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Meaningful Use And Medical Home Functionality In Primary Care Practice

ABSTRACT To improve health care quality and decrease costs, both the public and private sectors continue to make substantial investments in the transformation of primary care. Central to these efforts is the patient-centered medical home model (PCMH) and the adoption and meaningful use of health information technology (IT). We used 2018 national family medicine data to provide a perspective on the implementation of PCMH and health IT elements in a variety of US physician practices. We found that 95 percent of family medicine–affiliated practices used electronic health records (EHRs) in 2018, but there was wide variation in whether those EHRs met meaningful-use criteria. Federally qualified health centers and military clinics were significantly more likely than other settings to have adopted PCMH elements. Adoption of PCMH elements was lowest among independently owned practices, which make up one-third of the primary care delivery system. Our findings suggest that achieving PCMH transformation across all types of practices will require a coordinated approach that aligns strong financial incentives with tailored technical assistance, an approach similar both to that used in federally qualified health centers over the past decade and to that used to drive EHR adoption a decade ago.

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In the US there have been numerous federal, state, and private initiatives to encourage adoption of both the patient-centered medical home (PCMH) model and the health information technology (IT) that supports the PCMH. The federal Center for Medicare and Medicaid Innovation, created by the Affordable Care Act in 2010, launched eight initiatives in its first decade that focused on primary care delivery and payment reforms.[1] These initiatives provided varying degrees of financial incentives and technical assistance to participating practices, but rarely both. An example is the Transforming Clinical Practice Initiative, launched in 2015 to provide practice transformation technical assistance to primary and specialty care clinicians through peer-based learning networks called practice transforma-

tion networks, but without financial support to most practices.[2] Separately, the Health Resources and Services Administration (HRSA) provided financial incentives, technical assistance, and special recognition to federally qualified health centers to become PCMH-certified by the National Committee for Quality Assurance (NCQA) and, similar to the Department of Veterans Affairs (VA) and the Department of Defense (DOD), invested heavily in the adoption of PCMH elements.

Similarly, there have been numerous efforts to encourage the adoption and use of health IT. The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 authorized nearly $30 billion to support the increased adoption and use of health IT throughout the US health care delivery system. In early

2010 the Office of the National Coordinator for Health Information Technology established a nationwide system of regional extension centers to support the adoption and use of health IT, particularly among small primary care practices. In addition, beginning in 2011 the Centers for Medicare and Medicaid Services (CMS) Medicare and Medicaid EHR Incentive Programs offered substantial financial rewards to practices for implementation and meaningful use of EHRs.

National data on the extent of adoption of PCMH and health IT meaningful-use elements are scarce. The two most recent studies of PCMH adoption were published in 2017. The first study provided descriptive statistics from the 2013 National Ambulatory Medical Care Survey and found that only 18 percent of office-based primary care physicians worked in practices certified as PCMHs.[3] The second study used data from the 2015 Medical Organizations Survey, part of the Medical Expenditure Panel Survey, and found that nationally, 41 percent of patients were served by physician practices certified as PCMHs.[4]

In this article we use data from the American Board of Family Medicine (ABFM) to provide a perspective on the implementation of PCMH and health IT elements in a variety of US physician practices. This data set provides a unique opportunity to use family physicians as a lens on recent progress of primary care practice transformation in the context of national PCMH and health IT meaningful-use policies and incentives.

Study Data And Methods

DATA SOURCES AND STUDY SAMPLE Survey data are from the 2018 ABFM Family Medicine Certification practice demographic questionnaire, administered to every family physician registering for the examination component of continuous certification by the ABFM.[6] In the 2018 ABFM continuing certification process, all applicants completed a core set of questions that included measures of practice characteristics. Applicants were also randomly assigned to one of five modules, two of which focused on PCMH certification and the extent of adoption of components of the PCMH, as well as the extent of adoption of components of health IT that support the PCMH. The questionnaires make up a cross-sectional census of board-certified family physicians with a 100 percent response rate. Responding family physicians work in various practice settings, most of which have clinicians of other types and specialties. The 2018 questionnaire yielded responses from 6,723 family physicians, of whom 1,283 completed the PCMH

module and 1,249 completed the health IT meaningful-use module. These numbers exclude physicians practicing outside of the US and those not currently practicing outpatient continuity care, which removed those working solely in urgent care or emergency settings and hospitalists. The data on practice characteristics are similar across subsets of physicians randomly selected for participation in each of the five questionnaire modules.

MEASURES To measure the extent of adoption of PCMH elements, we relied on the PCMH module, asked of approximately 20 percent of the physicians who applied for the ABFM examination in 2018. The PCMH module consists of fifteen items specific to practice transformation (see the online appendix for questionnaire items).[5] The first item asks whether the physician's main practice site is certified as a PCMH by the NCQA or any other state or national accrediting organization. The other fourteen items were designed on the basis of the most recent definition of the PCMH model and mapped to the criteria and competencies required for PCMH certification by the NCQA. In addition to using these fourteen items from the PCMH module, we used seven other questions (for example, use of electronic health records [EHRs] and patient engagement efforts) asked of the entire population of physicians applying for recertification in 2018. Based on our prior work, we created a twenty-one-item index of PCMH adoption by counting the number of elements affirmed by each responding physician.[7,8] This index serves as a dependent variable in our regression analysis. Because many of the items in the PCMH index were adopted by a vast majority of practices, we also created a subindex of eight PCMH items, each of which was adopted by fewer than 70 percent of physician practices. This subindex provides a large component of the variability in the full twenty-one-item index. We used this PCMH subindex as another dependent variable in our regression analysis.

To measure the extent of adoption of health IT meaningful-use elements, we relied on one question asked of the entire population of physicians (Do you use an electronic health record at your primary practice site?) and on the health IT meaningful-use module, asked of one-fifth of the physicians who applied to continue their certification in 2018. This module comprises five items specific to health IT with designs based on 2018 meaningful-use criteria (in 2018 these were changed to promoting-interoperability criteria). The module mirrors questions asked by the National Center for Health Statistics on the National Ambulatory Medical Care Survey (NAMCS). The specific questionnaire item about EHR adop-

tion has been validated using NAMCS data.[9] We created an index of health IT meaningful-use adoption by counting the number of elements affirmed by each responding physician. This six-item index serves as a dependent variable in our analyses of meaningful use.

PRACTICE CHARACTERISTICS AND EXTERNAL INCENTIVES According to our previous research, the following practice characteristics are likely to be associated with adoption of the PCMH and health IT meaningful-use elements: size, ownership type, and service to vulnerable populations.[6,7] For size (number of providers), we used the categories that were included in the questionnaire (solo practice, two to five providers, six to twenty providers, and more than twenty providers). For ownership type, we used the following categories: academic health center, hospital/health system, managed care/health maintenance organization, federally qualified health center, rural health clinic, federal military (VA, DOD), independent, and other. Service to vulnerable populations was measured by the following question: What percentage of the patient population in your principal practice site is part of a vulnerable group (that is, uninsured, Medicaid, homeless, low-income, non-English-speaking, racial/ethnic minority, or an otherwise traditionally underserved group)? Three response categories were allowed: fewer than 10 percent, 10–50 percent, and more than 50 percent. We also included measures of the four US census regions (Northeast, South, Midwest, and West) and a variable to indicate whether the physician's primary practice was located in a rural or urban area, based on the Rural-Urban Continuum Codes code for that practice.[10] Finally, we included in the analysis whether the respondent was participating in the Transforming Clinical Practice Initiative through a practice transformation network.[11]

STATISTICAL ANALYSIS First, we generated frequency distributions of individual PCMH and health IT meaningful-use elements, as well as of practice characteristics. We calculated the mean and median values of the count indices for PCMH and meaningful use. Next, we examined cross-tabulations of PCMH and health IT meaningful-use indices with practice characteristics. Finally, we conducted multivariate regression analysis to determine the profile of characteristics independently associated with adoption of PCMH and health IT meaningful-use elements. We conducted logistic regression to find associations with PCMH certification (yes/no) as the dependent variable. We also conducted linear regression using a twenty-one-point PCMH index as the dependent variable. As a sensitivity analysis, we conducted linear regres-

sion using the PCMH subindex as a dependent variable. Finally, we conducted linear regression using a six-point health IT meaningful-use index as the dependent variable. Independent variables for all regressions were the same and included practice characteristics and participation in a practice transformation network.

This study was reviewed by the University of California San Francisco Institutional Review Board and deemed exempt.

LIMITATIONS Our study had limitations. First, the survey data are self-reported, but prior work comparing ABFM data with NAMCS responses about EHR adoption found comparable state level estimates, supporting the validity of ABFM data.[8] Second, our data are cross-sectional, and we could not infer causality. Third, our data are only from family physicians and might not generalize to primary care practices without family physicians. However, family physicians provide the largest share of ambulatory visits in the US.[12] Finally, our health IT questions ask about practice capabilities rather than use; the actual extent of use by practices may be lower.

Study Results

Exhibit 1 shows the practice characteristics of the family medicine physicians in our data set. Nearly half (47.4 percent) worked in practices with one to five providers. One-third (34.2 percent) worked in practices that were owned by a hospital or health system, and another third (32.9 percent) worked in practices that were independently owned. A total of 10.7 percent worked in practices that were part of a practice transformation network through the Transforming Clinical Practice Initiative.

Exhibit 2 shows the percentage of family medicine physicians who reported that their practice had adopted each measure of PCMH and health IT meaningful use: 42.1 percent reported that their principal practice was certified as a PCMH by the NCQA or other state or national accrediting organization. The median number of PCMH elements that practices adopted was sixteen of twenty-one (data not shown; see the appendix for questionnaire items).[5] The correlation between PCMH certification and adoption of PCMH elements was high (data not shown). For the majority of the individual PCMH and health IT meaningful-use elements, more than 70 percent of physicians reported that their practice had already adopted them (exhibit 2). In particular, EHR adoption was nearly universal (95.5 percent). The elements adopted by the fewest practices (fewer than 50 percent) included working collaboratively with a practice-based care coordinator or patient navigator (28.2 per-

Characteristics of the medical practices of family physicians seeking to continue their American Board of Family Medicine certification, 2018

Characteristics	Percent of practices
Practice size	
Solo	12.4
2–5 providers	35.0
6–20 providers	30.2
>20 providers	22.4
Region	
Northeast	14.0
Midwest	23.4
West	28.0
South	34.7
Ownership	
Academic health center	7.2
Hospital/health system owned	34.2
Managed care/health maintenance organization	5.9
Federally qualified health center	6.6
Rural health clinic	1.9
Federal military (VA, DOD)	4.1
Independent	32.9
Other	7.2
Practice location	
Rural	14.9
Urban	85.2
Vulnerable population	
<10%	40.4
10%–50%	38.7
>50%	20.9
Practice transformation network	
Yes	10.7
No	89.3

SOURCE 2018 American Board of Family Medicine Family Medicine continuous certification exam registration questionnaire. **NOTES** $n = 2,532$ for all items (except region: $n = 2,507$). VA is Department of Veterans Affairs. DOD is Department of Defense.

cent); having the capability for patients to add patient-generated health data (for example, blood pressure or blood glucose levels checked at home) through a portal into their EHRs (31.2 percent); working collaboratively with a practice-based behavioral health specialist or social worker (37.9 percent); and involving patients on a governing board, in an advisory group dedicated to practice improvement, or as volunteers or workers on specific practice improvement projects (46.8 percent).

Exhibit 3 shows the results of regression analyses using PCMH certification as the dependent variable and the six independent variables we hypothesized would be associated with certification. Larger practice size was strongly associated with higher odds of PCMH certification. Family medicine physicians in practices with twenty or more providers were 4.56 times more likely to have PCMH certification compared with the reference category of solo practices. Of all ownership types, federally qualified health cen-

ters had the highest odds of being PCMH certified, being eight times more likely to be certified than independent practices (the reference category). Physicians in practices in the Northeast region were 3.22 times more likely to be in certified practices than physicians in the South (the reference category). Participation in a practice transformation network was not associated with higher odds of PCMH certification. Similar associations were seen between these same independent variables and the twenty-one-item PCMH adoption index (exhibit 3). Our sensitivity analysis yielded similar results (data not shown).

When we used the six-item health IT meaningful-use index as the dependent variable, larger practice size, ownership by a managed care/health maintenance organization, and urban location were all significantly associated with adoption of more health IT meaningful-use elements (exhibit 3). Practices with more than 50 percent "vulnerable population" were less likely to adopt health IT meaningful use, but federally qualified health centers were not significantly more or less likely. Participation in a practice transformation network was not associated with increased adoption.

Discussion

This study used 100 percent response survey data from a national cross-sectional census of family medicine physicians in 2018 as a lens with which to examine a variety of physician practice types and their adoption of PCMH and health IT meaningful-use elements across the US. Overall, 42.1 percent of practices were PCMH certified, and adoption of the majority of individual PCMH and health IT meaningful-use elements was high (more than 70 percent).

With regard to PCMH certification and adoption of PCMH elements, we found wide variation by practice ownership type. Compared with independent practices, federally qualified health centers stood out as leaders in terms of both PCMH certification and the adoption of specific PCMH elements. This is most likely a reflection of HRSA's federally qualified health center policies, including the provision of technical assistance, a related national cooperative agreement with NCQA to facilitate certification, provision of funds to pay for certification, and financial incentives that included increased payments for quality for federally qualified health centers that were NCQA certified. Federal military practices demonstrated a high likelihood of adoption of PCMH elements, although the odds of these practices being PCMH certified were not as high as for federally qualified health centers. This may be explained by VA and DOD policies to promote

adoption of PCMH elements throughout their health systems while placing relatively little emphasis on PCMH certification compared with federally qualified health centers.[13] Academic health centers, where most training of the future physician workforce takes place, had higher odds of achieving PCMH certification compared with independent practices but were less likely than federally qualified health centers, federal military practices, and practices owned by managed care/health maintenance organizations and hospitals/health systems to have adopted PCMH elements.

Independently owned practices and rural health clinics, constituting 34.8 percent of physician practices, demonstrated much lower odds of PCMH certification and much lower likelihood of adoption of PCMH elements. Rural health clinics are an interesting comparison to federally qualified health centers because they received enhanced Medicare reimbursement but not the same technical support and PCMH incentives as federally qualified health centers, potentially explaining the difference in our findings.[14] Participation in the Transforming Clinical Practice Initiative, which provided technical assistance but no financial incentives, was not associated with PCMH certification, increased adoption of PCMH elements, or increased health IT meaningful-use adoption. Although PCMH certification was not an objective of the Transforming Clinical Practice Initiative, it was a focus for some of the practice transformation networks that the initiative supported, and many of the improvements that the initiative sought to achieve aligned with PCMH elements.[2,15]

One area in which the US has been very successful is in the adoption of EHRs: 95.5 percent of family physicians' practices have adopted some version of an EHR. This reflects the success of federal policies such as the HITECH Act, which provided substantial financial incentives, and the subsequent funding of the regional extension centers for health IT meaningful use, which provided substantial regional technical assistance. The EHRs themselves vary in capabilities, however. We found that although 84.1 percent of physicians reported the ability to exchange secure messages with patients, only 31.2 percent reported having the capability for patients to add patient-generated health data (for example, blood pressure or blood glucose levels checked at home) through a portal into their EHR systems. The variation in EHR capabilities may be attributed to policies surrounding vendor certification rather than to physicians in practice.

Our findings confirmed the well-established relationship between larger practice size and adoption of PCMH and health IT meaningful-

Percent of family medicine physicians adopting patient-centered medical home and health information technology meaningful-use elements, 2018

Elements	Percent of physicians adopting
PATIENT-CENTERED MEDICAL HOME	
Regular huddles about individual patients	69.4
On-site behavioral health or social work	37.9
On-site care coordinator/patient navigator	28.2
Patient or family/caregiver surveys	75.3
Patient engagement in practice improvement or advisory board	46.8
Depression screening using standardized tool	79.9
Decision support at point of care	80.7
Electronic health record	95.5
Routine comprehensive health assessments including SDOH	69.9
Referrals based on SDOH	63.4
Routine reminders to patients for chronic or preventive services	76.2
Clinical tools and resources to address SDOH	66.5
Extended hours for routine and urgent appointments	67.1
Telephone advice	94.8
Identify high-risk patients for care management	73.7
Track labs and imaging results	87.0
Track referrals	74.4
Follow-up after hospital or emergency department	81.7
Clinical quality feedback to clinicians	82.2
Patient experience feedback to practice	76.4
Set clinical quality goals on acute, chronic, preventive care	84.2
PCMH certified	42.1
HEALTH INFORMATION TECHNOLOGY MEANINGFUL USE	
Electronic health record	95.5
Electronic registry	82.5
Transmit electronic summary to outside hospitals/specialists	53.0
Receive electronic summary from outside hospitals/specialists	68.7
Exchange secure messages with patients	84.1
Portal to add patient-generated health data to electronic health record	31.2

SOURCE 2018 American Board of Family Medicine Family Medicine continuous certification exam registration questionnaire. **NOTES** $n = 1,283$ for all items (except electronic health record: $n = 2,532$). SDOH is social determinants of health.

use elements.[8,16] This is important because 47.4 percent of family medicine physicians reported practicing in small practices with one to five providers. Various demonstration programs have sought to support these small practices with transformation efforts, but most have not combined facilitation with strong financial support or incentives similar to HITECH or HRSA.[1,17] Our findings suggest that this combination may be important. As policies are crafted to address PCMH and health IT adoption in independent practices, many lessons from these prior, more successful, efforts could be applied. The Medicare Access and CHIP Reauthorization Act (MACRA) of 2105, which went into effect in 2019, allocates $100 million to support organizations (for example, quality improvement organizations, regional extension centers) that provide technical assistance to small practices

EXHIBIT 3

Family physicians' practice characteristics associated with patient-centered medical home (PCMH) certification, PCMH adoption index, and health information technology (IT) meaningful-use adoption index, 2018

Characteristics	PCMH certification (odds ratio)	PCMH adoption index (0–21 scale) (coefficient)	Health IT meaningful-use adoption index (0–6 scale) (coefficient)
Size			
>20 providers	4.56****	1.78****	1.01****
6–20 providers	3.50****	0.90**	0.94****
2–5 providers	1.56*	−0.45	0.78****
Solo	Ref	0.00	0.00
Region			
Northeast	3.22****	1.24****	0.24*
Midwest	1.22	0.24	0.15
West	0.24	0.41	−0.04
South	Ref	0.00	0.00
Ownership type			
Academic	3.08****	1.32***	−0.05
Hospital/health system	2.31****	1.70****	0.16
Managed care/health maintenance organization	3.96****	2.75****	0.44**
Federally qualified health center	7.98****	3.45****	−0.17
Federal military (VA, DOD)	2.18**	3.29****	−0.33
Rural health clinic	1.13	0.15	0.04
Independent	Ref	0.00	0.00
Other	0.70	0.81	−0.85****
Practice location			
Urban	1.25	0.60*	0.28**
Rural	Ref	0.00	0.00
Vulnerable population			
>50%	1.03	0.64*	−0.26**
10%–50%	1.30*	0.64**	−0.06
<10%	Ref	0.00	0.00
Practice transformation network			
Yes	1.10	−0.26	0.12
No	Ref	0.00	0.00
Constant	0.10	12.15	3.17

SOURCE 2018 American Board of Family Medicine Family Medicine continuous certification exam registration questionnaire. **NOTES** $n = 1{,}271$ for PCMH certification; $n = 1{,}270$ for the PCMH adoption index; and $n = 1{,}235$ for the health IT meaningful-use adoption index. VA is Department of Veterans Affairs. DOD is Department of Defense. $*p < 0.10$ $**p < 0.05$ $***p < 0.01$ $****p < 0.001$

participating in new systems of payment based in part on meaningful use of health IT and on clinical practice improvements. The Affordable Care Act authorized, but did not fund, the Primary Care Extension Program, which could provide technical assistance for PCMH practice transformation.[18] Our findings suggest that practices need both intensive tailored technical assistance and substantial financial incentives to successfully transform.

Past work using data collected by the ABFM in 2011 found that family physicians reported having EHRs with basic functionality that were unable to meet increasingly stringent meaningful-use criteria.[19] Our findings show substantial progress over the next seven years, with the percentage of practices reporting the ability to create patient registries through EHRs going from 37 percent to 82 percent and those reporting

secure messaging increasing from 26 percent to 84 percent (data not shown). However, the prior study did not report adjusted findings by practice type, and despite rapid increases in some functions, overall our results suggest that small and independent practices may lag in adoption. These trends also demonstrate the capacity of ABFM data to track practice changes.

Despite major investments in primary care transformation to the PCMH model, early data on the evidence on the value of the PCMH for improving quality and cost are mixed, perhaps because its instantiation across the country is such a mixed picture. The data behind this study could be used to create meaningful cohorts that could be compared on quality and outcomes to better understand how fuller implementation of PCMH functions or elements compares with less robust implementation and certification.

Conclusion

Our findings suggest that primary care practices have come a long way toward transformation to the PCMH model, including implementation of health IT meaningful use to support advanced primary care. Nonetheless, there is much work to be done, especially among small and independently owned practices, which make up a large proportion of care delivery sites. The challenge is greater now than ever because these practices are strained to their limits by the global coronavirus disease 2019 (COVID-19) pandemic. Achieving PCMH transformation across all types of practices will require a coordinated approach that aligns strong financial incentives with tailored technical assistance, similar to that provided to federally qualified health centers over the past decade and for EHR adoption a decade ago. The alternative is to continue to leave behind a large sector of primary care practices that serve the majority of US patients. ∎

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