

ORIGINAL ARTICLE

Patient Decision Control and the Use of Cardiac Catheterization

患者对决策的参与控制及心导管插入术的使用情况

Control de la decisión del paciente y uso del cateterismo cardíaco

Suzanne E. Mitchell, MD, MS, *United States*; Michael K. Paasche-Orlow, MD, MA, MPH, *United States*; Michelle B. Orner, MPH, *United States*; Sabrina K. Stewart, BA, *United States*; Nancy R. Kressin, PhD, *United States*

Author Affiliations

Department of Family Medicine, Boston University School of Medicine/ Boston Medical Center (Dr Mitchell, Ms Stewart); Section of General Internal Medicine, Boston University School of Medicine/Boston Medical Center (Drs Paasche-Orlow and Kressin); Bedford VA Medical Center, Massachusetts (Dr Orner); Veterans Administration Boston Healthcare System, (Dr Kressin).

Correspondence

Suzanne E. Mitchell, MD MS
suzanne.mitchell@bmc.org

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ABSTRACT

Background: Shared decision-making is a key determinant of patient-centered care. A lack of patient involvement in treatment decisions may explain persistent racial disparities in rates of cardiac catheterization (CCATH). To date, limited evidence exists to demonstrate whether patients who engage in shared decision-making are more or less likely to undergo non-emergency CCATH.

Objective: To assess the relationship between participation in the decision to undergo a CCATH and the use of CCATH. We also examined whether preference for or actual engagement in decision-making varied by patient race.

Methods: We analyzed data from 826 male Veterans Administration patients for whom CCATH was indicated and who participated in the Cardiac Decision Making Study.

Results: After controlling for confounders, patients reporting any degree of decision control were more likely to receive CCATH compared with those reporting no control (doctor made decision without patient input) (54% vs 39%, $P < .0001$). Across racial groups, patients were equally likely to report a preference for control over decision-making ($P = .53$) as well as to experience discordance between their preference for control and their perception of the actual decision-making process ($P = .59$). Therefore, these factors did not mediate racial disparities in rates of CCATH use.

Conclusion: Shared decision-making is an essential feature of whole-person care. While participation in decision-making may not explain

disparities in CCATH rates, further work is required to identify strategies to improve congruence between patients' desire for and actual control over decision-making to actualize patient-centered care.

摘要

背景：共同作决策是以患者为中心的护理的决定性因素。治疗决策过程中缺少患者的参控，可能是心导管插入术（CCATH）使用率持续存在种族差异的原因。截至目前，可证明参与共同决策的患者，是更可能还是更不可能接受非紧急 CCATH 的现存证据仍很有限。

目的：对患者是否接受 CCATH 决策过程中的参与情况同 CCATH 使用率之间的关系进行评估。我们也检验了患者对参控决策的喜好或其实际参与决策的情况是否会因患者的种族不同而有所不同。

方法：我们对 826 名可适用 CCATH 且参加了心脏决策研究的退伍军人管理局患者的数据进行了分析。

结果：刨除混杂因素的影响后，与不参控决策的患者（医生自行决策，不参考患者的意见）相比，在决策过程中有任何程度参控的患者更有可能接受 CCATH（39% 和 54%， $P < 0.0001$ ）。不同种族的患者都同样喜欢参控决策（ $P = 0.53$ ），且其对参控决策的喜好与其对实际决策过程的认识都同样存在不一致（ $P = 0.59$ ）。因此，这些因素并不能解决 CCATH 使用率的种族差异。

结论：共同决策是全科护理的必要特征。既然决策参与并不能解释 CCATH 使用率上的差异，我们还需进一步努力确立一套策略来提高患者参控意愿与实际参控程度之间的一致性，以真正实现以患者为中心的护理。

SINOPSIS

Antecedentes: Tomar una decisión compartida es un punto clave determinante del cuidado centrado en el paciente. La falta de implicación del paciente en las decisiones de tratamiento podría explicar las disparidades raciales persistentes en las tasas de cateterismo cardíaco (CC). Hasta la fecha, existen pocas pruebas que demuestren que los pacientes que participan en la decisión compartida tengan más o menos probabilidades de someterse a un CC que no precisa atención urgente.

Objetivo: Evaluar la relación entre la participación en la decisión de someterse a un CC y el empleo del CC. También examinamos si la preferencia o el compromiso real en la toma de decisiones variaba según la raza del paciente.

Métodos: Analizamos datos de 826 pacientes varones del la Administración de Veteranos a los que se les había indicado someterse a CC y que habían participado en el estudio de toma de decisiones cardíacas.

Resultados: Tras el control de los factores de confusión, los pacientes que notificaron algún grado de control en la decisión tuvieron más probabilidades de recibir CC en comparación con aquellos que no tuvieron ningún grado de control (el médico tomó la decisión sin la intervención del paciente) (54 % frente a 39 %, $P < 0,0001$). Entre grupos raciales, los pacientes tenían las mismas probabilidades de notificar una preferencia por controlar la toma de la decisión ($P = 0,53$) que de experimentar una discordancia entre sus preferencias de

control y su percepción del proceso de toma de decisión real ($P = 0,59$). Por tanto, estos factores no mediaron en las disparidades raciales en las tasas de uso del CC.

Conclusión: La toma de decisiones

compartidas es una función esencial del cuidado integral de la persona. Aunque la participación en la toma de decisiones podría no explicar las disparidades en las tasas de CC, es necesario seguir trabajando

para identificar las estrategias que hagan mejorar la congruencia entre el deseo de los pacientes y el control real sobre la toma de decisiones para actualizar el cuidado dirigido al paciente.

INTRODUCTION

Coronary heart disease (CHD) afflicts an estimated 16 million US adults and is the leading cause of death from cardiovascular disease, accounting for 1 in every 6 deaths among US adults.^{1,2} Death rates from CHD fell approximately 47% between 1980 and 2000 primarily due to the use of emerging medical and surgical treatments.² Determining the desired clinical approach to the diagnosis and treatment of non-emergency CHD requires patients, together with physicians, to make decisions such as whether to undergo invasive procedures, to take medications, or to modify lifestyle approaches.^{2,3} Patient engagement in medical decision-making is often referred to as shared decision-making (SDM). As a hallmark of autonomous care, SDM is viewed by many as a mechanism for attaining holistic care and meeting the multifaceted values and needs of a patient.

Variations in physician practice and disparities in healthcare raise questions about the patient-centeredness of decisions that determine what care is provided to whom and whether it contributes to prevailing health and healthcare disparities. In recent years, the use of invasive cardiac procedures has been closely scrutinized, with evidence of notable racial and gender disparities in procedure rates emerging in the literature.⁴ The underlying reasons for these differences remain unclear even after accounting for potential sources of variation.⁵ Available literature suggests that minority patients, particularly blacks, are more likely to report mistrust of the healthcare system and more likely to refuse invasive cardiac procedures,⁶ but these results have been contradicted by other researchers.⁷ Kressin et al conducted the Veterans Administration (VA) Cardiac Decision Making Study (CDMS), investigating the influence of patient preferences on disparities in cardiac catheterization (CCATH) rates. The authors found that after controlling for potential confounders, disparities in CCATH rates could not be explained by patient preferences; however, the patient's level of participation in decision-making about CCATH use was not taken into account.⁸

Few data currently exist to demonstrate the effect of patient decision involvement on actual treatment utilization by patients. Herein, we report findings from a secondary analysis of data from the Cardiac Decision Making Study,⁷ examining the association between patient control over the decision to undergo CCATH and the use of CCATH by patients with CHD. In addition, we explored the possibility that differences in patient decision involvement would corre-

late with racial disparities in CCATH rates in this study population.

METHODS

Data from the Cardiac Decision Making Study conducted by Kressin et al from August 1999 to January 2001 were included in a secondary analysis.⁷ While this dataset was compiled when indications for performing CCATH were different from those that determine clinical practice today, racial disparities in CCATH use persist, and we are yet to understand the mechanism driving such variation. This dataset contains considerable individual-level data, which enables an investigation of the effect of patient involvement in decision-making on CCATH rates while controlling for many factors that are known to mediate disparities in procedure use. Additionally, SDM has yet to be widely implemented in healthcare settings, and understanding the relationship between SDM and procedure use remains valuable as evidence suggests that SDM can lower healthcare costs by reducing the use of invasive procedures.⁹⁻¹¹

Cardiac Decision-making Study Setting and Participants

CDMS was a prospective observational cohort study of VA patients from 5 VA medical centers across the United States (Pittsburgh, Pennsylvania; Houston, Texas; Atlanta, Georgia; St Louis, Missouri; Durham, North Carolina), designed to study whether patients' attitudes and beliefs or physician assessments and perceptions of patients were related to racial disparities in the use of invasive cardiac procedures.⁷ Patients were eligible for enrollment if they had a positive nuclear imaging study indicating reversible cardiac ischemia, were a veteran, black or white, English speaking, and cognitively intact. Exclusion criteria included being enrolled in another clinical trial, having any revascularization or heart transplant within 6 months of the positive nuclear imaging study, being of a race that was not black or white, or having already received CCATH. Following enrollment, subjects were asked to complete a survey. Each patient's physician was also asked to complete a survey to indicate the overall clinical assessment of the patient, the physician's perception of the decision-making process regarding CCATH, and the physician's perception of certain patient characteristics such as the likelihood of adherence behaviors. Clinical and treatment variables were recorded from medical records. Of 1045 subjects enrolled, data on medical decision-making preferences were available for

826 subjects, which became the analytical dataset for the current study. The original study was approved by the human studies subcommittees of the 5 VA medical centers where data collection took place and by the study coordinating center site. This secondary analysis was approved by the Institutional Review Board of Boston University School of Medicine.

Measures

The primary outcome measure was receipt of CCATH confirmed by the medical record. The primary independent variable was patient self-reported control over the decision to undergo CCATH, measured using a single survey item adapted from Degner's Controlled Preferences Scale.¹² The Controlled Preferences Scale has been adapted to assess an individual's perceived role in medical decision-making and is rooted in the theory that there is a continuum of desired control over the decision-making process among patients. Respondents chose 1 response from a total of 5 response items following the statement, "After the stress test results were presented to you, how did you and your doctor(s) decide what to do next? Please tell me which statement best describes how the decision was made." The respondent chose 1 of the following response items: (a) You left all decisions regarding your treatment to your doctor(s); (b) Your doctor(s) made the decision about which treatment to use, but he/she seriously considered your opinion; (c) Your doctor(s) and you shared the responsibility for deciding which treatment is best for you; (d) You made the final decision about treatment but seriously considered your doctor(s) opinion; or (e) You made the final decision about treatment which you will receive. A similar question was posed in the questionnaire for physicians but was reworded to refer to the patient instead of the doctor to ascertain their perspective on how the decision had been made. In order to elicit patients' preferences for control over medical decision-making processes more generally, the patient was asked, "How do you prefer to make medical decisions?" (same response options). From these responses, patient decision control was dichotomized into two categories, decision control (which includes response item b, c, d, and e), or no decision control (response item a only), based on the rationale that responses b, c, d, and e represent increasing degrees of patient control over decision-making.

Other variables considered were demographic, clinical, and physician assessments of patients' likelihood of benefitting from CCATH. Clinical variables included the presence or absence of a history of hypertension, diabetes, angina, renal dysfunction, lung disease, prior revascularization, prior myocardial infarction, presence of angina symptoms, and whether the patient was on maximal medical treatment for CHD, derived from chart review. Continuous measures of frequency and severity of current angina symptoms were assessed using the patient-reported

Seattle Angina Questionnaire.¹⁰ Demographic variables included age (<65, 65-75, >75 y); income; years of education (<12, high school graduate, >12 y); marital status (married, not married); and race (white or black). We did not include insurance status or employment variables in our analyses given that the VA healthcare system treats all veterans regardless of enrollment in private insurance or employment status. The physician's assessment variables included the patient's probability of having CHD (<25%, 50%-75%, >75%) and the importance of that patient receiving CCATH (benefit>risk, equivocal, risk>benefit or missing).

Statistical Analysis

Bivariate analyses were conducted to examine the associations between demographic, clinical, and physician assessment variables, (which had been determined *a priori* to be independently related to getting CCATH based on available literature)⁴ and whether patients had control over the decision to undergo CCATH (control vs no control).

Chi-square tests were used for categorical variables and *t*-tests for continuous variables. Age and years of education were treated as categorical variables. Marital status, race, and all clinical variables (eg, history of hypertension, yes or no) were treated as dichotomous variables except for the Seattle Angina Questionnaire scores, which were treated as continuous. We created a "missing" response category to account for missing physician assessment data because only 670 subjects had physician assessment data. The patient's reported preference for control over medical decision-making was also dichotomized as preference for control vs no preference for control, using the same rationale as for the variable measuring patients' experience of control over the decision to undergo CCATH.

Logistic regression was performed to assess the association between patients' perceptions of their control over the decision-making process regarding CCATH and their likelihood of receiving CCATH, adjusting for possible confounders. A statistical significance level of $P=.10$ was used for the stepwise regression. Interaction terms were tested to evaluate potential interactions between patient decision involvement and race and importance of CCATH and race. Two-sided significance tests were used. *P* values of less than .05 were considered to indicate statistical significance. All data were analyzed using SAS version 9.1.3 (SAS Institute Inc, Cary, North Carolina).¹²

RESULTS

Descriptive statistics of the demographic characteristics of the study cohort showed that 57% of subjects were less than 65 years old, the cohort was predominantly non-Hispanic white (78% vs 22% non-Hispanic black), 62% had high school education or higher, 59% were married, and 66% had household income between \$10 000 and \$50 000 annually. Thirty-

Table 1 Participants' Sociodemographic, Clinical, and Physician Factors by Patient Decision Involvement

Patient Characteristics	Patient's Perceived Decision Involvement (PDI)			P value
	All Patients	No PDI n = 397 (48%)	Moderate to High PDI n = 429 (52%)	
Race				.53
White	650 (79%)	308 (78%)	342 (80%)	
Black	176 (21%)	89 (22%)	87 (20%)	
Age, y				<.001
<65	470 (57%)	201 (51%)	269 (63%)	
65-75	277 (33%)	149 (38%)	128 (30%)	
>75	79 (10%)	47 (12%)	32 (7%)	
Education				<.001
<12 y	228 (28%)	130 (33%)	98 (23%)	
≥12 y	598 (72%)	267 (67%)	331 (77%)	
Married, % yes	485 (59%)	244 (61%)	241 (56%)	.32
Income				.75
< \$10000	199 (24%)	102 (26%)	97 (23%)	
\$10000-\$50000	548 (66%)	261 (66%)	287 (67%)	
\$50000-100000	28 (34%)	10 (2%)	18 (4%)	
Missing or >\$100000	51 (6%)	24(6%)	27 (6%)	
Prior revascularization (yes)	256 (31%)	112 (28%)	144 (34%)	.04
Prior myocardial infarction (yes)	268 (32%)	126 (32%)	142 (33%)	.35
Hypertension (yes)	633 (77%)	310 (78%)	323 (75%)	0.62
Angina (yes)	541 (65%)	244(61%)	297 (69%)	0.02
Congestive heart failure (yes)	140 (17%)	58 (15%)	82 (19%)	0.19
Diabetes (yes)	255 (31%)	120 (30%)	135 (31%)	.76
Lung disease (yes)	198 (24%)	106 (27%)	92 (21%)	.23
Renal dysfunction (yes)	92 (11%)	38 (10%)	54 (13%)	.32
Maximal medical therapy (yes)	304 (37%)	140 (35%)	164 (38%)	.47
Physician's perceived importance of CCATH				<.001
Benefit > risk	317 (38%)	124 (31%)	193 (54%)	
Equivocal	136 (16%)	72 (18%)	64 (15%)	
Risk > benefit	200 (24%)	123 (31%)	77 (18%)	
Missing	173 (21%)	78 (20%)	95 (22%)	
Probability of CHD				.15
0-50%	105 (13%)	63 (16%)	42 (10%)	
50-75%	165 (20%)	84 (21%)	81 (19%)	
75-100%	379 (46%)	170 (43%)	209 (49%)	
Missing	177 (21%)	80 (20%)	97 (23%)	
Received CCATH (yes)	384 (46%)	153 (39%)	231 (54%)	<.0001
Patient PDI				<.0001
Moderate to high PDI	700 (85)	296 (42%)	404 (58%)	
No PDI	125 (15)	101 (81%)	24 (19%)	

Abbreviations: CCATH, cardiac catheterization; CHD, coronary heart disease.

Table 2 Adjusted Odds Ratios for Receiving CCATH Among Patients Who Reported Moderate to High Patient Decision Involvement Participation in Decision Making (vs No Involvement) Following Positive Cardiac Stress Testing

Model	Variables	Odds Ratio	95% CI	P value
Model 1	Patient Perceived Decision Involvement (PDI) Moderate to High PDI vs No PDI	1.9	1.4, 2.5	<.001
Model 2	PDI + Race (White vs Black)	1.9	1.4, 2.5	<.001
Model 3	PDI + Race + Sociodemographics ^a	1.9	1.5, 2.6	<.001
Model 4	PDI + Race + Sociodemographics + Clinical ^b Variables	1.9	1.4, 2.6	<.001
Model 5	PDI + Race + Sociodemographics + Clinical Variables + MD assessments ^c	1.5	1.1, 2.2	.02

^a Sociodemographic variables included in regression analysis were income, education, and marital status.

^b Clinical variables included in regression analysis were presence or absence of a history of hypertension, diabetes, angina, renal dysfunction, lung disease, congestive heart failure, prior revascularization, prior myocardial infarction, presence of angina symptoms, and whether the patient was on maximal medical treatment for CHD, derived from chart review.

^c MD assessments included likelihood of CHD and likely benefit of CCATH.

Abbreviations: CCATH, cardiac catheterization; CHD, coronary heart disease; MD, medical doctor.

one percent had a history of prior revascularization, and most (65%) had angina symptoms. As demonstrated in the original CDMS, a racial disparity in the proportion of patients receiving CCATH in this subsample of the entire cohort was evident: 49% of non-Hispanic white vs 36% of blacks received CCATH.⁸

Patient Decision Control Experiences

Of the 826 subjects, 397 (48%) patients reported that the doctor made the decision regarding whether or not to pursue CCATH alone (choice a), and 429 (52%) reported some degree of control over the decision making process: choice b=12% (doctor made decision with patient input); choice c=24% (shared decision); choice d=10% (patient made decision with doctor input); and 6%, patient made the decision alone (choice e). Table 1 presents sociodemographic and clinical characteristics by patients' self-reported actual decision-making experience.

Compared with subjects reporting no control over decision-making, subjects who reported control over decision-making were more often younger than 65 years old (63% vs 51%, $P<.001$), had completed more than 12 years of education (77% vs 67%, $P<.001$), reported angina symptoms (69% vs 61%, $P=.02$), had prior revascularization (34% vs 28%, $P=.04$), and received CCATH (54% vs 39%, $P<.0001$). Non-Hispanic white patients (41%) as well as patients reporting control over decision-making (54%) were more likely to be perceived by physicians as benefitting from CCATH compared to black patients (26%) or those reporting no control over decision-making (31%).

Preferences for Control Over Decision-making

Overall, 82% ($n=700$) of study patients reported a preference for partial or total control over decision-making. Of these, 17% wanted the physician to decide with some input from themselves; 37% wanted a fully shared decision; 22% preferred to make their own decision with advice from the physician, and 6% preferred to

make the decision alone. Among the patients who preferred to have at least some control over medical decision-making, only 58% reported actually participating in the medical decision about whether or not to undergo CCATH. Non-Hispanic whites and black patients were equally likely to report a preference for control over medical decision-making ($P=.53$) as well as to experience discordance between their preference for control over decision-making and their perception of the actual treatment decision-making process ($P=.59$).

Role of Shared Decision-making Experiences in Likelihood of Receiving Cardiac Catheterization

Results of our logistic-regression analyses are presented in Table 2. The unadjusted odds for receiving CCATH (Table 2, Model 1) among patients reporting control over decision-making was significantly higher than for patients reporting no decision control (OR: 1.9; 95% CI: 1.4, 2.5; $P<.001$). After adjustment for sociodemographic and clinical variables, the odds of receiving CCATH were unchanged for patients reporting control over decision-making compared with patients who reported no decision control (odds ratio [OR]: 1.9; 95% confidence interval [CI]: 1.4, 2.5; $P<.001$). Following further adjustment for physician assessment variables (Table 2, Model 5), the association between patient control over decision-making and receiving CCATH was attenuated but still significant (OR=1.5, 95% CI: 1.1, 2.2; $P=.02$). We tested interaction terms between race and decision involvement, and race and the importance of CCATH and found no effect modification by race.

DISCUSSION

Our study indicates that patient control over decision-making is associated with an increased likelihood of receiving a CCATH among male VA patients with reversible ischemic cardiac disease, after accounting for relevant potential confounders that have previously been shown to be associated with getting a

CCATH.³ Patients' reported control over decision-making and preference for decision control did not vary by race and did not, therefore, help explain the previously reported racial disparity in rates of CCATH in this dataset. Furthermore, our study found significant discordance between patients' preference for and perceived control over decision-making that transcended race.

Our findings might be explained in several ways. Patients may be more willing to accept the risks associated with an invasive procedure when they feel well informed and engaged in medical decision-making with the treating physician.^{13,14} By involving their patients in the decision-making process, physicians may have gained the trust of their patients, leading to higher acceptance rates of CCATH procedures.¹⁵ Our study found that patients who participated in the decision-making process were perceived by their physicians to be more likely to benefit from CCATH than patients who had no involvement in the decision-making process. It was not possible, however, to assess the order of causation, whether a patient's involvement affected the physician's assessment of their likelihood of benefitting from CCATH or if physicians involved patients who they perceived would benefit from CCATH in the treatment decision for this procedure. In addition, physicians may be more likely to engage in an SDM process when recommending a procedure associated with moderate or higher risk of harm or complication such as CCATH, while adopting a more directive or paternalistic approach when recommending the relatively lower-risk medical management option for CHD treatment.^{14,16} Other evidence, however, challenges such findings and obscures our understanding of why patient decision involvement might lead to a higher likelihood of CCATH receipt. In response to the evidence that patients who participate more in decisions regarding their treatment have better subsequent health outcomes,¹⁷⁻¹⁹ numerous decision support tools have been developed for clinical use to help patients discuss their treatment options with physicians more fully and make choices that meet their needs and values.²⁰ In 2000, Morgan et al explored the use of a video decision aid to help patients with ischemic heart disease make treatment decisions. The investigators found that patients who used the decision aid were more knowledgeable and underwent fewer interventional therapies and concluded that informed patients less frequently choose risky interventional therapies than those who are not informed about treatment options.²¹ This finding raises the question about whether the CDMS participants were truly informed and engaged in an SDM process or had simply consented to the physician's recommendation for CCATH. Further research in the contemporary setting is required to clarify the link between patient control over decision-making and the use of invasive clinical services such as CCATH.

Participants' reported perceptions of their actual

decision involvement, whether they had control or not, did not explain the racial difference in CCATH rates, nor did patients' preference for decision control differ by race. This suggests that differences in CCATH rates are mediated by other factors such as patients' treatment preferences, clinical factors, or comorbidities that may not have been adequately accounted for in our statistical analysis. Whittle et al studied the CCATH results of patients from the CDMS study who underwent CCATH procedures.²² They found that although physicians' pre-CCATH estimates of the patients' likelihood of CHD were similar between black and non-Hispanic white patients, the black patients were found to have less coronary obstruction and significantly less severe CHD than non-Hispanic white patients, suggesting that physicians overestimated the likelihood of CHD in black patients. Thus, it may be that the racial differences in CCATH rates from our analysis of CDMS data are clinically warranted and that medical decision-making experiences among VA patients are not influenced by race.

A lack of congruence between patients' preferred and actual level of decision control is not an isolated finding, however. Other studies have similarly shown that patients prefer a greater level of control and participation than they are able to exercise.²³ No attempts have been made previously to understand whether congruence differed by race, nor whether it affected invasive procedure use.²³ Our findings indicate that, rather than an SDM process emphasizing the patient's values and goals of care, the physician often took control of the decision. Consequently, it may be necessary to examine and investigate how physicians may create and perpetuate racial disparities in procedure use.

The effect on CHD outcomes or treatment utilization is understudied, and the available research is limited due to inconsistent constructs of SDM, decision quality, and decision outcome measures. When Morgan et al explored the use of a video decision aid for helping patients with ischemic heart disease make treatment decisions,²² the study was limited in generalizability due to a paucity of female participants and unreported racial diversity of the study cohort. Another study examining concordance in perceived and preferred decision involvement among VA congestive heart failure patients found high levels of passive decision-making concordance among this elderly, white, male cohort. However, no correlation with treatment decision outcomes was reported. Evidence indicates a trend in less active participation in medical decision-making and information-sharing encounters among racial/ethnic minorities. Gordon et al studied interactions between patients and physicians following CCATH procedures.²⁴ The investigators found that on average, patients and physicians rarely engaged in communicative behaviors that encouraged the patient to be more involved in the decision-making process, and physicians spent less time counseling minority patients.²⁴

A major strength of the current study is the unusually comprehensive dataset and the broad range of covariates available for analyses. Additionally, our study focuses on a specific intervention and sociocultural context, a context in which financial barriers to care—a prominent challenge to holistic care—are minimized,²⁵ which enables a more thorough analysis of racial disparities in access to decision control. Although this study examines a specific medical decision, the nuanced understanding generated can be used in combination with other findings related to SDM to offer commentary on the structural barriers to the provision of patient-centered care. However, several limitations should be noted. First, we do not know the causal ordering of the associations we report. It is not known whether patients who assert control over decision-making communicate with physicians in such a way that increases the physicians' impression of the likely benefit of CCATH or if physicians are more likely to share decision-making power with patients they confidently feel will benefit from CCATH. Second, there is potentially limited validity to the self-report measure used to assess patients' participation in medical decision-making, Degner's Control Preferences Scale.⁹ Although Degner's scale has been validated as a measure of patients' level of decision control, other research indicates that patient-reported decision control may not accurately reflect true SDM when compared to expert assessment of an audio-recorded clinical encounter.²⁶⁻²⁸ Further, Degner's scale does not indicate what the patient understands or believes to be "shared" in their decision-making process.²⁹ Despite reported inconsistencies between patients' perceptions of their control over decision-making and their actual decision control, Degner's decision control construct is considered a valid measure and is widely used in research to assess SDM, allowing for comparison of our results with other research findings.⁹

A final potential limitation is that in the years since the CDMS was conducted (1999-2001) medical practice has evolved such that fewer invasive cardiac procedures are now occurring in the United States. Indeed, evidence suggests that this trend was already occurring at the time of the CDMS trial, with even fewer procedures occurring in the VA compared with non-VA healthcare systems at that time.³⁰ Despite this downward trend in procedure use, racial disparities in CCATH rates persist, and they remain unexplained. This dataset enabled our analysis to control for extensive variables known to drive disparities in procedure rates. Meanwhile, evidence indicates that the absence of SDM in clinical encounters is unchanged; true SDM is still uncommon given the many health system barriers faced by practicing physicians.³¹⁻³² The literature on how patient decision control relates to the use of invasive procedures, particularly those associated with CHD, remains limited.³³ Our findings contribute to this field of study by examining how race correlates with patients' perceptions of their own decision con-

rol and by demonstrating a significant relationship between patients' perceptions of decision control and the use of non-emergency invasive procedures.

CONCLUSIONS

Our study finds that patients' experience of control over decision-making is significantly associated with receiving a CCATH; however, because preference for and perceived control over decision-making did not vary by race, this finding does not explain the racial disparity in rates of CCATH found in this study cohort. The effect of SDM on CHD outcomes or treatment utilization is understudied, and the available research is limited, due in part to inconsistent constructs of SDM, patient decision control, and decision outcome measures in the literature. Future studies should focus on identifying strategies to improve the congruence between patients' desire for and actual control over decision-making to achieve patient-centered care.

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