The Association Among Medical Home Readiness, Quality, and Care of Vulnerable Patients

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ABSTRACT

Objectives: Despite broad support for the patient-centered medical home (PCMH), the implications of PCMH implementation efforts that require that participants have some degree of PCMH readiness at baseline are unclear. Therefore, we sought to examine the association among PCMH readiness, quality, and the care of vulnerable patients.

Study Design: We conducted a cross-sectional study of adult visits to a nationally representative sample of US office-based primary care physicians in 2007 and 2008.

Methods: Using National Committee for Quality Assurance criteria, we determined whether or not a visit occurred at a PCMH-ready practice. We used *t* tests and multiple linear regression to measure the association between PCMH readiness and performance on 9 validated outpatient quality indicators.

Results: Among 12,235 visits to general practitioners and 5123 visits to general internists, 73% occurred at practices that were PCMH-ready. Visits by patients with 3 or more chronic medical conditions were more likely to occur at ready practices ($P = .001$). Visits by patients that were poor or minority were equally likely to occur at ready and unready practices. Performance at ready practices was higher for 3 of 9 quality indicators related to chronic disease management and preventive counseling ($P = .031$ [beta-blocker or diuretic prescribed for hypertension]; $P = .018$ [diet counseling]; and $P < .001$ [exercise counseling]).

Conclusions: Implementation efforts that encourage the enrollment of practices most ready for the PCMH could improve the quality of care for complex patients without exacerbating socioeconomic disparities in access to care.

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Empirical work provides mixed evidence that implementation of the patient-centered medical home (PCMH) will improve the quality and costs of healthcare. Some demonstration projects have shown that the PCMH is associated with increased use of preventive services,[1,2] greater patient satisfaction,[3] and reductions in emergency department visits and/or hospital admissions.[1,4-8] Evidence that the PCMH positively impacts clinical processes of care and patient outcomes is weaker and more inconsistent.[3,9,10] However, there is little to suggest that the PCMH will harm patients, and many policy makers hope that the PCMH will eventually improve care. In this context, efforts are under way to disseminate the PCMH,[11] including a multi-state pilot initiative from CMS.[12]

While many PCMH programs are voluntary, a substantial number require that participants have a baseline level of medical home readiness.[11] Other programs require that practices attain a minimum level of medical home readiness within 12 to 18 months of program entry.[11] Such choices about PCMH program design would seem to favor the enrollment of practices that are PCMH-ready (or nearly ready). If there is no differential access to care between PCMH-ready and PCMH-unready practices, then current program design makes sense, as PCMH-ready practices also tend to be multispecialty practices with substantial visit volume.[13] However, if practices that are least ready for the PCMH also disproportionately treat vulnerable populations, then overlooking such practices could initially exacerbate existing disparities. In this case, a purely voluntary approach without any prerequisites for PCMH program enrollment, combined with improvement metrics tailored to a practice's baseline PCMH readiness, might be preferred.

Since no prior research has investigated the strengths and weaknesses of either strategy, we used data from a nationally representative sample of visits by adults to general practitioners and internists to examine the characteristics of

visits to practices stratified by their medical home readiness. We addressed 2 questions: 1) What types of patients are more likely to be seen in visits to practices that are more PCMH-ready? and 2) Is there an association between PCMH readiness and quality of care delivered?

Take-Away Points

Despite substantial support for the patient-centered medical home (PCMH), the implications of PCMH implementation efforts that require that participants have some degree of PCMH readiness at baseline are unclear. Our data suggest that PCMH program design that encourages the enrollment of practices most ready for the PCMH could improve the quality of care for complex patients without exacerbating socioeconomic disparities in access to care.

METHODS

Data Source and Study Population

For our study, we used data from the 2007 and 2008 National Ambulatory Medical Care Survey (NAMCS), which is an annual multistage probability sample of outpatient visits to randomly selected, nonfederally employed, office-based physicians in the United States.[14] Practices are sampled during a 1-week time frame, so the sample is unlikely to include 2 visits by the same patient. In 2007 and 2008, data were collected from 32,778 and 28,741 office-based visits, respectively. The data files contain practice-, physician-, patient-, and visit-level characteristics. Weighted estimates from them are considered representative of all US outpatient visits. We focused on adult (ie, aged ≥18 years) ambulatory visits occurring at general and internal medicine practices.

Assessing PCMH Readiness

We assessed the medical home readiness of each practice where a visit occurred using previously described methods.[13] In brief, we mapped practice-level characteristics reported by physicians in the NAMCS to the 2011 National Committee for Quality Assurance (NCQA) PCMH certification standards (see **eAppendix 1 Table**, available at **www.ajmc.com**).[15] The NCQA assigns a point value to each of the 30 elements (including 6 "must-pass" elements) outlined in the PCMH standards. We mapped 14 elements (including 3 "must-pass" elements), representing 6 of the medical home standards, to items collected in the NAMCS. The 6 PCMH standards were: 1) enhanced access and continuity (8 points); 2) identifying and managing patient populations (16 points); 3) planning and managing care (7 points); 4) providing self-care support and community resources (6 points); 5) tracking and coordinating care (6 points); and 6) measuring and improving performance (13 points).

To calculate a practice's PCMH readiness score, we used the NCQA scoring system[15] to derive a cumulative point total for each practice by summing across all of the passed elements. Based on the 14 measured elements, the maximum point total was 56 when no missing data were present. In the case of missing data, the maximum point total was based on all non-missing data (see **eAppendix 2**). The practice-level readiness score was then calculated by dividing the cumulative point total by the total number of available points. The resulting readiness score is expressed as a percentage and can be interpreted as the percentage of measureable NCQA elements that the practice (where the visit occurred) possesses. Based on the NCQA's levels of medical home recognition, we categorized practices into 2 groups: unready (<35 %) and ready (≥35 %) for medical home implementation.

Measuring Quality of Care

To measure the quality of care provided at each visit, we first determined whether or not the visit met any of 6 validated medication quality indicators.[16-19] These indicators were: 1) angiotensin-converting-enzyme inhibitor/angiotensin receptor blocker for congestive heart failure (CHF); 2) beta-blocker for CHF; 3) diuretic or beta-blocker for hypertension; 4) beta-blocker for coronary artery disease; 5) statin for hyperlipidemia; and 6) the prescribing of no inappropriate medications during the visit. We coded these indicators using diagnosis and medication codes in NAMCS, as well as responses to questions about the presence or absence of specific chronic diseases. For each visit, the treating physician can list up to 3 diagnoses (primary, secondary, or tertiary) on the patient record form. In addition to diagnoses, the patient record form lists up to 8 original and 8 generic medications prescribed by the treating physician.

In addition to the 6 medication quality indicators, we examined 3 previously validated prevention and counseling quality indicators: diet and exercise counseling (yes/no responses in NAMCS), and blood pressure monitoring at any general medical exam visit.[17] The NAMCS asks respondents to enter blood pressure readings (if blood pressure was measured at the visit). In defining a general medical exam, a visit for preventive care was defined as a general medical exam, but a follow-up visit was not considered a general medical exam.

Statistical Analysis

We first described the characteristics of visits occurring at practices that were PCMH-ready versus unready. We

Table. Characteristics of Visits to PCMH-Ready vs PCMH-Unready Practices, 2007-2008

Characteristics	N (millions)	PCMH-Ready, %	PCMH-Unready, %	*P*
Total	341	73	27	<.001
Age, years				
18-35	61	18	18	.85
36-49	77	22	23	
50-64	98	29	28	
65-75	52	15	16	
≥76	53	15	16	
Race/ethnicity				
Other	19	6	5	.22
Hispanic	40	12	10	
Non-Hispanic black	37	10	14	
Non-Hispanic white	245	72	71	
Median household income				
Missing	24	7	8	
<$32,793	70	18	27	.16
$32,793-$40,626	79	25	19	
$40,627-$52,387	79	24	21	
≥$52,388	89	26	25	
Insurance				
Other	55	16	19	.14
Medicare	89	27	30	
Private insurance	182	57	51	
Visit type				
General medical examination	57	17	17	.96
Other	275	83	83	

(Continued)

used Student's *t* tests to test for differences in visit characteristics. We also used *t* tests to determine whether the percentage of visits meeting each of the 9 quality-of-care indicators differed between ready and unready practices.

We applied appropriate sampling weights, clusters, and stratification to correct our standard error estimates for the complex survey design. We performed all analyses using Stata version 11.0 (StataCorp LP, College Station, Texas). The University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board determined that this study was exempt from its oversight.

RESULTS

We examined 17,358 visits, representing 341 million adult outpatient visits to general practitioners and internists during the study interval. Nearly three-fourths occurred at practices ready for the PCMH (Table). Compared with patients seen at visits to unready practices, patients seen at visits to ready practices were more likely to have 3 or more comorbid conditions (25% of visits to PCMH-ready practices vs 17% of visits to other practices; $P = .001$). However, visits to both types of practices were similar with respect to race/ethnicity and socioeconomic status. Practice characteristics of both types of visits were also similar except for physician ownership and rural location, although this latter finding was not statistically significant ($P = .058$). In sensitivity analyses with broader categories, 2 findings became statistically significant. When we compared visits in the South with all other practices, visits in the South were less likely to occur at PCMH-ready compared with unready practices (36% vs 52%; $P = .049$). Similarly, when we compared privately insured visits with all other visits, privately insured visits were more likely to occur at PCMH-ready compared with unready practices (57% vs 51%; $P = .047$).

Visits to PCMH-ready practices were generally more likely to meet the medication and counseling/screening

Table. Characteristics of Visits to PCMH-Ready vs PCMH-Unready Practices, 2007-2008 *(continued)*

Characteristics	N (millions)	PCMH-Ready, %	PCMH-Unready, %	*P*
Visits in past 12 months				
2 or less	144	41	45	.11
>2	197	59	55	
Physician specialty				
General or family practitioner	195	59	54	.41
General internist	145	41	46	
Metropolitan area				
Rural	52	12	25	.06
Urban	288	88	75	
Region				
Northeast	63	21	13	.26
Midwest	71	22	18	
West	70	22	17	
South	137	36	52	
Physician ownership				
No	75	26	10	<.001
Yes	266	74	90	
Practice size				
Solo	116	32	39	.25
Other	225	68	61	
Number of chronic conditions				
0	96	27	33	.001
1 or 2	161	47	50	
≥3	77	25	17	

PCMH indicates patient-centered medical home.

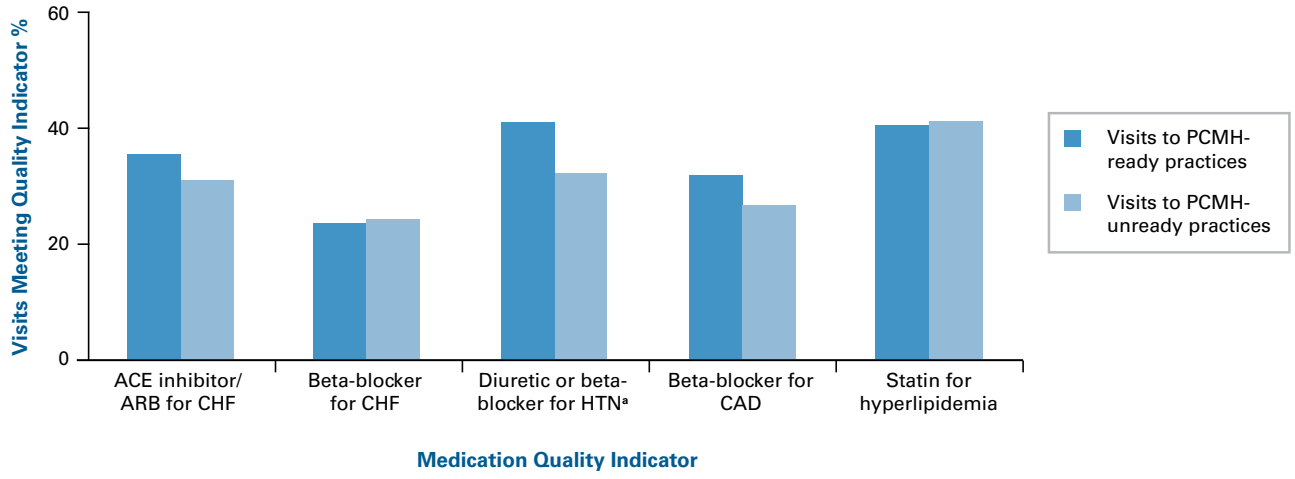
quality indicators, although this difference reached statistical significance for only 3 indicators (**Figures 1** and **2**). For example, 18% of visits to ready practices included diet counseling, compared with 12% of visits to unready practices (P = .018). Similarly, exercise counseling occurred at 14% of visits to ready practices, but at only 5% of visits to unready practices (P <.001). For medication quality indicators, at visits to ready practices (vs unready ones), 41% (vs 32%) of patients were prescribed a diuretic or beta-blocker for hypertension (P values for difference = .031).

DISCUSSION

Our study had 2 principal findings. First, while visit rates among racial minorities and patients from poorer neighborhoods did not differ based on a practice's PCMH readiness, those most ready for this new care model have a disproportionate share of patients with multiple comorbid conditions. Second, ready practices, at baseline, delivered higher or equivalent quality care in all dimensions.

Our study must be considered in the context of prior work on the value of health information technology (IT) tools, which the NCQA PCMH standards emphasize heavily. Many of the NAMCS items that we evaluated mapped to the NCQA elements that capture health IT tools. To the extent that the use of health IT improves chronic disease management,[20] our finding that visits by patients with multiple chronic conditions are more likely to occur at ready practices is reassuring. Second, evidence is still being gathered to assess whether medical homes deliver better-quality care across multiple domains (eg, patient satisfaction, clinical processes of care, patient outcomes).[1,3,21] While a fully developed medical home is clearly more than the sum of its parts, our observation of modestly higher quality among visits to ready practices provides 1 piece of evidence to suggest that adoption of PCMH components may be beneficial to care quality.

Figure 1. Proportion of Visits to PCMH-Ready vs PCMH-Unready Practices Meeting Medication Quality Indicators, 2007-2008



ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CAD, coronary artery disease; CHF, congestive heart failure; HTN, hypertension; PCMH, patient-centered medical home.
[a] $P < .05$.
$P \geq .05$ for all medication indicators except beta-blocker or diuretic prescribed for hypertension (41% of PCMH-ready visits vs 32% of PCMH-unready visits; $P = .031$).

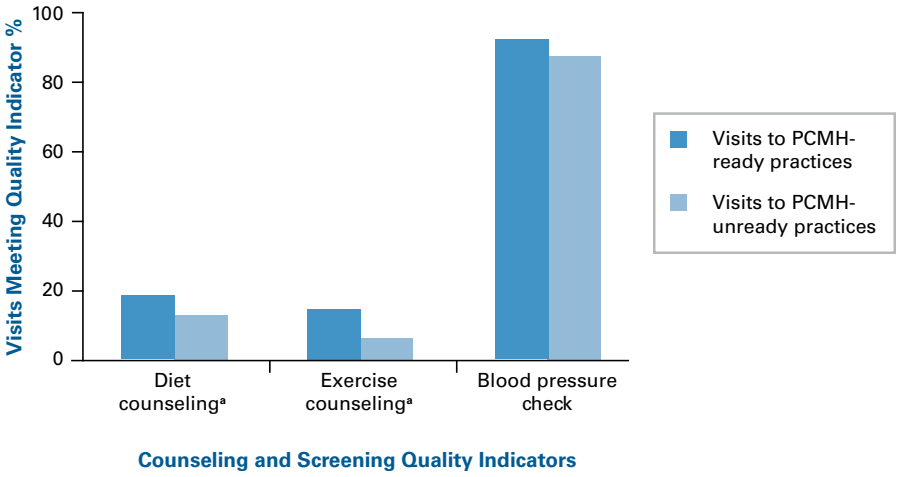
Limitations

Our study has several important limitations. First, we ascertained PCMH readiness by matching survey responses about a practice's infrastructure and processes of care to 1 standard of medical home readiness: the NCQA PCMH standard. However, prior studies have utilized this method,[13,22] and the NCQA standard has been widely adopted and was developed with input from organizations such as the American College of Physicians.[23] Second, because the NAMCS questions are not based on the NCQA PCMH standard, we could not perfectly match NCQA elements to NAMCS questions, nor could we match all NCQA elements to an NAMCS question. This may have resulted in some misclassification of ready practices as unready or vice versa, but the directionality of this bias is difficult to ascertain. Prior work has found the NAMCS-NCQA matching approach robust to missing data (see eAppendix 2). Third, our measures of quality were limited by the cross-sectional nature of the NAMCS survey. However, the quality measures have been validated,[16-19] and one of the criteria for constructing these measures with NAMCS data was that the measures have a high likelihood of correlating with improved patient outcomes.[17] Nevertheless, we cannot make conclusions about causality between medical home readiness and quality of care. Fourth, it is possible that better scores on exercise and diet counseling measures for PCMH-ready versus unready practices reflect better documentation at PCMH-ready practices, since many of the NCQA measures that we mapped to NAMCS rely on health IT tools.

Implications

In spite of these limitations, our findings on care quality have implications for PCMH implementation strategy. To date, policy makers have often tested these models in practices most ready for transformation into a fully recognized PCMH.[12,24] For example, 2 large CMS programs provide incentives to practices that already have some medical home capabilities. Criteria for inclusion in CMS' Comprehensive Primary Care Initiative include having some level of medical home recognition. CMS' Multipayer Advanced Primary Care Practice Demonstration provides a monthly care management fee for beneficiaries receiving primary care from a medical home. Moreover, programs often require that participating practices attain a certain level of medical home readiness as early as 1 year after enrollment. This too would seem to favor the participation of practices that are PCMH-ready (or nearly ready). Our data support these efforts, as they suggest that such a strategy will not leave out a disproportionate number of visits by poor or minority patients, or by patients with multiple comorbidities.[1,4-7]

Figure 2. Proportion of Visits to PCMH-Ready vs PCMH-Unready Practices Meeting Counseling and Screening Quality Indicators, 2007-2008



PCMH indicates patient-centered medical home.
[a]$P < .05$.
Visits to PCMH-ready (vs unready) practices met the diet counseling indicator 18% (vs 12%) of the time ($P = .018$). Visits to PCMH-ready (vs unready) practices met the exercise counseling indicator 14% (vs 5%) of the time ($P < .001$). There was no statistically significant difference (ie, $P \geq .05$) in blood pressure monitoring at visits to practices that were PCMH-ready versus unready.

CONCLUSIONS

While it is reasonable to design PCMH programs that may attract the most PCMH-ready practices first, policy makers should also take steps to ensure that the least ready practices are not left behind. This would also shed light on the broader generalizability of results from early implementation efforts at PCMH-ready practices. Future research should examine whether or not PCMH incentives that account for baseline levels of medical home readiness are effective in bringing along the least ready practices. For example, in the Medicare Shared Savings Program, tailored incentives exist for provider organizations at different stages of becoming an accountable care organization[25]; a similar approach might be utilized to support PCMH adoption by a wide range of practices. Implementation of PCMHs will require as much care as ongoing, related work that assesses the net benefits of PCMH adoption.

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