Readiness of Primary Care Practices for Medical Home Certification

AUTHORS: Joseph S. Zickafoose, MD, MS,^a Sarah J. Clark, MPH,^a Joseph W. Sakshaug, PhD,^b Lena M. Chen, MD, MS,^{c,d} and John M. Hollingsworth, MD, MS^e

^aChild Health Evaluation and Research (CHEAR) Unit, Division of General Pediatrics, ^bInstitute for Social Research, ^cDivision of General Medicine, and ^dDepartment of Urologic Surgery, University of Michigan, Ann Arbor, Michigan; and ^eVA Health Services Research and Development Center of Excellence, Ann Arbor, Michigan

KEY WORDS

pediatric primary care, medical home, National Ambulatory Medical Care Survey

ABBREVIATIONS

CI—confidence interval

NAMCS—National Ambulatory Medical Care Survey

NCQA—National Committee for Quality Assurance

PCMH—patient-centered medical home

SCHIP—State Children's Health Insurance Program

Dr Zickafoose conceptualized and designed the study, reviewed analyses, and drafted the initial manuscript; Ms Clark, Dr Chen, and Dr Hollingsworth contributed to the conceptualization and design of the study, and reviewed and revised the manuscript; Dr Sakshaug performed all analyses, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

www.pediatrics.org/cgi/doi/10.1542/peds.2012-2029

doi:10.1542/peds.2012-2029

Accepted for publication Oct 25, 2012

Address correspondence to Joe Zickafoose, MD, MS, 220 East Huron St, Suite 300, Ann Arbor, MI 48104. E-mail: jzickafoose@mathematica-mpr.com

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2013 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: Dr Zickafoose was supported by a training grant from the National Institute of Child Health and Human Development (T32 HD07534).

WHAT'S KNOWN ON THIS SUBJECT: Practice characteristics, such as practice size, have been associated with the readiness of adult primary care practices for medical home certification. Little is known about how ready primary care practices for children are for medical home certification.

WHAT THIS STUDY ADDS: Primary care practices for children attained only 38% of the infrastructure required for medical home certification. Smaller practice size was significantly associated with lower infrastructure scores. Medical home programs need effective approaches to support practices with limited resources.

abstract

OBJECTIVES: To assess the prevalence of medical home infrastructure among primary care practices for children and identify practice characteristics associated with medical home infrastructure.

METHODS: Cross-sectional analysis of restricted data files from 2007 and 2008 of the National Ambulatory Medical Care Survey. We mapped survey items to the 2011 National Committee on Quality Assurance's Patient-Centered Medical home standards. Points were awarded for each "passed" element based on National Committee for Quality Assurance scoring, and we then calculated the percentage of the total possible points met for each practice. We used multivariate linear regression to assess associations between practice characteristics and the percentage of medical home infrastructure points attained.

RESULTS: On average, pediatric practices attained 38% (95% confidence interval 34%–41%) of medical home infrastructure points, and family/general practices attained 36% (95% confidence interval 33%–38%). Practices scored higher on medical home elements related to direct patient care (eg, providing comprehensive health assessments) and lower in areas highly dependent on health information technology (eg, computerized prescriptions, test ordering, laboratory result viewing, or quality of care measurement and reporting). In multivariate analyses, smaller practice size was significantly associated with lower infrastructure scores. Practice ownership, urban versus rural location, and proportion of visits covered by public insurers were not consistently associated with a practice's infrastructure score.

CONCLUSIONS: Medical home programs need effective approaches to support practice transformation in the small practices that provide the vast majority of the primary care for children in the United States. *Pediatrics* 2013;131:473–482

The medical home has become the central model in efforts to transform primary care practice to improve health care delivery, enhance patient experience, and control costs.^{1–4} To participate in medical home programs and qualify for additional reimbursement from insurers, primary care practices are typically required to go through a certification process.^{5–8} The National Committee for Quality Assurance's (NCQA) Patient-Centered Medical Home (PCMH) program is one of the most common medical home certification programs and measures practices on 27 specific elements grouped into 6 standards.⁵ In the 2011 NCQA PCMH standards, practices are scored on a 100-point scale with 35 as a minimum level for certification.⁵ Many medical home programs base payments on whether a practice meets the minimum requirement,⁴ and some programs have increasing payments for higher certification scores.⁹

The services and infrastructure required for medical home certification are resource-intensive to implement and maintain,^{10,11} raising the possibility that primary care practices with limited resources will be at a disadvantage for medical home certification and be ineligible for additional reimbursement that could be used to improve care. Studies in adult primary care suggest that smaller and independent practices are less likely to have the infrastructure needed for medical home certification.^{12–16} Primary care practices that serve children may be at an added disadvantage for medical home certification because of the high proportion of children enrolled in Medicaid,¹⁷ which pays significantly less than other insurers, potentially limiting practices' resources to implement the services and infrastructure needed for medical home certification.¹⁸ Little is known about the readiness for medical home certification

in primary care practices serving children, however.

This study was designed to address the following questions: (1) to what degree do primary care practices for children have the infrastructure required for medical home certification; and (2) are practice characteristics associated with a practice's medical home infrastructure. Based on the adult literature,^{12–16} we hypothesized that smaller and physician-owned primary care practices would be less ready for medical home certification compared with larger and health-system-owned practices. We also hypothesized that primary care practices with a higher proportion of patient visits from publicly insured children would be less ready for medical home certification.

METHODS

Sample

We used restricted data files from the 2007 and 2008 National Ambulatory Medical Care Survey (NAMCS), an annual multistage probability sample of outpatient visits to randomly selected, non-federally employed, office-based physicians in the United States.¹⁹ Because physicians are one of the sampling stages for the survey, results can be used to produce national estimates of physician-reported practice characteristics using published methods.²⁰

For this study, we were interested in primary care practices for children. Therefore, we included physicians with reported specialties of pediatrics, family practice, and general practice. We excluded physicians from pediatric subspecialties and sports medicine. There was insufficient sample size to include adolescent medicine or internal medicine/pediatrics. We restricted the analyses to physicians with at least 5% of their visits involving individuals <19 years old.

Data Collection

During the physician sampling stage of NAMCS, an induction interview was performed with the physicians that included questions about a variety of physician and practice characteristics. For confidentiality reasons, many of these physician and practice characteristics are not included in the NAMCS public data files, but they are available in restricted data files available from the Research Data Center of the National Center for Health Statistics.²¹

Measuring Medical Home Infrastructure

As in a previous study,¹⁶ we measured medical home infrastructure by mapping practice characteristics reported by physicians in NAMCS to the NCQA PCMH certification standards. For this study, we used the 2011 NCQA PCMH standards.⁵ NCQA assigns a point value to each of the elements in the PCMH standards for a total possible score of 100. We were able to map items from NAMCS to each of the 6 NCQA PCMH standards and represent 56 of the NCQA points, including (1) enhance access and continuity (12 points); (2) identify and manage patient populations (16 points); (3) plan and manage care (3 points); (4) provide self-care support and community resources (6 points); (5) track and coordinate care (6 points); and (6) measure and improve performance (13 points) (Table 1).

To generate the medical home infrastructure score, we first determined the presence of practice characteristics mapped to the NCQA standards and assigned points to the practice based on the NCQA scoring system.⁵ We then generated a cumulative point total for the practice by summing the points across all practice characteristics that were present. For practices with complete data, the maximum point total was 56, and for practices with missing

TABLE 1 Mapping of NAMCS Questions (2007 and 2008) to the 2011 NCQA PGMH Standards and Proportions of Pediatric and Family/General Practices That Meet Standards

NCQA Standard	Element	NCQA Points	NAMCS Question	Points Possible in NAMCS	Pediatrics, % (95% CI)	FP/GP, % (95% CI)
Total		100		56		
1: Enhance Access and Continuity	A. Access During Office Hours ^a	4				
	A1. Providing same-day appointments					
	A2. Providing timely clinical advice by telephone during office hours		During the last normal week of practice, about how many encounters of the following type did you make with patients: telephone consults? ^c	2	63 (53–73)	67 (58–74)
	A3. Providing timely clinical advice by secure electronic messages during office hours		During the last normal week of practice, about how many encounters of the following type did you make with patients: Internet/e-mail consults? ^c	2	6 (3–12) ^b	5 (2–10) ^b
	A4. Documenting clinical advice in the medical record					
	B. After-Hours Access	4	Does the physician see patients in the office during the evening or on weekends?	4	58 (49–67)	40 (32–49)
	C. Electronic Access	2				
	D. Continuity	2				
	E. Medical Home Responsibilities	2				
	F. Culturally and Linguistically Appropriate Services (CLAS)	2				
	G. Practice Team	4	Any of the following: - Was a physician assistant seen at the visit? ^c - Was a nurse practitioner seen at the visit? ^c - Was an RN/LPN seen at the visit? ^c	4	59 (48–69)	72 (63–80)
2: Identify and Manage Patient Populations	A. Patient Information	3	Does your practice have a computerized system for patient demographic information?	3	77 (66–85)	72 (62–79)
	B. Clinical Data	4	If your practice has a computerized system for patient demographic information, does it include patient problem lists?	4	33 (23–44)	29 (22–36)
	C. Comprehensive Health Assessment	4	For any visit: Do you offer any type of cervical cancer screening? ^{c,d}	0.5	3 (1–11) ^b	41 (33–49)
			Was any asthma education ordered or provided at this visit? ^c	0.5	47 (37–58)	29 (23–36)
			Was any diet/nutrition education ordered or provided at this visit? ^c	0.5	83 (72–90)	85 (76–91)
			Was any exercise education ordered or provided at this visit? ^c	0.5	56 (46–66)	74 (64–83)
			Was any growth/development education ordered or provided at this visit? ^c	0.5	79 (68–87)	30 (23–38)
			Was any injury prevention education ordered or provided at this visit? ^c	0.5	57 (46–68)	27 (20–36)
			Was any tobacco use/exposure education ordered or provided at this visit? ^c	0.5	34 (25–45)	59 (49–68)
			Was a depression screening examination ordered or provided at this visit? ^c	0.5	7 (3–15) ^b	20 (14–27)
	D. Use Data for Population Management ^a	5	Does your practice have a computerized system for reminders for guideline-based interventions and/or screening tests?	5	25 (17–37)	33 (25–43)

TABLE 1 Continued

NCQA Standard	Element	NCQA Points	NAMCS Question	Points Possible in NAMCS	Pediatrics, % (95% CI)	FP/GP, % (95% CI)
3: Plan and Manage Care	A. Implement Evidence-Based Guidelines	4				
	B. Identify High-Risk Patients	3				
	C. Care Management ^a	4				
	D. Medication Management	3				
	E. Use Electronic Prescribing	3	Does your practice have a computerized system for orders for prescriptions?	1	35 (25–46)	30 (23–37)
			If your practice does have a computerized system for orders for prescriptions, are there warnings of drug interactions or contraindications provided?	1	28 (19–39)	21 (15–29)
			If your practice does have a computerized system for orders for prescriptions, are there prescriptions sent electronically to the pharmacy?	1	24 (15–35)	16 (11–24)
4: Provide Self-Care Support and Community Resources	A. Support Self-Care Process ^a	6	Was any health education ordered or provided at this visit? ^c	6	97 (94–99)	93 (84–97)
	B. Provide Referrals to Community Resources	3				
5: Track and Coordinate Care	A. Test Tracking and Follow-up	6	Does your practice have a computerized system for orders for tests?	1	29 (21–39)	33 (26–41)
			If your practice has a computerized system for orders for tests, are orders sent electronically?	1	17 (10–26)	18 (13–25)
			Does your practice have a computerized system for viewing laboratory results?	1	47 (36–58)	47 (39–55)
			If your practice has a computerized system for viewing laboratory results, are out-of-range levels highlighted?	1	40 (29–51)	37 (29–45)
			Does your practice have a computerized system for viewing imaging results?	1	35 (26–46)	36 (28–44)
			If your practice has a computerized system for viewing imaging results, are electronic images returned?	1	14 (8–22)	15 (10–24)
	B. Referral Tracking and Follow-up ^a	6				
	C. Coordinate With Facilities/Care Transitions	6				
6: Measure and Improve Performance	A. Measure Performances	4	Is quality of care (eg, rates of preventive care services) taken into account for your patient care compensation (eg, base pay, bonuses, or withholds)?	2	37 (27–48)	32 (24–41)
			Is practice profiling (patterns of using certain services, eg, laboratory tests, imaging, referrals) taken into account for your patient care compensation (eg, base pay, bonuses, or withholds)?	2	13 (7–23)	17 (11–27)
	B. Measure Patient/Family Experience	4	Is patient satisfaction (eg, results of patient surveys) taken into account for your patient care compensation (eg, base pay, bonuses, or withholds)?	4	30 (21–42)	26 (18–36)
	C. Implement Continuous Quality Improvement ^a	4				
	D. Demonstrate Continuous Quality Improvement	3				

TABLE 1 Continued

NCQA Standard	Element	NCQA Points	NAMCS Question	Points Possible in NAMCS	Pediatrics, % (95% CI)	FP/GP, % (95% CI)
	E: Report Performance	3	Are performance measures on your practice available to the public?	3	15 (9–25)	12 (7–19)
	F: Report Data Externally	2	Does your practice have a computerized system for public health reporting?	1	22 (14–33)	20 (14–28)
			If your practice does has a computerized system for public health reporting, are notifiable diseases sent electronically?	1	7 (3–14) ^b	7 (4–13)

FP, family practice; GP, general practice; LPN, licensed practical nurse; RN, registered nurse.

^a “Must-pass” elements in NCQA certification. All 6 must-pass elements must be met for certification, regardless of overall score.

^b Because it is based on <30 records, the National Center for Health Statistics considers this estimate to be unreliable.

^c Practices given credit if service was reported for any encounter during the sample period.

^d Before 2009, cervical cancer screening guidelines included sexually active adolescents.²²

data, the maximum point total was based on nonmissing data. The medical home infrastructure score for each practice was then calculated by dividing the total points for the practice by the maximum possible points. The medical home infrastructure score represents the percentage of measurable NCQA medical home elements present in the practice. It is important to note that the NCQA standards include 6 “must-pass” elements that are required for certification, regardless of overall score (Table 1). We were able to map NAMCS items to only 3 of the 6 must-pass elements and chose to score them in the same manner as other elements.

Practice Characteristics

Several practice characteristics that we hypothesized to be associated with medical home infrastructure were identifiable in NAMCS, including practice size, practice ownership, urban versus rural location, and the proportion of visits covered by public payers (Medicaid and the State Children’s Health Insurance Program [SCHIP]). Practice size was categorized based on the number of physicians in the practice: solo/2 physicians, small (3–5 physicians), medium (6–10), or large (≥ 11).²⁰ Practice ownership was categorized as physician or physician group, community health center, or

health system. Health systems included health maintenance organizations, academic medical centers, hospitals, and other health care corporations. Urban versus rural location was categorized in NAMCS based on the zip code of the practice. The proportion of visits covered by public payers was determined by the percentage of visits for individuals <19 years old with expected payment from Medicaid or SCHIP during the NAMCS sampling period for that physician.

Statistical Analyses

We generated nationally representative practice-level estimates by deriving a medical practice estimator by using methodology suggested by the National Center for Health Statistics.²⁰ This approach allowed us to make practices, rather than physicians, our unit of analysis. We corrected the SEs of our estimates to account for the complex survey design, including the use of survey weights and stratification. We then assessed bivariate and multivariate associations between practice characteristics and the medical home infrastructure score by using linear regression.

We used Stata 11.0 (Stata Corp, College Station, TX) for all statistical analyses with appropriate adjustments for the complex survey design. The University of Michigan Health Sciences and Behavioral

Sciences Institutional Review Board determined that this study was exempt from oversight.

RESULTS

Characteristics of Primary Care Practices for Children in the United States

The final sample included 222 primary care pediatric practices, representing >12 000 practices nationally, and 398 family and general practices, representing >20 000 practices nationally (Table 2). Most visits for children occurred in pediatric practices (78% [95% confidence interval (CI) 74%–82%]) versus family and general practices. In pediatric practices, nearly all visits in pediatric practices were for children <19 years old (98% [95% CI 96%–99%]), whereas children accounted for a much smaller percentage of visits in family/general practices (15% [95% CI 13%–17%]).

Most practices were solo or 2 partner in size and were owned by a physician or physician group (Table 2). Most pediatric practices were in large metropolitan areas, whereas most family and general practices were outside large metropolitan areas. Pediatric practices had higher proportions of visits for children that were expected to be paid for by Medicaid or SCHIP compared with family and general practices, but

TABLE 2 Characteristics of Primary Care Practices for Children in the United States, NAMCS, 2007 and 2008

	Pediatrics		Family and General Practice ^a	
	Weighted <i>n</i> (Unweighted <i>n</i>)	Weighted % (95% CI)	Weighted <i>n</i> (Unweighted <i>n</i>)	Weighted % (95% CI)
Total	12 045 (222)	100	20 856 (398)	100
Practice size				
Solo/partner (1–2)	7998 (66)	66 (58–74)	16 005 (155)	76 (71–82)
Small (3–5)	2899 (73)	24 (18–31)	3410 (124)	16 (12–21)
Medium (6–10)	976 (56)	8 (6–11)	1168 (74)	6 (4–9)
Large (11 or more)	172 (27)	1 (1–3)	274 (45)	1 (1–2)
Who owns the practice				
Physician or physician group	10 377 (143)	86 (81–91)	16 498 (197)	79 (72–85)
Community health center	319 (42)	3 (2–5)	134 (134)	5 (3–7)
Health systems	1332 (36)	11 (7–17)	3325 (67)	16 (11–23)
Urban versus rural location				
Large central metro	3666 (77)	31 (21–43)	4484 (114)	22 (15–31)
Large fringe metro	3888 (61)	33 (24–43)	4451 (62)	22 (15–30)
Medium/small metro	3328 (63)	28 (20–38)	6980 (133)	34 (24–46)
Nonmetro	877 (15)	7 (3–17) ^c	4559 (79)	22 (14–34)
Proportion of visits covered by Medicaid/SCHIP ^b				
No Medicaid/SCHIP visits	2368 (39)	20 (12–30)	9576 (139)	46 (38–55)
Low	3099 (61)	26 (17–36)	3575 (78)	17 (13–23)
Medium	3168 (46)	26 (18–37)	3840 (90)	18 (13–25)
High	3389 (74)	28 (19–39)	3812 (84)	18 (12–27)

^a Practices with $\geq 5\%$ of patient visits for individuals < 19 y.

^b Practices grouped based on proportion of visits covered by Medicaid/SCHIP for individuals < 19 y: pediatrics (0%, 1%–23%, 24%–52%, 53%–100%) and family practice/general medicine (0%, 1%–43%, 44%–75%, 76%–100%).

^c Because it is based on < 30 records, the National Center for Health Statistics considers this estimate to be unreliable.

a significant proportion of practices of all types had no visits for children covered by Medicaid or SCHIP (20% [95% CI 12%–30%] for pediatrics and 46% [95% CI 38%–55%] for family and general practice).

Elements of Medical Home Infrastructure

Of the 6 NCQA PCMH standards, most primary care practices for children met NAMCS items mapped to the NCQA standards for enhanced access and continuity, and providing self-care support and community resources (Table 1). In terms of enhanced access, more than half of all practices offered advice by telephone and used other providers during visits, such as registered nurses, physician assistants, and nurse practitioners. In most pediatric practices, patients could be seen during the evening or on weekends; these services were available in only a minority of family/general practices. Very few practices offered advice through electronic communication, such

as e-mail. In the standard for providing self-care support, nearly all practices reported providing health education to patients at visits.

In contrast, fewer than half of primary care practices met NAMCS items in the NCQA standards for planning and managing care, tracking and coordinating care, and measuring and improving performance (Table 1). Low scores in these standards were largely a result of few practices reporting computerized systems that facilitated patient management tasks, such as writing prescriptions, test ordering, viewing laboratory results, or measuring and reporting quality of care.

Results in the NCQA standard for identifying and managing patient populations were more mixed (Table 1). A significant majority of practices reported a computerized system with patient demographic information, but fewer than half of practices had systems that included problem lists or prompts for guideline-based screening or interventions. In this standard,

results were also mixed for services that could be considered part of a comprehensive health assessment, such as screening and education about nutrition, development, or tobacco use/exposure.

Medical Home Infrastructure Score

On average, pediatric practices met 38% (95% CI 34%–41%) of the possible medical home infrastructure points, and family and general practices met 36% (95% CI 33%–38%) of the possible points. In bivariate analyses, medical home infrastructure score was significantly associated with practice size for both pediatric and family/general practices, with smaller practices having lower scores (Table 3). The medical home infrastructure score was not associated with practice ownership, urban versus rural location, or proportion of visits covered by Medicaid/SCHIP for either type of primary care practices for children.

In multivariate analyses, practice size was independently associated with the

TABLE 3 Mean Medical Home Infrastructure Scores by Practice Characteristics

	Mean Medical Home Infrastructure Score (95% CI) ^a	
	Pediatrics	Family and General Practice ^b
Total	38 (34–41)	36 (33–38)
Practice size		
Solo/partner (1–2)	36 (31–41) ^d	34 (31–37) ^d
Small (3–5)	38 (35–42)	39 (35–43)
Medium (6–10)	44 (38–50)	41 (37–45)
Large (11 or more)	51 (44–57)	43 (38–48)
Who owns the practice		
Physician or physician group	38 (34–41)	35 (32–38)
Community health center	35 (27–44)	34 (28–40)
Health systems	37 (30–43)	39 (34–43)
Urban versus rural location		
Large central metro	39 (33–46)	34 (30–38)
Large fringe metro	41 (36–46)	36 (29–42)
Medium/small metro	34 (28–40)	36 (33–40)
Nonmetro	31 (25–38)	35 (31–40)
Proportion of visits covered by Medicaid/SCHIP ^c		
No Medicaid/SCHIP visits	35 (30–39)	36 (32–40)
Low	37 (31–43)	37 (32–42)
Medium	43 (36–50)	36 (32–40)
High	35 (29–41)	32 (28–37)

^a Scale 0% to 100%.^b Practices with $\geq 5\%$ of patient visits for individuals <19 y.^c Practices grouped based on proportion of visits covered by Medicaid/SCHIP for individuals <19 y: pediatrics (0%, 1%–23%, 24%–52%, 53%–100%) and family practice/general medicine (0%, 1%–43%, 44%–75%, 76%–100%).^d $P < .05$ for F -test from bivariate linear regression.**TABLE 4** Multivariate Associations Between Characteristics of Primary Care Practices for Children and Medical Home Infrastructure Score

	Adjusted β Coefficient for Medical Home Infrastructure Score ^{a,b}	
	Pediatrics	Family and General Practice ^c
Practice size		
Solo/partner (1–2) (reference)	—	—
Small (3–5)	3.4	4.3 ^f
Medium (6–10)	9.8 ^e	6.3 ^e
Large (11 or more)	14.0 ^e	9.6 ^e
Who owns the practice		
Physician or physician group (reference)	—	—
Community health center	−1.2	−2.6
Health systems	0.4	2.7
Urban versus rural location		
Large central metro (reference)	—	—
Large fringe metro	2.4	2.1
Medium/small metro	−6.8	1.7
Nonmetro	−10.0 ^f	1.9
Proportion of visits covered by Medicaid/SCHIP ^d		
No Medicaid/SCHIP visits	—	—
Low	2.3	−0.4
Medium	11.6 ^e	−0.2
High	2.8	−3.5

^a Linear regression adjusted for each practice characteristic.^b Coefficients represent change in score on 100-point scale compared with reference category.^c Practices with $\geq 5\%$ of patient visits for individuals <19 y.^d Practices grouped based on proportion of visits covered by Medicaid/SCHIP for individuals <19 y: pediatrics (0%, 1%–23%, 24%–52%, 53%–100%) and family practice/general medicine (0%, 1%–43%, 44%–75%, 76%–100%).^e $P < .01$.^f $P < .05$.

practice's medical home infrastructure score (Table 4). Compared with solo/2-partner pediatric practices, medium and large pediatric practices had significantly higher medical home infrastructure scores (10% and 14% higher on the 100-point scale, respectively). The association between practice size and the medical home infrastructure score was similar for family and general practices. Location in a nonmetropolitan (rural) area was associated with lower medical home infrastructure scores for pediatric practices but not for family and general practices (Table 4). There was no significant difference in the medical home infrastructure score between practices with a high proportion of visits covered by Medicaid/SCHIP and practices with no visits covered by Medicaid/SCHIP (Table 4). Practices with a medium proportion of visits covered by Medicaid and SCHIP had significantly higher medical home infrastructure scores compared with practices with no visits covered by Medicaid/SCHIP. There were no significant associations between practice ownership and the medical home infrastructure score.

DISCUSSION

In this nationally representative study of primary care practices for children, practices generally score low on an overall measure of medical home infrastructure, averaging $<40\%$ of included medical home elements. With a minimum threshold of 35 for medical home certification in the NCQA program,⁵ a significant proportion of practices would not qualify for the lowest level of certification. We found that smaller primary care practices were at a distinct disadvantage for overall medical home infrastructure. Our results are similar to those for adult primary care practices,^{12–16} but to our knowledge, this is the first study

to assess the medical home infrastructure in a nationally representative sample of primary care practices serving children.

These findings add to a growing body of literature that suggest that practice size is a key factor in practices having the infrastructure required for medical home certification.^{12–16} This presents a significant challenge for medical home implementation in primary care practices for children, because our results suggest that at least two-thirds of these practices are solo or 2-partner models. Implementation of medical home processes is time and resource intensive for primary care practices,^{11,23} and it has been postulated that practices with higher levels of organizational reserve, or “slack,” are more likely to be successful at medical home implementation.²⁴ Larger practices may be more likely to be able to reallocate physicians and staff time away from direct patient care to implement new systems of care. Larger practices may also be more likely to have the financial resources to invest in health information technology,^{12,13} which is a core aspect of medical home certification, particularly in the NCQA program.²⁵ In this study, 25 of the 56 NCQA points we assessed were dependent on health information technology, and this may be a rate-limiting factor for many small, independent practices.

The resources needed for medical home certification raises questions about the degree to which individual primary care practices can be expected to implement these services and infrastructure on their own. Fortunately, this issue has been increasingly recognized by policy makers involved in primary care transformation. The Health Information and Technology for Economic and Clinical Health portion of the American Recovery and Reinvestment Act of 2009 included billions

of dollars in incentives for providers to adopt electronic health records and funded regional extension centers to support clinical practices in adopting these systems.²⁶ In addition to supporting electronic health record adoption, it has been proposed that these extension centers could be leveraged to provide primary care practices with support for adopting other components of the medical home.^{26–28} In response to the drive toward more integrated care through accountable care organizations, larger health systems are again aggressively buying out primary care practices, and these large health systems may provide small primary care practices with the infrastructure needed for medical home implementation.²⁹ In parallel, many state and private payers have developed initiatives to encourage and support small practices in sharing the resources necessary for medical home implementation while maintaining their organizational independence.^{28,30}

Our findings also suggest that pediatric practices in the most rural settings may also be at a disadvantage in medical home certification, regardless of size. Although they are a small group, these practices could represent another important target for policies supporting primary care transformation. Interestingly, family and general practices in rural settings scored equal to their urban counterparts. It is possible that family practices in rural settings may have relatively more financial resources compared with rural pediatric practices because of higher reimbursement through Medicare for adult patients compared with Medicaid for pediatric patients.¹⁸

Concerns have been raised that practices that serve low-income populations may be at a disadvantage for medical home certification, although the only study specifically examining this issue found

that safety-net practices may be at a relative advantage.³¹ In our results, it was encouraging to find that a higher proportion of practice visits covered by Medicaid/SCHIP was not associated with lower medical home infrastructure scores and was actually associated with higher infrastructure scores for pediatric practices with moderate levels of Medicaid/SCHIP visits.

The overall low scores are concerning for many practices' ability to effectively and efficiently care for children and youth with special health care needs. Few practices reported computerized systems that facilitate the prospective care, such as reminders for routine tests and preventive care, or tracking and follow-up of test results and imaging that are particularly important for high-needs populations. Although it is possible to have such systems and qualify for NCQA certification without an electronic health record, health information technology can help standardize and automate these processes of care that are critical for children and youth with special health care needs and facilitate medical home certification for practices.

The results of our study should be viewed in the context of several limitations. First, the medical home infrastructure score we used is based on the NCQA PCMH certification program, while there are now a wide variety of other certification programs sponsored by not-for-profit organizations,^{6–8} private payers,³² and state agencies.³⁰ Additionally, the NCQA PCMH standards have been criticized for relying too heavily on process measures, particularly health information technology, while relatively neglecting other aspects of the medical home model, such as interpersonal communication and patient experience, and patient outcomes.^{33,34} However, the NCQA medical home certification process is currently the most widely used standard in

medical home programs, and it largely resembles other medical home certification standards.^{4,34} Second, we were able to assess only approximately half of the points in the NCQA PCMH standards (56 of 100) and only 3 out of 6 must-pass elements. However, a sensitivity analysis in a previous study using the same methodology suggested that the trends found would be consistent even with the inclusion of the other NCQA PCMH elements.¹⁶ Third, the mapping of NAMCS items to NCQA PCMH elements was indirect for several items. In the previous study using this methodology, exclusion of indirectly mapped items did not substantially change results,¹⁶ and in the

absence of other nationally representative data sets directly measuring medical home infrastructure in primary care practices for children, NAMCS represents the best available option. Fourth, the variable available to categorize practice ownership did not allow us to differentiate between small practices that were owned by large physician groups versus small independent practices. Last, these data are from 2007 and 2008; it is unclear whether the various policies and programs promoting the medical home in the past 5 years are likely to increase or close the gaps in medical home infrastructure between primary care practices.

CONCLUSIONS

Primary care practices for children are generally ready for the lowest levels of medical home certification, but very few had higher levels of medical home infrastructure. Small primary care practices that serve children are significantly less likely to be prepared for medical home certification. If the goal is to transform all primary care practices into medical homes, medical home programs will need to move beyond the vanguard practices that have been part of initial efforts and find effective approaches to support practice transformation in the small practices that compose the vast majority of the primary care system for children in the United States.

REFERENCES

1. Details for Medicare Medical Home Demonstration. 2010. Available at: www.cms.gov/demoprojectsevalrpts/md/itemdetail.asp?itemid=cms1199247. Accessed July 30, 2010
2. Patient-Centered Primary Care Collaborative. 2012. Available at: www.pcpcc.net/. Accessed April 30, 2012
3. Institute for Healthcare Improvement. 2012. Available at: www.ihl.org. Accessed April 30, 2012
4. Bitton A, Martin C, Landon BE. A nationwide survey of patient centered medical home demonstration projects. *J Gen Intern Med*. 2010;25(6):584–592
5. National Committee for Quality Assurance. *Standards and Guidelines for NCQA's Patient-Centered Medical Home (PCMH)*. Washington, DC: National Committee for Quality Assurance; 2011
6. URAC. URAC's Patient Centered Health Care Home Program. 2012. Available at: https://www.urac.org/healthcare/prog_accred_pchch_toolkit.aspx. Accessed April 30, 2012
7. The Joint Commission. Primary care medical home. 2012. Available at: www.jointcommission.org/accreditation/pchi.aspx. Accessed April 30, 2012
8. Accreditation Association for Ambulatory Health Care. Primary care & medical home. 2012. Available at: www.aaahc.org/accreditation/primary-care-medical-home/. Accessed April 30, 2012
9. Bielaszka-DuVernay C. Vermont's blueprint for medical homes, community health teams, and better health at lower cost. *Health Aff (Millwood)*. 2011;30(3):383–386
10. Stewart EE, Nutting PA, Crabtree BF, Stange KC, Miller WL, Jaen CR. Implementing the patient-centered medical home: observation and description of the national demonstration project. *Ann Fam Med*. 2010;8:S21–S32, S92
11. Crabtree BF, Nutting PA, Miller WL, Stange KC, Stewart EE, Jaen CR. Summary of the National Demonstration Project and recommendations for the patient-centered medical home. *Ann Fam Med*. 2010;8:S80–S90, S92
12. Rittenhouse DR, Casalino LP, Gillies RR, Shortell SM, Lau B. Measuring the medical home infrastructure in large medical groups. *Health Aff (Millwood)*. 2008;27(5):1246–1258
13. Rittenhouse DR, Casalino LP, Shortell SM, et al. Small and medium-size physician practices use few patient-centered medical home processes. *Health Aff (Millwood)*. 2011;30(8):1575–1584
14. Friedberg MW, Safran DG, Coltin KL, Dresser M, Schneider EC. Readiness for the Patient-Centered Medical Home: structural capabilities of Massachusetts primary care practices. *J Gen Intern Med*. 2009;24(2):162–169
15. Goldberg DG, Kuzel AJ. Elements of the patient-centered medical home in family practices in Virginia. *Ann Fam Med*. 2009;7(4):301–308
16. Hollingsworth JM, Saint S, Sakshaug JW, Hayward RA, Zhang L, Miller DC. Physician practices and readiness for medical home reforms: policy, pitfalls, and possibilities. *Health Serv Res*. 2012;(1 pt 2):486–508
17. The Henry J. Kaiser Family Foundation. Health insurance coverage of children 0–18, states (2009–2010), US. 2010. Available at: www.statehealthfacts.org/comparetable.jsp?ind=127&cat=3. Accessed June 5, 2012
18. Zuckerman S, Williams AF, Stockley KE. Trends in Medicaid physician fees, 2003–2008. *Health Aff (Millwood)*. 2009;28(3):w510–w519
19. Centers for Disease Control and Prevention. About the Ambulatory Health Care Surveys. 2012. Available at: www.cdc.gov/nchs/ahcd/about_ahcd.htm. Accessed May 1, 2012
20. Hing E, Burt CW. Office-based medical practices: methods and estimates from the national ambulatory medical care survey. *Adv Data*. 2007;383(383):1–15
21. Centers for Disease Control and Prevention. Restricted variables. 2012. Available at: www.cdc.gov/rdc/B1dataType/dt122.htm. Accessed May 1, 2012
22. Sawaya G. Cervical-cancer screening—new guideline and the balance between benefits and harms. *N Engl J Med*. 2009;361:2503–2505

23. Nutting PA, Crabtree BF, Miller WL, Stange KC, Stewart E, Jaén C. Transforming physician practices to patient-centered medical homes: lessons from the national demonstration project. *Health Aff (Millwood)*. 2011;30(3):439–445
24. Goldberg DG, Mick SS. Medical home infrastructure: effect of the environment and practice characteristics on adoption in Virginia. *Med Care Res Rev*. 2010;67(4):431–449
25. Rittenhouse DR, Shortell SM. The patient-centered medical home: will it stand the test of health reform? *JAMA*. 2009;301(19):2038–2040
26. Bodenheimer T, Grumbach K, Berenson RA. A lifeline for primary care. *N Engl J Med*. 2009;360(26):2693–2696
27. Grumbach K, Mold JW. A health care cooperative extension service: transforming primary care and community health. *JAMA*. 2009;301(24):2589–2591
28. Abrams M, Schor EL, Schoenbaum S. How physician practices could share personnel and resources to support medical homes. *Health Aff (Millwood)*. 2010;29(6):1194–1199
29. O'Malley AS, Bond AM, Berenson RA. Rising hospital employment of physicians: better quality, higher costs? *Issue Brief Cent Stud Health Syst Change*. 2011;(136):1–4
30. Kaye N, Buxbaum J, Takach M. *Building Medical Homes: Lessons From Eight States With Emerging Programs*. Washington, DC: National Academy for State Health Policy; 2011
31. Friedberg MW, Coltin KL, Safran DG, Dresser M, Schneider EC. Medical home capabilities of primary care practices that serve socio-demographically vulnerable neighborhoods. *Arch Intern Med*. 2010;170(11):938–944
32. Blue Cross Blue Shield of Michigan. Physician group incentive program: patient-centered medical home initiatives. 2010. Available at: www.bcbsm.com/provider/value_partnerships/pgip/medical_home.shtml. Accessed July 30, 2010
33. Carrier E, Gourevitch MN, Shah NR. Medical homes: challenges in translating theory into practice. *Med Care*. 2009;47(7):714–722
34. Malouin RA, Starfield B, Sepulveda MJ. Evaluating the tools used to assess the medical home. *Manag Care*. 2009;18(6):44–48

COACHES FOR FIRE: *My daughter recently finished her high school soccer career. At the end of the season I congratulated her coach on another successful campaign and asked about his plans for next year. He told me that he had been coaching the team for more than 25 years, but had no plans to retire or change positions. This seemed such a remarkable difference from the coaching carousel that occurs in Division I schools, particularly in football programs. While high school sports and Division I football are entirely different entities, in either program deciding when to replace a coach (and at what cost) is not easy. However, in Division I football, universities quite frequently replace coaches at a fantastic cost. As reported in The New York Times (Sports: November 28, 2012), over the past decade approximately 10% of major college football programs replaced their coaches each year for performance-related reasons. Sometimes the cost associated with firing coaches seems unbelievable. One university must pay the fired coaching staff 11 million dollars and another almost 9 million dollars over the next several years. For one of the coaches, that amounts to more than \$200,000 a month for three years to sit in the stands rather than coach from the sidelines. Surprisingly, little data exists to support such practices. A recently published study examined the performance of major college football teams in the five years following a coaching change and compared it to the performance of teams with similar records at the onset who had not changed coaches. Overall, for teams with losing records, changing or retaining coaches had little impact; for teams that had won about half their games, teams that changed coaches had worse outcomes. Why the results are not better is unknown, but it could be that teams need time to adjust to new systems and develop new recruiting networks. As for universities, football is often a window to their school, and individual examples of success do abound, so they are willing to invest heavily in college coaches who can potentially bring immediate success and recognition to the school. With the average salary of a head coach at a major college program now at approximately \$1.6 million dollars a year, the investment is quite large indeed. Personally, I am not a huge fan of the increasingly higher salaries being paid now to college, let alone professional coaches and managers, and relish the idea that the CVU high school coach will return for his 26th year because he is invested in his players and the game of soccer.*

Noted by WVR, MD