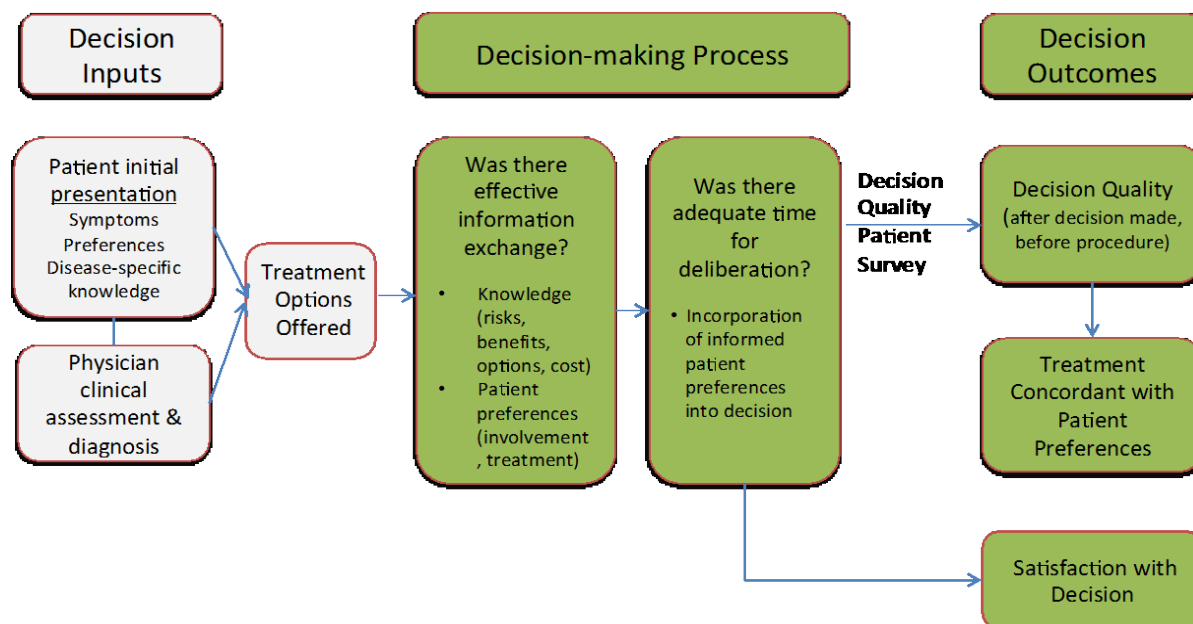


Figure: A conceptual model of decision quality.

In the first step (“decision inputs”), the patient considers his symptoms, history, preferences, and expectations, while the physician gleanes the patient’s specific clinical situation. In the second step (“decision-making process”), the patient and physician share this knowledge with each other and deliberate the decision. The results from Aim 2 have led to a revised conceptual model, depicted in the figure below. Both the patient and physician provide inputs into the decision-making process, including symptoms, preferences, and knowledge from the patient and the clinical assessment from the physician. Once treatment options are offered, the decision-making process should focus on two key aspects: Was there effective information exchange, and was there adequate time for deliberation and incorporation of the patient’s preferences into the decision-making process. If all these steps are accomplished, then a high-quality decision-making process will likely have taken place, which in turn makes receiving treatment concordant with the patient preferences more likely. In addition, there may be some effect on decision satisfaction, though satisfaction may hinge on clinical outcomes rather than a high-quality decision-making process.

From the conceptual model, we concluded that the essential elements of a high-quality decision are that 1) the patient was fully informed; 2) the patient’s preferences were incorporated into the decision; 3) the patient was involved in the decision making to the extent desired; and 4) the decision is implemented.

Development of a Decision Quality Questionnaire

After refining the conceptual model, the expert panel was asked to evaluate the domains for importance, relevance, and appropriateness for inclusion in a measure. We used the following criteria to choose the final set of domains and subdomains to include in the initial decision quality survey: importance to stakeholders (i.e., rated highly among all stakeholder groups), face validity, and feasibility (our goal for the final survey is approximately 10 questions). After reviewing all the data, the following domains were chosen for inclusion: Knowledge, Preferences, Involvement, and Communication.

Decision satisfaction, a domain included in our initial conceptual model, was rejected by the Expert Advisory Panel as parallel to, but not part of, decision quality; the Panel felt that satisfaction could be highly influenced by a good or bad clinical outcome, whereas decision quality should be independent of the clinical outcome (i.e., can have good decision quality even if the patient has a bad clinical outcome like complications). The domains of health beliefs and decision regret were also rated by the panel as not essential to decision quality and therefore were dropped from the survey.

Once the domains were chosen, we wrote candidate survey items based on review of the literature and feedback from co-investigators. Approximately 60 candidate items were generated. The expert panel was next asked to rate the 60 candidate survey items that were developed based on the conceptual model and domains and subdomains that were chosen in the previous round. Panel ratings were submitted via Survey Monkey and then discussed during a conference call. Questions were dropped, added, or refined based on survey results and feedback during the conference call. Based on the revised questions, a draft decision quality survey containing 32 questions was developed and sent to the expert panel again for review and comments. Comments from the third round of review by the expert panel led to further refinements in the survey, resulting in a draft 23-question survey questionnaire. There were nine knowledge questions, eight questions addressing communication, and six questions addressing patient preferences. Table 3 lists the domains, subdomains, and topics included in the questionnaire.

Table 3. Domains and subdomains included in decision quality questionnaire

Domain	Subdomain	Specific topic
Knowledge	Treatment options	Most patients have more than one treatment option
	Treatment risks/benefits	Risks of medical therapy, angioplasty, bypass surgery
		Comparison of risk of repeat procedure among treatment options
		Need for ongoing medical therapy
	Treatment outcomes	Comparison of prevention of mortality and cardiovascular outcomes among treatment options
		Comparison of symptom relief among treatment options
Communication	Risk and benefits	Were risks and benefits discussed in a way that patient understood?
	Treatment options offered	Were clinically appropriate treatment options offered?
	Discussion	Was there sufficient time for discussion?
Preferences	Preference for decision-making role	Patient's preference for decision making: mostly doctor vs shared vs mostly patient
	Treatment preference	Patient's stated preference amongst treatment options
	Cost	Was decision influenced by cost considerations?

Cognitive interviews, which involved debriefing participants for comprehension of the questions and feasibility of administration, were performed on 21 CAD patients. During each interview, patients were asked their thoughts on the questions in terms of both concepts and comprehension. Questions were revised after each set of two to three cognitive interviews, as themes emerged from the data. The cognitive interviews revealed issues with the knowledge and preferences questions in particular. Respondents tended to interpret the knowledge items as either preference or opinion questions and had difficulty with some of the more complex questions.

In terms of the preference questions, respondents had difficulty with the hypothetical nature of the questions and were often unable to separate from their own experience (the majority reported that they received a stent and that there was no choice given to them) to answer what their preference might have been had they had been able to consider alternate options for treatment. Overall, however, respondents felt that the questions were relevant to patients with CAD, felt that the questions were appropriate, and did not find the questionnaire particularly burdensome in terms of time or quality of experience. The result of 21 cognitive interviews was a set of 23 items representing the knowledge, communication, and preferences domains. The questionnaire contained nine multiple choice and true/false items testing core knowledge concepts; eight items about communication between the physician and patient (n=6 questions with Likert scale ratings and n=2 multiple choice questions) and six items about patients' preferences for decision making and for treatment for coronary artery disease.

Conclusions and Implications

The results of this project have demonstrated that decision quality is still a nascent concept in the literature, with various definitions. Thus, there are as of yet no consistent methods for measuring decision quality, particularly if attempting to measure multiple dimensions of decision quality. Our findings demonstrate that a tool to measure decision quality for patients with CAD making treatment decisions is needed, as Medicare patients undergoing PCI demonstrated low knowledge and low participation in the decision-making process. In constructing our conceptual model, we found a consensus amongst our experts that the most important and relevant concepts to decision quality included measuring knowledge, communication, and preferences. Based on the conceptual model, we have developed a 23-item decision quality questionnaire that is ready for pilot testing in a cohort of patients with CAD.

List of Publications and Products

Publications

1. **Lin GA**, Halley M, Rendle KA, Tietbohl C, May SG, Trujillo L, Frosch DL. An effort to spread decision aids in five California primary care practices yielded low distribution, highlighting hurdles. *Health Aff (Millwood)*. 2013 Feb; 32(2):311-20.
2. **Lin GA**, Lucas FL, Malenka DJ, Skinner J, Redberg RF. Mortality in Medicare patients undergoing elective percutaneous coronary intervention with or without antecedent stress testing. *Circ Cardiovasc Qual Outcomes*. 2013 May 1; 6(3):309-14. PMID: 23674314
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5. **Lin GA**, Bynum J, Cosenza C, Lucas A, Reinking C, Sepucha K, Smolderen K, Dudley RA. Patients knowledge and perceptions about the decision-making process in elective percutaneous coronary intervention. *Submitted for publication*.
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7. **Lin GA**. Patient education: One size does not fit all. *JAMA Intern Med*. 2013 Jul 22;173(14):1376. PMID: 23877082
8. **Lin GA**, Dudley RA. Fighting the "oculostenotic reflex". *JAMA Intern Med*. 2014 Oct;174(1):1621-2.
9. **Lin GA**, Bardach NS. Moving Patients from Consultants to Partners in Health Care System Redesign: Achieving Meaningful Engagement. *Jt Comm J Qual Patient Saf*. 2014 Dec;40(12):531-32.
10. **Lin GA**, Harris IS. Can appropriate use criteria lead to appropriate care? *Circ Cardiovasc Qual Outcomes*. 2015 Jan;8(1):4-5.
11. **Lin GA**, Redberg RF. Addressing Overuse of Medical Services One Decision at a Time. *JAMA Intern Med*. 2015 May 18. doi: 10.1001/jamainternmed.2015.1693. [Epub ahead of print]

Abstracts

1. **Lin GA**, Lucas FL, Malenka DJ, Skinner JS, Redberg RF. Mortality in patients undergoing elective percutaneous coronary intervention with or without antecedent stress testing. Poster presentation at the 2011 American Heart Association Quality of Care and Outcomes Meeting.
2. **Lin GA**, May S, Trujillo L, Tietbohl C, Dudley RA, Frosch D. Promoting use of decision support interventions in a large, multispecialty community group practice. Oral presentation at the 2011 International Shared Decision Making Meeting.
3. Hicks K, Cosenza C, Bynum J, Sepucha K, Smolderen K, Dudley RA, **Lin GA**. Information seeking behavior among Medicare patients with stable coronary artery disease. Poster presentation at 2012 Northern California American College of Physicians Regional Meeting and 2012 American Heart Association Quality of Care and Outcomes Meeting.

4. **Lin GA**, Bynum J, Cosenza C, Lucas A, Reinking C, Sepucha K, Smolderen K, Dudley RA. What do patients remember? Knowledge and decision making in Medicare patients undergoing elective percutaneous coronary interventions. Poster presentation at 2012 Resource Centers in Minority Aging Research Annual Meeting and oral presentation at 2012 AcademyHealth Annual Research Meeting.
5. **Lin GA**, Halley M, Rendle K, Tietbohl C, May S, Trujillo L, Frosch D. Increasing patient engagement using decision aids will require both structural and cultural changes in clinical practice. Oral presentation at 2013 International Shared Decision Making Meeting.
6. Halley MC, May S, Rendle KA, Teitbohl C, **Lin GA**, Trujillo L, Frosch D. Implementing decision aids to facilitate shared decision making in clinical care – it takes a team to tango. Oral presentation at 2013 International Shared Decision Making Meeting.
7. Tietbohl CK, Rendle KA, Halley M, May S, **Lin GA**, Frosch DL. Implementation of patient decision support interventions in primary care: the role of relational coordination. Oral presentation at 2013 International Shared Decision Making Meeting.
8. **Lin GA**, Hess E, Matlock D, Magid D, Sepucha K. Challenges to incorporating shared decision making in cardiovascular care. Oral symposium presentation at 2013 International Shared Decision Making Meeting.