Chronic Illness and Patient Satisfaction

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Objective. To examine how the relationship between patient characteristics, patient experience with the health care system, and overall satisfaction with care varies with illness complexity.

Data Sources/Study Setting. Telephone survey in 14 U.S. geographical areas.

Study Design. Structural equation modeling was used to examine how relationships among patient characteristics, three constructs representing patient experience with the health care system, and overall satisfaction with care vary across patients by number of chronic illnesses.

Data Collection/Extraction Methods. Random digital dial telephone survey of adults with one or more chronic illnesses.

Principal Findings. Patients with more chronic illnesses report higher overall satisfaction. The total effects of better patient–provider interaction and support for patient self-management are associated with higher satisfaction for all levels of chronic illness. The latter effect increases with illness burden. Older, female, or insured patients are more satisfied; highly educated patients are less satisfied.

Conclusions. Providers seeking to improve their patient satisfaction scores could do so by considering patient characteristics when accepting new patients or deciding who to refer to other providers for treatment. However, our findings suggest constructive actions that providers can take to improve their patient satisfaction scores without selection on patient characteristics.

Key Words. Chronic disease, patient assessment/satisfaction, *LISREL*

Many studies have examined the relationship between patient characteristics and satisfaction with care, or satisfaction with a specific visit for care. However, the literature on how illness complexity is related to overall satisfaction with care is much more limited. In this article, we use data from a national survey of people with different numbers and types of chronic illnesses to examine relationships between patient characteristics, constructs relating to patient experience with the health care system, and overall satisfaction with care. We focus on how these relationships vary with number of chronic illnesses. In addition to improving our basic understanding of how people with chronic,

sometimes multiple, medical conditions view their care, our results are relevant to performance measurement, public reporting, and pay-for-performance initiatives.

BACKGROUND

In the past decade, there has been growing interest in the United States and internationally (Groenewegen et al. 2005) in measuring consumer satisfaction with care with the IOM's Crossing the Quality Chasm identifying patient satisfaction as one component of quality. Consumers now have access to a variety of comparative reports of provider quality (Scholle et al. 2009; Christianson et al. 2010), with a growing number of reports containing measures of consumer satisfaction with care (Friedberg et al. 2010). The Robert Wood Johnson Foundation's (RWJF) Aligning Forces for Quality initiative (Painter and Lavizzo-Mourey 2008) encourages community health care alliances to include measures of satisfaction with care in their public reports. In addition, services such as Angie's List report consumer ratings of health care providers accompanied by consumer comments (Freudenheim 2009). Consumer satisfaction metrics also have a potential role in calculating rewards for provider performance (P4P) and in constructing "tiered" benefit designs that encourage consumers to seek care from higher ranking providers.

Some policy analysts have expressed concern about possible unintended consequences of provider performance reporting (Werner and Asch 2005). In particular, providers might avoid "hard to manage" patients because low scores on technical measures of quality might translate into lower rankings in public reports and less P4P compensation. Patient avoidance could take the form of referring clinically difficult patients to other providers or declining to accept clinically complex new patients. There is little empirical evidence to support or refute the notion that providers engage in these types of behaviors, but research suggests that eliminating even a small number of diabetes patients with low scores from a practice denominator can improve average performance scores (Hofer et al. 1999).

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Two recent studies suggest patients in relatively poor health do not have lower scores on technical quality measures (Chang et al. 2006; Petersen et al. 2009). However, if clinically complex patients are less satisfied with their care, providers may have an incentive to avoid them nevertheless. Given the growing interest in the use of patient satisfaction measures for provider ranking and remuneration, research improving our understanding of the ways in which clinical complexity influences satisfaction with care clearly has practical, as well as theoretical, importance.

PREVIOUS WORK

Recent research has investigated the relationship between measures of clinical complexity for people with chronic illnesses and various outcome measures, including utilization of services, cost of care, barriers to self-care, psychological distress, physician communication, and technical quality of care (see, for instance, Parchman, Hitchcock Noël, and Shuko 2005; Fortin et al. 2006; Higashi et al. 2007; Meduru et al. 2007; Condelius et al. 2008; Fung et al. 2008a; Teh, Reynolds, and Cleary 2008). Other studies have examined the relationship between care experience and a general measure of health status (see, e.g., Keenan et al. 2009) as well as determinants of self-reported patient satisfaction, where satisfaction is measured in the context of a specific physician (Aspinal et al. 2003; Chang et al. 2006; Fung et al. 2008a; Dowd et al. 2009; Salisbury, Wallace, and Montgomery 2010). However, we found only three studies that directly addressed the relationship between satisfaction with health care services overall and presence of chronic illnesses, or illness complexity; all were carried out in the Veterans Administration (VA) health care system with male, older, relatively low-income patients.

Fan et al. (2005) used mail questionnaires to construct two summary measures of satisfaction and estimated their models separately for individuals with ischemic heart disease, chronic obstructive pulmonary disease, and diabetes. For each disease, self-reported ability to cope with conditions was more strongly related to patient satisfaction than was disease severity. They concluded "Further improvements in patient education and self-management may lead to improved satisfaction and quality of care" (p. 452).

Werner and Chang (2008) used data collected by survey and chart review to examine the relationship between provider performance measures and satisfaction with care, emphasizing the role of clinical complexity. As a first step, the authors employed hierarchical logistic regression techniques to

estimate the relationship between clinical complexity and provider performance; in a second stage, they estimated the relationship between overall provider performance and satisfaction. They found that better performance was associated with greater satisfaction with care for patients with higher illness complexity. Petersen et al. (2009) examined the relationship between quality of care and illness complexity for hypertensive patients in the VA. Using chi-square analysis, they found no relationship between presence of different comorbid conditions and patient assessments of quality of care.

Our analysis adds to the limited existing literature in several ways. We use survey data collected from a more representative general population, screened for the presence of chronic illness. Also, these individuals received care from community providers, where treatment settings and expectations may differ from the VA. Therefore, our findings have greater relevance for public reporting and the design of P4P programs in the private sector. Our analysis is grounded in a conceptual framework that allows us to explore the impact of illness complexity on reported satisfaction with care through different pathways, making our results potentially more valuable in assessing unintended consequences and how they might arise, and in shedding light on what providers might do to increase patient satisfaction.

CONCEPTUAL FRAMEWORK

Our conceptual framework is shown in Figure 1. Following other studies, we assume that overall satisfaction with care received is a function of the difference between expected care experience and that which actually transpired; the greater the difference between expected and actual experience, the lower the reported satisfaction with care. Many studies have focused on measuring the impact of the difference between expected and realized care on satisfaction using before/after survey data tied to a specific patient visit, with mixed results (Rao, Weinberger, and Kroenke 2000). We take a different approach; our measure of satisfaction with care is not tied to a specific visit, nor do we have survey-based measures of the expected experience of patients prior to a visit. Following past research, we assume that expected care experience will be a function of consumer sociodemographic characteristics and disease complexity (Jackson, Chamberlin, and Kroenke 2001; Fan et al. 2005; Chang et al. 2006; Keenan et al. 2009). Controlling for these factors, we hypothesize that reported consumer satisfaction with care depends on (1) perception of the quality of interaction with providers,

Figure 1: Conceptual Framework

Note. Latent endogenous characteristics are measured through survey questions detailed in Table 1.

(2) perception of provider support for self-management of the illness(es), and (3) understanding of medical conditions and treatment options. Survey questions used to capture these constructs are paraphrased in Table 1. We hypothesize that the first two constructs can affect satisfaction directly and also through other constructs.

Quality of Interaction with Provider

Studies of the determinants of overall patient satisfaction often include measures that reflect patient assessments of provider communication skills and “humanistic” qualities (see Fan et al. 2005). The hypothesis is that patients will view their overall care experience more favorably if providers are respectful, good listeners, and take the time to solicit concerns and answer questions. Findings from research studies that examine this relationship in isolation generally support the hypothesis. Furthermore, Fung et al. (2008b) found that patients with more complex illnesses assigned “modestly” lower ratings to provider communication skills.

Provider Support for Self-Management of Illness

Previous studies have investigated the relationship between patient satisfaction scores and technical measures of quality, most common process of care measures (e.g., Hitchcock Noël et al. 2007; Werner and Chang 2008).

Table 1: Data Summary

	Percent Missing (%)	Means (Binary, Yes = 1) and Distributions (Multinomial) after Imputation, %
<i>Complexity of health status</i>	0.0	
1 chronic condition		58
2 chronic conditions		32
3 or more chronic conditions		10
<i>Patient's satisfaction with overall care</i>		
Patient's satisfaction with care in the past 12 months from all providers; 10-point Likert scale (SROvCare)	0.8	
≤ 7		22
8		25
9		20
10		34
<i>Patient perception of quality of interaction with provider</i>		
Provider explained things in a way patient could understand (Explain)	1.5	48
Provider spent enough time with patient (EnTime)	1.3	44
Provider treated patient with respect (Respect)	1.1	57
<i>Patient perception of provider support for self-management of illness</i>		
Providers helped set specific goals for diet (DietGoal)	10.8	73
Providers helped set specific goals for exercise (ExerGoal)	9.6	68
Provider taught patient to self-monitor condition (Monitor)	6.0	77
Providers or insurance called patient to see how they were doing (PhoneCal)	0.3	36
Patient received a letter reminding them they were due for an appointment (RemndLtr)	0.3	68
Patient received materials explaining how to care for condition (RecdMat)	0.8	52
Providers arranged for patient to access outside resources to improve care (OutsRes)	0.0	34
<i>Patient understanding of medical condition and treatment options</i>		
Patient knows what each prescription does (WhRxDoes)	1.8	37
Patient is confident they know when to get help and when to self-treat (GetHelp)	0.8	36

continued

Table 1. *Continued*

	<i>Percent Missing (%)</i>	<i>Means (Binary, Yes = 1) and Distributions (Multinomial) after Imputation, %</i>
Patient is confident they can follow through with care at home (HomeCare)	0.5	37
Patient understands nature and causes of condition (Causes)	1.0	34
Patient knows the treatment options for their condition (Options)	1.5	25
Patient knows how to prevent further problems with their condition (Prevent)	1.2	25
<i>Exogenous variables</i>		
Market	0.0	**
Age category (AgeCateg)	0.9	
<35		3
35–44		8
45–54		19
55–64		28
65–74		22
75+		20
Female	0.0	65
Income	11.4	
<20 K		32
20–39 K		26
40–74 K		25
75 K+		16
Race	0.0	
Hispanic		7
Black, Non-Hisp		27
Other, Non-Hisp		4
White, Non-Hisp		62
Education level (Education)	0.4	
LT HS		12
HS/GED		31
Some college		28
4-year degree		16
Grad school		14

continued

Table 1. *Continued*

	<i>Percent Missing (%)</i>	<i>Means (Binary, Yes = 1) and Distributions (Multinomial) after Imputation, %</i>
Employment status (Employed)	0.2	
FT		29
PT		8
Looking		3
Retired		44
Other		15
Household size (HHSIZE)	0.3	
1		35
2		40
3 or more		25
Some public or private insurance coverage (SomeIns)	0.1	93
BMI > 30 (Obesity)	3.6	43

** Distribution by market available from the corresponding author.

However, patients may not have well-formed expectations about what provider performance should be on these technical measures, nor will they always be aware of what actual provider performance was. Instead of taking this approach, we focus on the actions that providers take in supporting self-management of illnesses. This includes provider collaboration in developing exercise or diet plans, provider-initiated contacts between visits, availability of group sessions, and so forth. We hypothesize that consumers value these activities both because they increase the likelihood of successful self-management and also because they are indicators of provider concern for patient well-being. Consequently, we expect that more aggressive self-management support, as perceived by patients, will be associated with higher overall satisfaction scores.

Understanding of Medical Condition and Treatment Options

We hypothesize that overall satisfaction with the care received will reflect both the direct actions of providers, and consumers' ability to understand their medical conditions and treatment options. That is, consumers will be less satisfied with the care they receive if they lack information in these areas, or if they cannot understand the information provided. Illness complexity could be

associated with understanding and knowledge; for example, medication regimes are likely to be more complicated and more difficult to understand for patients with multiple conditions.

Interactions between Constructs

We expect that more aggressive self-management support will be associated with both better perceived interactions with the provider (Figure 1, arrow 1) and a better understanding of the patient's condition and treatment options (Figure 1, arrow 3). We also expect that a more favorable perception of provider interactions will be associated with a better patient understanding of conditions and treatment options (Figure 1, arrow 2), perhaps due to better communication between patient and provider.

Exogenous Variables

We follow other studies in hypothesizing that overall patient satisfaction will be influenced directly by sociodemographic characteristics, as well as through the relationship of these characteristics to the three constructs described above. For example, one would expect education to be associated with ability to understand medical conditions and treatment options and to carry out effective self-management activities.

DATA

We used data from a survey undertaken as part of the evaluation of the AF4Q initiative, a major programmatic effort of the RWJF to improve the treatment of chronic illnesses in 14 geographic areas through the actions of multi-stakeholder health care alliances. A random-digit dial telephone survey was administered between June 2007 and June 2008 to adults reporting one or more of five chronic diseases: asthma, diabetes, hypertension, coronary artery disease, and depression as determined in a screener interview. Respondents were considered ineligible if they were under 18 years of age, did not have one of the five chronic conditions, or had not seen a health care provider for one of these conditions in the 2 years prior to the interview date. In 9 of 14 geographic areas, underrepresented racial and ethnic groups were oversampled.

The overall response rate for the survey was 27 percent using the American Association of Public Opinion Research method of response rate

calculation (found at <http://www.aapor.org/ForResearchers/4362.htm>) or 48 percent using the Council of American Survey Research Organizations method, with 7,337 respondents in the 14 AF4Q markets completing the survey. These response rates were generally comparable to those achieved by Fox and Purcell (2006) and Couper et al. (2010), who also conducted random-digit dial surveys of the general population during the same period. However, their surveys did not include screener interviews, which could depress response rates. We examined the potential for nonresponse bias in the AF4Q survey by comparing respondent characteristics to those of respondents to the National Health Interview Survey (Groves 2006), an in-person survey of households conducted by the U.S. Bureau of the Census. Because it has a response rate of approximately 90 percent, NHIS respondents are likely to be representative of people in the United States with the identified chronic illnesses. For this subpopulation, the following characteristics of respondents were compared: age, gender, race, prevalence of chronic condition (diabetes, hypertension, asthma, heart disease), flu shot use, and smoking status. The populations were similar except for employment rate and flu shot use.

METHODOLOGY

The conceptual model (Figure 1) focuses attention on the relationship between three constructs and satisfaction with care. We estimated the parameters of the model separately for three different levels of complexity, defined as the presence of one, two, or three or more chronic illnesses. There is a growing literature on the impact of multiple chronic illnesses on use of treatment guidelines, patient use of services, and patient outcomes (e.g., Boyd et al. 2005; Higashi et al. 2007; Lee et al. 2007; Meduru et al. 2007; Fung et al. 2008a) as well as what constitutes clinical “complexity” (Hitchcock Noël et al. 2007; Safford, Allison, and Kiefe 2007; Whittle and Bosworth 2007). Consistent with many articles in the literature, we use number of co-occurring chronic conditions as a proxy for complexity. This approach allows the estimated parameters of the model to vary across level of complexity. We restricted our analysis to survey respondents with at least one of three chronic illnesses—diabetes, hypertension, and heart disease—because measures of provider performance with respect to the treatment of these illnesses are common in performance reports and frequently used as the basis for rewards in P4P programs. Each individual included in the

analysis has at least one of these three illnesses, but the total count of chronic illnesses may also include asthma. The latent constructs are represented by ovals, with observed measures in boxes (Figure 1).

Estimation Approach

We used structural equation techniques in estimating the relationships in our model, an approach employed by others in examining patient satisfaction (Platonova, Kennedy, and Shewchuk 2008; Cavrini, Galimberti, and Soffritti 2009; Lee and Lin 2010). The software used to complete this estimation was *LISREL* (v 8.80). In our structural equation model, we label the exogenous variables x_i for person i , including the sociodemographic variables and dummy variables for market influences, and the vector of four latent variables η_i . Thus, the model is as follows:

$$\eta_i = \eta'_i B + x'_i \Gamma + \zeta_i$$

where B is a matrix of parameters with nonzero elements corresponding to the arrows in the conceptual model to capture the influence of these latent variables (η_i) on each other, and Γ is a matrix of parameters capturing the influence of the exogenous variables on η_i . The error vector ζ_i is assumed to be independent with free variance parameters, as correlations are captured in the matrix B . Note that the exogenous variables in x_i influence the value of a particular η_{ij} both directly and through their influence on the other values in η_i .

The observed outcomes resulting from these latent variables we label Y_i and represent their relationship to η_i through the following equation:

$$Y_i = \eta'_i \Lambda + \varepsilon_i$$

where Λ is a block-diagonal matrix, with each block a column of parameters capturing the relationships between the latent variable and the multiple measures of that latent concept. We fix one value of Λ in each equation to 1, to normalize the level of the estimated latent variables.

Measures

The proposed measures for the different components of the conceptual model are listed in Table 1. The overall satisfaction measure is a modified version of a measure used in a telephone survey conducted as part of the RAND ICICE study (Baker et al. 2005). Originally a 10-point scale, the measure was collapsed to a 4-point scale by creating a “7 and under category” due to the low

number of responses at the extreme dissatisfaction level (of the 24 percent in the 7 and under category, two-thirds are 6 or 7). In several other cases, 4-point Likert scales were reduced to binary responses also because of the limited number of responses in the extreme categories.

Missing Data Imputation

Most variables have less than 2 percent of values missing, and patient satisfaction with care is missing fewer than 1 percent of observations (Table 1). A higher percentage of values is missing for three of the seven measures of support for self-management of illness—setting a diet goal (10.8 percent), setting an exercise goal (9.6 percent), and knowing how to monitor the condition (6.0 percent). The only exogenous variables with more than 1 percent missing observations are income (11.4 percent) and obesity (3.6 percent).

Missing variables were imputed using the expected value of the missing item, based on the exogenous covariates. The imputation model depends on the form of the variable. Binary covariates are modeled using a probit specification and assigned a value of 1 if the expected value of the latent variable is greater than τ , where τ is selected to reproduce the actual expected value of the variable among the records with observed values. Ordered multinomial variables (e.g., age, income, education) are modeled with an ordered probit specification, and unordered multinomial variables (e.g., race, employment) with a multinomial logit regression. The missing variable is filled with the value that has the greatest predicted probability of occurring. In these regressions, and in the overall analysis, unweighted records are used, as this is a multivariate analysis based on individuals, rather than a replication of population-level values.

RESULTS

Survey respondents with higher levels of illness complexity report higher overall satisfaction with medical care received. A Duncan test (Duncan 1955) indicated the mean satisfaction of the group with one chronic illness (average 2.6 on a 4-point Likert scale) was significantly different from the means of the other two groups (2.7 and 2.8).

We examined the impact of illness complexity by estimating the model separately for each group of patients. Following standard practice (Bentler 2007), we report both the standardized root mean square residual (SRMR) and an estimate of fit, the root mean square error of approximation (RMSEA),

with suggested cutoff levels of SRMR > 0.10 (Hu and Bentler 1999) and RMSEA > 0.07 (Steiger 2007). For all groups, these measures are adequate, with RMSEA at or very near the recommended 0.07 cutoff: 0.062 for one chronic illness, 0.068 for two chronic illnesses, and 0.079 for three or more illnesses and acceptable SRMR of 0.03, 0.03, and 0.04, respectively.

Direct Effect of Latent Constructs

We label Figure 2 with the parameters quantifying the direct and indirect pathways through which the latent constructs affect overall satisfaction for each of the three complexity levels. There are positive and statistically significant direct effects on overall patient satisfaction for both provider interaction and support for self-management at the lower two levels of complexity. For these constructs, the estimated effects at the highest level of complexity are not significant, possibly reflecting the smaller number of observations in this

Figure 2: Summary of Latent Variable Interactions Showing Unstandardized Path Coefficients

Note. Bolded parameters indicate individual *p*-value < 0.5. Parameters are statistically significantly different across complexity levels in the direct effects from understanding of condition and treatment options to overall satisfaction and from support for self-management of illness to overall satisfaction.

group. Interestingly, the direct effect of a good understanding of the patient's condition and treatment options suggests a higher level of satisfaction for less complex patients, but significantly lower satisfaction for patients at higher levels of complexity. One interpretation of this finding is that a better understanding of medical conditions and treatment options could be distressing for people with multiple chronic conditions, resulting in less overall satisfaction with care.

Indirect Effect of Latent Constructs

We hypothesized that respondents who reported better interactions with providers also would have a better understanding of conditions and treatment options, and the results do suggest a strong positive link between these two constructs that is relatively uniform across illness complexity level (Figure 2). We also hypothesized that, in addition to its direct effect, strong provider support for self-management of the patient's condition will lead to improved interaction with the provider (Figure 2, arrow 1) and a better understanding of condition and treatments on the part of the respondent (Figure 2, arrow 3). Again, we find that this hypothesis is supported by positive associations between these constructs, which are uniform across chronic illness complexity.

Total Effect of Latent Constructs

There are multiple pathways through which the latent constructs can influence overall satisfaction. In Table 2, we summarize the direct and total effects of the latent constructs on overall satisfaction. As an illustration (referring to the "1 CI" path coefficients shown in Figure 2), for those with one chronic illness, the direct effect of the perceived quality of interaction with providers (*ProvInt*) on overall patient satisfaction (*Satisfaction*) is the direct path coefficient 0.374, and the indirect effect is a result of the pathway from *ProvInt* through the patient's understanding of condition and treatment option (*Undrstnd*), and subsequently from *Undrstnd* to *Satisfaction*. The path coefficients from this indirect pathway are 0.499 (*ProvInt* to *Undrstnd*) and 0.085 (*Undrstnd* to *Satisfaction*), so the indirect effect is the product of these coefficients: $(0.499)(0.085) = 0.042$. The total effect of *ProvInt* on *Satisfaction*, then, is the sum of the direct and indirect effects: $0.374 + 0.042 = 0.416$.

The left-hand side of Table 2 shows direct and total effects that have not been standardized to facilitate comparison across the three chronic illness models. To permit a more intuitive interpretation of the parameters, we also

Table 2: Summary of Total and Direct Effects

<i>Chronic Illness Level</i>	<i>Effect on Overall Satisfaction Unstandardized</i>				<i>Effect on Overall Satisfaction Standardized</i>			
	<i>Total Effects</i>				<i>Total Effects</i>			
	<i>1</i>	<i>2</i>	<i>3+</i>		<i>1</i>	<i>2</i>	<i>3+</i>	
Latent constructs								
ProvInt	0.416	0.372	0.414		0.374	0.382	0.440	
Statistically significant differences across CI levels	None			None				
SelfMgmt	0.478	0.577	0.602		0.323	0.453	0.441	
Statistically significant differences across CI levels	1-2 (<i>p</i> = .004), 1-3+ (<i>p</i> = .039)			1-2 (<i>p</i> < .001), 1-3+ (<i>p</i> = .051)				
Undrstnd	0.085	-0.019	-0.056		0.085	-0.019	-0.056	
Statistically significant differences across CI levels	1-2 (<i>p</i> = .003), 1-3+ (<i>p</i> = .011)			1-2 (<i>p</i> = .003), 1-3+ (<i>p</i> = .011)				
Demographic characteristics								
Age	0.161	0.204	0.135		0.212	0.255	0.144	
Statistically significant differences across CI levels	None			2-3+ (<i>p</i> = .048)				
Female	0.042	0.082	0.012		0.051	0.044	-0.021	
Statistically significant differences across CI levels	None			1-3+ (<i>p</i> = .072)				
Income	-0.031	0.051	0.121		-0.039	0.030	0.066	
Statistically significant differences across CI levels	1-2 (<i>p</i> = .084), 1-3+ (<i>p</i> = .016)			1-2 (<i>p</i> = .086), 1-3+ (<i>p</i> = .052)				

continued

Table 2. *Continued*

Chronic Illness Level	Effect on Overall Satisfaction Unstandardized				Effect on Overall Satisfaction Standardized			
	Total Effects				Direct Effects			
	1	2	3+		1	2	3+	Total Effects
Insured	0.214	0.065	0.102		0.128	−0.014	0.089	0.186
Statistically significant differences across CI levels	1-2 ($p < .001$)	2-3+ ($p = .030$)			1-2 ($p < .001$)	2-3+ ($p = .036$)		Not applicable
Obese	−0.060	−0.015	0.083		−0.035	−0.047	0.108	−0.052
Statistically significant differences across CI levels	2-3+ ($p = .048$)	1-3+ ($p = .002$)			2-3+ ($p < .001$)	1-3+ ($p < .001$)		Not applicable
Black, Non-Hispanic	−0.015	−0.008	0.066		−0.050	−0.066	0.029	−0.013
Statistically significant differences across CI levels	None				2-3+ ($p = .045$)	1-3+ ($p = .074$)		Not applicable
Hispanic	0.017	0.013	0.062		0.025	0.009	0.02	0.015
Statistically significant differences across CI levels	None				None			Not applicable
Education	−0.101	−0.128	−0.107		−0.096	−0.128	−0.129	−0.088
Statistically significant differences across CI levels	None				None			Not applicable
								−0.097

Bold parameter indicates statistically significantly different from zero at the 5 percent level.

“CI” = “chronic illness.”

have included standardized total effects on the right-hand side. (Standardized effects cannot be used to compare models because they are measured in different units—their respective inverse standard deviations.) For example, the standardized total effect of support for the perceived quality of interaction with providers (*ProvInt*) on overall satisfaction, within the one chronic illness model, is 0.323. This indicates that the total of the direct and indirect effects of a one standard deviation increase in *ProvInt* will lead to a 0.323 standard deviation improvement in overall patient satisfaction.

Because only a direct effect is identified for the patient's understanding of condition and treatment option, the total effect and direct effects are identical. Using unstandardized total effects to allow us to look across population subsets, we see a significant decline in the impact of increased understanding of condition and treatment options on overall satisfaction as level of complexity increases.

The total impact of the perceived quality of interaction with providers is the sum of the direct impact and an indirect impact through understanding of condition (arrow 2). Because the direct impact of interaction moves in the opposite direction of the direct impact of patient understanding for those with multiple illnesses, when both pathways are combined in the unstandardized total effects, a higher rating of interaction with the provider no longer leads to monotonically greater satisfaction as complexity increases. However, the unstandardized total effect of improved provider interaction is still uniformly positive across illness complexities and similar in size, consistent with Boudreaux and O'Hea (2004).

Of the three constructs, perceived provider support for self-management has the most complex set of pathways to patient satisfaction. Better self-management support is associated with better patient understanding of condition (Figure 2, arrow 3), and with better perceived interaction with the providers (Figure 2, arrow 1). The pathway through patient understanding of condition and treatment options is relatively weak, however, so the lower level of patient satisfaction with increased complexity has little net effect (Table 2). Consistent with Fan et al. (2005), the unstandardized total effect of support for self-management is positive and larger at higher levels of complexity.

Effects of Exogenous Characteristics

Although the impacts of the latent constructs on satisfaction are of interest because of the implications for providers (as discussed below), the associations between individual characteristics and reported satisfaction have policy impli-

cations as well. If providers seek to manipulate their patient mix to achieve higher satisfaction scores, they are likely to base their decisions on observable patient characteristics. To explore the relationship between observable characteristics and reported satisfaction with care, the total and direct effects of selected characteristics are shown in Table 2. Total effects for exogenous variables are the accumulation of the direct effect on satisfaction, and the indirect effect of the exogenous variables' influence through the three latent variables to overall satisfaction.

With respect to total effects, irrespective of illness complexity, the impact of exogenous variables tends to be much smaller than the effect of latent variables (Table 2). Respondents are likely to report greater levels of satisfaction if they are older, female, or have some form of health insurance coverage. The result for females is particularly interesting, as the unstandardized direct effect of being female suggests less satisfaction at higher levels of complexity, but the unstandardized total effect is consistently positive. People at higher education levels are less satisfied with their care. Those who are obese are less satisfied with their care when they have one chronic condition, but become more satisfied as complexity increases. There is no consistent, statistically significant relationship between race and satisfaction.

DISCUSSION

Our findings suggest that readily observable characteristics of patients are likely to be associated with physician practice "satisfaction with care" scores in public reports or P4P programs. For example, providers with patient mixes skewed toward older or female patients are likely to have higher scores. In contrast, practices with a higher proportion of well-educated patients are likely to have lower scores. (The relationship between education and satisfaction reported by Fan et al. (2005) is in the opposite direction.) Providers seeking to improve their patient satisfaction scores could do so by considering certain patient characteristics when accepting new patients or deciding who to refer to other providers for treatment. But we find the incentive to control the mix by age, gender, education, or race is not moderated by the patients' number of chronic illnesses.

Our findings also suggest constructive actions that providers can take to improve their practice satisfaction scores. Consistent with past research, there is a positive relationship between consumer perceptions of the quality of inter-

action with their providers and overall satisfaction; however, our results suggest that relationship may be more complex than previously understood. For instance, providers who specialize in treating patients with chronic conditions can achieve higher satisfaction scores by investing in activities that support patient self-management. Providers who invest in improving their communication with patients also will be rewarded with higher satisfaction levels, and this holds true irrespective of patient complexity.

LIMITATIONS

We acknowledge several limitations in our study. First, we use only a single measure to assess satisfaction with care. While this measure is similar to those used in public performance reporting, the results could vary with choice of satisfaction measure, and we have no way of exploring this with our data set. Second, we use a relatively simple measure of complexity—number of chronic conditions—for individuals using ambulatory services. Studies using more nuanced complexity measures could yield different findings. Many studies of the determinants of patient satisfaction focus on patients with specific conditions and are able to examine the impact of gradations of illness. We would argue, however, that a relatively simple measure based on number of chronic illnesses is appropriate for the purposes of our study, because patients with chronic illnesses are a primary focus for public reporting and P4P efforts. Third, we were not able to directly control for physician or other caregiver characteristics in our analysis. (However, respondent reports on provider activities supporting self-management help to capture, in part, important practice characteristics.) There may be physician characteristics that affect satisfaction scores separately from their effect through physician interaction with patients. Finally, we controlled for geographic-level characteristics using indicator variables for area, because our focus was on how complexity affected satisfaction. Further research should explore factors that influence geographic differences in satisfaction with care.

CONCLUSIONS

The purpose of this study is to increase knowledge concerning the relationship between patient complexity and measures of satisfaction with care typically used in physician practice performance reports or P4P programs.

Although our findings suggest that scores vary with observable demographic characteristics, which creates the potential for practices to improve scores by avoiding or referring specific types of patients, we found no strong evidence (consistent with studies within the VA system) that avoiding complex patients will improve satisfaction measures. Importantly, our results suggest that investing in better communication with patients and in supporting patients in self-management of their illnesses can improve patient satisfaction. In the latter case, the improvement may be greater for patients with more chronic conditions.

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