

Association Between Use of Clinician Performance Information and Patient Experience

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Nearly half of all primary care physicians and specialists are in group practices.¹ Although many hope that group practices may have more tools and resources to improve the quality of care, much remains unknown about which specific tools leveraged by group practices may improve quality. One increasingly common practice in physician practices is to collect information on clinician performance.²⁻⁴ Some organizations and policy makers hope that collecting this information can be an important step toward improving care quality.^{5,6}

As primary care delivery increasingly focuses on patient-centeredness, it is important to ask whether initiatives commonly used by primary care organizations, such as the collection and use of clinician performance information, translate to better care as perceived by patients.⁷ There are many ways in which the collection and use of performance information could improve patient experience. When used well, performance information may allow organizations to identify problem areas, optimize the allocation of resources, and share best practices, all of which may improve patient experience. Although many health care organizations noted benefits from the increasingly common practice of performance information collection, evidence on the relationship between performance measurement and patient experience is still rare. CMS develops, implements, and administers several patient experience surveys. A few studies have looked at the relationship between various organizational practices and policies and patient experience measures.⁸ Data from several studies have shown patient experience measures to be related to clinical quality,⁹⁻¹⁵ although most studies have focused on the Medicare population.^{16,17} A number of recent studies have also explored the association between organizational characteristics and quality outcomes, also with a focus on the Medicare population.^{18,19}

This study explores the association between the collection and use of clinician performance information and patient experience in primary care services in the commercially insured population using data from 2 innovative surveys. Findings from this study could help identify high-quality practices and help practices evaluate the effectiveness of their policies.

ABSTRACT

OBJECTIVES: To study the association between the collection and use of clinician performance information in physician practices and patient experience in primary care.

STUDY DESIGN: Patient experience scores are calculated from the 2018-2019 Massachusetts Statewide Survey of Adult Patient Experience of Primary Care. Physicians were attributed to physician practices using the Massachusetts Healthcare Quality Provider database. Scores were matched to information on the collection or use of clinician performance information from the National Survey of Healthcare Organizations and Systems using practice name and location.

METHODS: We conducted observational multivariate generalized linear regression at the patient level where the dependent variables were 1 of 9 patient experience scores and the independent variables were 1 of 5 domains in the collection or use of performance information of the practice. Patient-level controls included self-reported general health, self-reported mental health, age, sex, education, and race/ethnicity. Practice-level controls include the size of the practice and the availability of weekend and evening hours.

RESULTS: Nearly 90% of practices in our sample collect or use clinician performance information. High patient experience scores were associated with whether any information was collected and used, especially with whether the practice shared this information internally to compare. Among practices that used clinician performance information, patient experience was not associated with whether the information was used in more aspects of care.

CONCLUSIONS: The collection and use of clinician performance information were associated with better primary care patient experience among physician practices. Deliberate efforts to use clinician performance information in ways that cultivate clinicians' intrinsic motivation may be especially effective for quality improvement.

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TAKEAWAY POINTS

High patient experience scores were associated with the collection and use of any clinician performance information, especially with whether the practice shared this information internally to compare.

- ▶ Whether a physician practice uses clinician performance information may be used to identify high-quality practices.
- ▶ Deliberate efforts to use clinician performance information in ways that cultivate clinicians' intrinsic motivation may be especially effective for quality improvement.
- ▶ Our findings suggest that policies that impose requirements on the collection and measurement of quality information alone may not be sufficient tools for quality improvement.
- ▶ Future studies may directly test the effect of policies that encourage the use of quality information on quality improvement.

- Number of areas from which the practice uses information for individual clinician performance for physician compensation (out of 7 aspects of patient care)
- Whether reports are shared within the group in a way that an individual clinician can compare their performance with that of other clinicians within the practice (yes or no)

For each of the first 4 measures, we constructed a binary variable that indicated whether the practice collected or used no (0) or any (1-7) information. These binary variables and the binary indicator from the last measure constituted the 5 independent variables on the use of clinician performance information in our primary analysis. Among practices that did collect or use any clinician performance information, we further divided them into practices that collected and used this information in a high number of areas or aspects (4-7) and practices that collected and used this information in a low number of areas or aspects (1-3). The distribution of these 5 measures of clinician performance across the practices in our sample can be found in

TABLE 1. Distribution of NSHOS Survey Answers by Practice, Binned Into 2 Categories

	High (4-7)	Low (1-3)	None	Missing
Collecting clinician performance information	42 (57.5%)	21 (28.8%)	8 (11.0%)	2 (2.7%)
Using performance information for feedback	40 (54.8%)	24 (32.9%)	9 (12.3%)	0
Using performance information for internal QI	41 (56.2%)	19 (26.0%)	13 (17.8%)	0
Using performance information for physician compensation	11 (15.1%)	34 (46.6%)	28 (38.4%)	0
		Yes	No	Missing
Sharing reports on performance information to compare		59 (80.8%)	14 (19.2%)	0

NSHOS, National Survey of Healthcare Organizations and Systems; QI, quality improvement.

Table 1. The details of the sampling framework and survey answers can be found in [eAppendix A](#) and [eAppendix B](#) (eAppendices available at [ajmc.com](#)).

A second data source was the Massachusetts Health Quality Partners (MHQP) Statewide Survey of Adult Patient Experience of Primary Care Data (a component of the MHQP Statewide Patient Experience Survey, or MHQP-PES). This was a statewide mail survey sent to patients who had had primary care visits in the prior 12 months. All patients in the sample were required to have a primary care provider (PCP) by their commercial health plan, and patient responses were attributed to the PCP listed on their health plan. The survey asked patients to rate the quality of certain doctor-patient interactions and other aspects of care using a nationally developed standard survey instrument. The surveys included in this study were fielded from April to July in 2018 and 2019. They sampled commercially insured patients from 771 adult and 315 pediatric primary care practices of 1576 statewide. A total of 41,976 responses were received of 192,625 adult patient samples, with a response rate of 21.8%.

The MHQP-PES used in this study is based on the Consumer Assessment of Healthcare Providers and Systems (CAHPS) Clinician & Group Survey, 3.0.²⁰ The survey had 19 items that made up 7 composites (communication [4 items], integration of care [3 items], organizational access [3 items], self-management support [2 items], knowledge of patient [2 items], adult behavioral health [2 items], and office staff [2 items]) and 2 individual items that

METHODS

Data and Variables

This study used 2 survey data sets. Data on the use of clinician performance information came from the 2017-2018 National Survey of Healthcare Organizations and Systems—Practice Level (NSHOS-P). NSHOS was a collection of nationally representative surveys that aimed to characterize the structure, ownership, leadership, and care delivery capabilities of health care systems; physician practices with 3 or more primary care physicians; and hospitals. We used only the physician practice component of the survey and focused on practices from Massachusetts. A total of 236 physician practices with 3 or more primary care physicians were surveyed in Massachusetts; 82 responded, for a response rate of 35%. From this survey, we extracted 5 measures based on answers to 3 survey questions related to the use of clinician performance information. These measures were:

- Number of areas on which the practice collects information for individual clinician performance (out of 7 clinical areas)
- Number of areas from which the practice uses information for individual clinician performance for feedback (out of 7 aspects of patient care)
- Number of areas from which the practice uses information for individual clinician performance for internal quality improvement (out of 7 aspects of patient care)

TABLE 2. Distribution of Patient Experience Score^a

	(1) ICC	(2) Mean [range of practice-level means] [overall SD]	(3) Collecting clinician performance information, mean (SD)		(4) Using performance information for feedback, mean (SD)		(5) Using performance information for internal QI, mean (SD)		(6) Using performance information for physician compensation, mean (SD)		(7) Sharing reports on performance information to compare, mean (SD)	
			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Communication	0.02	94.46 [88.01-99.26] (14.11)	94.03 (14.32)	94.37 (14.24)	94.48 (13.95)	94.46 (14.13)	93.78 (14.60)	94.59 (14.01)	94.39 (13.81)	94.49 (14.25)	92.57 (16.04)	94.83 (13.67)
Knowledge of patient	0.03	89.72 [79.22-95.47] (17.23)	88.85 (17.57)	89.62 (17.35)	90.56 (16.58)	89.58 (17.33)	88.27 (17.92)	90.00 (17.07)	89.50 (16.99)	89.82 (17.34)	87.42 (18.58)	90.16 (16.92)
Integration of care	0.02	86.92 [77.83-94.12] (20.16)	84.68 (21.26)	86.95 (20.21)	87.98 (19.58)	86.74 (20.26)	84.87 (21.17)	87.31 (19.94)	86.29 (20.43)	87.21 (20.04)	85.30 (21.10)	87.24 (19.96)
Organizational access	0.04	85.60 [69.44-94.79] (19.45)	84.04 (19.67)	85.50 (19.61)	87.52 (18.27)	85.30 (19.62)	84.61 (19.47)	85.80 (19.45)	85.32 (19.58)	85.73 (19.40)	82.93 (20.92)	86.10 (19.13)
Office staff	0.03	88.46 [77.78-96.02] (18.61)	87.98 (18.45)	88.28 (18.82)	89.79 (17.56)	88.24 (18.77)	88.49 (18.10)	88.45 (18.72)	88.34 (18.79)	88.51 (18.53)	86.97 (19.61)	88.74 (18.40)
Self-management support	0.02	63.37 [45.24-79.61] (40.03)	62.27 (40.99)	63.14 (40.00)	64.86 (39.17)	63.13 (40.16)	59.74 (41.15)	64.08 (39.76)	62.84 (40.26)	63.61 (39.92)	61.11 (39.98)	63.81 (40.02)
Adult behavioral health	0.05	75.11 [43.67-91.45] (37.71)	76.06 (36.88)	74.59 (38.02)	78.83 (34.67)	74.49 (38.16)	72.36 (39.05)	75.64 (37.42)	74.77 (37.86)	75.26 (37.64)	69.40 (40.54)	76.21 (37.04)
Willingness to recommend	0.02	91.22 [81.62-96.74] (20.26)	90.16 (20.72)	91.17 (20.38)	91.31 (20.90)	91.21 (20.16)	89.97 (21.13)	91.47 (20.08)	90.93 (20.27)	91.36 (20.26)	88.87 (21.61)	91.68 (19.96)
Provider rating	0.03	92.33 [83.28-97.83] (13.56)	91.43 (13.94)	92.31 (13.63)	92.87 (13.37)	92.24 (13.59)	91.14 (14.35)	92.56 (13.39)	92.25 (13.34)	92.37 (13.66)	90.33 (14.63)	92.72 (13.31)

ICC, intraclass correlation coefficient; QI, quality improvement.

^aColumn 1 shows the ICCs (class = practice) for the patient experience measures. The ICCs are calculated using the “mixed” command in Stata 17. Column 2 shows the overall mean of patient experience scores, with the range of practice-level means in square brackets and overall SDs in parentheses. Columns 3-7 show the patient experience scores stratified by whether the practice collected or used any clinician performance information, with overall SDs in parentheses.

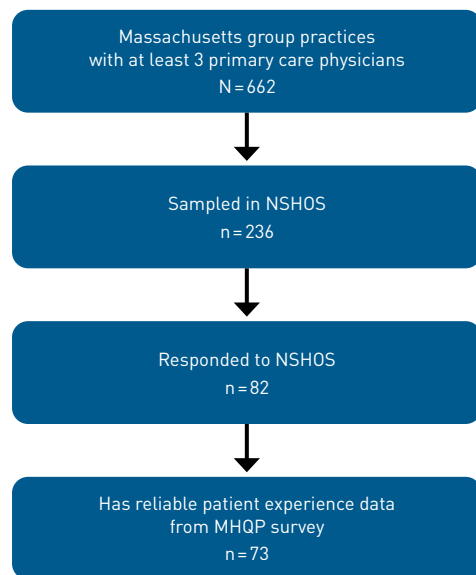
measured overall ratings (willingness to recommend and provider rating). The mean of each composite score can be found in [Table 2](#), and the distribution of the number of responses per practice in our sample can be found in [eAppendix Table 1](#). The components were calculated for adult patients only. Details on the survey questions can be found in [eAppendix C](#).

The NSHOS-P and MHQP-PES data were matched on the names and addresses of the physician practices. The study sample included data from 73 practices that had both NSHOS-P and reliable MHQP-PES data (see [eAppendix C](#) for a definition of reliable survey data). The merged data were at the patient respondent level (for MHQP-PES respondents). The construction of the sample practices is shown in the [Figure](#).

Controls

From NSHOS-P responses, we created a continuous variable of the number of employed and affiliated/contracted providers at a practice (Q.55: What is your best estimate of the total number of full- and part-time providers in your practice?). We controlled for practice size because large and small practices may have different levels of resources that may affect both patient experience and the practices’ ability to collect and use clinician performance information. We also controlled for whether the practice offered

FIGURE. Sample Construction



MHQP, Massachusetts Health Quality Partners; NSHOS, National Survey of Healthcare Organizations and Systems.

weekend or evening hours, as the availability of appointments was likely to affect patient experience. From the MHQP-PES, we used responses from questions that asked about self-reported general health, self-reported mental health, age, sex, education, and race/ethnicity to generate patient-level controls. For self-reported general and mental health, responses were on a 5-point Likert-type scale. We scored these as: excellent = 5, very good = 4, good = 3, fair = 2, and poor = 1. Response options for age were binned into: 18 to 24 years = 1; 25 to 34 = 2; 35 to 44 = 3; 45 to 54 = 4; 55 to 64 = 5; 65 to 74 = 6; and 75 or older = 7. For sex, response options were male = 1 and female = 0. For education, response options were scored as follows: eighth grade or less = 1; some high school, but did not graduate = 2; high school graduate or General Educational Development = 3; some college or 2-year degree = 4; 4-year college graduate = 5; and more than 4-year college degree = 6. For race/ethnicity, we included an indicator each for whether the individual was White, Black, Asian, or Hispanic (not mutually exclusive).

METHODS

To assess the relationship between the use of clinician performance information and patient experience, we regressed each composite score of patient experience on each of the 5 measures of the use of clinician performance measures with controls, using data at the respondent level (for MHQP-PES respondents). Data on patient experience measures and patient characteristics varied by patients, but other measures only varied across practices. Specifically, we ran the generalized linear regression:

$$PatientExperienceScore_{ij} = \beta_1 NSHOSmeasure_j + \beta_2 X_{ij} + \alpha_j + \varepsilon_{ij}$$

where $PatientExperienceScore_{ij}$ was 1 of the 9 patient experience scores for patient i going to practice j , $NSHOSmeasure_j$ was 1 of the 5 measures on the use of clinician performance information from the NSHOS survey, and X_{ij} was a list of controls. The SEs were clustered at the practice level. To address the concerns of multiple hypothesis testing, we adjusted the P values of the estimates using a free step-down resampling method.²¹ This method is a more powerful alternative than the commonly used Bonferroni method for controlling familywise error rate in situations of multiple hypothesis testing.^{21,22}

In addition, for each independent variable, we generated a composite measure of the overall effect of that clinician performance measure on all 9 dimensions of patient experience by taking a weighted mean of the individual regression coefficients, weighted by the SD of each of the 9 patient experience scores. In addition to providing a summary measure of the relationship between all patient experience domains and the collection/use of clinician performance measures, this composite measure reduced the number of statistical tests and partially alleviated the concerns for multiple hypothesis testing as well.²¹ The exact calculation of the standardized coefficient can be found in [eAppendix D](#).

RESULTS

Table 2 shows the mean patient experience scores for all practices and stratified by whether the practice collected or used clinician performance information. Overall, patient experience scores were quite high, with means higher than 85 (out of 100) for most patient experience score measures. Two aspects of patient experience, self-management and adult behavioral health, had slightly lower means at 63 and 75. These 2 measures also had higher SDs and more variations across practices than other patient experience measures. The intraclass (class = practice) correlations for the patient experience measures were between 0.02 and 0.05, suggesting that the variation in patient experience scores within a practice was much greater than the variation in scores across practices. Table 2 also shows close similarities in most patient experience measures between practices that collected and used clinician performance information and practices that did not. The 1 exception was that practices that shared performance information internally for comparison appeared to have higher patient experience scores, but it was not possible to reject this difference as due to chance given the large SDs. These mean comparisons also did not adjust for any other practice-level characteristics or differences in patient compositions between practices that collected or used clinician performance information and practices that did not.

The regression coefficients of patient experience scores on different measures of the use of clinician performance information are shown in [Table 3](#). After controlling for patient and organizational characteristics, the standardized coefficient on whether a practice collected any information on the primary care physician was positive but not significant at the 5% level. When looking at the 9 domains of patient experience scores separately, practices that collected any information on clinician performance performed better in only 2 domains: integration of care and organizational access (a measure of whether patients were getting timely appointments, care, and information). The coefficients on the other 7 domains were very imprecisely estimated, with adjusted P values greater than .999 and CIs too broad to be meaningful.

The standardized coefficients on whether the practice used clinician performance information for internal quality improvement (QI), feedback, physician compensation, and internal comparison were all positive, but the coefficient was not significant at the 5% level for whether the practice used clinician performance information for feedback. Practices that used clinician performance information for internal QI efforts had patient experience scores that were 0.09 SDs higher than those of practices that did not use clinician performance information for internal QI efforts. Practices that used clinician performance information for physician compensation had patient experience scores that were 0.07 SDs higher than those of practices that did not use the information for physician compensation. Practices that shared clinician performance quality information internally for comparison had patient experience scores that were 0.19 SDs higher than those of practices that did not share

TABLE 3. Correlation Between Patient Experience Scores and Any Use of Clinician Performance Information*

	Independent variable				
	Clinical performance information	Feedback	Internal QI	Physician compensation	Reports shared to compare
All patient experience measures	0.06 [-0.02 to 0.13]	0.06 [-0.01 to 0.12]	0.09 [0.02-0.16]	0.07 [0-0.14]	0.19 [0.19-0.19]
Communication	0.31 (<i>P</i> > .999)	2.39 [0.39-4.38]	1.63 [0.17-3.09]	0.39 [-0.41 to 1.2]	3.57 [1.44-5.69]
Knowledge of patient	0.47 (<i>P</i> > .999)	2.36 [0.24-4.49]	1.91 [-0.02 to 3.83]	0.39 [-0.41 to 1.2]	4.76 [1.93-7.6]
Integration of care	3.40 [0.12-6.68]	1.68 [-0.83 to 4.19]	3.47 [1.4-5.53]	3.23 [0.53-5.92]	4.28 [1.73-6.83]
Organizational access	4.13 [0.99-7.27]	-0.87 [-3.37 to 1.63]	2.89 [-0.21 to 6]	2.34 [-1.99 to 6.67]	3.98 [0.13-7.83]
Office staff	0.86 (<i>P</i> > .999)	-0.36 [-1.39 to 0.67]	1.01 [-0.87 to 2.9]	1.99 [-1.69 to 5.66]	2.30 [-0.63 to 5.22]
Self-management support	1.60 (<i>P</i> > .999)	2.22 [-1.09 to 5.54]	5.76 [1.44-10.08]	3.34 [-2.83 to 9.52]	5.33 -0.37 to 11.04]
Adult behavioral health	-1.79 (<i>P</i> > .999)	-4.25 [-8.48 to -0.02]	-0.90 [-2.79 to 0.98]	-2.41 [-7.34 to 2.51]	-0.53 [-1.46 to 0.39]
Willingness to recommend	0.39 (<i>P</i> > .999)	2.29 [0.23-4.34]	1.097 [-0.44 to 2.64]	0.88 [-0.92 to 2.67]	5.12 [2.07-8.17]
Provider rating	0.23 (<i>P</i> > .999)	1.63 [0.17-3.09]	1.37 [-0.01 to 2.74]	0.91 [-0.77 to 2.59]	3.82 [1.55-6.1]

QI, quality improvement.

*This table shows the regression coefficients from the generalized linear regression in the equation in the text. The independent variable is the patient experience score in 1 of the 9 domains, and the dependent variable is an indicator of whether the physician practice collected or used clinician performance information in any of the manners. The 95% CIs of the estimated coefficients are shown in parentheses. The first row shows a composite measure of the overall effect of each of the 5 measures of the collection and use of clinician performance measures on patient experience by taking a weighted average of the individual regression coefficients, weighted by the SD of each of the 9 patient experience scores. The CIs for the summary measure are unadjusted, and the CIs for the individual patient experience measures are adjusted for multiple hypothesis testing using a step-down resampling method. Patient-level controls included self-reported general health, self-reported mental health, age, sex, education, and race/ethnicity. Practice-level controls included the size of the practice and the availability of weekend and evening hours.

TABLE 4. Correlation Between Patient Experience Scores and High Use of Clinician Performance Information

	Independent variable			
	Clinical performance information	Feedback	Internal QI	Physician compensation
All patient experience measures	-0.05 [-0.11 to 0.01]	-0.02 [-0.11 to 0.08]	-0.02 [-0.1 to 0.07]	-0.07 [-0.15 to 0.01]
Communication	-1.02 [-2.75 to 0.71]	0.08 (<i>P</i> > .999)	-0.59 (<i>P</i> > .999)	-0.07 [-0.55 to 0.42]
Knowledge of patient	-2.46 [-5.09 to 0.18]	-0.27 (<i>P</i> > .999)	-0.49 (<i>P</i> > .999)	-0.28 [-2.29 to 1.73]
Integration of care	-1.22 [-3.29 to 0.85]	0.22 (<i>P</i> > .999)	-0.57 (<i>P</i> > .999)	-1.33 [-4.02 to 1.36]
Organizational access	0.09 [-0.09 to 0.27]	-0.16 (<i>P</i> > .999)	1.39 (<i>P</i> > .999)	-2.07 [-6.25 to 2.11]
Office staff	1.52 [-1.05 to 4.09]	1.34 (<i>P</i> > .999)	-1.09 (<i>P</i> > .999)	-3.12 [-5.5 to -0.75]
Self-management support	-3.68 [-9.91 to 2.55]	-2.72 [-18.51 to 9.15]	-3.29 (<i>P</i> > .999)	-2.43 [-9.03 to 4.16]
Adult behavioral health	1.69 [-1.8 to 5.19]	-0.36 [-15.35 to 5.71]	-0.14 (<i>P</i> > .999)	-7.45 [-13.12 to -1.78]
Willingness to recommend	-1.61 [-4.33 to 1.11]	-0.36 (<i>P</i> > .999)	0.82 (<i>P</i> > .999)	0.09 [-0.54 to 0.72]
Provider rating	-1.51 [-3.18 to 0.17]	-0.36 (<i>P</i> > .999)	-0.46 (<i>P</i> > .999)	-0.39 [-3.14 to 2.37]

QI, quality improvement.

*This table shows the regression coefficients from the generalized linear regression in the equation in the text. The independent variable is the patient experience score in 1 of the 9 domains, and the dependent variable is an indicator of whether the physician practice had high use (in 4 or more areas of 7) of each of the 4 practices related to the collection and use of clinician performance information, conditional on the practice collecting or using such information at all (in at least 1 area of 7). The 95% CIs of the estimated coefficients are shown in parentheses. The first row shows a composite measure of the overall effect of each of the 5 measures of the use of clinician performance measures on patient experience by taking a weighted average of the individual regression coefficients, weighted by the SD of each of the 9 patient experience scores. The CIs for the summary measure are unadjusted, and the CIs for the individual patient experience measures are adjusted for multiple hypothesis testing using a step-down resampling method. Patient-level controls included self-reported general health, self-reported mental health, age, sex, education, and race/ethnicity. Practice-level controls included the size of the practice and the availability of weekend and evening hours.

such information. Practices that shared clinician performance quality information internally for comparison reported higher patient experience scores in 6 of 9 domains.

Table 4 shows the regression coefficient on whether the practices used clinician performance information in a high number of aspects (4-7) or a low number of aspects (1-3) among practices

that collected or used clinician performance information at all. Because this comparison was performed on a select subsample, the coefficients were much less precisely estimated. Overall, using clinician performance information in a high number of areas did not have a statistically significant association with higher patient experience in any domain.

DISCUSSION

High patient experience scores in primary care were associated with whether clinician performance information was collected and used at the physician practice level. The association was strongest for whether the practice shared reports from clinician performance information internally for comparison. Among practices that collected or used clinician performance information, using this information in more clinical areas was not associated with higher patient experience scores.

The collection of clinician performance information was associated with greater integration of care and organizational access. This may be because the collection of such information enabled the practice to better match patients to clinicians within the organization based on patient needs and clinician expertise, leading to more effective management of the caseload.

Compared with whether practices collected any clinician performance information, measures on whether the practice used clinician performance information were associated with a broader set of patient experience measures. This was especially true for whether the practice shared such information internally for comparison and less true for whether the practices used such information for physician compensation. Part of the reason that the correlation was especially strong for whether the practices shared reports from clinician performance information internally for comparison may be that these practices were especially good at encouraging peer feedback and harnessing the intrinsic motivation of clinicians to provide high-quality care. This is consistent with findings from 2 strands of research. First, previous research findings have shown that team-based work may improve quality in primary care.^{19,23} Second, previous research findings have shown that intrinsic motivation may be more powerful in leading to desirable behavior than extrinsic motivation (such as performance payment or fines).²⁴⁻²⁶

Among the 9 measures of patient experience, integration of care had a consistently positive correlation with the collection and use of information. This might be because integrated care management programs have gained increasing attention as a tool to improve primary care quality in the past decade.^{27,28} We did not find a positive association that is significant at the 5% level between the collection and use of clinician performance information and patient experience with office staff or related to adult behavioral health. This might be because efforts that are centered on clinicians are unlikely to affect aspects of patient care that rely heavily on nonphysicians and other professionals. For example, adult behavioral health care usually involves a multidisciplinary team that includes physicians, nurses, administrative staff, and social workers.²⁹

Our results suggest that using clinician performance information may contribute to positive improvement in patient experience, and such contribution is likely to be greatest if the collected information is used deliberately with a goal for QI. Future research may seek to understand more about the mechanism through which the deliberate

use of clinician performance information may lead to QI and the characteristics of practices that collected performance information without effectively using it. It is possible that these practices may be collecting information as a passive response to a requirement by the health system, the payer, or the regulator. It is also possible that these practices lack the resources to translate information to QI. In **eAppendix Table 2**, we show that practices collecting clinician performance information are much less likely to have weekend and evening hours than practices not collecting such information. Although our study controls for the availability of weekend and evening hours, this pattern suggests the possibility that with limited resources, practices may have to choose between opening for more hours and allocating resources to collecting and using clinician performance information. **eAppendix Table 2** also shows that practices that collect or use clinician performance information on average scored higher on a composite measure of how well they incorporate patient input and on a composite score for team culture. Such higher scores in incorporating patient input and team culture could be the result of deliberate efforts to use clinician performance information and could serve as mechanisms through which greater use of performance information may improve patient experience.

Overall, although practices that collected or used clinician performance information had higher patient experience scores, the difference was relatively small compared with the overall variation in patient experience scores across practices. This suggests that although the use of clinician performance information may matter for patient experience, patient experience may be influenced by many other factors.

Limitations

This study has some limitations. It covers a relatively small number of practices in a single state. Both surveys have response rates below 50%. Although these rates are not unusually low for surveys of such type, nonresponses may affect the representativeness of our sample. For example, physician practices that respond to the survey may be the ones that have more resources or may be the ones with clinical or organizational initiatives that they are eager to make known. They may be both more likely to collect and use clinician performance information and more likely to have other resources to improve patient experience. For the MHQP-PES, patients may be more likely to respond to the survey if they have had particularly good or particularly bad experiences with their PCPs. Such selective responses may affect the observed relationship between the collection and use of clinician performance information and patient experience in either direction. In addition, **eAppendix Table 3** shows that patients included in our study had a lower likelihood of being Black or Hispanic than the general Massachusetts population (4% and 5% vs 9% and 12%, respectively).³⁰ This may be because Black or Hispanic patients were underrepresented in the practices that responded to the NSHOS-P surveys or among the patients who responded to the MHQP surveys. This difference limits the applicability of our findings to these groups of patients.

A second limitation of this study is that it focuses on the commercially insured population only and may not be representative of the experience of patients with publicly funded insurance. Although the collection and use of clinician performance information are practice-wide, patients with publicly funded insurance may have different patient experiences, especially in aspects related to organizational access.

Last, the association does not speak to the causal relationship between the use of clinician performance information and patient experience. It is possible that practices that focused on the collection and use of clinician performance information also focused on other practices that may have led to QI. Nevertheless, the findings of this study add to our knowledge of the relationship between organizational practices and patient experience in the commercially insured population. They could also help us identify high-quality practices and generate hypotheses for further testing.

CONCLUSIONS

The collection and use of clinician performance information were associated with better primary care patient experience among physician practices. Deliberate efforts to use clinician performance information in ways that cultivate clinicians' intrinsic motivation may be especially effective for quality improvement. ■

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eAppendix A. The NSHOS Survey Sample

The National Survey of Healthcare Organizations and Systems (NSHOS), was developed by researchers at one of the AHRQ-funded Comparative Health System Performance Center of Excellence led by researchers from Dartmouth College, the University of California at Berkeley, Harvard University, and the Mayo Clinic. The survey was fielded from June 2017 to August 2018. It surveys a nationally representative sample of health systems, physician practices and hospitals to characterize the structure, ownership, leadership, and care delivery capabilities of these providers.

The NSHOS survey team identified systems, physician practices, and hospitals to sample from the health information firm, IQVIA. IQVIA uses the American Medical Association's physician Masterfile, publicly available sources, and proprietary data collection strategies to develop the OneKey database.

The NSHOS survey used a stratified-cluster sampling design to select health care systems, physician practices, and hospitals. When a health care system was sampled, the team then selected physician practices and hospitals owned by those systems. Samples are stratified based on ownership and composition structures including samples of both system-owned and independent physician practices and hospitals.

The NSHOS-P survey surveyed practice managers and physicians in primary and multispecialty care physician practices that had at least 3 primary care physicians. Physician practices are defined as a single location practice. Primary care physicians included family medicine, geriatrics, internal medicine, or preventive medicine specialties. Nationally, the survey sampled 4,976 practices and obtained 2,333 responses. More detailed information about the surveys can be found on the NSHOS website (<https://sites.dartmouth.edu/coe/nshos/>) .

eAppendix B. Relevant NSHOS Survey Questions

To measure the **“Number of Areas on Which the Practice Collects Information for Individual Clinician Performance”** we used responses from the NSHOS **Question 48**: *Does your practice collect information about individual clinician performance for: Diabetes; Congestive heart failure; Asthma/COPD; Coronary artery disease; Hypertension; Depression; Serious mental illness* (response options for each: Yes, No). We created a variable, ‘Clinician Performance Information,’ by giving 1 point for each “yes” response for each condition (score range for ‘Clinician Performance Information’: range 0 to 7).

To measure the **“Number of Areas of Which the Practice Uses Information for Individual Clinician Performance for Feedback,” “Number of Areas of Which the Practice Uses Information for Individual Clinician Performance for Internal Quality Improvement”** and **“Number of Areas of Which the Practice Uses Information for Individual Clinician Performance for Physician Compensation,”** we used responses from NSHOS **Question 49**: *How does your practice manage information about individual clinician performance for: preventive services; patient experiences; overuse of medical tests or procedures; underuse of medical tests or procedures; use of acute care services; clinical quality; and total inpatient cost of care* (response options: use for feedback; use for internal quality improvement; and use for physician compensation). We created new variables to measure these uses. We gave one point for responses marked “use for Feedback,” “use for Internal Quality Improvement,” and “use for Physician Compensation” for each of the categories, respectively, to create the variables **“Number of Areas of Which the Practice Uses Information for Individual Clinician Performance for Feedback”**, **“Number of Areas of Which the Practice Uses Information for Individual Clinician Performance for Internal Quality Improvement”** and **“Number of Areas of Which the Practice Uses Information for Individual Clinician Performance for Physician Compensation.”** Scores for each had a possible range of 0 to 7.

To measure **“Whether Reports are Shared within the Group in a way that an individual clinician can compare their performance to other clinicians within the practice”** we used responses to NSHOS **Question 50**: *Are reports shared within the group in a way that an individual clinician can compare their performance to other clinicians within the practice?* (Response options: Yes (score=1), No (score=0), Not collected (score= missing)).

To measure **“How Well the Organization Incorporates Patient Input”**, we used responses to NSHOS **Question 8**: *Do you agree with or disagree with A. The practice does a good job of assessing patient needs and expectations. B. Staff promptly resolve patient complaints. C. Patients’ complaints are studied to identify patterns and prevent the same problems from recurring. D. The practice uses data from patients to improve care. E. The practice uses patient expectations/experiences data when developing new services.* (Response options: Strongly Disagree (score = 0), Disagree (score =25), Neither agree nor disagree (score = 50), Agree (score = 75), Strongly Agree (score = 100).) Scores from part A-E are averaged to construct an overall score.

To measure “**The Availability of Weekend and Evening Hours**”, we used responses to NSHOS **Question 10**: *Is your practice regularly open for patient appointments outside usual business hours.*

To measure “**Team Culture**”, we used responses to NSHOS **Question 6**: *How often do these things happen within your practice: A. Successful care delivery innovations are highly publicized within the practice. B. Team members openly share patient care challenges and failures with each other. C. There is protect time given to generate new ideas and innovations. D. We encourage trying new ideas to see if they work. E. There is a strong sense of belonging to this practice. F. We consider ourselves to be the testing ground for new approaches to engage patients in their care. G. Team members feel safe raising concerns regarding patient care. H. Our physicians deliver clinical care for patients using the same protocols and pathways. And I. Non-clinical decisions about the practice are made by our physicians acting as a single integrated group.* (Response options: Never (score = 0), Sometimes (score = 33), Often (score = 67), and Always (score = 100)). Scores from part A-I are averaged to construct an overall score.

eAppendix C. Relevant MHQP Survey Questions

The **Organizational Access** composite consisted of 3 items: (1) In the last 12 months, when you called this provider's office to get an appointment for care you needed right away, how often did you get an appointment as soon as you needed? (2) In the last 12 months, when you made an appointment for a check-up or routine care with this provider, how often did you get an appointment as soon as you needed? (3) In the last 12 months, when you called this provider's office during regular office hours, how often did you get an answer to your medical question that same day? Response options for all items were: Never, Sometimes, Usually, Always

The **Communication** composite consisted of 4 items: (1) In the last 12 months, how often did this provider explain things in a way that was easy to understand? (2) In the last 12 months, how often did this provider listen carefully to you? (3) In the last 12 months, how often did this provider show respect for what you had to say? (4) In the last 12 months, how often did this provider spend enough time with you? Response options for all items were: Never, Sometimes, Usually, Always

The **Knowledge of Patient** composite consisted of 2 items: (1) In the last 12 months, how often did this provider seem to know the important information about your medical history? (2) How would you rate this provider's knowledge of you as a person, including values and beliefs that are important to you? Response options for item (1) was: Never, Sometimes, Usually, Always, and for item (2) was: Very poor, Poor, Fair, Good, Very good, Excellent.

The **Integration of Care** composite consisted of 3 items: (1) In the last 12 months, how often did the provider named in Question 1 seem informed and up-to-date about the care you got from specialists? (2) In the last 12 months, when this provider ordered a blood test, x-ray, or other test for you, how often did someone from this provider's office follow up to give you these results? (3) In the last 12 months, how often did you and someone from this provider's office talk about all the prescription medicines you were taking? Response options for all items were: Never, Sometimes, Usually, Always

The **Self-Management Support** composite consisted of 2 items: (1) In the last 12 months, did you and anyone in this provider's office talk about specific goals for your health? (2) In the last 12 months, did anyone in this provider's office ask you if there are things that make it hard for you to take care of your health? Response options for both items: Yes, No.

The **Adult Behavior Health** composite consisted of 2 items: (1) In the last 12 months, did anyone in this provider's office ask you if there was a period of time when you felt sad, empty, or depressed? (2) In the last 12 months, did you and anyone in this provider's office talk about things in your life that worry you or cause you stress? Response options for both items: Yes, No.

The **Office Staff** composite consisted of 2 items: (1) In the last 12 months, how often were the front office staff at this provider's office as helpful as you thought they should be? (2) In the last 12 months, how often did the front office staff at this provider's office treat you with courtesy and respect? Response options for both items were: Never, Sometimes, Usually, Always

The **Willingness to Recommend** item was: Would you recommend this provider to your family and friends? Response options were: Definitely yes, Probably yes, Not sure, Probably not, Definitely not. The **Provider Rating item was:** Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider? Response options were 0 to 10.

How are the survey responses scored?

All survey responses are coded to a 0 to 100 scale so that questions with different response options may be easily combined. Higher values indicate more positive responses.

For example, a question with 4 response options would be assigned the following values:

Response	Value
Always	= 100.00
Usually	= 66.67
Sometimes	= 33.33
Never	= 0.00

A question with 2 response options would be assigned the following values:

Response	Value
Yes	= 100.00
No	= 0.00

Composites are calculated as a simple average of the response values for each of the component questions. If fewer than half of the questions have valid responses for a given survey respondent, then the composite cannot be calculated and is considered missing.

For example, a composite that is comprised of 5 questions would be calculated as follows:

	Q1	Q2	Q3	Q4	Q5	Composite
Respondent A	66.67	66.67	0.00	.	.	44.45
Respondent B	100.00	66.07	100.00	100.00	100.00	93.21
Respondent C	100.00	100.00	100.00	66.67	66.67	86.67
Respondent D	33.33	.	.	66.67	.	.
Respondent E	66.67	100.00	50.00	100.00	66.67	76.67

Formula for Assessing MQHP Survey Reliability

All survey questions and summary measures have undergone extensive psychometric testing. A key criterion by which all survey measures were evaluated is their site-level reliability. Site-level reliability is a metric that indicates how accurately a survey measure captures information about a particular practice site. Specifically, the site-level reliability coefficient indicates the extent to which patients of a given practice site report similarly about their experiences with that practice. In other words, site-level reliability indicates the consistency of the information provided by patients of a given practice site. Reliability scores range from 0.0 to 1.0 where:

- 1.0 signifies a measure for which every patient of the site reports an experience identical to every other patient in the practice; and
- 0.0 signifies a measure for which there is no consistency or commonality of experiences reported by patients of a given practice.

Targeted sample sizes were designed to achieve results with very high site-level reliability (0.70 or higher), in accordance with psychometric standards and principles. For all measures except those with very high overall performance, **site-level results must achieve a reliability threshold of 0.70 to be publicly reported.**

$$SD_{\text{site}} = SD_{\text{all}} \sqrt{(1 + 14.2 / N_{\text{doc at site}}) / (1 + 14.2 / 7.625)}$$

$$\text{Reliability} = SD_{\text{site}}^2 / (SD_{\text{patient}}^2 / N_{\text{patients at the site with computable composite}} + SD_{\text{site}}^2)$$

eAppendix D. Calculation of Standardized Coefficients

For each independent variable from the NSHOS survey, we summarize the relationship between all patient experience domains and the independent variable by calculating the following average standardized coefficient across K patient experience scores:

$$\sum_{k \in K} \frac{1}{K} \frac{\xi_{1k}}{\sigma_k}$$

where σ_k is the standard deviation of the outcome and ξ_{1k} is the coefficient of interest for outcome k. The ξ_{1k} 's correspond to the β_1 's in Equation (1). In order to account for covariance in the estimates of ξ_{1k} / σ_k we estimate pooled OLS for all outcomes $k \in K$. An implicit assumption of this standardized coefficient is that they “weight” each patient experience domain equally¹⁸.

eAppendix Table 1. Number of Responses per Practice for Each Patient Experience Score

	mean	min	max
Communication	174.71	21	1596
Knowledge of Patient	174.48	21	1592
Integration of care	148.03	17	1337
Organizational Access	113.32	12	994
Office Staff	172.26	21	1556
Self Management Support	172.19	21	1562
Adult Behavioral Health	171.44	21	1552
Willingness to recommend	173.52	21	1579
Provider Rating	173.48	21	1578

eAppendix Table 2. Other practice characteristics stratified by the collection and use of any clinician performance information.

	Mean	Collecting Clinician Performance Information		Using Performance Information for Feedback		Using Performance Information for Internal QI		Using Performance Information for MD Compensation		Sharing Reports on Performance Information to Compare	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Patient Care	76.71 (16.80)	70.31 (18.82)	77.28 (16.66)	72.22 (20.28)	77.34 (16.35)	70.67 (19.50)	78.02 (16.05)	74.33 (18.19)	78.19 (15.91)	70.54 (26.90)	78.18 (13.30)
Off Hours	0.68 (0.47)	0.88 (0.35)	0.67 (0.48)	0.67 (0.50)	0.69 (0.47)	0.69 (0.48)	0.68 (0.47)	0.79 (0.42)	0.62 (0.49)	0.43 (0.51)	0.75 (0.44)
Team Culture	59.88 (20.08)	56.44 (20.53)	60.80 (20.26)	49.80 (20.60)	61.29 (19.76)	54.68 (22.14)	61.00 (19.62)	59.01 (21.38)	60.41 (19.46)	49.70 (25.90)	62.29 (17.87)

Notes: This tables shows the overall mean value and mean values stratified by whether the practice collected or used any clinician performance information for 3 practice characteristics: a composite score of how well the organization incorporates patient input; an indicator of whether the practice has weekend or evening hours and a composite score on team culture. Standard errors are shown in parenthesis.

eAppendix Table 3. Distribution of Responses per Practice for Each Patient Experience Score

	(1)	(2)		(3)		(4)		(5)		(6)	
	Mean	Collecting Clinician Performance Information		Using Performance Information for Feedback		Using Performance Information for Internal QI		Using Performance Information for MD Compensation		Sharing Reports on Performance Information to Compare	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Physical Health	2.22 (0.86)	2.29 (0.87)	2.22 (0.86)	2.17 (0.84)	2.23 (0.87)	2.27 (0.87)	2.21 (0.86)	2.24 (0.87)	2.21 (0.86)	2.26 (0.87)	2.21 (0.86)
Mental Health	1.98 (0.90)	2.03 (0.88)	1.98 (0.90)	1.94 (0.85)	1.99 (0.91)	2.02 (0.89)	1.98 (0.90)	2.00 (0.90)	1.97 (0.90)	1.99 (0.89)	1.98 (0.90)
Age	54.88 (12.19)	55.09 (12.14)	54.77 (12.22)	56.19 (11.58)	54.67 (12.27)	54.12 (11.99)	55.03 (12.22)	54.66 (12.06)	54.98 (12.25)	55.65 (11.78)	54.73 (12.26)
Male	0.42 (0.49)	0.37 (0.48)	0.43 (0.49)	0.42 (0.49)	0.42 (0.49)	0.40 (0.49)	0.42 (0.49)	0.42 (0.49)	0.42 (0.49)	0.41 (0.49)	0.42 (0.49)
Some College	0.86 (0.35)	0.84 (0.37)	0.86 (0.35)	0.88 (0.32)	0.85 (0.36)	0.83 (0.38)	0.86 (0.35)	0.84 (0.37)	0.86 (0.34)	0.85 (0.35)	0.86 (0.35)
White	0.79 (0.40)	0.81 (0.39)	0.79 (0.41)	0.86 (0.35)	0.78 (0.41)	0.80 (0.40)	0.79 (0.41)	0.79 (0.41)	0.80 (0.40)	0.84 (0.37)	0.79 (0.41)
Black	0.04 (0.20)	0.02 (0.12)	0.05 (0.21)	0.02 (0.15)	0.05 (0.21)	0.02 (0.13)	0.05 (0.21)	0.03 (0.17)	0.05 (0.21)	0.02 (0.14)	0.05 (0.21)
Asian	0.05 (0.21)	0.03 (0.18)	0.05 (0.22)	0.04 (0.20)	0.05 (0.22)	0.04 (0.20)	0.05 (0.22)	0.04 (0.19)	0.05 (0.22)	0.04 (0.20)	0.05 (0.22)
Hispanic	0.05 (0.23)	0.08 (0.27)	0.05 (0.23)	0.03 (0.17)	0.06 (0.24)	0.09 (0.28)	0.05 (0.22)	0.08 (0.28)	0.04 (0.20)	0.05 (0.21)	0.06 (0.23)

Notes: Column (1) shows the overall average of patient experience scores, with the range of practice-level means in square brackets, and overall standard deviations in parenthesis. Columns (2)-(6) shows the patient experience scores stratified by whether the collected or used any clinician performance information, with overall standard deviations in parenthesis.