

Measuring Patients' Experiences with Individual Primary Care Physicians

Results of a Statewide Demonstration Project

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BACKGROUND: Measuring and reporting patients' experiences with health plans has been routine for several years. There is now substantial interest in measuring patients' experiences with individual physicians, but numerous concerns remain.

OBJECTIVE: The Massachusetts Ambulatory Care Experiences Survey Project was a statewide demonstration project designed to test the feasibility and value of measuring patients' experiences with individual primary care physicians and their practices.

DESIGN: Cross-sectional survey administered to a statewide sample by mail and telephone (May–August 2002).

PATIENTS: Adult patients from 5 commercial health plans and Medicaid sampled from the panels of 215 generalist physicians at 67 practice sites ($n=9,625$).

MEASUREMENTS: Ambulatory Care Experiences Survey produces 11 summary measures of patients' experiences across 2 domains: quality of physician-patient interactions and organizational features of care. Physician-level reliability was computed for all measures, and variance components analysis was used to determine the influence of each level of the system (physician, site, network organization, plan) on each measure. Risk of misclassifying individual physicians was evaluated under varying reporting frameworks.

RESULTS: All measures except 2 achieved physician-level reliability of at least 0.70 with samples of 45 patients per physician, and several exceeded 0.80. Physicians and sites accounted for the majority of system-related variance on all measures, with physicians accounting for the majority on all "interaction quality" measures (range: 61.7% to 83.9%) and sites accounting for the largest share on "organizational" measures (range: 44.8% to 81.1%). Health plans accounted for negligible variance (<3%) on all measures. Reporting frameworks and principles for assuring misclassification risk $\leq 2.5\%$ were identified.

CONCLUSIONS: With considerable national attention on the importance of patient-centered care, this project demonstrates the feasibility of obtaining highly reliable measures of patients' experiences with individual physicians and practices. The analytic findings underscore the validity and importance of looking beyond health plans to individual physicians and sites as we seek to improve health care quality.

KEY WORDS: doctor-patient relationship; primary care; quality measurement; patient-centered care.

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The past dozen years have seen unprecedented investments in developing and testing health care quality measures. Yet, by most accounts, we remain in the very

early stages of these endeavors.^{1,2} The Institute of Medicine (IOM) report *Crossing the Quality Chasm* highlighted the challenges of achieving a truly outstanding health care delivery system.³ Patient-centeredness was 1 of 6 priority areas identified as having vastly inadequate performance. With this, patient-centered care went from being a boutique concept to a widely sought goal among health care organizations nationwide.

These events heightened the importance of patient surveys as essential tools for quality assessment. A well-constructed survey offers a window into patient experiences that is otherwise unavailable. Surveys measuring patients' experiences with health plans are already widely used, with results reported annually through the National Committee on Quality Assurance and the Centers for Medicare and Medicaid Services. However, the limitations of measuring quality only at the health plan level have become clear.^{4–6} In the late 1990s, several initiatives began developing surveys measuring patients' experiences with medical groups and then, increasingly, with individual physicians. The Massachusetts Ambulatory Care Experiences Survey (ACES) Project, a statewide demonstration project conducted in 2002 to 2003, is the most extensive such effort completed to date.

The ACES Project involved a collaboration among 6 payers (5 commercial health plans and Medicaid), 6 physician network organizations, and the Massachusetts Medical Society working through Massachusetts Health Quality Partners. The project sought to address 3 principal concerns related to the feasibility and merit of this form of measurement: (1) ascertaining sample sizes required to achieve highly reliable physician-specific information; (2) evaluating the need for plan-specific samples within physicians' practices; and (3) establishing the extent to which patients' experiences are influenced by individual physicians, practice sites, physician network organizations, and health plans.

METHODS

Study Design and Sampling

Sample frames were provided by the 6 payer organizations. Files from the 5 commercial plans included all adult members in the plan's HMO product, and for each member, provided a primary care physician identifier. Because the Medicaid Primary Care Clinician (PCC) Plan registers members to sites, not physicians, Medicaid provided primary care site identifiers for

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each member. A linked sampling file was created using available physician and site identifiers.

Because a principal objective of the study was to estimate plan-physician interaction effects, physicians had to have at least 75 patients in each of two or more commercial plans to be eligible. Practice sites were eligible if they had at least 2 adult generalist physicians, and if at least two-thirds of the site's physicians were eligible. Because the majority of adult generalists in Massachusetts are in settings with at least 4 physicians (81%) and accept multiple payers, these criteria caused few exclusions except among physicians in solo practice (6.9%) and in two-to-three physician practices (12.1%) wherein one or more physicians had an extremely limited panel. We worked with leadership at each of the 6 Physician Network Organizations to identify eligible practice sites statewide.

We randomly sampled 200 commercially insured patients from each physician's panel, stratifying by health plan, with plan allocations as equal as possible within physician samples. Most physician samples drew patients from 2 commercial plans, but some panels afforded sample from 3. Primary Care Clinician enrollees were selected by identifying sites from the sample that had at least 200 PCC enrollees and drawing a starting sample of approximately 100 PCC enrollees per site. The study's starting sample ($n=44,484$) included 39,991 commercially insured patients from the practices of 215 generalist physicians at 67 sites, and 4,493 Medicaid PCC enrollees from 47 of these sites (see Fig. 1).

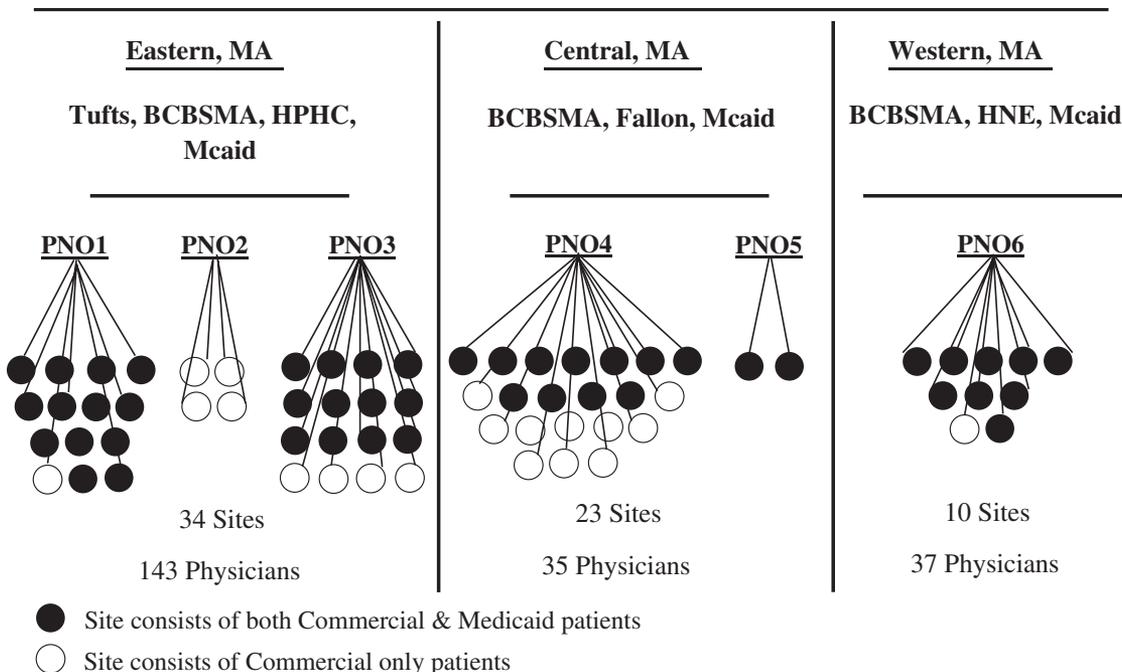
Data Collection

The ACES administered to study participants was developed for the project, drawing substantially upon existing validated survey items and measures.^{4,7,8} The survey's conceptual mod-

el for measuring primary care corresponds to the IOM definition of primary care.⁹ Ambulatory Care Experiences Survey extends beyond previous similar measures of these domains in ways suggested by our National Advisory Committee, which included national and local organizations representing physicians, patients, purchasers, health plans, and accreditors. The survey produces 11 summary measures covering 2 broad dimensions of patients' experiences: quality of physician-patient interactions (communication quality, interpersonal treatment, whole-person orientation, health promotion, patient trust, relationship duration) and organizational features of care (organizational access, visit-based continuity, integration of care, clinical team, and office staff). All measures range from 0 to 100 points, with higher scores indicating more favorable performance. The initial survey question named the primary care physician indicated by the respondent's health plan and asked the respondent to confirm or correct this. For Medicaid, respondents confirmed or corrected the primary care site, and then wrote-in their primary care physician's name.

Data were obtained between May 1 and August 23, 2002 using a 5-stage survey protocol involving mail and telephone.¹⁰ The protocol included an initial survey mailing, a reminder postcard, a second survey mailing, a second reminder postcard, and a final approach to all nonrespondents using either mail (commercially insured) or telephone (Medicaid). For Medicaid enrollees, mailings included both English and Spanish materials, and telephone interviews were available in both languages. Costs per completed survey were \$10 for commercial and \$24 for Medicaid.

This protocol yielded 12,916 completed surveys (11,416 commercial, 1,304 Medicaid) for a response rate of 30% after excluding ineligible ($n=1,716$). On average, 58 completed questionnaires per physician were obtained (SD=14.4). Non-



NOTE: Tufts = Tufts Health Plan; BCBSMA = Blue Cross Blue Shield of Massachusetts; HPHC = Harvard Pilgrim Health Care; Fallon = Fallon Community Health Plan; HNE = Health New England; Mcaid = Medicaid

FIGURE 1. Sampling framework.

response analyses are summarized here, with further detail provided at [available online at <http://www.blackwellpublishing.com/products/journals/suppmat/jgi/jgi00311/jgi00311.sm.html>]. As is customary in survey research, nonresponse was higher among younger, poorer, less educated, and non-white individuals.¹¹⁻¹³ To evaluate whether nonresponse threatened the data integrity for physician-level analysis, we evaluated whether the nature or extent of nonresponse differed by physician. Using U.S. Census block group-level data for the full starting sample ($n=44,484$), we evaluated whether the factors associated with individuals' propensity to respond (e.g., age, race, education, socioeconomic status) differed by physician. There were no significant interactions between propensity to respond¹⁴ and physician—signifying that the lower propensity of certain subgroups applied equally across physicians. To evaluate whether differential response rates among physicians threatened data integrity, we evaluated whether the timing of survey response differed by physician. Previous research suggests that late responders report more negative experiences than initial responders, and that late responders' characteristics and experiences approximate those of nonrespondents.¹⁵⁻¹⁷ While some evidence suggests that early and late responders are equivalent,¹⁸⁻²⁰ no research has found more favorable views among late responders. We found no significant interactions between stage of survey response and physician ($P > .20$). Overall, nonresponse analyses suggest that differential response rates across physicians (15% to 35%) were associated with effects no greater than 0.8 points, which are approximately one-seventh the size of true physician-level differences observed for the ACES measures. Thus, despite a relatively low response rate, nonresponse analyses suggested that the nature of nonresponse does not vary significantly by physician, and that the extent of nonresponse does not vary sufficiently to threaten the integrity of physician-level analyses.

Statistical Analyses

Analyses included all respondents who confirmed having a primary care physician, whose physician was part of the original sample, and who reported at least one visit with that physician in the past 12 months ($n=9,625$). In the commercial sample, these criteria excluded 790 respondents who indicated that the plan-named physician was incorrect (6.9%) and 1,129 respondents who reported no qualifying visits (11%). For Medicaid, the criteria excluded 732 respondents who either did not name a primary physician or named a physician not included in the study sample.

We compared the sociodemographic profiles, health, and care experiences of commercial and Medicaid samples. Next, we calculated the physician-level reliability (α_{MD}) of items and scales under varying sample size assumptions using intraphysician correlation and the Spearman Brown Prophecy Formula.²¹ The physician-level reliability coefficient (α_{MD}) signifies the level of concordance in responses provided by patients within physician samples (range: 0.0 to 1.0). The Spearman Brown Prophecy Formula estimates reliability for projected sample sizes in the same way that estimated standard error allows studies to estimate the accuracy of a mean in a proposed experiment, and thus allowed us to determine measure reliability under varying sample size assumptions.

Next, we estimated the probability of incorrectly classifying a physician's performance ("risk of misclassification") using the Central Limit Theorem of statistics to compute the expected percentage of physicians who would be misclassified to the next lower performance category under varying levels of measurement reliability ($\alpha_{MD}=0.70$ to 0.90). The Central Limit Theorem asserts that, for an individual physician, the observed mean score across multiple independent patients is approximately normally distributed around a physician's true mean score. This applies here because scores are limited to a 0 to 100 range, the patients are independent, and the statistic in question is a sample average for an individual physician. This fact allows us to estimate, for an individual physician, the probability of being misclassified within any range of scores. With additional information on the distribution of true mean scores in a population of physicians, we can make unconditional misclassification probability estimates for that physician population.

Finally, we used Maximum Likelihood Estimation methods²² to determine the influence of each level of the system (physician, site, network organization, plan) on each ACES measure, controlling for patient characteristics (age, sex, race, years of education, number of chronic medical conditions) and for system interaction effects (i.e., plan-site and plan-MD interactions).

RESULTS

Commercial and Medicaid samples differed significantly on most sociodemographic and health characteristics (Table 1). Medicaid enrollees reported shorter primary care relationships than commercially insured ($P \leq .05$), but otherwise reported similar primary care experiences. Where differences occurred, trends favored the experiences reported by Medicaid enrollees somewhat.

With samples of 45 patients per physician, all ACES measures except 2 (clinical team, office staff) achieved physician-level reliability (α_{MD}) exceeding 0.70, and several measures exceeded $\alpha_{MD}=0.80$ (Table 2). Sample sizes required to achieve $\alpha_{MD} \geq 0.90$ generally exceeded 100 patients per physician. Variability among physicians, as measured by the standard deviation of the physician effect (SD_{MD}), averaged 6.0 points on "organizational" features of care (range: 3.7 to 10.5) and 7.2 points on "interaction quality" measures (range: 4.1 to 13.9).

Analyses of misclassification risk highlighted 3 important influences: (1) measurement reliability (α_{MD}), (2) proximity of a physician's score to the performance cutpoint, and (3) number of performance cutpoints. Table 3 illustrates diminishing probability of misclassification for scores more distal to a performance cutpoint (column 1), and with higher measurement reliability (α_{MD}). The findings suggest the usefulness of establishing a "zone of uncertainty" around performance cutpoints to denote scores that cannot be confidently differentiated from the cutpoint score. The logic is very similar to that of confidence intervals and, in the illustration provided (Table 3 diagram), is equivalent to a 95% confidence interval. Note that higher measurement reliability affords smaller uncertainty zones (i.e., ± 3.26 points vs 6.3 points). In this illustration, 3 performance categories are established, and risk of misclassification to the next-lower category is no greater than 2.5%. That is, a physician whose true score is "above average," has

Table 1. Characteristics of the Analytic Sample, Unadjusted

	Total Sample (n=9,625)	Commercial (n=9,053)	Medicaid (n=572)	P Value
Sociodemographics				
Age (mean, SD)	47.2 (12.5)	47.4 (12.5)	44.9 (12.4)	.000
≤ 25 (%)	4.3	4.1	7.4	.000
26 to 40 (%)	26.6	26.4	30.7	.026
41 to 64 (%)	63.1	63.3	59.4	.065
65+ (%)	6.0	6.2	2.5	.000
Female	67.0	66.5	76.0	.000
Race				
White (%)	91.5	92.0	84.6	.000
Black (%)	3.8	3.7	5.3	.062
Asian (%)	2.2	2.3	1.4	.155
Hispanic (%)	2.9	2.4	12.2	.000
High school diploma (%)	94.8	96.2	72.3	.000
Health				
Chronic conditions (mean, SD)*	1.2 (1.3)	1.2 (1.3)	2.3 (1.8)	.000
Hypertension (%)	29.0	28.5	37.3	.000
Angina/coronary artery disease (%)	4.2	4.0	8.8	.000
CHF (%)	1.3	1.1	4.8	.000
Diabetes (%)	7.9	7.4	16.1	.000
Asthma (%)	14.0	13.0	30.1	.000
Arthritis (%)	15.4	14.4	32.5	.000
Depression (%)	21.8	19.5	57.3	.000
Overall health (% rated health as "poor")	1.6	0.9	12.4	.000
Health care				
Duration of current primary relationship (y, %)				
< 1	8.4	8.6	5.1	.003
1 to 5	42.9	42.4	50.5	.000
> 5	48.7	49.0	44.4	.034
Organizational/structural features of care (mean, SD)				
Organizational access	77.6 (22.6)	77.5 (22.7)	79.9 (21.2)	.045
Visit-based continuity	80.8 (27.2)	80.8 (27.3)	80.9 (26.5)	.906
Integration of care	78.3 (19.5)	78.1 (19.6)	81.1 (18.5)	.005
Clinical team	75.3 (21.8)	75.2 (21.7)	76.7 (23.6)	.222
Quality of interactions with primary physician				
Communication (mean, SD)	88.5 (18.5)	88.5 (18.5)	88.5 (19.5)	.986
Whole person orientation (mean, SD)	64.6 (24.2)	64.2 (24.1)	71.4 (23.7)	.000
Health promotion (mean, SD)	64.2 (33.5)	63.6 (33.4)	73.9 (32.6)	.000
Interpersonal treatment (mean, SD)	90.3 (16.5)	90.4 (16.4)	88.7 (18.8)	.023
Patient trust (mean, SD)	79.4 (22.4)	79.3 (22.3)	81.0 (24.1)	.077
Had flu shot (%)	37.6	37.9	32.9	.020

*From a checklist of 11 chronic conditions with high prevalence among U.S. adults aged 65 and older.³
CHF, congestive heart failure.

no more than 2.5% risk of being observed as "average" with a given respondent sample. A performance report imposing multiple cutpoints would require this buffering around each cutpoint in order to maintain the desired level of classification certainty. Thus, even with highly reliable measures, going beyond 2 or 3 cutpoints appears ill-advised in the complexity and overlapping uncertainty zones that would likely result.

Table 4 reveals that, on average, 11% of variance in the measures (range: 5.0% to 22.1%) was accounted for by our models. Of the variance accounted for by the delivery system (physician, site, network, plan), individual physicians and practice sites were the principal influences. For organizational features of care, sites accounted for a larger share of system-related variance than physicians (range: 44.8% to 81.1%), but the physician contribution was substantial (range: 17.8% to 39.4%). For all measures of "interaction quality," physicians accounted for the majority of system-related variance (range: 61.7% to 83.9%), though sites played a substantial role (range: 22.4% to 38.3%). Networks accounted for no variance except

on 3 measures (organizational access, visit-based continuity, office staff). Health plans accounted for negligible variance on all measures.

Plan-physician interaction effects were less than 2 points for all measures, and were zero for 5 measures, suggesting that experiences in a physician's practice do not differ meaningfully by plan (commercial payers). ANOVA models testing Medicaid-physician interaction effects suggest that these findings generalize to Medicaid. That is, within a physician's panel, Medicaid enrollees produced results that were identical or nearly identical to those of commercial patients.

DISCUSSION

This demonstration project addresses several important questions concerning the feasibility and merit of measuring patients' experiences with individual physicians. Perhaps most importantly, the measures showed high physician-level reliability with samples of 45 patients per physician, and at these

Table 2. MD-Level Reliability and Sample Size Requirements of PCP-ACES Measures

	MD Reliability (n=45 Patients Per Physician)	Sample Size Requirements By Varying MD-Level Reliability Thresholds, α_{MD}			
		SD _{MD}	0.70	0.80	0.90
<i>Organizational/structural features of care</i>					
<i>Organizational Access, * $\alpha=0.80$</i>					
When you needed care for an illness or injury, how often did your personal doctor's office provide care as soon as you needed it	0.81	6.6	24	42	95
When you called your personal doctor's office in the evening or on weekends, how often did you get the help or advice you needed	0.74	5.9	37	64	144
When you scheduled a check-up or routine care, how often did you get an appointment as soon as you needed it	0.70	7.4	44	76	172
When you scheduled a check-up or routine care, how often did you get an appointment as soon as you needed it	0.82	8.4	22	38	87
<i>Visit-based continuity, * $\alpha=0.67$</i>					
When you were sick and went to the doctor, how often did you see your personal doctor (not an assistant or partner)	0.89	10.5	13	22	51
When you were sick and went to the doctor, how often did you see your personal doctor (not an assistant or partner)	0.92	15.2	9	16	37
When you went for a check-up or routine care, how often did you see your personal doctor (not an assistant or partner)	0.86	8.4	16	28	64
<i>Integration, * $\alpha=0.85$</i>					
When your personal doctor sent you for a blood test, x-ray, or other test, did someone from your doctor's office follow-up to give you the test results	0.72	4.5	41	71	159
When your personal doctor sent you for a blood test, x-ray, or other test, did someone from your doctor's office follow-up to give you the test results	0.79	9.2	27	47	105
When your personal doctor sent you for a blood test, x-ray, or other test, how often were the results explained to you as clearly as you needed	0.70	6.4	45	78	176
How would you rate the quality of specialists your personal doctor has sent you to	0.52	3.2	98	168	378
How would you rate the help your personal doctor's office gave you in getting the necessary approval for your specialist visits	0.64	4.2	59	102	230
How often did your personal doctor seem informed and up-to-date about the care you received from specialist doctors	0.65	5.8	55	94	213
How would you rate the help your personal doctor gave you in making decisions about the care that specialist(s) recommended for you	0.67	5.3	50	86	195
<i>Clinical team, * $\alpha=0.87$</i>					
How often did you feel that the other doctors and nurses you saw in your personal doctor's office had all the information they needed to correctly diagnose and treat your health problems	0.57	3.7	78	134	302
How often did you feel that the other doctors and nurses you saw in your personal doctor's office had all the information they needed to correctly diagnose and treat your health problems	0.53	3.9	92	159	358
How would you rate the care you got from these other doctors and nurses in your personal doctor's office	0.57	3.6	80	137	309
<i>Office staff, * $\alpha=0.88$</i>					
How often did office staff at your personal doctor's office treat you with courtesy and respect	0.69	4.6	46	79	178
How often did office staff at your personal doctor's office treat you with courtesy and respect	0.65	4.1	55	95	214
How often were office staff at your personal doctor's office as helpful as you thought they should be	0.70	5.1	45	78	175
<i>Physician-patient interactions</i>					
<i>Communication, * $\alpha=0.92$</i>					
How often did your personal doctor explain things in a way that was easy to understand	0.72	4.3	40	68	155
How often did your personal doctor explain things in a way that was easy to understand	0.71	4.3	43	74	167
How often did your personal doctor listen carefully to you	0.73	4.9	39	67	152
How often did your personal doctor give you clear instructions about what to do to take care of health problems or symptoms that were bothering you	0.66	4.1	54	93	211
How often did your personal doctor give you clear instructions about what to do if symptoms got worse or came back	0.64	4.4	58	100	227
<i>Whole-person orientation, * $\alpha=0.90$</i>					
How would you rate your personal doctor's knowledge of your medical history	0.83	7.5	21	37	83
How would you rate your personal doctor's knowledge of your medical history	0.81	6.7	24	41	94

Table 2 (continued)

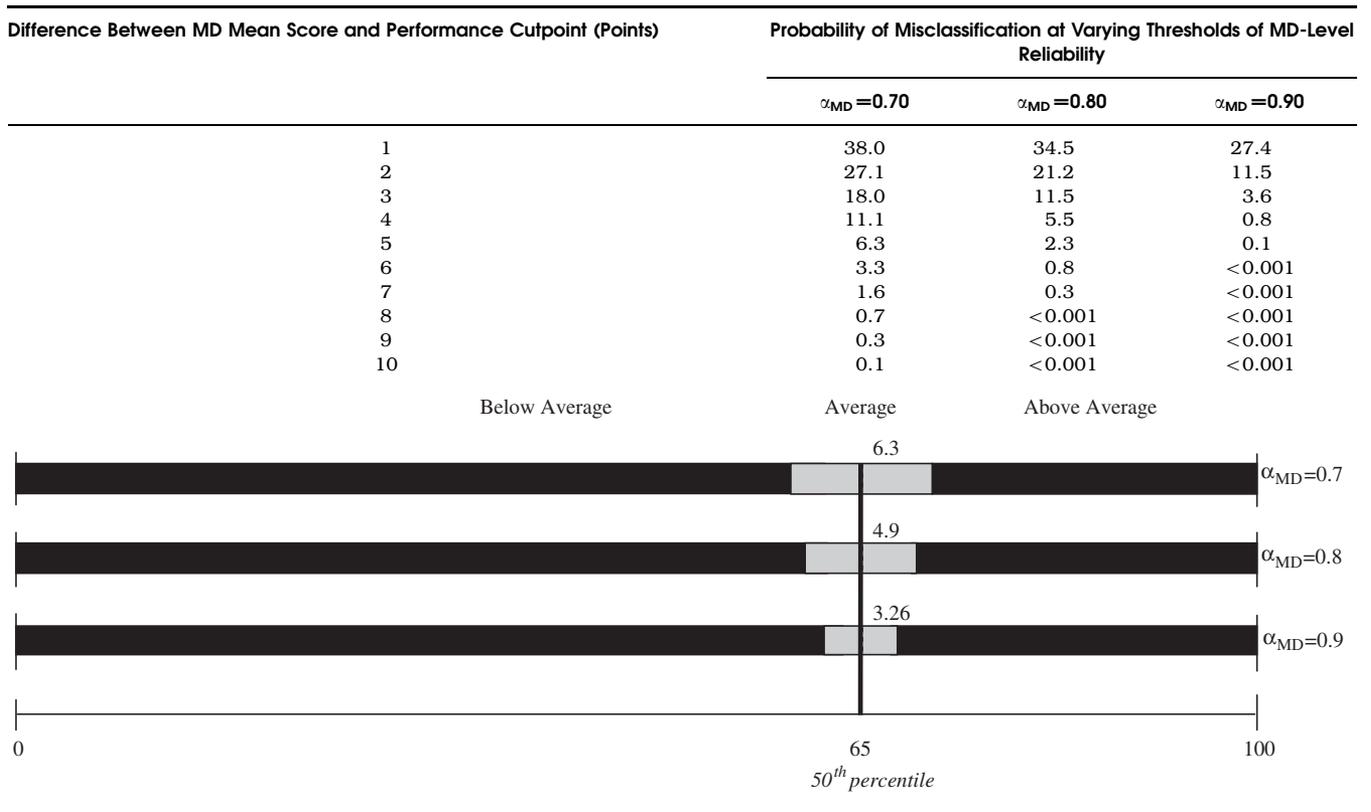
	MD Reliability (n=45 Patients Per Physician)	Sample Size Requirements By Varying MD-Level Reliability Thresholds, α_{MD}			
		SD _{MD}	0.70	0.80	0.90
How would you rate your personal doctor's knowledge of your responsibilities at home, work or school	0.79	7.6	27	47	105
How would you rate your personal doctor's knowledge of you as a person, including values and beliefs important to you	0.82	8.8	22	38	87
Health promotion,* $\alpha=0.82$	0.71	7.7	42	72	163
Did your personal doctor give you the help you wanted to reach or maintain a health body weight	0.66	9.7	55	94	212
Did your personal doctor talk with you about specific things you could do to improve your health or prevent illness	0.66	9.2	54	94	211
Did your personal doctor give you the help you needed to make changes in your habits or lifestyle that would improve your health or prevent illness	0.65	9.2	56	96	217
Did your personal doctor ever ask you about whether your health makes it hard to do the things you need to do each day (such as at work or home)	0.56	8.1	83	142	320
Did your personal doctor give the attention you felt you needed to your emotional health and well-being	0.61	7.0	66	114	258
Interpersonal treatment,* $\alpha=0.85$	0.75	4.1	35	60	136
How often did your personal doctor treat you with respect	0.60	2.5	69	119	268
How often was your personal doctor caring and kind	0.72	4.0	41	71	161
How often did your personal doctor spend enough time with you	0.75	6.1	34	59	134
Patient trust,* $\alpha=0.83$	0.74	5.4	37	63	143
How often did you feel you could tell your personal doctor anything, even things you might not tell anyone else	0.73	7.9	39	68	153
How often did you feel that your personal doctor had all the information needed to correctly diagnose and treat your health problems	0.65	4.4	57	97	220
How often did your personal doctor put your best interests first when making recommendations about your care	0.69	4.6	47	80	182
Relationship duration	0.95	13.9	5	9	22
How long has this person been your doctor	0.95	13.9	5	9	22

*All items asked the respondent to report with reference to the last 12 months.
PCP, primary care physicians; ACES, Ambulatory Care Experiences Survey.

levels of reliability, the risk of misclassification was low ($\leq 2.5\%$) given a reporting framework that differentiated 3 levels of performance. However, the results also underscored that high misclassification risk is inherent for scores closest to the performance cutpoint ("benchmark") and where multiple cutpoints are introduced. Thus, reporting protocols will need to limit the number of performance categories, and determine how to fairly handle cases most proximal to performance cutpoints, where misclassification risk will be high irrespective of measurement reliability. Also importantly, the study showed that individual physicians and practice sites are the principal delivery system influences on patients' primary care experiences. Network organizations and health plans had little apparent influence. These findings accord with previous analyses of practice site, network, and health plan influences on patients' experiences,^{4,23} but extend beyond previous work by estimating the effects of individual physicians within practices sites.

The results address several persistent concerns about physician-level performance assessment. First, the difficulties of achieving highly reliable performance measures have been noted for condition-specific indicators, given limited sample sizes in most physicians' panels, even for high prevalence conditions like diabetes and hypertension.^{2,24,25} Because the measures evaluated here apply to all active patients in a physician's panel, sample sizes required for highly reliable measures are easily met. Second, questions about whether measurement variance can be fairly ascribed to physicians themselves versus to the systems in which they work and the patients they care for have been prominent a concern.²⁴⁻²⁷ In this study, physicians and sites accounted for the vast majority of delivery system variance for all measures, but there was substantial sharing of variance between physicians and sites. The results suggest a shared accountability for patients' care experiences and for improving this aspect of quality.

Table 3. Risk of Misclassification for Mean Scores with Varying Proximity to the Performance Cutpoint and with Measures Varying in MD-Level Reliability



Importantly, although, a substantial amount of variance on all measures remained unaccounted for. Although the delivery system variance accounted for here is considerably higher than that accounted for in studies of other types of performance indicators,^{24,26,28} it nonetheless raises a critical question for the quality field: Is it legitimate to focus on the

performance of physicians and practices when there are so many other influences at play? This seems analogous to questioning whether clinicians ought to focus on particular known clinical factors, such as blood cholesterol levels, even when these factors only account for a modest share of disease risk. As with health, the influences on quality are multifactorial.

Table 4. Allocation of Explainable Variance in Each Measure Across Four Levels of the Delivery System

	Variance Explained by			Percent of Delivery System Variance Accounted for by Each Level			
	Total	Patient Characteristics	Delivery System Effects	Physician	Practice	Network Organization	Health Plan
Organizational/structural features of care							
Organizational access	12.9	3.5	9.4	39.4	44.8	15.8	0.0
Visit-based continuity	22.1	5.1	16.9	36.4	55.7	8.0	0.0
Integration	10.6	5.2	5.3	22.9	77.1	0.0	0.0
Clinical team	5.0	2.6	2.4	17.8	81.1	0.0	1.1
Office staff	8.6	4.3	4.4	21.0	62.8	13.7	2.5
Physician-patient interactions							
Communication	8.6	2.4	6.2	61.7	38.3	0.0	0.0
Whole-person orientation	15.3	6.5	8.8	74.1	24.9	0.0	1.0
Health promotion	8.0	3.7	4.3	77.0	22.4	0.0	0.5
Interpersonal treatment	9.2	2.6	6.6	83.9	15.8	0.0	0.2
Patient trust	9.5	3.6	5.9	70.0	28.8	0.0	1.2

Because there is not likely to be a single element that substantially determines any dimension of quality, we must identify factors that show meaningful influence and are within the delivery system's purview. In this study, average performance scores across the physician population spanned more than 20 points out of 100. This suggests that meaningful improvement can be accomplished simply by working to narrow this differential. The well-documented benefits of high quality clinician-patient interactions—including patients' adherence to medical advice,^{29–33} improved clinical status,^{34–37} loyalty to a physician's practice,³⁸ and reduced malpractice litigation^{39–41}—suggest the value of doing so.

As with any area of quality measurement, however, there are costs that must be considered against the value of the information. Data collection costs associated with this study suggest that obtaining comparable information for adult primary care physicians statewide ($n=5,537$) would cost approximately \$2.5 million- or 50-cents per adult resident. Extrapolating to adult primary care physicians nationally ($n=227,698$), "per capita" costs across U.S. adults appear similar. Of course costs of such an initiative are highly sensitive to numerous variables—including the frequency, scope and modes of data collection⁶—and thus can only be very roughly gauged from this initiative. But a serious investment would clearly be required to accomplish widespread implementation of such measures, and while several such initiatives are currently underway,^{42–45} the potential for sustaining and expanding upon these over the long term remains unclear.

There are several relevant study limitations. First, the study included only patients of managed care plans (commercial and Medicaid). For other insurance products, where payers are not explicitly aware of members' primary care arrangements, a different sampling methodology would be required. Second, the initiative was limited to one state. In other geographic areas, individual plan effects could be larger, although previous evidence from national studies suggests these are unlikely to be of a magnitude necessitating plan-specific samples in a physician's practice.^{4,23} Finally, the measures here do not afford information on technical quality of care. Methodologies other than patient surveys are required for that area of assessment.

In conclusion, with considerable national attention focused on providing patient-centered care, this project demonstrates the feasibility of obtaining highly reliable measures of patients' experiences with individual physicians and practices. Physician-specific samples were created by pooling sample across multiple payers, and with samples of 45 completed surveys per physician, highly reliable indicators of patients' experiences were established. The finding that individual physicians and sites account for the majority of system-related variance indicates the appropriateness of focusing on these levels for measuring and improving these dimensions of quality.

The importance of adding measures of patients' experiences of care to our nation's portfolio of quality measures is underscored by recent evidence that we are losing ground in these areas.^{46,47} The erosion of quality on those dimensions stands in sharp contrast to recent improvements noted in the technical quality of care.^{48–50} The improvements in technical quality, seemingly spurred by the routine monitoring and reporting of performance on these measures, lend credence to the aphorism that "what gets measured gets attention." With

key methodological barriers to measuring patients' experiences with individual primary care physicians and practices addressed, it is time to add this balance and perspective to our nation's portfolio of quality measures.

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REFERENCES

1. **Epstein AM.** Public release of performance data: a progress report from the front. *JAMA.* 2000;283:1884–6.
2. **Lee TH, Meyer GS, Brennan TA.** A middle ground on public accountability. *N Engl J Med.* 2004;350:2409–12.
3. **Institute of Medicine.** Crossing the Quality Chasm: A New Health System for the Twenty-First Century. Washington, DC: National Academy Press; 2001.
4. **Solomon LS, Zaslavsky AM, Landon BE, Cleary PD.** Variation in patient-reported quality among health care organizations. *Health Care Fin Rev.* 2002;23:1–16.
5. **Landon BE, Wilson IB, Cleary PD.** A conceptual model of the effects of health care organizations on the quality of medical care. *JAMA.* 1998;279:1377–82.
6. **Rodriguez H, von Glahn T, Rogers W, Chang H, Fanjiang G, Safran D.** Evaluating patients' experiences with individual physicians: a randomized trial of mail, internet and interactive voice response (IVR) telephone administration of surveys. *Med Care.* 2006, in press.
7. **Safran DG, Kosinski M, Tarlov AR, et al.** The primary care assessment survey: tests of data quality and measurement performance. *Med Care.* 1998;36:728–39.
8. **Hays RD, Shaul JA, Williams VS, et al.** Psychometric properties of the CAHPS 1.0 survey measures. *Consumer Assessment of Health Plans Study.* *Med Care.* 1999;37:22–31.
9. **Institute of Medicine.** Primary Care: America's Health in a New Era. Washington, DC: National Academy Press; 1996.
10. **Dillman DA.** Mail and Telephone Surveys: The Total Design Method. New York: John Wiley; 1978.
11. **Fowler FJ Jr., Gallagher PM, Stringfellow VL, Zaslavsky AM, Thompson JW, Cleary PD.** Using telephone interviews to reduce nonresponse bias to mail surveys of health plan members. *Med Care.* 2002;40:190–200.
12. **Zaslavsky AM, Zaborski LB, Cleary PD.** Factors affecting response rates to the consumer assessment of health plans study survey. *Med Care.* 2002;40:485–99.
13. **Lasek RJ, Barkley W, Harper DL, Rosenthal GE.** An evaluation of the impact of nonresponse bias on patient satisfaction surveys. *Med Care.* 1997;35:646–52.
14. **Little R, Rubin D.** Statistical Analysis with Missing Data. NY: Wiley and Sons; 1987.
15. **Allen HM, Rogers WH.** The consumer health plan value survey: round two. *Health Aff (Millwood).* 1997;16:156–66.
16. **Brenner H.** Alternative approaches for estimating prevalence in epidemiologic surveys with two waves of respondents. *Am J Epidemiol.* 1995;142:1236–45.
17. **Herbert R, Bravo G, Korner-Bitensky N, Voyer L.** Refusal and information bias associated with postal questionnaires and face-to-face interviews in very elderly subjects. *J Clin Epidemiol.* 1996;49:373–81.
18. **Keeter S, Miller C, Kohut A, Groves RM, Presser S.** Consequences of reducing nonresponse in a national telephone survey. *Public Opin Q.* 2000;64:125–48.

19. **Gasquet I, Falissard B, Ravaud P.** Impact of reminders and method of questionnaire distribution on patient response to mail-back satisfaction survey. *J Clin Epidemiol.* 2001;54:1174-80.
20. **Friedman EM, Clusen NA, Hartzell M.** Better Late? Characteristics of Late Responders to a Health Care Survey. No. PP03-52, 1-7. Washington, DC: Mathematica Policy Research, Inc; 2004.
21. **Nunnally J, Bernstein I.** *Psychometric Theory.* 3rd ed. New York: McGraw-Hill; 1994.
22. **SAS Institute Inc.** SAS/STAT User's Guide. Version 8. Cary, NC: SAS Institute Inc.; 1999.
23. **Zaslavsky AM, Landon BE, Beaulieu ND, Cleary PD.** How consumer assessments of managed care vary within and among markets. *Inquiry.* 2000;37:146-61.
24. **Hofer TP, Hayward RA, Greenfield S, Wagner EH, Kaplan SH, Manning WG.** The unreliability of individual physician "report cards" for assessing the costs and quality of care of a chronic disease. *JAMA.* 1999;281:2098-105.
25. **Landon BE, Normand SL, Blumenthal D, Daley J.** Physician clinical performance assessment: prospects and barriers. *JAMA.* 2003;290:1183-9.
26. **Miller ME, Hui SL, Tierney WM, McDonald CJ.** Estimating physician costliness. An empirical Bayes approach. *Med Care.* 1993;31:YS16-28.
27. **Orav EJ, Wright EA, Palmer RH, Hargraves JL.** Issues of variability and bias affecting multisite measurement of quality of care. *Med Care.* 1996;34:SS87-101.
28. **Hayward RA, Manning WG Jr., McMahon LF Jr., Bernard AM.** Do attending or resident physician practice styles account for variations in hospital resource use? *Med Care.* 1994;32:788-94.
29. **DiMatteo MR.** Enhancing patient adherence to medical recommendations. *JAMA.* 1994;271:79-83.
30. **DiMatteo MR, Sherbourne CD, Hays RD, et al.** Physicians' characteristics influence patients' adherence to medical treatment: results from the Medical Outcomes Study. *Health Psychol.* 1993;12:93-102.
31. **Francis V, Korsch BM, Morris MJ.** Gaps in doctor-patient communication: patients' response to medical advice. *N Engl J Med.* 1969;280:535-40.
32. **Wilson IB, Rogers WH, Chang H, Safran DG.** Cost-related skipping of medications and other treatments among Medicare beneficiaries between 1998 and 2000: results of a national study. *J Gen Intern Med.* 2005; 20:715-20.
33. **Safran DG, Taira DA, Rogers WH, Kosinski M, Ware JE, Tarlov AR.** Linking primary care performance to outcomes of care. *J Fam Pract.* 1998;47:213-20.
34. **Greenfield S, Kaplan S, Ware JE Jr.** Expanding patient involvement in care. Effects on patient outcomes. *Ann Intern Med.* 1985;102:520-8.
35. **Greenfield S, Kaplan SH, Ware JE Jr, Yano EM, Frank HJ.** Patients' participation in medical care: effects on blood sugar control and quality of life in diabetes. *J Gen Intern Med.* 1988;3:448-57.
36. **Stewart MA.** Effective physician-patient communication and health outcomes: a review [see comments]. *CMAJ.* 1995;152:1423-33.
37. **Roter DL, Hall JA, Kern DE, Barker LR, Cole KA, Roca RP.** Improving physicians' interviewing skills and reducing patients' emotional distress. A randomized clinical trial. *Arch Intern Med.* 1995;155:1877-84.
38. **Safran DG, Montgomery JE, Chang H, Murphy J, Rogers WH.** Switching doctors: predictors of voluntary disenrollment from a primary physician's practice. *J Fam Pract.* 2001;50:130-6.
39. **Levinson W, Roter DL, Mullooly JP, Dull V, Frankel RM.** Physician-patient communication: the relationship with malpractice claims among primary care physicians and surgeons. *JAMA.* 1997;277:553-9.
40. **Beckman HB, Markakis KM, Suchman AL, Frankel RM.** The doctor-patient relationship and malpractice: lessons from plaintiff depositions. *Arch Intern Med.* 1994;154:1365-70.
41. **Hickson GBC, Clayton EW, Entman SS, et al.** Obstetrician's prior malpractice experience and patients' satisfaction with care. *JAMA.* 1994;272:1583-7.
42. **Miller S.** American Board of Medical Specialties; Implementing the CAHPS Ambulatory Care Survey: A Panel Discussion of Current and Planned Activities. Presented at CAHPS Across the Health Care Continuum: 9th National User Group Meeting. Baltimore, MD, 12-2-2004.
43. **Karp M.** Massachusetts Health Quality Partners; Implementing the CAHPS Ambulatory Care Survey: A Panel Discussion of Current and Planned Activities. Presented at CAHPS Across the Health Care Continuum: 9th National User Group Meeting. Baltimore, MD, 12-2-2004.
44. **Damberg C.** Pacific Business Group on Health; Implementing the CAHPS Ambulatory Care Survey: A Panel Discussion of Current and Planned Activities. Presented at CAHPS Across the Health Care Continuum: 9th National User Group Meeting. Baltimore, MD, 12-2-2004.
45. **Centers for Medicare and Medicaid Services (CMS).** CMS Doctor's Office Quality Project Overview, 7-15-2004. <http://www.cms.hhs.gov/quality/doq/DOQOverview.pdf>
46. **Safran DG.** Defining the future of primary care: what can we learn from patients? *Ann Intern Med.* 2003;138:248-55.
47. **Murphy J, Chang H, Montgomery J, Rogers WH, Safran DG.** The quality of physician-patient relationships: patients' experiences 1996-1999. *J Fam Pract.* 2001;50:123-9.
48. **National Committee for Quality Assurance.** *State of Managed Care Quality 2000.* Washington, DC, 2000.
49. **National Committee for Quality Assurance.** *State of Managed Care Quality, 2001.* Washington, DC, 2001.
50. **Jencks SF, Huff ED, Cuerdon T.** Change in the quality of care delivered to Medicare beneficiaries, 1998-1999 to 2000-2001. *JAMA.* 2003;289:305-12.

Supplementary Material

The following supplementary material is available for this article online:

Appendix. Non-Response.