Association Between Patient-Centered Medical Home Rating and Operating Cost at Federally Funded Health Centers

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Abstract

Context—Little is known about the cost associated with a health center's rating as a patient-centered medical home (PCMH).

Objective—To determine whether PCMH rating is associated with operating cost among health centers funded by the US Health Resources and Services Administration.

Design, Setting, and Participants—Cross-sectional study of PCMH rating and operating cost in 2009. PCMH rating was assessed through surveys of health center administrators conducted by Harris Interactive of all 1009 Health Resources and Services Administration–funded community health centers. The survey provided scores from 0 (worst) to 100 (best) for total PCMH score and

6 subscales: access/communication, care management, external coordination, patient tracking, test/referral tracking, and quality improvement. Costs were obtained from the Uniform Data System reports submitted to the Health Resources and Services Administration. We used generalized linear models to determine the relationship between PCMH rating and operating cost.

Main Outcome Measures—Operating cost per physician full-time equivalent, operating cost per patient per month, and medical cost per visit.

Results—Six hundred sixty-nine health centers (66%) were included in the study sample, with 340 excluded because of nonresponse or incomplete data. Mean total PCMH score was 60 (SD,12; range, 21–90). For the average health center, a 10-point higher total PCMH score was associated with a $2.26 (4.6%) higher operating cost per patient per month (95% CI, $0.86–$4.12). Among PCMH subscales, a 10-point higher score for patient tracking was associated with higher operating cost per physician full-time equivalent ($27 300; 95% CI,$3047–$57 804) and higher operating cost per patient per month ($1.06;95%CI,$0.29–$1.98). A 10-point higher score for quality improvement was also associated with higher operating cost per physician full-time equivalent ($32 731; 95% CI, $1571–$73 670) and higher operating cost per patient per month ($1.86; 95% CI, $0.54–$3.61). A 10-point higher PCMH subscale score for access/communication was associated with lower operating cost per physician full-time equivalent ($39 809; 95% CI, $1893–$63 169).

Conclusions—According to a survey of health center administrators, higher scores on a scale that assessed 6 aspects of the PCMH were associated with higher health center operating costs. Two subscales of the medical home were associated with higher cost and 1 with lower cost.

The patient-centered medical home (PCMH) is a model of care characterized by comprehensive primary care, quality improvement, care management, and enhanced access in a patient-centered environment. The PCMH is intuitively appealing and has improved clinical and organizational performance in several early studies, leading a broad range of stakeholders to call for its adoption.[1]

It is critical to understand the cost of the PCMH from the perspective of individual clinics. Such cost data are essential for practices to make informed decisions to adopt the PCMH and for policy makers and administrators to design financially sustainable medical home models. Most PCMH cost studies have focused on potential savings from reducing hospitalizations and emergency department visits.[2–8] Although those are important cost outcomes, the savings accrue to payers and rarely affect the finances of the primary care provider.[9–11] The majority of US primary care physicians do not benefit financially from prevented hospitalizations or emergency department visits.

We are aware of only 1 previous study that has examined the cost effect of the PCMH from the primary care provider perspective, using actual practice cost data from more than 1 site. Zuckerman et al[12] studied 35 private primary care practices and found minimal evidence of an association between a clinic's medical home rating and cost; however, the analysis was limited by the small number of practices, limited variation in PCMH rating, and discordant timing of data sources (2006 cost data and 2008 PCMH data).

The present study examines the association between PCMH rating and operating cost in primary care practices, specifically among federally funded health centers. In this article, unless otherwise noted, the terms *health center* and *grantees* are used to refer to organizations that receive grants under the Health Center Program as authorized under section 330 of the Public Health Service Act, as amended. It does not refer to Federally Qualified Health Center look-alikes or clinics that are sponsored by tribal or Urban Indian Health Organizations, except for those that receive Health Center Program grants.

METHODS

We assessed the cross-sectional relationship between medical home rating and operating cost among 669 health centers across all 50 states and the District of Columbia in 2009. The University of Chicago institutional review board designated this study as exempt from review.

Medical Home Rating

Data on medical home rating were drawn from a national survey of health center administrators conducted by Harris Interactive, on behalf of the Commonwealth Fund, between March and May 2009 (http://www.commonwealthfund.org/Surveys/2010/May/The-2009-Commonwealth-Fund-National-Survey-of-Federally-Qualified-Health-Centers.aspx).[13] The survey process was guided by an advisory panel of representatives of individual health centers, researchers, and policy experts on health centers. Surveys were sent to executive directors of all health center program grantees with at least 1 community-based primary care site. For grantees with more than 1 site, the survey asked respondents to provide answers that reflected their largest site. The original mailing included a $100 honorarium for the health center. Respondents had the option of completing the survey by mail, online, or by telephone. Seven hundred ninety-five individuals completed at least part of the survey (603 mail, 189 online, 3 telephone), which reflects a 79% response rate, according to the American Association for Public Opinion Research standard for Response Rate 2.

In accordance with these survey data, we used the Safety Net Medical Home Scale to assess medical home rating along 6 subscales.[14,15] The access/communication subscale assesses whether patients can contact their clinician on a timely basis and whether translation services are available when necessary. The care management sub-scale assesses the ability to proactively manage a population of patients through reminders, follow-up calls, patient education, and care coordination. The external coordination sub-scale assesses the providers' ability to secure outside referrals for their patients and receive updates on care that occurs outside of the clinic. The patient tracking subscale assesses the ability to create lists of patients with particular clinical characteristics for population management. The test/referral tracking subscale assesses the ability to monitor tests and referrals from the time the order is made until the result is received. Finally, the quality improvement subscale assesses the ability to systematically collect measures of clinician and practice performance and improve care.

The Safety Net Medical Home Scale is a validated measure that provides scores for each subscale, with a potential range of 0 (worst) to 100 (best). The scale also provides a total PCMH score that is calculated as the mean of the 6 subscale scores and possesses a potential range of 0 (worst) to 100 (best).[14,15] To help interpret the numeric total PCMH score values, we provide one example of a set of differences that yield a 10-point higher total PCMH score when comparing hypothetical health center A to health center B, with all other factors equal. The following 3 differences, in aggregate, would yield a 10-point higher total PCMH score for health center A: health center A is usually able to accommodate a same- or next-day appointment compared with never for health center B, health center A usually sends care reminders to patients compared with never for health center B, and health center A reports patient satisfaction surveys at the provider and group level, whereas health center B conducts no patient satisfaction reporting.[14] We interpret the results of our analysis in terms of 10-point differences in PCMH scores, differences that are operationally meaningful.

Health Center Cost

Data on health center cost were drawn from 2009 Uniform Data System reports.[16] The system is a database of information on all health centers funded by the Health Resources and Services Administration's Bureau of Primary Health Care. Uniform Data System data include aggregated, calendar-year, health center-level information on patient demographics, services provided, staffing, clinical indicators, cost, and revenues. Data from the system provide a comprehensive report of health center activity at the grantee level, which may include multiple sites of care.

Our analysis uses 3 cost outcome variables commonly used in health care finance: operating cost per physician full-time equivalent, operating cost per patient per month, and medical cost per medical visit. Operating cost reflects how much it costs each year for the health center to provide care for the population it serves. Operating cost is directly reported by health centers in the Uniform Data System according to detailed instructions provided by the Health Resources and Services Administration and comprises all types of clinic costs, including administrative overhead, facility expenses, and annual depreciation of capital such as an electronic health records system.[17] Because operating cost inherently varies by the size of the practice, we express our outcome measures as averages by dividing cost by the number of physician full-time equivalents or total patients (times 12 for patient-months). We use a third outcome variable, medical cost per medical visit, that focuses on the traditional medical services and excludes activities such as dental care. Because cost varies by geography, we transformed cost variables by using the Physician Practice Cost Component of Medicare's Geographic Practice Cost Index, which is used to adjust Medicare Part B physician payments to account for geographic variation in practice cost.[18]

Covariates

We analyzed factors known to be associated with health center operating cost. To account for economies of scale, we included covariates for annual number of patient visits, annual number of patients served, and number of full-time equivalent physicians.[19] Because centers with a high portion of managed care patients may have more financial incentive to reduce costs, we included the percentage of patients enrolled in managed care as a covariate.[19]

As a proxy for differences in severity of illness across health centers, we included a covariate for the percentage of visits focused on chronic diseases tracked in the Uniform Data System. Included chronic conditions were diabetes, selected heart disease (*International Classification of Diseases, Ninth Revision, Clinical Modification* codes 391.xx-392.0x and 410.xx-429.xx), hypertension, asthma, chronic bronchitis, emphysema, human immunodeficiency virus infection, hepatitis B, and hepatitis C.

We also included a covariate for the annual patients treated per physician full-time equivalent.[20] In addition, because health centers that rely heavily on Health Resources and Services Administration grant funding may be less likely to aggressively manage their operating cost, we include the percentage of total revenue that is independent of Health Resources and Services Administration grants (referred to as "self-sufficiency") as a covariate.[19–21] Finally, we adjusted for race, sex, and age mix of patients treated at each health center. All covariates were constructed with the Uniform Data System.

Analysis

To determine the study sample, we started with the 1009 primary care clinics that received Health Resources and Services Administration community health center funding in 2009. We then excluded centers for which we were unable to construct all variables on medical home rating, operating cost, and covariates because the health center did not respond to the

Commonwealth Fund Survey, the health center identifier in the survey could not be linked to the Uniform Data System, or the health center had missing or outlier values for variables used in analysis. To test whether the health centers included in the analysis were different from those that were excluded because of nonresponse or poor data quality, we used 2-tailed hypothesis tests of difference in clinic characteristics.

We assessed all variables for normality to ensure that we used appropriate statistical models. We calculated Spearman rank correlation coefficients to assess the unadjusted correlation among outcome variables and all PCMH variables and covariates

We developed generalized linear models to evaluate the association between measures of PCMH rating and cost. To adjust for a clustering effect of clinics within states, we used generalized estimating equations with an exchangeable correlation structure. To account for skewness in our cost variables, we assessed them with the use of a log-link function with variances proportional to the mean.

Each of the 3 cost outcomes is modeled in 2 ways, once as a function of the total PCMH score and covariates and again as a function of the 6 PCMH subscales and covariates. Because cost data were reported for an entire health center (which may include multiple sites) and PCMH rating was reported for a health center's largest site, we conducted sensitivity analyses in which we tested the effect of adding a binary covariate that indicates whether the health center was composed of more than 2 practice sites. For interpretation of the cost variables that were analyzed with a log-link function, we retransformed model estimates back to a dollar scale and report the effect of a 10-point increase in total PCMH score and PCMH subscales. All statistical testing used a 2-sided .05 level of significance. Analysis was performed with SAS version 9.3 and Stata version 11.

RESULTS

Of the population of 1009 health centers that had at least 1 primary care site in 2009, we were able to construct the full Safety Net Medical Home Scale scores, costs, and covariates for 669 health centers (66%), which represented our final study sample (Table 1). The final sample of 669 health centers included in the analyses represents 5966 full-time equivalent physicians, who cared for more than 12.5 million patients nationally in 2009. Comparing the study sample with the health centers excluded because of nonresponse or missing data, excluded health centers tended to be smaller, with fewer annual visits (63 357 vs 73 084; P <.001), patients (16 048 vs 18 753; P<.001), and full-time equivalent physicians (8.4 vs 8.9; P=.002). Excluded health centers also had higher medical cost per medical visit ($158 vs $137; P=.007), lower self-sufficiency (63% vs 68%; P<.001), and fewer sites of care (6.2 vs 6.8; P= .002). In terms of patient characteristics, excluded health centers had a lower percentage of white patients (62% vs 67%; P=.02), Medicare patients (8.1% vs 8.8%; P=.02), and patients whose insurance type was something other than Medicare, Medicaid, private, or self-pay (2.2% vs 2.3%; P=.001).

The mean total PCMH score for the study sample was 60 (SD,12), with a low score of 21 and a high of 90. Mean PCMH subscale scores ranged from a low of 49 (SD,19) for the care management subscale and a high of 70 (SD,24) for the test and referral tracking sub-scale.

The mean operating cost per full-time equivalent physician was $1 509 742 (SD,$926 215; median,$1 241 853; interquartile range,$987 726–$1 735 882), mean operating cost per patient per month was $51.23 (SD, $20.84; median,$47.13; interquartile range,$39.31–$57.49), and mean medical cost per medical visit was $136.70 (SD,$41.22; median, $130.43; interquartile range,$110.51–$152.86). The distributions of all 3 health center cost variables were strongly right skewed, with a large number of higher cost observations.

In unadjusted, bivariate analysis (Table 2), operating cost per patient per month had a small, statistically significant, positive correlation with the total PCMH score ($r=0.18$; $P<.001$), as did the care management ($r=0.18$; $P<.001$), external coordination ($r=0.10$; $P=.01$), patient tracking ($r=0.18$; $P<.001$), and quality improvement ($r=0.15$; $P<.001$) subscales. Among covariates, the number of patients served had statistically significant negative correlations with all 3 cost outcome variables ($-0.20<r<-0.10$; P .01 for all).

In multivariate models that used total PCMH score as the medical home measure, higher total PCMH score was associated with higher operating cost per patient per month ($P<.001$). For the average health center in our study sample, a 10-point higher total PCMH score (ie, a score of 70 instead of 60 on the 100-point scale) was associated with a $2.26 (4.6%) higher operating cost per patient per month (95% CI, $0.86-$4.12), assuming all other variables remain constant (Table 3).

In multivariate analyses that used PCMH subscale scores, a 10-point higher score was associated with higher operating cost per physician full-time equivalent for patient tracking ($27 300; 95% CI, $3047–$57 804; $P=.03$) and quality improvement ($32 731; 95% CI, $1571–$73 670; $P=.04$) and higher operating cost per patient per month for patient tracking ($1.06; 95% CI, $0.29–$1.98; $P=.005$) and quality improvement ($1.86; 95% CI, $0.54–$3.61; $P=.003$). A 10-point higher PCMH sub-scale score was associated with lower operating cost per physician full-time equivalent for access/communication ($39 809; 95% CI $1893–$63 169; $P=.04$).

We confirmed the robustness of the models' estimates by examining alternative specifications. In particular, we tested the assumption that PCMH rating of the health center's largest service site had an effect on overall health center cost, regardless of that grantee's number of sites. For all but 1 of the 6 models, the effect of a binary multisite indicator variable was nonsignificant. In the case in which the indicator was significant, the model estimates did not change appreciably.

COMMENT

Higher medical home rating in health centers is associated with higher operating cost, as measured by operating cost per patient per month. To our knowledge, this is the first analysis to examine the association between cost and medical home rating from the clinic perspective by using a large sample of clinics, and the first in the community health center setting.

Our results suggest that for the average health center in our study sample, a 10-point higher total PCMH score is associated with a $2.26 higher operating cost per patient per month. Of the 3 cost outcome measures in our analysis, operating cost per patient per month may be the most policy relevant because many of the financing models for the PCMH include per-patient, per-month payments to physicians. The magnitude of health center cost effect in our study is significant. The $2.26 (4.6%) higher operating cost per patient per month associated with a 10-point higher total PCMH score would translate into an annual cost of $508 207 for the average health center ($2.26 per patient per month for 18 753 patients during 12 months). The cost associated with higher PCMH function is large for a health center, but that cost is relatively small compared with the potential cost savings from averted hospitalization and emergency department use observed in some preliminary PCMH studies. Although no studies are available specific to the health center setting, if health centers realize even a fraction of the $18 per member per month savings from hospitalization and emergency department use observed in one early study conducted in an integrated delivery system,[4] the savings would be more than enough to fund the cost associated with higher PCMH rating. Savings from averted hospitalization and emergency department use may be

significant, yet most US physicians do not have financial mechanisms in place that allow them to benefit from such downstream savings.

Among individual PCMH sub-scales, higher patient tracking and quality improvement scores were associated with higher operating cost per physician full-time equivalent and operating cost per patient per month. Patient tracking functions are often facilitated by electronic health records systems and they are frequently used to identify needed services. Although health centers may apply for incentive payments for electronic health records implementation under the Medicaid Meaningful Use program,[22] cost for the systems would still be reflected in our operating cost measures, as well as the costs of any additional services that result from improved patient tracking. Higher scores on the quality improvement PCMH subscale were also associated with higher cost. Formal quality improvement activities often require significant time and resources, and although many quality improvement initiatives have been documented as cost-effective (ie, the benefits are perceived to be worth the cost), they are rarely cost saving to the primary care provider.[9–11,23,24]

The access/communication sub-scale was associated with lower operating cost per physician full-time equivalent, which may suggest that the cost of higher PCMH rating along the access/communication subscale is offset by savings in other areas. For example, the cost of improving access/communication by providing telephone-based clinical advice may be offset if that activity replaces a more costly in-person visit.

The nation's health centers are primary care clinics that serve more than 20 million vulnerable patients each year.[16] The health center program has been growing significantly with bipartisan support, and federal agencies are actively funding PCMH demonstration programs in health centers. Our study has broad significance because it provides national standardized cost data on PCMH rating in outpatient clinics. Although our cross-sectional analysis does not determine the direction of the relationship between PCMH rating and cost, it provides useful information, given the dearth of existing PCMH cost information and the current policy momentum toward PCMH adoption.

There are several limitations to this study. First, because it is a cross-sectional analysis, we have limited ability to determine the direction of the relationship between PCMH rating and cost. Although the improvement of medical home rating may require additional resources and increase operating cost, it is also possible that the health centers with higher operating cost have been able to develop a higher medical home rating. However, the association between PCMH rating and cost is a policy-relevant finding regardless of the direction of the relationship. If PCMH implementation causes an increase in cost, health centers that adopt the model will need increased funding; if only those centers with high operating cost are able to implement the PCMH, then PCMH advocates must address the barriers that low-cost health centers may face in improving PCMH rating. Also, the scope of study was limited to cost and does not examine value. An assessment of value would require a comprehensive quantitative analysis of the benefit of higher PCMH rating, which was beyond the scope of this analysis.[25] Finally, although the Safety Net Medical Home Scale is a validated measure of PCMH rating, formal PCMH measurement is still in its early stages and more study is required to understand how different PCMH measurement tools relate to one another and to key outcome variables such as cost, quality, and patient experience.[26]

Payment reform is central to the sustainability of the PCMH, and major demonstration projects include payments for practices that adopt the medical home.[27] However, current financing for the PCMH is largely exploratory, with payment amounts varying widely and many ending at the conclusion of a demonstration project. We believe payment for the

medical home should be evidence based and grounded in observations of costs that accrue to each stakeholder in the health care system. Without such data, aggressive pressure to reduce health care cost is more likely to erode PCMH payment over time. Strong quantitative documentation of the actual practice cost of higher PCMH rating could provide the basis for evidence-based financial incentive structures that would be useful as the health care system moves toward more integrated care models such as the accountable care organization. It will only be through effective design and implementation of such financial mechanisms that the PCMH can be sustained.

Acknowledgments

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Table 1

Health Center Characteristics (n = 669)

Characteristic	Mean (SD)	
Patients Served[a]		
Insurance, %[b]		
Medicaid	32.7 (14.5)	
Medicare	8.8 (5.9)	
Private	18.1 (13.2)	
Self-pay	37.9 (17.5)	
Other	2.3 (4.2)	
Patients enrolled in managed care, %	15.1 (17.5)	
Chronic disease, %[c]	20.2 (9.8)	
Demographics		
Female, %	58.8 (5.2)	
Age, y[d]	32.9 (5.7)	
White, %	66.7 (31.0)	
	Mean (SD)	**Median (IQR)**
Health center size		
Visits, in thousands	73.1 (78.0)	49.5 (27.0–91.7)
Patients, in thousands	18.8 (18.3)	13.2 (7.4–22.7)
Total FTEs	121.1 (120.2)	81.7 (46.9–150.2)
FTE physicians	8.9 (10.2)	5.6 (2.9–10.8)
No. of sites	6.8 (7.0)	5.0 (3.0–9.0)
Financial measures, $US		
Total operating cost, millions[e]	10.9 (11.7)	7.3 (3.8–13.5)
Operating cost per physician FTE, millions	1.51 (0.93)	1.24 (0.99–1.74)
Operating cost per patient per month	51.23 (20.84)	47.13 (39.31–57.49)
Medical cost per medical visit	136.70 (41.22)	130.43 (110.51–152.86)
Self-sufficiency, %[f]	68.1 (12.4)	69.3 (61.3–77.2)
PCMH scores (0–100)[g]		
Total PCMH score	60.3 (12.1)	60.1 (51.6–69.1)

Characteristic	Mean (SD)	
PCMH subscales		
Access/communication	67.8 (13.6)	68.8 (58.3–78.5)
Care management	49.0 (18.9)	47.5 (35.0–62.5)
External coordination	52.7 (17.5)	52.1 (41.7–64.6)
Patient tracking	63.9 (24.7)	63.3 (46.7–85.0)
Test/referral tracking	69.7 (23.7)	75.0 (54.2–87.5)
Quality improvement	59.0 (15.5)	60.0 (50.0–70.0)

Abbreviations: FTE, full-time equivalent; IQR, interquartile range; PCMH, patient-centered medical home.

[a] Patient characteristics data are available only at the health center level. Mean percentage values expressed reflect the mean and standard deviation of individual health center percentages (ie, average of averages).

[b] Insurance categories do not add to 100 because the values presented are a mean of health center mean values.

[c] Percentage of clinic visits that are for patients with select chronic disease diagnoses tracked in the Health Resources and Services Administration's Uniform Data System: diabetes, select heart disease diagnoses (*International Classification of Diseases, Ninth Revision, Clinical Modification* codes 391.x-392.0x; 410.x-429.xx), hypertension, asthma, chronic bronchitis, emphysema, human immunodeficiency virus, hepatitis B, and hepatitis C.

[d] Uniform Data System age data provide counts of patients by age, with 1-year bins for patients aged 0 to 24 years and 5-year bins for patients aged 25 years and older. Mean age was estimated according to the midpoint of each bin.

[e] Includes all types of health center cost, including administrative overhead and capital depreciation.

[f] Percentage of total health center revenue that is not derived from grants provided by the Health Resources and Services Administration under section 330 of the Public Health Service Act.

[g] From the Safety Net Medical Home Scale.[14]

Table 2

Correlations Among PCMH Scores, Covariates, and Operating Costs

	Operating Cost per FTE Physician		Operating Cost per Patient per Month		Medical Cost per Medical Visit	
	r	*P* Value	*r*	*P* Value	*r*	*P* Value
PCMH scores[a]						
Total PCMH score	0.04	.30	0.18	<.001	0.06	.13
PCMH subscales						
Access/communication	−0.02	.56	0.03	.41	0.03	.44
Care management	0.06	.09	0.18	<.001	0.09	.02
External coordination	−0.04	.34	0.10	.01	−0.03	.38
Patient tracking	0.09	.03	0.18	<.001	0.10	.01
Test/referral tracking	0.03	.37	0.08	.04	0.01	.87
Quality improvement	0.05	.16	0.15	<.001	0.02	.57
Covariates						
Health center size						
Physician FTEs	−0.37	<.001	0.05	.17	−0.09	.02
Visits	−0.08	.04	0.04	.35	−0.17	<.001
Patients	−0.10	.01	−0.10	.01	−0.20	<.001
Organizational characteristics						
Self-sufficiency[b]	−0.10	.01	−0.04	.36	−0.28	<.001
Patients per physician FTE	0.54	<.001	−0.43	<.001	−0.32	<.001
Patient characteristics						
Female	−0.19	<.001	−0.16	<.001	−0.12	.001
White	0.15	<.001	0.07	.08	−0.04	.28

	Operating Cost per FTE Physician		Operating Cost per Patient per Month		Medical Cost per Medical Visit	
	r	P Value	r	P Value	r	P Value
Age, y	<0.01	.93	0.11	.004	<0.01	.98
Chronic disease[c]	−0.06	.14	−0.13	<.001	−0.12	.002
Managed care[d]	−0.24	<.001	0.05	.22	0.09	.02

Abbreviations: FTE, full-time equivalent; PCMH, patient-centered medical home.

[a] From the Safety Net Medical Home Scale.[14]

[b] Percentage of total health center revenue that is not derived from grants provided by the Health Resources and Services Administration under section 330 of the Public Health Service Act.

[c] Percentage of clinic visits that are for patients with select chronic disease diagnoses tracked in the Health Resources and Services Administration's Uniform Data System: diabetes, select heart disease diagnoses (*International Classification of Diseases, Ninth Revision, Clinical Modification* codes 391.xx-392.0x; 410.xx-429.xx), hypertension, asthma, chronic bronchitis, emphysema, human immunodeficiency virus, hepatitis B, and hepatitis C.

[d] Percentage of patients enrolled in managed care.

Table 3

Multivariate Correlation of PCMH Capability Rating and Operating Cost[a]

PCMH Scores[b]	Cost Effect of a 10-Point Increase in PCMH Score (95% CI)		
	Operating Cost per FTE Physician, $ in Thousands	**Operating Cost per Patient per Month, $**	**Medical Cost per Medical Visit, $**
Total PCMH score	27.95 (−18.04 to 101.02)	2.26 (0.86 to 4.12)[c]	1.40 (−0.40 to 3.53)
PCMH subscales			
Access/communication	−39.81 (−63.17 to −1.89)[c]	−1.07 (−2.25 to 1.11)	−0.25 (−2.20 to 2.07)
Care management	11.37 (−18.72 to 50.32)	−0.20 (−1.15 to 1.03)	−0.25 (−2.20 to 2.07)
External coordination	12.19 (−19.41 to 54.50)	−0.01 (−0.72 to 0.86)	−1.14 (−2.80 to 0.81)
Patient tracking	27.30 (3.05 to 57.80)[c]	1.06 (0.29 to 1.98)[c]	1.08 (−0.22 to 2.57)
Test/referral tracking	−21.59 (−38.93 to 1.19)	0.22 (−0.30 to 0.83)	0.18 (−0.98 to 1.50)
Quality improvement	32.73 (1.57 to 73.67)[c]	1.86 (0.54 to 3.61)[c]	0.94 (−0.98 to 3.25)

Abbreviations: FTE, full-time equivalent; PCMH, patient-centered medical home.

[a] General linear models with logistic link and exchangeable correlation structure, controlling for physician FTEs, patients, visits, managed care, chronic disease, self-sufficiency, annual patients per physician, average patient age, patient sex, and patient race. Cost effects are estimated for a hypothetical average health center that reflects the mean values for all medical home characteristics and covariates.

[b] From the Safety Net Medical Home Scale.[14]

[c] $P < .05$.