Measuring The Medical Home Infrastructure In Large Medical Groups

The largest of the large medical groups have the highest levels of medical home infrastructure, but adoption is slow.

by Diane R. Rittenhouse, Lawrence P. Casalino, Robin R. Gillies, Stephen M. Shortell, and Bernard Lau

ABSTRACT: The patient-centered medical home is taking center stage in discussions of primary care innovation as a new delivery model that provides comprehensive, coordinated care across the lifespan. Although the medical home is widely discussed by policymakers, payers, and other stakeholders, the extent to which physician practices have the infrastructure in place to function as medical homes is not known. Using data from the 2006–07 National Study of Physician Organizations, we examine the extent of adoption of medical home infrastructure components among large primary care and multispecialty medical groups and their association with medical group size and ownership. [*Health Affairs* 27, no. 5 (2008): 1246–1258; 10.1377/hlthaff.27.5.1246]

IT IS WELL DOCUMENTED THAT THE U.S. health care system pays for and produces care that is highly specialized, compartmentalized, disorganized, and fragmented and that falls short on most measures of clinical quality. In its landmark report, *Crossing the Quality Chasm*, the Institute of Medicine (IOM) called for a complete overhaul of the health care system—aligning incentives, coordinating care, and redesigning delivery systems—with the goal of achieving health care that is safe, effective, patient-centered, timely, efficient, and equitable.[1] A large body of evidence documents the positive impact that primary care has on health care quality and efficiency.[2] Despite this evidence, incentives for patients and physicians are not aligned to encourage a strong primary care infrastructure in the United States.

■ **The PCMH model.** The patient-centered medical home (PCMH) is a model of comprehensive health care delivery and payment reform that emphasizes the central

Diane Rittenhouse (rittenhouse@fcm.ucsf.edu) is an assistant professor, Family and Community Medicine, at the University of California (UC), San Francisco. Lawrence Casalino is an associate professor, Health Studies, at the University of Chicago. Robin Gillies is a researcher in the School of Public Health at UC Berkeley. Stephen Shortell is dean and professor in the School of Public Health at UC Berkeley. Bernard Lau is a master of public health student in the UC Berkeley School of Public Health.

role of primary care. The model includes seven essential components: (1) *A personal physician:* each patient has an ongoing relationship with a personal physician trained to provide first-contact, continuous, and comprehensive care. (2) *Physician-directed medical practice:* the personal physician leads a team of people at the practice level who collectively take responsibility for the ongoing care of patients. (3) *Whole-person orientation:* the personal physician is responsible for providing for all of the patient's health care needs or taking responsibility for appropriately arranging care with other qualified professionals. This includes care for all stages of life (acute care, chronic care, preventive services, and end-of-life care). (4) *Coordinated/integrated care:* care is coordinated and integrated across all elements of the complex health care system and the patient's community. Care is facilitated by registries, information technology (IT), health information exchange, and other means. (5) *Quality and safety:* this includes the use of evidence-based decision support, IT, performance feedback to physicians, active engagement in quality improvement activities, patient education, and incorporating feedback from patients in decision making. (6) *Improved access:* timely access to care and improved methods of communication between patients and the health care team will improve access to care. (7) *Payment:* payment should appropriately recognize the added value provided to patients who have a PCMH. The payment structure should provide fee-for-service payments for face-to-face visits, recognize case-mix differences, value care management work (including e-mail and telephone consultation and remote monitoring of clinical data using IT), pay for coordination of care, support the adoption and use of health IT for quality improvement, allow physicians to share in savings from reduced hospitalizations, and provide additional payments for achieving measurable and continuous quality improvements.

■ **Endorsement and promotion.** The PCMH model was endorsed in February 2007 by the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Physicians, and the American Osteopathic Association; it builds on decades of work by these organizations.[3] The recent effort to broadly promote the PCMH model was initiated by IBM with the aim of stimulating the growth of innovative primary care delivery system options available to its employees. A broad coalition of health care stakeholders is now working to pilot the model in both the commercial and public insurance sectors.[4] In January 2008 the National Committee for Quality Assurance (NCQA) launched a voluntary program to recognize medical practices that function as patient-centered medical homes.[5]

■ **Adoption by large medical groups.** At the national level, the extent to which the medical practice infrastructure exists to support the PCMH model is not known. Large, integrated, primary care and multispecialty medical groups have generous resources relative to smaller practice settings and may therefore be well positioned to implement many of the infrastructure components of the PCMH model.[6] We used data from the second National Study of Physician Organizations and the Management of Chronic Illness (NSP02) to quantify the extent of adoption of the

infrastructure components of the PCMH by large medical groups, and to examine the relationship between PCMH infrastructure and medical group size and ownership. Although the NSP02 data do not allow for analysis of all seven components of the model, measures are available to examine four of the seven components, which we refer to, for the purposes of this study, as the "infrastructure" components: physician-directed medical practice; care coordination/integration; quality and safety; and enhanced access. The measures of PCMH infrastructure covered by the NSP02 are similar to those covered by the NCQA recognition program. However, the NCQA program is voluntary and cannot produce data for a national sample of organizations. Data from the NSP02 therefore provide a unique perspective for health care providers, payers, and policymakers on the level of medical practice infrastructure now in place to support the PCMH model.

Study Data And Methods

■ **Data source and study sample.** The NSP02 is a thirty-five-minute phone survey conducted between March 2006 and March 2007 with the medical director, president, or chief executive officer (CEO) of all U.S. medical groups and independent practice associations (IPAs) having twenty or more physicians. Only organizations that treated patients with asthma, diabetes, congestive heart failure (CHF), or depression were included in the NSP02. From a variety of sources, we compiled an initial list of 1,520 organizations. We were able to contact 1,162 of these. We found that 480 of the 1,162 were ineligible to participate because they did not meet study inclusion criteria. Following the standard approach for studies in which the eligibility of nonrespondents could not be confirmed, we estimated that 210 of the 358 organizations that could not be confirmed were eligible, resulting in 892 organizations deemed eligible.[7] Of these 892 organizations, 538 responded (response rate 60.3 percent). For this paper we were interested in exploring the extent to which the PCMH infrastructure components have been implemented in large integrated settings responsible for comprehensive medical care. We excluded IPAs (n = 199) because of their less integrated structure. Because of the PCMH model's orientation toward comprehensive medical care, we also excluded medical groups that did not treat all four chronic illnesses or reported that their physicians were "mainly specialists" (n = 48). Our final analytic sample included 291 medical groups.

■ **Measurement of the principal components.** To measure physician-directed medical practice, we asked groups a single yes/no question about whether they used primary care teams, defined as "a group of physicians and other staff who meet with each other regularly to discuss the care of a defined group of patients and who share responsibility for their care." To measure the care coordination/integration, quality and safety, and enhanced access components, we created an index for each component comprising questions across multiple domains. The care coordination/integration index provides a summary of responses across five domains (Exhibit 1). The domain of electronic medical records (EMRs) addressed whether a majority of

EXHIBIT 1
Measures Of Patient-Centered Medical Home Components: Physician-Directed Medical Practice Component And Care Coordination Component

Measures of physician-directed medical practice component	Medical groups (N = 291)		
	Number	Percent	
Primary care teams	93	32	

Measures of care coordination/ integration component			Care coordination/integration index—criteria for point, and number (%) of medical groups awarded point
Electronic medical record (EMR)			
EMR with progress notes	128	44	1 point if yes to at least 3 of 4 questions
EMR with medication list	125	43	119 (40.9%)
EMR with lab test results	144	49.5	
EMR with radiology	135	46.4	
Electronic interchange with hospitals and specialists			
Electronic access to specialist referral notes	124	42.6	1 point if yes to at least 2 of 3 questions
ED notes	144	49.5	155 (53.3%)
Hospital discharge summaries	178	61.2	
Pharmacy electronic coordination			
Records of prescriptions filled	67	23	1 point if yes to any
Physician order entry (electronic prescribing)	127	43.6	142 (48.8%)
Registry			
Diabetes	156	53.6	1 point if yes to at least 3 of 4 questions
Asthma	96	33	89 (30.6%)
CHF	108	37.1	
Depression	73	25.1	
Nurse care managers			
Diabetes	136	46.7	1 point if yes to 3 of 4 questions
Asthma	88	30.2	73 (25.1%)
CHF	99	34	
Depression	59	20.3	
Index for care coordination component, mean (SD)			2.0 (1.5) Range 0–5

SOURCE: National Study of Physician Organizations and the Management of Chronic Illness, March 2006–March 2007.
NOTES: ED is emergency department. CHF is congestive heart failure. SD is standard deviation.

physicians used an EMR for four separate functions. The domain of electronic interchange with hospitals and specialists addressed whether a majority of physicians had electronic access to specialists' reports, emergency department (ED) notes, and hospital discharge summaries. The domain of pharmacy electronic coordination addressed whether a majority of physicians had electronic access to a record of prescriptions filled by their patients and whether they had the ability to transmit prescriptions electronically to pharmacies. The registry domain addressed whether or not the group maintained electronic registries of patients with chronic illnesses. Finally, the domain of nurse care managers included questions about their use for se-

verely ill patients.

The quality and safety index provided a summary of responses across eleven domains (Exhibit 2). Several domains contained single yes/no questions, including whether the group participated in a quality improvement collaborative; used the

EXHIBIT 2
Measures Of Patient-Centered Medical Home Components: Quality And Safety Component

Measures of quality and safety component	Medical groups (N = 291)		Quality and safety index—criteria for point, and number (%) of medical groups awarded point
	Number	Percent	
Participate in quality improvement collaboratives	189	64.9	1 point if yes 189 (64.9%)
Rapid-cycle quality improvement strategy	104	35.7	1 point if yes 104 (35.7%)
Use electronic records to collect data for quality meausures	133	45.7	1 point if yes 133 (45.7%)
Performance feedback to physicians			1 point if yes to at least 4 of 5 questions
Asthma	137	47.1	87 (29.9%)
CHF	123	42.3	
Depression	80	27.5	
Diabetes	185	63.6	
Tobacco	73	25.1	
Clinical decision support			
Alerts for potential drug interactions	102	35.1	1 point if yes to at least 2 of 3 questions
Alerts for abnormal test results	104	35.7	100 (34.4%)
Prompts at time of patient visit	87	29.9	
Distribute guidelines to patients			
Diabetes	252	86.6	1 point if yes to at least 3 of 4 questions
Asthma	223	76.6	186 (63.9%)
CHF	194	66.7	
Depression	165	56.7	
Patient educators			
Diabetes	224	77	1 point if yes to at least 3 of 4 questions
Asthma	147	50.5	128 (44.0%)
CHF	144	49.5	
Depression	106	36.4	
Patient reminders			
Diabetes	148	50.9	1 point if yes to at least 4 of 6 questions
Asthma	83	28.5	88 (30.2%)
CHF	88	30.2	
Depression	50	17.2	
Mammograms	192	66	
Flu shots	160	55	
Administer and contact patients regarding health risk assessments	67	23	1 point if yes 67 (23.0%)
Health promotion programs			
Nutrition	109	37.5	1 point if yes to at least 4 of 5 questions
Weight loss	112	38.5	59 (20.3%)
Physical activity	78	26.8	
STD prevention	54	18.6	
Smoking cessation	144	49.5	

EXHIBIT 2
Measures Of Patient-Centered Medical Home Components: Quality And Safety Component (cont.)

Measures of quality and safety component	Medical groups (N = 291)		Quality and safety index—criteria for point, and number (%) of medical groups awarded point
	Number	Percent	
Incorporate feedback from patients (strongly agree)			
Assess patients' needs and expectations	60	20.6	1 point if strongly agree to at least 4 of 5 questions 30 (10.3%)
Promptly resolve patients' complaints	69	23.7	
Complaints studied to identify patterns and prevent recurrence	97	33.3	
Use data from patients to improve care	75	25.8	
Use data on patients' expectations/ satisfaction to develop new services	53	18.2	
Index for quality and safety component, mean (SD)			4.0 (2.4) Range 0–11

SOURCE: National Study of Physician Organizations and the Management of Chronic Illness, March 2006–March 2007.
NOTES: CHF is congestive heart failure. STD is sexually transmitted disease. SD is standard deviation.

rapid-cycle quality improvement strategy (Plan-Do-Study-Act or PDSA cycle); accessed its EMR to collect data for quality measures; and routinely used health risk assessments to contact at-risk patients.[8] Other domains contained multiple questions. The domain of performance feedback to physicians assessed whether the group provided data to its physicians on the quality of their care in five areas. The domain of clinical decision support assessed whether a majority of physicians used an EMR for (1) point-of-care prompts; (2) alerts of abnormal test results at the time they are received; and (3) alerts of potential drug interactions. For the domain of distribution of clinical guidelines to patients, we asked whether groups provided written materials that explain the guidelines for recommended medical care for their illness directly to patients. The domain of patient educator addressed the use of specially trained and designated staff for patient education. The domain of patient reminders addressed whether groups routinely sent reminders for preventive or follow-up care to a majority of patients with specific chronic illnesses or who were eligible for specific preventive services. We asked whether groups had health promotion programs in five specified areas. Finally, for the domain of incorporation of patient feedback, we asked to what extent the physicians in the group would agree with each of the following statements: the group does a good job of assessing patients' needs and expectations; staff promptly resolve patients' complaints; patients' complaints are studied to identify patterns and prevent the same problems from recurring; the group uses data from patients to improve care; and the group uses data on patients' expectations or satisfaction, or both, when developing new services.

The enhanced access index provided a summary of responses across three do-

mains, each containing a single question: whether a majority of patients could access any part of the group's EMR online, whether the medical group used group visits, and whether the majority of physicians communicated with patients via e-mail (never, occasionally, or daily).

■ **Index summary scores.** Each medical group could score a maximum of one point per domain, resulting in a care coordination/integration index for each medical group ranging from 0 to 5, a quality and safety index ranging from 0 to 11, and an enhanced access index ranging from 0 to 3. Each medical group was assigned one point per domain if it passed a minimum threshold of 66 percent for that domain.[9] For example, we asked each medical group whether or not it had a registry for each of four chronic illnesses but gave the group a point for the registry domain only if it responded "yes" for at least three (75 percent) of the illnesses. A summary PCMH Index, ranging from 0 to 20, was created for each medical group by adding the domains across all four components.

■ **Analysis.** We calculated the percentage of medical groups using each of the individual measures described above. We also calculated each group's score on each of the three indexes and the summary PCMH index, and we report the mean and distribution of these indexes. We defined *highest performers* as those groups that scored in the top quartile on all four of the measured PCMH components, and *lowest performers* as those groups that scored in the bottom quartile on all four components.

To examine whether increased PCMH infrastructure was associated with organizational size, we divided the medical groups into quartiles by number of physicians and present the mean value of each index by size quartile. To display the means of multiple indexes on a single graph, we standardized them by dividing the mean value by the total possible value, and we graphed the resulting percentage. To examine the association between PCMH infrastructure and type of ownership, we divided the medical groups into two categories: those owned by a larger entity such as a hospital or health maintenance organization (HMO), and those owned by physicians; we present the mean value of each index by ownership category. We also examined the highest and lowest performers by size and ownership. Significance tests were performed for all bivariate comparisons of categorical data.

Study Results

■ **Physician-directed care.** As shown in Exhibit 1, approximately one-third of medical groups use primary care teams at a majority of their practice sites. Forty-one percent reported that a majority of their physicians use an EMR with basic functionalities, although just over half of groups have substantial electronic interchange with hospitals and specialists. Less than a third of medical groups use registries for at least three chronic diseases studied; only one in four routinely use nurse care managers to manage care for patients with severe illnesses. The mean score on the care coordination index was 2 out of a possible 5. Forty-two percent of groups

scored 0 or 1; 18 percent scored at least 4; and only 7 percent scored 5 on the five-point index (data not shown).

■ **Quality and safety.** As shown in Exhibit 2, 65 percent of medical groups participate in quality improvement collaboratives, while only 36 percent use the PDSA cycle. Nearly half of groups use electronic records to collect data for quality measures. Only 30 percent provide physicians with performance feedback for at least four of the five clinical conditions measured, and 34 percent provide physicians with point-of-care decision support. With the exception of distributing guidelines, fewer than half of groups were engaged in substantial activity in the quality and safety domains focused on the patient (patient educators, sending patient reminders, administering health risk assessments, and health promotion programs). Only 10 percent reported that most of their physicians would "strongly agree" with statements that the group regularly incorporates feedback from patients in improving care and developing new services. The mean value of the quality and safety index was 4 out of a possible 11. Twenty-eight percent of groups scored between 0 and 2; 6 percent scored at least 9; and only one scored 11 on the eleven-point index (data not shown).

■ **Enhanced access.** Thirty percent of medical groups use group visits for patients with chronic illnesses at a majority of their practice sites (data not shown). A similar proportion reported that most of their physicians communicate with patients via e-mail "occasionally," although only 1 percent reported that physicians use e-mail with patients daily. Nine percent said that a majority of their patients could access some part of the group's EMR online. The mean of the enhanced access index was 0.7 out of a possible 3. Fifty-one percent of groups scored 0, and 5 percent scored 3 on the three-point index.

■ **PCMH index.** The mean and median scores on the PCMH index were 7 out of a possible 20 (data not shown). The distribution of this index is shown in Exhibit 3. None of the 291 medical groups scored 20 on the index.

■ **Highest and lowest performers.** Twenty-six medical groups (9 percent) were identified as highest performers because they scored in the highest quartile for all four components measured, and thirty-four groups (12 percent) were classified as lowest performers because they scored in the bottom quartile for all four components (data not shown).

■ **Association of infrastructure with group size and type of ownership.** The standardized mean for each of the four PCMH components is presented in Exhibit 4 according to organizational size. Physician-directed medical practice is more common among the smallest and largest medical groups and appears as a roughly U-shaped curve. The other three infrastructure components demonstrate a more linear association—that is, increased size is positively and significantly associated with increased infrastructure. The positive association between size and infrastructure is especially evident for the very largest medical groups (more than 140 physicians). Highest and lowest performers also varied according to organizational size (Exhibit 5). Among medical groups in the smallest size quartile (20–37 physicians), only 1

EXHIBIT 3
Distribution Of Patient-Centered Medical Home (PCMH) Index Scores Among 291 Medical Groups
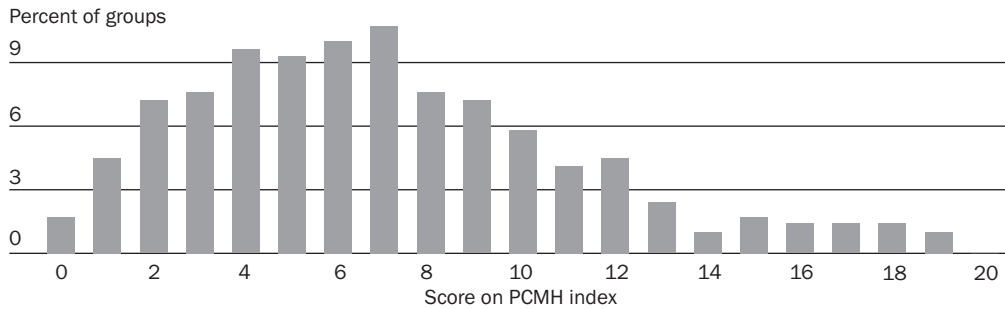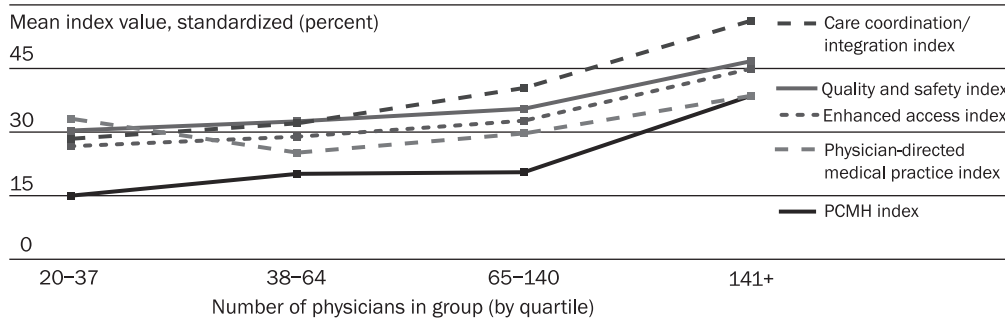

Percent of groups

Score on PCMH index

percent were identified as highest performers, while 19 percent were identified as lowest performers. Among medical groups in the largest size quartile (141 or more physicians), 19 percent were identified as highest performers, compared to 3 percent identified as lowest performers.

Physician-directed medical practice did not vary by type of ownership (data not shown). The mean score for the other three PCMH components did vary significantly according to ownership (data not shown). For medical groups owned by a hospital or an HMO, the mean score was 2.2 out of 5 for the care coordination/integration index; 4.5 out of 11 for the quality and safety index; and 0.9 out of 3 for the enhanced access index. For medical groups owned by physicians, the mean values were 1.9, 3.8, and 0.6, respectively.

Discussion And Policy Implications

This is the first study of multiple components of the PCMH infrastructure using a national database. We found that, on average, the level of adoption of PCMH

EXHIBIT 4
Four Components Of The Patient-Centered Medical Home (PCMH), Mean Index Value According To The Size Of The Medical Group

Mean index value, standardized (percent)

Number of physicians in group (by quartile)

Care coordination/integration index
Quality and safety index
Enhanced access index
Physician-directed medical practice index
PCMH index

EXHIBIT 5
Highest And Lowest Performers On The Patient-Centered Medical Home (PCMH) Index According To The Size Of The Medical Group
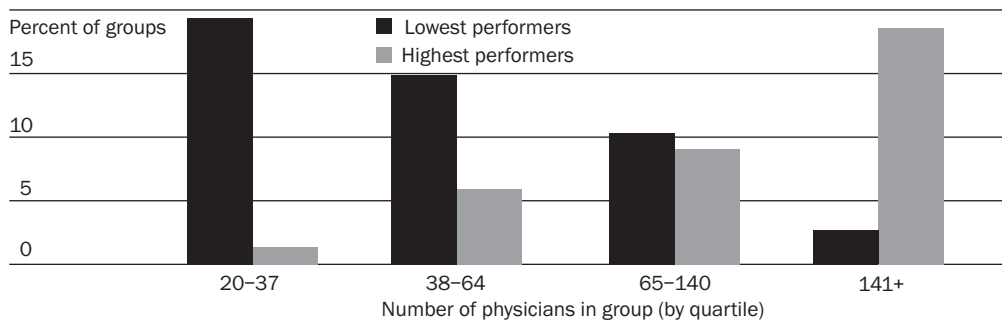
SOURCE: National Study of Physician Organizations and the Management of Chronic Illness, March 2006–March 2007.

infrastructure components among large medical groups is low. This is true overall and for each of the four components measured. Although low on average, the level of PCMH infrastructure varied considerably among medical groups, as shown in Exhibit 3. The data for each of the four components had a similarly wide distribution across medical groups (data not shown). Across each of the four components studied, we found that very large organizational size is strongly associated with greater PCMH structure. Compared to ownership by physicians, ownership by a larger entity, such as a hospital or an HMO, is also associated with increased PCMH infrastructure.

■ **Study limitations.** Our findings should be considered in light of several limitations. First, we studied only the infrastructure components of the PCMH model. These components are necessary, but not sufficient, for full implementation of the model as currently formulated. The NSP02 data do not include measures of the personal physician or payment reform components. We also did not include direct measures of the whole-person orientation component, although we made an effort to only include medical groups responsible for coordination and integration across the care continuum, including chronic illness care and prevention, by limiting the sample to medical groups that designated themselves as "mainly primary care" or "multispecialty" and that reported treating a range of chronic illnesses, including depression.

Second, our measures for each of the infrastructure components were not exhaustive. This is especially true of the enhanced access component, where, for example, we did not have measures of advanced access scheduling or after-hours accessibility. Third, we were rigorous in our assignment of points for each of the PCMH component domains. We conducted sensitivity analysis using a more generous assignment of points that resulted in a modest increase in prevalence but similar findings in terms of variation among medical groups overall and by size and ownership categories.

Fourth, the NSP02 data derive from telephone interviews with practice leaders. It is possible that the leaders overstated the extent of PCMH infrastructure within their organizations. Thus, the true prevalence could be lower than the low numbers we are reporting; we do not expect that it would otherwise bias our findings. Fifth, our data on large medical groups cannot be generalized to all types of U.S. medical practices.

■ **Gap between current and potential use of the PCMH.** The PCMH is taking center stage in discussions of primary care innovation and is gaining traction in debates around health care reform as a new model of care that provides comprehensive, coordinated care to people across their lifespan. Our data suggest that relatively low levels of infrastructure exist in large medical groups to support the PCMH and highlight the gap between the current state of medical practice and widespread adoption of the PCMH. Many of the PCMH infrastructure components derive from evidence-based best practices, such as the Chronic Care Model, that have been gradually implemented in some physician practices in recent years.[10] Efforts to better understand the levers for adoption of these components and work to disseminate best practices are ongoing.[11]

■ **Measuring the medical home.** As the PCMH model is piloted in both the private and public sectors, there is an urgent need to develop standard measurement criteria. The NCQA has taken the lead in this area; its voluntary PCMH recognition program has been adopted by PCMH advocates and is being used in pilot projects across the country.[12] Practices seeking recognition complete a Web-based survey and provide documentation for validation of their responses. Practices are scored on a 100-point scale and are eligible for three levels of recognition. Some medical home advocates remain skeptical of measurement, emphasizing that the PCMH is not merely the sum of its component parts but instead an integrated whole. For example, although infrastructure components are important to ensuring that care is coordinated, integrated, safe, of high quality, and accessible, at the heart of the PCMH is the personal physician and a team of professionals providing first-contact, continuous, and comprehensive care. This focus on primary care adds a qualitatively different dimension to the model. From the patient's perspective, a medical home is not simply a combination of disease registries, reminder systems, and performance measurement. A medical home is a familiar place, with familiar people, that delivers high-quality, well-organized care that is accessible in time of need.[13] Although some argue that "medical-homeness" is better evaluated from the patient's perspective than from the physician's, others balk at all attempts to measure aspects of the PCMH as overly reductionist. Regardless, the demand for clinical practice "transparency" remains a reality of the current policy environment, and success of the model will depend in part on continued multistakeholder involvement in the development of standardized, comprehensive assessment tools.

■ **Small versus large practice settings.** Early visions of the medical home centered on smaller practice settings. Interestingly, our data demonstrate that the larg-

"Changing the way in which primary care physicians are paid is deemed essential for the success of the model."

est of the large medical groups, and those owned by larger entities such as a hospital or an HMO, have much higher levels of PCMH infrastructure than smaller groups do. This suggests that greater resources are associated with earlier adoption. Advantages of small versus large practice settings are not known for other aspects of the PCMH not measured in this study. The American Academy of Family Physicians' TransforMED initiative and the American College of Physicians' Center for Practice Improvement are major efforts under way to better understand PCMH adoption in smaller practice settings.

■ **Costs of implementation.** Implementation of the PCMH model and all of its components is not without cost.[14] Changing the way in which primary care physicians are paid by aligning incentives to prepare and evaluate practices, to pay for the coordination and integration of care, and to reward higher performance is deemed essential for the success of the model. Agreement on a mixed-model payment method that combines fee-for-service, pay-for-performance, and a separate payment for care coordination/integration has been endorsed by coalitions of purchasers and large insurers and is being piloted in regional markets around the country.[15] This payment method provides compensation for aspects of primary care medical practice that have long gone uncompensated. Advocates are encouraged by the experience in the North Carolina Medicaid program, where implementation of the PCMH model saved the state government $231 million in state fiscal years 2005 and 2006.[16]

■ **Prospects for widespread adoption.** Our data on the infrastructure components of the PCMH model demonstrate that the model has a long way to go to achieve widespread implementation. Whether the PCMH prevails as an innovative solution that drives enduring change, or whether it proves to be simply new packaging for an age-old concept that lacks support from the body politic, depends on whether it is able to go the distance and deliver a fundamentally different system of care that emphasizes primary care and results in improved overall health outcomes, decreased health disparities, and enhanced patient experience.

NOTES

1. Institute of Medicine, *Crossing the Quality Chasm: A New Health System for the Twenty-first Century* (Washington: National Academies Press, 2001).

2. See, for example, B. Starfield, L. Shi, and J. Macinko, "Contribution of Primary Care to Health Systems and Health," *Milbank Quarterly* 83, no. 3 (2005): 457–502; M.J. Sepulveda, T. Bodenheimer, and P. Grundy, "Primary Care: Can It Solve Employers' Health Care Dilemma?" *Health Affairs* 27, no. 1 (2008): 151–158; B. Starfield and L. Shi, "The Medical Home, Access to Care, and Insurance: A Review of the Literature," *Pediatrics* 113, no. 5 Supp. (2004): 1493–1498; and C. Schoen et al., "Toward Higher-Performance Health Systems: Adults' Health Care Experiences in Seven Countries, 2007," *Health Affairs* 26, no. 6 (2007): w717–w734 (published online 31 October 2007; 10.1377/hlthaff.26.6.w717).

3. Robert Graham Center, Policy Studies in Family Medicine and Primary Care, "The Patient Centered Medical Home: History, Seven Core Features, Evidence, and Transformational Change," November 2007, http://www.graham-center.org/PreBuilt/PCMH.pdf (accessed 24 June 2008).

4. See the Patient-Centered Primary Care Collaborative home page, at http://www.pcpcc.net.

5. National Committee for Quality Assurance, "Physician Practice Connections—Patient-Centered Medical Home," http://www.ncqa.org/tabid/631/Default.aspx (accessed 24 June 2008).

6. A.C. Enthoven and L.A. Tollen, eds., *Toward a Twenty-first Century Health Care System: The Contributions and Promise of Prepaid Group Practice* (San Francisco: Jossey-Bass, 2004).

7. American Association for Public Opinion Research, *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, 2006, http://www.aapor.org/uploads/standarddefs_4.pdf (accessed 24 June 2008); and E.G. Campbell et al., "A National Survey of Physician-Industry Relationships," *New England Journal of Medicine* 356, no. 17 (2007): 1742–1750.

8. M.K. Lin et al., "Motivation to Change Chronic Illness Care: Results from a National Evaluation of Quality Improvement Collaboratives," *Health Care Management Review* 30, no. 2 (2005): 139–156.

9. We chose the 66 percent threshold in an effort to be rigorous in our definition of a PCMH. For sensitivity analyses, we reanalyzed the data using more generous criteria for each domain (that is, assigning one point per domain if the group responded "yes" to any of the questions for that domain).

10. T. Bodenheimer, E.H. Wagner, and K. Grumbach, "Improving Primary Care for Patients with Chronic Illness," *Journal of the American Medical Association* 288, no. 14 (2002): 1775–1779; A.C. Tsai et al., "A Meta-Analysis of Interventions to Improve Care for Chronic Illnesses," *American Journal of Managed Care* 11, no. 8 (2005): 478–488; and L. Casalino et al., "External Incentives, Information Technology, and Organized Processes to Improve Health Care Quality for Patients with Chronic Diseases," *Journal of the American Medical Association* 289, no. 4 (2003): 434–441.

11. D.R. Rittenhouse et al., "Improving Chronic Illness Care: Findings from a National Study of Care Management Processes in Large Physician Practices" (Unpublished paper, University of California, San Francisco, February 2008); and "TransforMED—Transforming Medical Practices," http://www.transformed.com/transformed.cfm (accessed 4 March 2008).

12. NCQA, "Physician Practice Connections."

13. A.C. Beal et al., "Closing the Divide: How Medical Homes Promote Equity in Health Care: Results from the Commonwealth Fund 2006 Health Care Quality Survey," June 2007, http://www.commonwealthfund.org/publications/publications_show.htm?doc_id=506814 (accessed 1 March 2008).

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