

# Correlation of the *Care by Design*<sup>TM</sup> Primary Care Practice Redesign Model and the Principles of the Patient-Centered Medical Home

Marlene J. Egger, PhD, Julie Day, MD, Debra L. Scammon, PhD, Yao Li, MStat, Andrew Wilson, MStat, and Michael K. Magill, MD

**Background:** Health care reform requires major changes in the organization and delivery of primary care. In 2003, the University of Utah Community Clinics began developing Care by Design (CBD), a primary care model emphasizing access, care teams, and planned care. In 2007, leading primary care organizations published joint principles of the patient-centered medical home (PCMH), the basis for recognition of practices as PCMHs by the National Committee for Quality Assurance (NCQA). The objective of this study was to compare CBD and PCMH metrics conceptually and statistically.

**Methods:** This was an observational study in 10 urban and rural primary care clinics including 56 providers. A self-evaluation included the CBD Extent of Use survey and self-estimated PCMH values. The main and secondary outcome measures were CBD scores and PCMH values, respectively.

**Results:** CBD and PCMH principles share common themes such as appropriate access, team-based care, the use of an augmented electronic medical record, planned care, and self-management support. CBD focuses more on the process of practice transformation. The NCQA PCMH standards focus more on structure, including policy, capacity, and populated electronic medical record fields. The Community Clinics' clinic-level PCMH/CBD correlations were low ( $P > .05$ .)

**Conclusions:** Practice redesign requires an ability to assess uptake of the redesign as a transformation progresses. The correlation of CBD and PCMH is substantial conceptually but low statistically. PCMH and CBD focus on complementary aspects of redesign: PCMH on structure and CBD on process. Both domains should be addressed in practice reform. Both metrics are works in progress. (J Am Board Fam Med 2012;25:216–223.)

**Keywords:** Delivery of Health Care, Health Care Team, Health Care Reform, Primary Health Care

Renovation of primary care is a foundation for health care system reform to achieve lower cost

along with improved quality and experience of care. The 1967 description of the pediatric medical home<sup>1</sup> foreshadowed recognition of the need for enhanced primary care. The declaration of Alma Ata's 1978 recognition of primary care as "an integral part . . . of the country's health care system, of which it is the central function and main focus . . . (and) constitutes the first element of a continuing health care process,"<sup>2</sup> was also important, as was the Institute for Health Care Improvement's project on idealized design of the office practice.<sup>3</sup> Dis-

This article was externally peer reviewed.

Submitted 2 May 2011; revised 3 December 2011; accepted 12 December 2011.

From the Department of Family and Preventive Medicine (MJE, DLS, MKM) and the David Eccles School of Business Department of Marketing (DLS), University of Utah, Salt Lake City; the University of Utah Health Sciences Center Community Clinics, Salt Lake City (JD, MKM); Intermountain Healthcare, Salt Lake City, UT (YL); and ARUP Laboratories, Salt Lake City, UT (AW).

**Funding:** Funding was provided in part by the University of Utah Department of Family and Preventive Medicine Health Studies Fund F. Marian Bishop award (MJE, MKM, JD); the University of Utah Community Clinics (MKM, JD); and the David Eccles School of Business Center for Business and Healthcare (DLS). Mr. Wilson and Ms. Li provided their services as a practicum for their MStat degrees and received no additional funding.

**Conflict of interest:** The University of Utah Community Clinics owns the trademark of Care by Design.

**Corresponding author:** Marlene J. Egger, PhD, Department of Family and Preventive Medicine, University of Utah, 375 Chipeta Way, Suite A, Salt Lake City, UT 84108 (E-mail: marlene.egger@hsc.utah.edu).

cussions within the family of Family Medicine, such as the Keystone conferences of 1984, 1988, and 2000 and the Future of Family Medicine project,<sup>4–6</sup> further nurtured reform and led major primary care organizations, including the American Academy of Family Physicians (AAFP), to articulate the Joint Principles of the Patient-Centered Medical Home (PCMH; Joint Principles) in 2007.<sup>7</sup> The Joint Principles, in turn, led to criteria for the recognition of practices as PCMHs, developed by the National Committee for Quality Assurance (NCQA).<sup>8</sup>

In a growing environment of quality improvement initiatives and consumerism, Starfield<sup>9</sup> articulated the “4 pillars of primary care” as access to first-contact care; longitudinal continuity of care, comprehensiveness of care, and coordination across other parts of the health care system. Crabtree et al<sup>10,11</sup> and Miller et al<sup>12</sup> provided rich descriptions of what happens in a family practice, with a view toward how change might be accomplished. Spurred by development of the AAFP’s New Model of Family Medicine<sup>6</sup> and heralded by the Institute of Medicine’s Quality Chasm report,<sup>13</sup> the 21st century saw a variety of stakeholders articulate consensus principles of a PCMH, which included the 4 pillars mentioned earlier as well as a team-oriented approach led by the personal physician, whose added value was appropriately recognized by reimbursement reform.<sup>7</sup> The most common metric to identify practices implementing PCMH principles is tiered recognition as an NCQA PCMH.<sup>14</sup>

During the past decade, multiple large- and small-scale family practices have initiated efforts to deliver more fully a medical home that focuses on quality, the patient experience, and taking the family physician “off the hamster wheel”<sup>6</sup>; among these efforts is the National Demonstration Project facilitated by TransforMED, a for-profit subsidiary of the AAFP.<sup>15–20</sup> Many of these efforts, including the National Demonstration Project, began before PCMH consensus activities, participated in the conversation that developed the Joint Principles and NCQA PCMH criteria (eg, Geisinger and Group Health), pointed out their shortcomings,<sup>21</sup> and expanded as they deemed appropriate along with the PCMH. Many such transformed practices were able to document reduced system-level costs and improved outcomes.<sup>18,19,22</sup> Nevertheless, implementation of PCMH principles is a lengthy and complex process.<sup>23</sup> Uptake of PCMH processes has

been estimated to be 35% in large medical groups and 20% in small to medium-size practices.<sup>24,25</sup> Furthermore, the components of local strategies toward practice redesign may not correspond to criteria for recognition as an NCQA PCMH.

The University of Utah Health Care Community Clinics (CCs) have developed and initiated a series of research-informed, self-funded phases of practice redesign under the name Care by Design<sup>™</sup> (CBD).<sup>20</sup> CBD utilizes organizing principles of appropriate access, care teams (CTs) incorporating the efforts of advanced practice medical assistants, and planned care supported by a robust, augmented electronic medical record (EpicCare, Epic, Verona, WI).<sup>26,27</sup> Building on a successful financial turnaround,<sup>28</sup> the CCs began developing CBD in 2003. They initiated appropriate access first, followed by implementation of the CT and then planned care. The Joint Principles provided opportunities for further fine tuning. The CCs have documented improvement in quality measures during the time frames of this effort<sup>29</sup> and have held a series of “learning days” to share this model with others.<sup>30</sup>

The quality manager, the authors, and the CC leadership developed a metric of the extent of implementation of CBD. This article is not a comprehensive evaluation of CBD, which continues to evolve, nor is it a PCMH implementation study. The purpose of the article is to consider, at a single interval in time, the CBD model and its extent of use metric compared with the principles of the PCMH as an example of the correspondences and differences between practice redesign viewed from one local level, represented by the elements of CBD, versus the national level, represented by our interpretation of 2008 PPC-PCMH<sup>™</sup>.

## Methods

### Setting

This was an observational study of all 10 University of Utah Health Science Center CCs which provided primary care during 2008 to 2009, as they continued to implement phases of the research-informed practice redesign of CBD and contemplated application for recognition as an NCQA PCMH. The study was approved by the University of Utah Institutional Review Board and the Utah Health Research Network, the PBRN affiliated with the CCs. Clinic sites were urban and rural, small and medium-sized, in an east to west band in

northern Utah, approximately centered around Salt Lake City. Two were urban faculty practice/residency clinics. The CCs quality office and clinic managers assessed all nonlearner primary care providers, including physicians, nurse practitioners, and physician assistants (1–11 providers per clinic; N = 56) to measure their extent of use of CBD (26 items, objectively scored) in Summer 2008. To ensure interrater reliability, observers were trained using a set of scenarios until each observer reached 80% agreement with the quality manager. Also in the 2008 to 2009 time frame, the CCs performed a clinic-level self-evaluation based upon the 2008 PPC-PCMH<sup>TM</sup>.

### **Care by Design and the CBD Care Team**

During the time of this study, appropriate access and the CT had been fully rolled out in all clinics, and planned care was being initiated. Appropriate access offered same-day access for acute care coupled with prescheduled visits for chronic care, balancing immediately desired care with continuity with the personal physician for chronic care and shared decision making. Planned care involved pre-visit planning with laboratory testing completed before visits when possible, the use of chronic disease registries, electronic medical record (EMR) reminders for health maintenance, and order sets to support chronic care protocols. Patients were provided printed after-visit summaries of the results and decisions made during the visit as well as follow-up instructions. The CBD CT ideally included 5 medical assistants and 2 physicians acting as a team, with some adaptations based on the context of each clinic. In a model clinic, the reception desk was eliminated entirely and advanced-practice medical assistants (MAs) on the team rotated in greeting the next patient and providing a continuous presence until the patient left the clinic. The MA checked in the patient, including obtaining payment information and rooming the patient; opened the EMR; reviewed medications; completed templated symptom- or diagnosis-based questionnaires; and identified any best practice alerts (eg, an overdue colonoscopy). The MA then invited the physician into the visit and stayed at the computer as a scribe, facilitating the physician's ability to focus fully on the patient. Advanced-practice MAs performed laboratory and other technical work or accompanied the patient to receive these services, gave the patient the after-visit sum-

mary, arranged for referrals, and escorted the patient out at the conclusion of the visit. This strategy was based on "lean" principles,<sup>31</sup> eliminating waste and enhancing visit efficiency.<sup>32</sup>

### **Data Analysis**

The principles of CBD and the PCMH were compared conceptually and the respective metrics were compared item by item. The items of each metric operate at various levels, such as the physician level, clinic level, or system wide. Many of the NCQA PCMH metrics were at the system level. Many CBD metrics focus on provider implementation of day-to-day processes such as those involved in CBD CTs. Therefore, we asked (1) whether metrics are correlated at the clinic level, and (2) whether higher provider-level CBD scores may be anticipated in clinics that ranked higher on the PCMH self-evaluation. For simplicity, we conducted Spearman correlations at the clinic and provider levels, setting the criterion for statistical significance at 5%. In the CBD metric, 14 of the 26 items describe the function of CTs, so correlations were also calculated for these items (CBD CTs) versus the PCMH metrics.

## **Results**

### **Conceptual Comparison of CBD and PCMH**

#### **Principles**

At the conceptual level, CBD and the Joint Principles correspond well. CBD includes 3 organizing principles and supportive infrastructure, including (1) appropriate access, balancing same-day care and continuity with a personal physician; (2) CTs, with advanced-practice MAs in an efficient, patient-centered visit; and (3) planned care, including chronic disease and preventive care registries and pre-visit planning; together with a robust, augmented EMR that includes clinical reminders and order sets, ongoing clinical quality improvement coordinated and facilitated by the CC's quality office, and long-term physician-patient relationships that include joint decision making and patient self-management support. The Joint Principles include an ongoing relationship with a personal physician; a physician-directed medical practice; whole-person orientation in the continuum of care; care that is coordinated, integrated, and facilitated by information technology; quality and safety of care; enhanced

access; and payment that recognizes added value to patients.

Thus, common themes include a continuous physician–patient relationship; appropriate access; use of an augmented EMR; quality, coordination, and planned care; and self-management support. Although the PCMH intends reimbursement reform, added-value reimbursement was not available to the CCs during the time of this study. Instead, the emphasis was on using to the fullest the skills of each team member, increasing the physician’s continuity and face time with the patient, eliminating waste, and building capacity for appropriate access. In addition, the intention of the PCMH includes coordination by the personal physician across levels of the health care system. Although the CCs had a robust EMR at the time of this study, the university hospital and its specialty clinics operated using a different EMR, so full system coordination was anticipated but not fully available at the time of this study.

Despite the conceptual overlap between CBD and the PCMH, Table 1 shows that there is little item-by-item overlap in metrics. The 2008 PPC-PCMH<sup>™</sup> survey elements were organized in 9 areas: access and communication; patient tracking and registry functions; care management; patient self-management support; electronic prescribing; test tracking and followup, and an electronic system for managing referrals; referral tracking for critical referrals; performance reporting and improvement; and advanced electronic communication. They emphasized the content of policy documents; the capacity to coordinate, integrate, and facilitate care; and fields populated in the EMR, leaving the specific strategies to achieve these up to each practice. Complementary to the PCMH metric, the CBD metric emphasized day-to-day processes of clinical care rather than policies. Five appropriate access items addressed phone access, same day appointments, and continuity visits. Fourteen items described standardized procedures and functions of the CT, including real-time electronic communication, team huddles, and the role of the advanced-practice MA. Seven items addressed planned care, although not all of these had been implemented at the time of this analysis. Table 1 shows that CBD articulated more specifically its requirements for appropriate access and CTs than did the PCMH metric, although most items of planned care were similar to those in PCMH.

### Correlation Among CBD and PCMH Metrics

The CCs’ PCMH self-study in this time frame was not correlated with CBD scores of providers within each clinic ( $P > .05$ ). Table 2 shows that the CCs’ average value based on its PCMH self-evaluation was 64 (out of 100) for faculty practices and 62 for the other 8 clinics. The average extent of use of CBD, as assessed by the complete set of items, was 1.71 on a 0- to 4-point scale (43% uptake) for faculty practices, and 1.78 (45% uptake) for other clinics. The items that measured CTs had the highest uptake, with 55% in faculty practices and 58% in other clinics. Scores for residents were not measured. Clinics with higher values on the PCMH metric tended to have slightly higher scores on the CT component of CBD ( $\rho = 0.146$ ;  $P > .05$ ), but there was not significant correlation between overall CBD and PCMH measurements ( $\rho = 0.025$ ;  $P > .05$ ). Figure 1A shows that this trend was stronger in the nonfaculty practices ( $\rho = 0.391$ ;  $P > .05$ ). The identical trend was observed for the CT component of CBD versus PCMH in nonfaculty practices ( $\rho = 0.391$ ,  $P > .05$ ).

Figure 1B is similar to A but includes a data point for every provider in the study, with individual faculty practices marked. Figure 1B shows considerable within-clinic variability.

### Discussion

Practice redesign is a process, not an event. It may be facilitated by periodic measurement of the changes that have occurred to date. This study compared CBD and PCMH metrics as measurements of change in a university-based network of family medicine clinics. There was an overall 44% uptake of CBD and 62% uptake of self-evaluated PCMH criteria compared with 20% in small to moderate-sized practices nationally.<sup>25</sup> Although we found that CBD and PCMH principles overlap conceptually, clinic-level extent of use of CBD or CTs had low correlation with clinic-level PCMH values. The lack of correlation may reflect our finding that the specific criteria in each metric addressed different aspects of redesign. In the sense of Donabedian’s<sup>33</sup> structure, process, and outcomes, the CBD and CT items focused more on the domain of day-to-day processes affected by the redesign, whereas the 2008 PPC-PCMH<sup>™</sup> metric items focused more on the domain of structure.

Considering extent of use of CBD as a measure of adoption<sup>34</sup> at discrete points in time pointed to



**Table 1. Comparison of Care by Design (CBD) and Patient-Centered Medical Home (PCMH) Metrics**

CBD Elements (June 2009)		Related 2008 PPC-PCMH <sup>SM</sup> Elements
<b>Appropriate Access (AA)</b>		
AA1	To acute care (ie, clinical need or patient request) by same-day appointment	Same-day capacity
AA2	To the provider for continuity of care	Continuity of care
AA4	Attention to call center messages (in-basket messages generated by call center to first contact to patient)	Timely telephone advice during office hours
AA5a	Getting through to the office by phone for an appointment (dropped calls)	
AA5b	Getting through to the office by phone for an appointment (TSF)	
<b>Care Team (CT)</b>		
CT1a	Standardized documentation: X files	Standardized narrative progress notes
CT1b	Standardized documentation: physical template	Standardized narrative progress notes
CT1c	Standardized documentation: best practice alerts	Recommended preventive screenings—by age Recommended risk screening—by age
CT2	MAs in rotation for rooming patient	
CT4	Standardized stocking for exam rooms	
CT5	Use of technology supports real-time communication by all team members and with patient during the visit	
CT6	Patient never left alone, unless part of patient care	
CT7a	Throughput: efficient check-in (patient waits ≤5 min from entering clinic to rooming)	
CT7b	Throughput: efficient visit (patient waits ≤10 min during visit)	
CT9	Huddles and schedule reviews (most days = 3 to 4 days; most providers and MAs miss no more than 1 of each)	
CT10	Referrals made at time of appointment, or detailed instructions with phone number in after-visit summary	
CT11	Lab draws done in room	
CT12	Continuity of MA with patient throughout the visit	
CT13	MA engagement in the visit (required elements: uses x-files, addresses Best Practice Alerts, documents physical exam, places orders, gives After-Visit Summary to patient, makes follow up appointment)	Complete standing orders for medication refills, tests, delivery of preventive care
<b>Planned Care (PC)</b>		
PC1	Use of registries for chronic care and preventive services	Previsit planning  Clinician review or action Preventive care reminders Reminders for specific tests Reminders for follow-up visits (ie, chronic conditions) Care management support
PC2	Labs done prior to the visit	Previsit planning with clinician reminders
PC3	Documentation that after-visit summary was given to patient	Previsit planning with clinician reminders Condition management education to patients/families  Individualized care plans in writing

*Continued*

**Table 1. Continued**

CBD Elements (June 2009)		Related 2008 PPC-PCMH <sup>®</sup> Elements
PC4	Motivational interviewing and goal setting for self-management	Provide written care plan to patient/family
		Individualized treatment goals in writing
PC5	Medication reconciliation	Assess patient/family preference, readiness to change, and self-management abilities
		Patient/family self-care confidence
PC6	Emergency room/hospitalization records available at time of visit	Review medication lists with patients
PC7	Procedure/consult notes available at time of visit (mammography, colonoscopy, endoscopy, cardiology)	Review outside facility information to identify special outreach or at risk

MA, medical assistant.

opportunities to improve adoption and to consider situations in which flexibility was more important than exact fidelity to the model. For example, faculty/residency clinics tend to have learning processes, academic requirements, provider attitudes, turnover, and other special issues that may make them less comparable with other clinics. Policies may be more clearly spelled out, but faculty and residents tend to have part-time practices, creating challenges for access and continuity. Although CCs' faculty practices had a slightly higher average uptake of PCMH items than other clinics, they had slightly lower uptake of CBD items, possibly reflecting the challenges of team models when providers are part time. Correlation of CBD and CT metrics with the PCMH self-evaluation values increased slightly when faculty practices were excluded.

Jaen et al<sup>35</sup> described methods to evaluate practice transformation in the context of the National Demonstration Project. Our article underscores

the necessity for metrics of the local practice strategy, such as CBD, in addition to national metrics of the larger practice redesign, such as PCMH. However, this is a dynamic process. Both CBD and the PCMH metrics continue to change. CBD now includes care managers, a patient web portal to our EMR, support for patient self-care, and other enhancements. Criteria for NCQA PCMH recognition has changed and a new 2011 survey has been released. Thus, the present study represents a comparison, in a snapshot of time, of criteria for a local strategy for practice redesign and a national practice redesign platform. In this snapshot, the mechanisms of both have been articulated and their uptake measured, which will facilitate mapping them to intermediate and patient-oriented outcomes.<sup>36</sup> The comparison can also inform efforts to continue to transform practice by helping to clarify the differences and similarities between measures of structure, process, and outcomes in transforma-

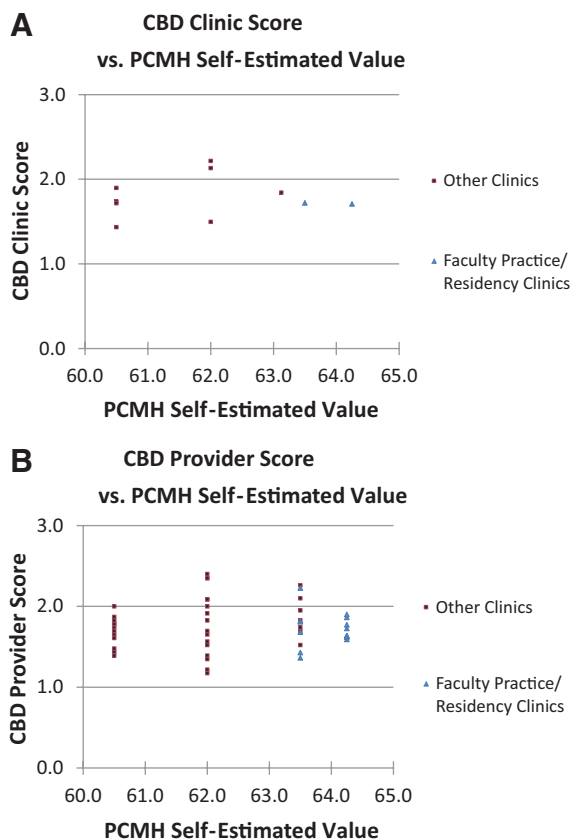
**Table 2. Scores on Care by Design and Self-Evaluated Patient-Centered Medical Home (PCMH) Metrics**

Metric (Possible Range)	Score (mean ± SD)			Average Uptake (%)	
	Faculty Practice/Residency Clinics*	Other Clinics <sup>†</sup>	All Clinics	Faculty Practice/Residency Clinics	Other Clinics
PCMH (0–100)	63.93 ± 0.38	61.76 ± 1.09	62.5 ± 1.38	64	62
Care by Design (0–4)	1.71 ± 0.01	1.78 ± 0.25	1.76 ± 0.21	43	45
Appropriate access (0–4)	1.17 ± 0.11	1.32 ± 0.24	1.27 ± 0.21	29	33
Care teams (0–4)	2.21 ± 0.14	2.3 ± 0.27	2.27 ± 0.23	55	58
Planned care (0–4)	0.57 ± 0.38	0.43 ± 0.25	0.48 ± 0.3	14	11

\*n = 2 clinics totaling 19 providers.

<sup>†</sup>n = 8 clinics totaling 37 providers.

**Figure 1. A: Comparison of clinic-level Care by Design (CBD) scores versus patient-centered medical home (PCMH) self-estimated values. B: Comparison of provider-level CBD scores versus PCMH self-estimated values.**



tion efforts. All will be needed for successful reinvigoration of primary care.

**Conclusions and Next Steps**

Primary care practice redesign is proceeding rapidly. There is a need to measure carefully each aspect of this process. The conceptual correlation of an example of a local strategy, CBD, with a national redesign platform, PCMH, is substantial; the quantitative correlation is low. This may be because CBD focuses on day-to-day processes of care, whereas PCMH emphasizes structure. Measures of both structure and process may be necessary to articulate and measure the specific features of practice redesign so that mechanisms of transformation can be connected to intermediate and patient-oriented outcomes. A full mixed-methods evaluation of the process of implementation of CBD and its effects on intermediate outcomes,

clinical quality, satisfaction, and cost of care is now underway.

We acknowledge the assistance of Annie Mervis in metric development and data acquisition and Ken Gondor in data acquisition.

**References**

1. Sia C, Tonniges TF, Osterhus E, Taba S. History of the medical home concept. *Pediatrics* 2004;113(5 Suppl):1473–8.
2. World Health Organization. Declaration of Alma-Ata. International Conference on Primary Health Care; September 6–12, 1978. Alma-Ata, USSR, page 1–2. Available at: [http://www.who.int/hpr/NPH/docs/declaration\\_almaata.pdf](http://www.who.int/hpr/NPH/docs/declaration_almaata.pdf). Accessed November 27, 2011.
3. Institute for Healthcare Improvement. Idealized design of clinical office practices. 2011. Available at <http://www.ihl.org/offering/Initiatives/PastStrategicInitiatives/IDCOP/Pages/Methodology.aspx>. Accessed December 3, 2011.
4. Stephens GG. Advanced forum in family medicine. *Fam Med* 1985;17:184.
5. Green L, Graham R, Frey J, Stephens G, eds. Keystone III. The role of family practice in a changing health care environment: a dialogue. Washington DC: American Academy of Family Physicians; 2001.
6. Martin JC. The future of family medicine: a collaborative project of the family medicine community. *Ann Fam Med* 2004;2(Suppl 1):S3–S32.
7. American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, American Osteopathic Association. Joint principles of the patient-centered medical home. March 2007. Available at [http://www.aafp.org/online/etc/medialib/aafp\\_org/documents/policy/fed/jointprinciplespcmh0207.Par.0001.File.dat/022107medicalhome.pdf](http://www.aafp.org/online/etc/medialib/aafp_org/documents/policy/fed/jointprinciplespcmh0207.Par.0001.File.dat/022107medicalhome.pdf). Accessed January 30, 2012.
8. National Committee for Quality Assurance. Standards and Guidelines for Physician Practice Connections®–Patient-Centered Medical Home (PPC-PCMH™), (C) 2008 by the National Committee for Quality Assurance (NCQA). [www.ncqa.org](http://www.ncqa.org). Accessed February 13, 2012.
9. Starfield B. Is primary care essential? *Lancet* 1994; 344:1129–33.
10. Crabtree BF, Miller WL, Stange KC. Understanding practice from the ground up. *J Fam Pract* 2001; 50:881–7.
11. Crabtree BF, Miller WL, Aita VA, Flocke SA, Stange KC. Primary care practice organization and preventive services delivery: a qualitative analysis. *J Fam Pract* 1998;46:403–9.
12. Miller WL, McDaniel RR Jr, Crabtree BF, Stange KC. Practice jazz: understanding in family practices using complexity science. *J Fam Pract* 2001;50:872–8.
13. Institute of Medicine. Crossing the quality chasm: a

- new health system for the 21st century. Washington DC: National Academy Press; 2000.
14. National Committee for Quality Assurance. Planned evolution of PCC-PCMH<sup>®</sup> requirements. 2009. Available at <http://www.ncqa.org>. Accessed September 1, 2009.
  15. 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(Suppl 1):S80–90, S92.
  16. Reid A, Baxley E, Stanek M, Newton W. Practice transformation in teaching settings: lessons from the I(3) PCMH collaborative. *Fam Med* 2011;43:487–94.
  17. Reid RJ, Coleman K, Johnson EA, et al. The group health medical home at year two: cost savings, higher patient satisfaction, and less burnout for providers. *Health Aff (Millwood)* 2010;29:835–43.
  18. Pandhi N, Devoe JE, Schumacher JR, et al. Preventive service gains from first contact access in the primary care home. *J Am Board Fam Med* 2011;24:351–9.
  19. Grumbach K, Bodenheimer T, Grundy P. The outcomes of implementing patient-centered medical home interventions: a review of the evidence from recent prospective studies in the United States. Updated November 16, 2010. Available at [http://www.pcpcc.net/files/evidence\\_outcomes\\_in\\_pcmh.pdf](http://www.pcpcc.net/files/evidence_outcomes_in_pcmh.pdf). Accessed January 23, 2012.
  20. Day J. Results of 5 years' progress implementing and teaching PCMH: University of Utah's "Care by Design." Paper presented at: Conference on Practice Improvement: Constructing the Medical Home; November 5–8, 2009; Kansas City, MO.
  21. Kuzel AJ, Skoch EM. Achieving a patient-centered medical home as determined by the NCQA—at what cost, and to what purpose? *Ann Fam Med* 2009;7:85–6.
  22. Jaen CR, Ferrer RL, Miller WL, et al. Patient outcomes at 26 months in the patient-centered medical home National Demonstration Project. *Ann Fam Med* 2010;8(Suppl 1):S57–67, S92.
  23. Nutting PA, Crabtree BF, Miller WL, Stange KC, Stewart E, Jaen C. Transforming physician practices to patient-centered medical homes: lessons from the national demonstration project. *Health Aff (Millwood)* 2011;30:439–45.
  24. Rittenhouse DR, Casalino LP, Gillies RR, Shortell SM, Lau B. Measuring the medical home infrastructure in large medical groups. *Health Aff (Millwood)* 2008;27:1246–58.
  25. 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;30:1575–84.
  26. Bodenheimer T. Building teams in primary care: 15 case studies. 2007. Available at <http://www.chcf.org/publications/2007/07/building-teams-in-primary-care-lessons-from-15-case-studies.pdf>. Accessed January 30, 2012.
  27. Blash L, Dower C, S. C. University of Utah Community Clinics—Medical Assistant Teams Enhance Patient-Centered, Physician-Efficient Care 2011. Available at [http://www.futurehealth.ucsf.edu/Content/11660/2011\\_04\\_University\\_of\\_Utah\\_Community\\_Clinics-Medical\\_Assistant\\_Teams\\_Enhance\\_Patient-Centered\\_Physician-Efficient%20Care.pdf](http://www.futurehealth.ucsf.edu/Content/11660/2011_04_University_of_Utah_Community_Clinics-Medical_Assistant_Teams_Enhance_Patient-Centered_Physician-Efficient%20Care.pdf). Accessed December 5, 2011.
  28. Magill MK, Lloyd RL, Palmer D, Terry SA. Successful turnaround of a university-owned, community-based, multidisciplinary practice network. *Ann Fam Med* 2006;4(Suppl 1):S12–8, discussion S58–60.
  29. Palmer D. Care models: physician productivity declining due to work/life balance issues. Presented at: the American Medical Group Association Annual Conference, Chief Administrative Offices/Chief Operating Officers Council Meeting, March 1, 2009, Las Vegas, NV.
  30. Magill MK, Lloyd R, Terry S, et al. Care team model learning day. Park City: Community Clinics Care Team Model; 2006.
  31. Endsley S, Magill M, Godfrey MM. Creating a lean practice. *Fam Pract Manag* 2006;13:34–48.
  32. Palmer D. It's about time: the patient centered, physician efficient visit. Paper presented at: American Medical Group Association's Annual Conference, Learning From the Best, March 10–13, 2005, Los Angeles, CA.
  33. Donabedian A. Evaluating the quality of medical care. *Milbank Mem Fund Q* 1966;44:166–203.
  34. Rogers EM. Diffusion of innovations. 5th ed. New York: Free Press; 2003.
  35. Jaen CR, Crabtree BF, Palmer RF, et al. Methods for evaluating practice change toward a patient-centered medical home. *Ann Fam Med* 2010;8(Suppl 1):S9–20, S92.
  36. Mold J. Measuring primary care transformation. North American Primary Care Research Group Annual Meeting, November 12–16, 2011, Banff, Alberta, Canada.