



Findings From the AHRQ Transforming Primary Care Grant Initiative: A Synthesis Report

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Executive Summary

In 2010, the Agency for Healthcare Research and Quality awarded 14 Transforming Primary Care Practice (TPC) grants to conduct retrospective evaluations of successfully implemented or ongoing patient-centered medical home (PCMH) transformation efforts in primary care settings. The transformation efforts studied by the TPC grants varied considerably in terms of the size, type, and number of primary care practices included; the types of changes implemented by the practices; and the processes used to effect PCMH transformation. Because of these differences, the ways in which the transformations were evaluated also varied considerably. Our team reviewed the final TPC grant reports, as well as published manuscripts that resulted from these grants, and conducted interviews with TPC investigators to collect information about the outcomes of the transformation efforts and lessons learned.

We identified the following key themes across the grants.

Transformation is an ongoing process, and does not end with PCMH recognition. Primary care transformation is a process that practices or health systems choose to engage in, rather than an endpoint or final goal to be achieved. Attaining recognition as a PCMH can be a useful marker of progress and can help motivate transformation efforts, but recognition itself does not necessarily signify the end of this process or indicate that a practice is fully transformed.

Motivation and readiness to transform vary across practices. The desire to improve patient care was a lead motivator for transformation. However, a number of other motivations were reported, including a desire to be involved in cutting-edge health care changes and financial incentives. Even when strong financial incentives for transformation were offered, however, not all practices were ready to engage in practice transformation.

Changes in practice culture and mental models are often required. For some practices, transformation into a PCMH built upon years of previous practice improvement or fit within the existing ethic for providing care. For these practices, embracing the changes necessary to become a PCMH was a relatively easy process. For other practices, however, these changes required a dramatic shift in existing mental models about primary care and in overall practice culture.

Contextual factors play an important role in the success of transformation efforts. The following contextual factors were identified as particularly important for primary care transformation efforts:

- **Leadership and communication:** Having strong and stable leadership that was committed to the goals of primary care transformation was identified by multiple grantees as vital to the success of transformation efforts. Effective communication among all levels within an institution was also found to facilitate transformation efforts.
- **Practice size:** Small, independent practices were disproportionately affected by the costs and time required for PCMH implementation because they did not have the resources and

infrastructure that are available to larger practices and that help offset the costs of practice change.

- **Electronic health records:** Having strong existing infrastructure, especially electronic health records (EHR), was important for successful primary care transformation. However, the capabilities of the existing EHR systems varied widely across practices studied by the TPC grants. Many of the practices that did have an EHR in place were not set up to do data extraction for quality improvement purposes.
- **Competing priorities:** PCMH transformation was only one of multiple initiatives going on at any one time at many institutions. Multiple initiatives competed for the limited time and attention of busy clinicians and administrators.

Care coordination and team-based care are key elements of transformation. Care coordination and team-based care were identified as key elements of successful primary care transformation by multiple grantees, and were found to be related to improved health outcomes as well as improved patient and provider satisfaction.

Practice transformation involves inherent tradeoffs. Transformation efforts aimed at implementing one aspect of the PCMH often involved a tradeoff with another aspect of care. These tradeoffs highlight the complex nature of PCMH transformation and the importance of weighing and evaluating the effect of system changes on diverse outcomes, including the patient and provider experience.

Transformation requires supplemental funding, and sustainability will require payment reform. Implementing PCMH transformation requires a significant investment of both time and money from practices; therefore, most practices need supplemental funding to help support transformation efforts. Fee-for-service reimbursement strategies do not cover PCMH-related costs, such as an expanded health care team and services. Traditional payment systems that reward quantity rather than quality of health services may compromise a practice's ability to sustain a PCMH over time.

Our team also described key outcomes of the primary care transformation efforts across the studies, which fell into the following categories.

Access: Two studies found that patient access improved after PCMH transformation. Results from three studies suggest that patients welcomed and valued the enhanced access offered through online systems, including secure email messaging with clinicians and patient portals for viewing laboratory results and other information. The relationship between access and utilization or outcomes, however, was mixed.

Quality: Studies found that PCMH implementation increased continuity as well as comprehensiveness of care. Additionally, two studies linked increased care coordination and teamwork to improvements in clinical quality, and another study found that PCMH implementation was associated with improved overall quality of care scores.

Health outcomes: Five of the TPC studies examined whether the PCMH model fulfilled its promise for improving chronic disease management by measuring the impact of PCMH

transformation on two of the most common chronic diseases encountered in primary care, diabetes and cardiovascular disease. Several of the studies linked improvements in clinical measures to specific PCMH processes such as care management, team-based care, and monitoring and outreach.

Utilization: Several studies provided evidence suggesting that PCMH transformation can lead to reductions in health care utilization. The evidence was strongest for reductions in emergency care and primary care services, though studies also found some evidence of reduced hospitalization. Factors that contribute to utilization trends, such as the extent of PCMH transformation and differences in patient morbidity, were also noted.

Cost: Evidence from three studies suggests that improvements in continuity of care, teamwork, and other changes implemented as part of PCMH transformation can help lower the costs of care.

Provider and patient satisfaction: Overall, investigators found that PCMH transformation was associated with improved satisfaction scores for both patients and providers and with lower rates of clinician burnout.

The findings and lessons learned from the TPC grants may be useful for practices and health care systems that are considering primary care transformation. Additionally, funding agencies, policymakers, and payers can use the information from this report to help guide payment and policy changes to effectively support ongoing primary care transformation efforts.

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Introduction

The patient-centered medical home (PCMH) (also referred to as primary care medical home, medical home, health care home, or advanced primary care) is a model for redesigning primary care in the United States to improve health care quality, reduce costs, and better address the needs of patients and families. In recent years, numerous health care systems and medical groups across the country have worked to transform their primary care practices into PCMHs. Although a number of definitions exist, efforts to transform into a PCMH go beyond quality improvement, and generally aim to transform both the organization and the delivery of primary care. The Agency for Healthcare Research and Quality (AHRQ) defines a PCMH as having the following five attributes: 1) comprehensive care, 2) patient-centered care, 3) coordinated care, 4) accessible services, and 5) quality and safety, and recognition of the central role of health information technology (IT) in successfully operationalizing and implementing the key features of the medical home. Additional information about how AHRQ defines these attributes is available at: <http://pcmh.ahrq.gov/page/defining-pcmh>.

In 2010, AHRQ awarded 14 Transforming Primary Care Practice (TPC) grants to examine the processes, determinants, and impacts of primary care transformation. These studies were all retrospective evaluations of successfully implemented or ongoing PCMH transformation efforts. The 14 studies varied considerably in terms of the size, type, and number of primary care practices studied, as well as their geographic location. At least in part because of the variation, the way in which transformation was implemented across these practices also differed greatly, as did the evaluation of each of these efforts. Consequently, it would not have been feasible to identify which methods of implementation were most effective by comparing across projects. However, a review of the findings and lessons learned across the 14 studies revealed a number of common themes that can be helpful for future primary care transformation efforts.

McNellis and colleagues began summarizing the common themes across the grants at the end of funding in a paper titled “Lessons learned from the study of primary care transformation.”¹ The paper highlighted the following five key lessons learned: 1) a strong foundation is needed for successful redesign; 2) the process of transformation can be a long and difficult journey; 3) approaches to transformation vary; 4) visionary leadership and a supportive culture ease the way for change; and 5) contextual factors are inextricably linked to outcomes. In this report, we build upon McNellis’ effort to synthesize key findings across grants, adding additional insights from findings included in the studies’ final reports as well as from manuscripts that have been published based on these grants (a full list of papers published by the TPC investigators as of January 1, 2015 is available at: www.ahrq.gov/professionals/systems/primary-care/tpc/tpcbib.html).

AHRQ PCMH Model

AHRQ defines a PCMH as having the following five attributes:

1. Comprehensive care
2. Patient-centered care
3. Coordinated care
4. Accessible services
5. Quality and safety

Methods

Final grant reports were collected when available, along with published manuscripts from each grant. In addition, we conducted telephone interviews with each principal investigator (PI) in December 2014. Some PIs chose to invite additional members of their research teams to join the calls. Interviews focused on clarifying information about the primary care transformation initiative that was studied; how successful the initiative was and what, if any, impacts were measured; challenges to practice change that were identified; key motivators for participation; and key lessons learned. Interviews were recorded and transcribed.

These materials were used to identify similarities and differences across the TPC studies in regards to the size and type of practices studied, approaches to transformation studied, the methods used to study the transformation efforts, the outcomes of practice changes that were observed, and key lessons learned. A conventional content analysis approach was used to identify themes across grants as reported.

Overview of the 14 Transforming Primary Care Grants

As mentioned previously, the 14 TPC grants varied widely in terms of the size, type, number, and geographic location of the practices included in the studies. For example, one study examined PCMH transformation efforts across a single integrated health care system located in the Pacific Northwest,² another looked at the 76 practices that participated in a statewide quality improvement initiative in North Carolina,³ while a third study investigated the PCMH transformation efforts of 249 small practices across the country that had achieved PCMH recognition by the National Committee for Quality Assurance (NCQA).⁴ The number of practices evaluated by each study ranged from five to 2,432, and the types of practices ran the gamut, including Federally Qualified Health Centers and Community Health Centers; large, multisite health systems; small, independent group practices; and solo practices. **Appendix A** provides details on key characteristics of each study, and short profiles of each study are available at www.ahrq.gov/professionals/systems/primary-care/tpc/tpcprofiles.html.

Approaches to Transformation

The practice transformation efforts studied by the TPC investigators also differed in terms of the types of changes they made toward becoming a PCMH and the processes they used to implement these changes.

We collected information about what types of changes were implemented by the practices being studied and mapped these to the five PCMH attributes, as defined by AHRQ (i.e., comprehensive care, patient-centered care, coordinated care, accessible services, and quality and safety), as well as health IT. Overall, we found that almost all of the practices implemented changes related to at least four of the five PCMH attributes. Only one of the 14 studies reported that practices implemented changes to fewer than four of the five attributes, and only three studies did not report efforts to improve health IT. More specifically, we found the following:

- The practices studied by all 14 grants reported practice changes aimed at improving **quality and safety**, including implementing evidence-based medicine and clinical decision-support tools, engaging in performance measurement and quality improvement, measuring and responding to patient experiences and patient satisfaction, and practicing population health management.
- Thirteen of the grants reported that practices engaged in practice changes related to providing **coordinated care**, including coordinating care across health care settings (e.g., specialty care, hospitals, emergency and urgent care, behavioral health care services, case management, pharmacy, and home health care), providing extra services to assist with transitions between care settings, and coordination with community services and support services.
- Practices studied by 12 of the grants made efforts to provide more **comprehensive care**, including implementing team-based care models (including shifting tasks from physicians and nurses to medical assistants (MAs) or other clinic staff); providing

chronic, acute, and preventive care services to patients; and integrating behavioral health services into primary care.

- Eleven studies reported efforts by practices to provide more **accessible services**, including offering same-day visits or shorter waiting times for urgent needs; additional in-person hours or evening appointments; secure messaging or email and telephone visits; online patient services; group visits; and redistributing physician panel sizes.
- A different subset of 11 studies reported efforts to provide more **patient-centered care**, including a focus on the whole person and considering contextual issues that can affect health; self-management support and self-care support; shared decisionmaking; and involving the family in care and care planning.
- Finally, yet another subset of 11 studies reported enhancements to **health IT**, including implementing or improving an electronic health record (EHR) system, health registries, a patient portal, electronic orders and e-prescribing, and health information exchanges.

In addition, some of the practices studied made efforts to improve continuity of care, where a patient is seen by the same clinicians at each visit.

A variety of processes were used by practices to implement continuous quality improvement as a part of practice change efforts. For example, five of the TPC grants reported that the primary care transformation efforts they studied used learning collaboratives. In these learning collaboratives, teams from multiple practices met together as a group to learn from each other and work on quality improvement activities. Practices also used plan-do-study-act (or plan-do-check-act) cycles for quality improvement efforts. Four grants reported the use of practice facilitation, where an outside expert or team of experts (sometimes called a practice coach, quality improvement coach, or process improvement coach) is brought in to assist with the implementation of practice changes and to help build the internal capacity to engage in quality improvement activities.⁵ A study by Scholle and colleagues found that 64 percent of the of 249 small practices they studied received practice-specific consultation to help with practice change efforts, and 59 percent had access to a learning collaborative.⁶ Other quality improvement-related processes employed by the practices included sponsoring trainings, implementing a steering committee to lead efforts, developing systems for care, conducting regular clinical performance quality reporting and review, and quality goal setting.

A few of the health systems being evaluated by TPC studies developed and used models for practice transformation. For example, the Southcentral Foundation in Alaska implemented the Nuka System of Care, which was developed with input from patients (referred to as “customer-owners” by Southcentral Foundation) and aims to help patients achieve “physical, mental, emotional and spiritual wellness.”⁷ Another notable example is the Group Health Cooperative, which applied the Lean (also called Toyota Production System) methodology to primary care transformation, which aims to maximize quality and value while minimizing waste.⁸

Methods Used to Study Transformation

Almost all of the studies used a mixed methods approach to study the primary care transformation efforts, incorporating both quantitative and qualitative analyses. Scammon et al

found that mixed methods were particularly useful for understanding the complex phenomena involved in primary care transformation.⁹ The authors reported that “each data source enriched our understanding of the change process and understanding of reasons that certain changes were more difficult than others...Mixed methods enabled generation and testing of hypotheses about change and led to a comprehensive understanding of practice change.”⁹

However, the specific data collected and analyzed by the TPC investigators and the analytical techniques they used varied widely. Quantitative assessments included analysis of operational and administrative data (such as claims data) and surveys. Qualitative assessments included analysis of interviews; focus groups; and survey data collected from the individuals involved in planning and implementing the practice changes, the providers and staff adjusting to the changes, and patients receiving care within the new model. For example, a study of 10 clinics at the University of Utah led by Magill used both existing operations data and newly collected quantitative and qualitative data. The investigators assessed the level of implementation achieved by the practices using an internally developed 28-measure tool; reviewed archived documents to understand the sequence and management of change; examined experiences with change through surveys, interviews, and focus groups of systems administrators, clinicians, and patients; assessed the impact of practice changes on quality measures, patient and provider satisfaction, and clinic operations using operational data; and assessed cost and utilization for individual patients through an analysis of claims data from the Centers for Medicare & Medicaid Services and Utah’s All Payer Claims Database.¹⁰

Key Themes Across Grants

Transformation Is an Ongoing Process, and Does Not End With PCMH Recognition

As discussed in the McNellis paper, primary care transformation is an ambitious and complex undertaking, and implementation generally does not follow a clear, linear trajectory. In addition, transformation is an ongoing process that practices or health systems choose to engage in, rather than a goal to be achieved. A primary care provider interviewed for one of the studies explained it this way: “medical home is a process, I don’t think it’s an endpoint. It is constantly evolving; if you get one thing going, there is always something else you can tweak or improve upon.”¹¹ A paper by Solberg et al found substantial variation in the performance of PCMHs and that many had significant room for improvement. This indicated to the investigators that there is a continuum of transformation and performance among medical homes, even after they have achieved recognition.¹²

Other investigators pointed out that achieving recognition or certification as a PCMH (by the NCQA, The Joint Commission, a State health department, or another group) was a useful marker of progress in the process and helped motivate transformation efforts, but recognition itself did not necessarily signify being a “true” medical home or the end of the process of transformation. Solberg reported that the Practice Advisory Group for 120 health care homes in Minnesota realized only after they had been certified as a PCMH for a while that becoming certified was “just the start of the journey” (oral interview, December 2014), and that successful transformation required not just meeting recognition standards, but rather a change in overall practice culture. Most of the TPC PIs agreed that “a practice could be a true PCMH without having received recognition, and a practice that has received recognition may not be a true PCMH.”¹ However, the standards that are required for PCMH recognition, particularly those of NCQA, have evolved over time to encompass important elements of practice transformation that were not included in earlier versions.

Of the 14 TPC grants, eight reported that all of the participating practices had already achieved PCMH recognition by the time the study ended—six by NCQA, one by Oregon’s Patient-Centered Primary Care Home Program, and one by the Minnesota Department of Health. (For two of these eight grants, recognition or certification as a PCMH was a condition for inclusion in the study). In four grants, some of the practices were recognized as a PCMH while others were not. Of these four, two were actively seeking recognition as a PCMH at the time the study ended, while the other two had chosen not to seek recognition. In one study, none of the practices sought recognition, and another study did not report information about recognition status of involved practices. **Appendix A** provides details about the PCMH recognition status of practices across TPC grants.

While most of the practices studied in the TPC grants had either already attained or sought recognition as a PCMH, some determined that attaining and maintaining PCMH recognition was not worth the effort or cost required. The time and cost required to apply for PCMH

recognition/certification can be significant because of the documentation that is required, and financial benefits for being a recognized PCMH are not available in all locations and are often minimal. For example, the 10 primary care practices run by the University of Utah did not seek recognition or certification as PCMHs despite their participation in a primary care transformation effort because they determined that there was no business case in their market to justify the necessary investment (M Magill, oral interview, December 2014). The Palo Alto Medical Foundation allowed its PCMH recognition from NCQA to lapse after only 2 years because the organization decided that transformation into a PCMH was important for its mission, but formal recognition was not.¹³ Berry and colleagues found that many small practices simply did not have the time or capacity to seek formal PCMH recognition.¹⁴

Motivation and Readiness to Transform Vary Across Practices

The motivations for undertaking primary care transformation, and the readiness to do so, varied across practices. The desire to improve patient care was mentioned by most of the TPC investigators as the key motivator for the primary care transformation efforts they studied. However, a number of other motivations were also mentioned, including intellectual curiosity, wanting to be involved in cutting-edge health care, and a desire to be ahead of the curve on something practices believed would ultimately become a requirement. In addition, a number of financial incentives were reported as motivating transformation initiatives, including financial assistance through PCMH pilot and demonstration projects, which practices used to improve clinic infrastructure (e.g., to implement EHRs) or to provide training or support (e.g., practice facilitators); by gaining a competitive edge in the health care market by becoming a recognized PCMH; and through direct payments for being a recognized PCMH from some State and private insurance payers. While not directly related to the PCMH, incentives are also available for practices that can demonstrate “meaningful use” of certified EHR technology by the Centers for Medicare & Medicaid Services through authorization from The American Recovery and Reinvestment Act of 2009.¹⁵ Even when strong financial incentives were offered, however, not all practices were ready to transform. For example, a study of safety net clinics by Rittenhouse and colleagues found that practices with insufficient organizational capacity were either slow to implement changes or unable to do so altogether.¹⁶

Changes in Practice Culture and Mental Models Are Often Required

For some practices, transformation to a PCMH built upon years of previous practice improvement, including quality improvement efforts, the adoption of EHRs, or a focus on shared decisionmaking. For the more advanced practices, these efforts often began before the concept of PCMH was fully developed or even had a name. Becoming a certified PCMH for these practices was relatively easy and was viewed by staff as another step in the process. Other practices found that even if they did not have previous initiatives to build upon, the concept of a PCMH fit within the practice’s existing ethic for providing care. For example, Federally Qualified Health Centers already used a family-centered approach to care before transformation to PCMH efforts

began. Therefore, investigators found that it was fairly easy for staff in these practices to embrace the PCMH model.¹⁷

For other practices, however, transformation to PCMH marked a big change and required a dramatic shift in mental models (i.e., how people think) about primary care at the individual level, as well as culture change, including staff buy-in to new roles and responsibilities, at the practice level.¹⁸ Gabbay and colleagues, who studied the Chronic Care Initiative in Pennsylvania, identified three main areas where shifts in mental models and practice culture were necessary for successful transformation to PCMH: 1) shifting toward proactive population-based care in the practice-patient relationship; 2) creating a culture of self-examination (i.e., routine review of clinical and quality improvement data at both the individual and practice level); and 3) the redistribution of responsibilities and adoption of a team-based care approach.¹⁸ One physician described this process as “taking your head out of the sand” and recognizing that you are not managing your population of patients as well as you thought you were.¹⁹ The Practice Advisory Group of a study examining 120 health care homes in Minnesota (PI: Leif Solberg) found that the most important factors for successful practice transformation were having a clear vision for change and an understanding of the “big picture” on the part of practice leaders (i.e., visionary leadership), and an overall change in practice culture (L Solberg, oral interview, December 2014).

Contextual Factors Play an Important Role in the Success of Transformation Efforts

As discussed by Tomoia-Cotisel et al,²⁰ contextual factors affected the success and sustainability of primary care practice changes at the practice level (e.g., practice characteristics), the organizational level (e.g., leadership structure and payment model), and in the external environment (e.g., sources of financing). The contextual factors discussed below were raised by the TPC investigators as particularly important in the efforts they studied.

Leadership and Communication

Strong leadership committed to primary care transformation at both the practice and systems levels was identified by multiple investigators as vital to the success of transformation efforts. In fact, Donahue and colleagues found that practices with higher leadership scores were significantly more likely to make practice changes.²¹ Calman and colleagues found that in addition to facilitating IT changes and process redesign, support from those in leadership positions helped to create a culture that encouraged innovation and early adoption of new policies and methods related to transformation (N Calman, oral interview, December 2014). Donahue et al reported that a committed mid-level manager in addition to strategic or visionary leaders was essential for successful practice change.²¹ These mid-level managers serve as the operational link between the strategic leaders and the practice staff responsible for day-to-day implementation activities.

To support transformation efforts, organizational leaders also needed to communicate effectively with frontline staff. Driscoll and colleagues found that to do so, it was necessary for leaders to

communicate in a clear and transparent way about what changes were expected from the staff and how long the changes were expected to take.²² After that, leaders needed to be open to feedback from clinic staff about what worked in practice and what did not (R Meenan and C McMullen, oral interview, December 2014). Effective communication was also found to facilitate practice buy-in to PCMH transformation.²³ Clinics with leaders who provided excellent communication and supported staff throughout implementation of primary care changes with hands-on, side-by-side training were found to have the highest functioning teams.²

Leadership stability was also identified as a key factor for achieving and maintaining successful practice transformation.²⁴ For example, a change in leadership at a university health system studied by one of the TPC investigators led to fundamental changes in the understanding of primary care transformation. As a result, previous efforts toward PCMH transformation were no longer seen as an organizational priority (M Magill, oral interview, December 2014.) The loss of a mid-level champion can also be devastating to a transformation effort, particularly for smaller practices where just one or two individuals are leading the work (R Meenan, oral interview, December 2014). As one investigator explained, “quality improvement efforts would stop if the one person who championed it left the practice” (K Donahue, oral interview, December 2014).

Practice Size

Small, independent practices were disproportionately affected by the costs and time required for implementation of the PCMH because they did not have the same resources and infrastructure that larger practices had to help offset the costs of implementation.^{25, 14, 4} Small practices also could not benefit from the same economies of scale as larger practices³ and often did not have the necessary funds to bring in outside experts or develop infrastructure to help with primary care practice changes (C Berry, oral interview, December 2014). The effect of practice size and resource constraints on PCMH transformation was underscored by a finding by Fetters and colleagues that overall mean PCMH implementation scores were highest in practices with six or more physicians and decreased as the number of physicians in the practice decreased,²⁵ as well as a finding by Rittenhouse that higher levels of NCQA recognition were associated with larger clinic size and ownership by a large health care system.²⁶

Small practices, did, however, find innovative ways to implement important aspects of the PCMH model. In fact, Berry and colleagues found that the small practices they studied were able to achieve substantial implementation even though they faced numerous potential challenges, and they were able to do so by using more informal strategies for team-based care and care coordination.²⁷ For example, although these clinics did not have the funds to hire an official “care manager,” a front office staff member was often trained to take on this role (C Berry, oral interview, December 2014).

Electronic Health Records

Existing infrastructure, especially having EHRs in place, was identified by investigators as an important contextual factor for primary care transformation. For example, Calman and colleagues found that the EHR at the Institute for Family Health Network, implemented just

prior to PCMH transformation, was integral to PCMH transformation because it allowed the network to more easily develop and implement patient registries, a patient portal, visit summaries, care guidelines, screening reminders, and other components of patient management.¹⁷ Gabbay and colleagues found that the practices with the most improved clinical outcomes were the ones that had greater structural capabilities at baseline, such as EHRs and stable financial systems, compared to lower performing practices.¹⁹

However, there was considerable variation in EHR systems in place across the practices evaluated by the TPC investigators. While a few larger health systems, such as Group Health and the Palo Alto Medical Foundation, had well-established EHR systems in place when they began PCMH transformation, many practices had only recently implemented EHR systems or did so during primary care transformation, and other practices did not have an EHR in place during PCMH transformation. (**Appendix A** provides comparative details across studies). Although practices can qualify for the lowest level of NCQA recognition as a PCMH without an EHR system in place, an EHR allows practices to implement population management and quality reporting and can help manage the volume of documentation required to establish and sustain a PCMH.

Kraschnewski and Gabbay reported that despite the numerous advantages of health IT, many of the practices they studied did not use EHRs at all because of multiple barriers to adoption. These barriers included issues with information exchange and interoperability between systems, challenges with technical implementation, low acceptance rates by both physicians and patients, and issues related to patient access. They also found that implementing health IT was a complex undertaking and required a large upfront expense, representing a significant financial risk for practices.¹

The capabilities of existing EHR systems also varied widely across practices. Solberg and colleagues identified the limitations of existing EHRs as a key barrier to practices in meeting the PCMH documentation requirements of the Minnesota Department of Health.²⁸ Of the safety net practices studied by Meenan and colleagues, those that did have an EHR in place were often not set up to do data extraction for quality improvement purposes. Therefore the data extraction required for conducting quality improvement activities was very time consuming for these practices and imposed a significant resource burden.²⁹ Cooley and colleagues found that, because of limited capabilities, EHRs were both a driver and restrainer of transformation.¹¹ While two of the 12 practices his team studied reported success in using EHRs to develop care plans and were close to using them for reporting purposes, none had yet been able to use EHRs for data and report retrieval, immunization management, or medication dosing.¹¹

Competing Priorities

Many institutions (particularly larger ones) had multiple initiatives going on at any one time, all of which vied for the limited time and attention of clinicians and administrators, and PCMH transformation was only one of these initiatives. Front-line staff at Palo Alto Medical Foundation reported feeling overwhelmed by the number of changes that were required of them across initiatives, and experienced change fatigue (M Tai-Seale, oral interview, November 2014). At Group Health, a large upgrade of practice management software took place at the same time as

the implementation of PCMH transformation, and this disrupted the collection and distribution of quality of care data, frustrated staff, and hampered quality improvement activities related to transformation.²

Other types of competing priorities were also mentioned by TPC investigators. For example, Rittenhouse and colleagues identified the need for medical school–affiliated clinics to balance transformation efforts with their mission to train future health professionals in their study of safety net clinics in the New Orleans area.²⁴

Care Coordination and Team-Based Care Are Key Elements of Transformation

Care coordination and team-based care were identified by multiple PIs as key elements of successful primary care transformation. In a study led by Cooley and McAllister, care coordinators were identified as integral to a practice’s ability to provide proactive care, support families, and reach out to communities. In fact, many physicians in this study reported that they would not be willing to go back to their previous care model without care coordinators.¹¹ Gabbay and colleagues found that practices with the most improvement in diabetes care reported greater involvement of a patient-centered care manager and greater integration of the care manager into the overall care team compared to practices with the least improvement.³⁰ The investigators concluded that care managers should meet with patients, support self-management, leverage the EHR for managing care, and integrate with the care team through office huddles and other ongoing communications.³⁰

Implementing team-based care also improved patient and provider satisfaction.¹⁰ Training clinical team members other than nurses and physicians to work with patients on self-management activities was found to increase patient involvement in care.³¹ Members of the clinical staff who were given expanded roles in providing care reported that acquiring the authority to make decisions empowered them to be more involved in patient care and led to better team relationships.⁴ In particular, utilizing MAs in expanded roles helped clinicians be more efficient,¹⁰ made office visits more productive,¹⁹ and allowed physicians more time with patients.⁴ With support and some additional training, MAs could be trained to support population management, care management, and quality improvement activities, as well as serve as health coaches.³² Expanding the role of MAs was also found to enhance teamwork, improve workflow, and improve patient safety.³²

Cronholm et al (PI: Gabbay) reported that the greatest tension from shifts in mental models arose between clinicians and MAs, suggesting that there were significant barriers to moving away from clinician-centered care to a team-based model.¹⁸ Driscoll and colleagues found that transition to a coordinated, team-based model was challenging for some physicians who were used to a private practice model and for clinicians who were unfamiliar with the role or abilities of clinicians from other disciplines.³³ However, they also found that most clinicians adapted to the team model and quickly became comfortable triaging patient care needs to the appropriate team member.³³ Gabbay and colleagues found that many of the MAs enjoyed their new role helping patients set self-management goals and ensuring that patients received needed care; however, a few thought

they should be paid more for this new role, resented the extra work, or found the documentation tasks to be tedious.¹⁹

Practice Transformation Involves Inherent Tradeoffs

Transformation efforts aimed at implementing one aspect of the PCMH often involved a tradeoff with other aspects of care. These tradeoffs highlight the complex nature of PCMH transformation and the importance of weighing and evaluating the effect of system changes on diverse outcomes, including the patient and provider experience.

For example, Magill and colleagues pointed out that an emphasis on improving access can have a negative impact on continuity of care because appointments can be made available more quickly, but not necessarily with a patient's regular primary care provider.¹⁰ The study of safety net practices led by Rittenhouse found that it was challenging to provide comprehensive care to patients while maintaining accessible services under conditions where there was a high demand for services from patients seeking care.²⁴

Other transformation-related activities required tradeoffs between patient and provider satisfaction. For example, Magill and colleagues found that a more efficient visit improved patient satisfaction because of reduced wait time, but decreased provider satisfaction because they had less time with each patient.¹⁰ Increased access to primary care services and same-day appointments for patients at Southcentral Foundation in Alaska (PI: Driscoll) had the unintended effect of causing high levels of stress and frustration for clinicians because of the large number of patients they were often required to see per day, requiring them to work extremely long hours, often without any prior notice.²² Magill and colleagues recommended that practices monitor both the intended and unintended consequences of redesign efforts to identify and address tradeoffs that come with practice change.¹⁰

Transformation Requires Supplemental Funding, and Sustainability Will Require Payment Reform

Implementing a PCMH represents a significant investment of time and money; therefore, ongoing access to adequate funding for transformation efforts was reported as a concern for many practices^{25, 16, 34} and as a barrier to implementation.⁶ Reiter et al (PI: Donahue) reported that transformation costs were a burden for practices, even when practices made cost-saving efforts such as leveraging existing resources and scheduling meetings during slower patient care periods.³⁴

Scholle and colleagues found that a large majority (69.5%) of the 249 practices they studied received some financial payment for PCMH transformation, either from participation in a pilot or demonstration project or through direct payments from State or private insurance payers (for recognized PCMHs) or other entities.⁶ Gabbay and colleagues reported that supplemental financial support was critical for primary care transformation because it allowed practices to acquire needed resources such as EHR systems and additional staff (e.g., MAs and care

coordinators), pay for the staff time needed for education and quality improvement efforts, and to make physical modifications to clinic space.¹⁹ Berry and colleagues found that even modest financial assistance could go a long way in making PCMH transformation possible for smaller practices (C Berry, oral interview, December, 2014). Fetters and colleagues warned that requiring primary care practices to shoulder the investment alone could severely limit PCMH implementation, and they and others recommended that payers, purchasers, and policymakers explore methods to help support the costs of primary care transformation.^{25, 34}

Rittenhouse and colleagues reported that financial support must be stable over time to ensure that PCMH changes are sustained. In their study of safety net clinics in New Orleans, declines were observed in the areas of access, quality and safety, and care coordination and integration once clinics were no longer eligible for redesign bonus payments and faced the loss of funding for patient care services. In light of new financial realities, investigators found that clinics shifted their priorities from growth and transformation to consolidation and financial survival.¹⁶

Other investigators noted that current fee-for-service reimbursement strategies do not cover PCMH-related costs,²⁸ such as an expanded health care team and services, including new roles for MAs, care managers, and clinical pharmacists (M Magill and D Scammon, oral interview, December 2014). Additionally, traditional payment systems, which reward quantity rather than quality of health services, do not account for care complexity and may compromise a practice's ability to sustain a PCMH.¹¹ Reiter et al (PI: Donahue) recommend that policymakers consider reimbursement and other strategies to help practices manage the costs of primary care transformation.³⁴

To address the need for a change from quantity-driven payment to more “value-based” payment, the Department of Health and Human Services has set a goal for Medicare payments through alternative payment models to reach 30 percent by 2016 and 50 percent by 2018. These alternative payment models include advanced primary care medical home models, as well as Accountable Care Organizations, new models of bundling payments for episodes of care, and integrated care demonstrations for beneficiaries that are dual Medicare-Medicaid enrollees.³⁵

Key Study Outcomes Across Grants

Some TPC studies examined practices that had begun primary care transformation many years prior, while others evaluated more recent or ongoing transformation efforts. However, AHRQ specifically funded evaluations of transformation efforts that had been in process long enough to produce patient-level outcomes. The outcomes of primary care transformation reported by the investigators fell into the following categories: access, utilization, cost, quality of care, health outcomes, patient satisfaction/experience, and provider/staff satisfaction.

Access

Multiple TPC studies assessed the impact of PCMH transformation on patient access to care, including access to in-person appointments and electronic methods of communicating with clinicians and viewing health care information through online portals. Several studies also examined the relationship between access to care and other outcomes, such as health care utilization and health outcomes.

Appointment Access

Results from two studies indicated that patient access improved after PCMH transformation. At Southcentral Foundation, a large primary care system in Alaska (PI: Driscoll), patients reported that access to primary care services and same-day appointments improved following the implementation of targeted changes that included open (often same-day) scheduling, expanded office hours, designated schedulers, and options for electronic communication with providers.²² Similarly, in a study of safety net primary care clinics in Oregon, Meenan and colleagues found that practices successfully reduced wait times for appointments by implementing same-day and telephone appointment options.²⁹

Electronic Access

In multiple studies, practices sought to improve access through online systems and patient portals that facilitated patient communication with clinicians and timely access to laboratory results and other information. Results from three studies suggest that patients welcomed and valued the enhanced access offered by these strategies. Calman and colleagues found that patients receiving care at Federally Qualified Health Centers in New York liked the ease of access offered by electronic methods of communication;¹⁷ in another study led by Magill, patients reported that an online portal that allowed them to view laboratory results and send secure email messages to their provider made them feel more empowered and engaged in their care.¹⁰ Further evidence of patient acceptance was identified by Reid and colleagues at Group Health Cooperative in Washington State, where the number of secure message threads per 1,000 patients increased by 123 percent following PCMH implementation.²

Impact of Access on Utilization and Patient Outcomes

Two studies examined the relationship between access and utilization and found mixed results. At Group Health, Reid and colleagues found that the sharp increase in secure messaging and a 20 percent increase in telephone encounters were accompanied by a 6.7 percent decrease in primary care office visits and an 18.5 percent decrease in emergency department visits.³⁶ Among diabetes patients, however, a more modest 10 percent increase in secure message threads and phone encounters was associated with a slight increase (1.25% to 2.74%) in office visits.³⁷ Tai-Seale and colleagues at the Palo Alto Medical Foundation in California similarly found that each new secure email thread between the patient and physician was associated with a small increase (+0.05 visits per patient year) in primary care office visits and a slight increase (+0.21 visits per patient year) in specialty care office visits, leading them to conclude that secure messaging complemented, rather than substituted for, office visits.³⁸

Other findings from Tai-Seale and colleagues suggested a complex relationship between access and health outcomes. The research team found that increased use of personal EHRs (an electronic application patients can use to maintain and manage their own health information in a secure and confidential environment) and shorter wait times to see one's own care provider were associated with improved chronic disease management processes and increased preventive screening, but were not consistently associated with improved clinical outcomes.³⁹ In commenting on their findings, the researchers noted the challenges of establishing relationships between access and quality outcomes in real-world settings, suggesting this is an area in need of further study.

Quality

Many studies explored how PCMH implementation impacted aspects of the quality of care, including continuity, care coordination and teamwork, and comprehensiveness of care, as well as measures of overall quality.

Continuity

The presence and impact of continuity, in which patients consistently see the same provider, was examined in two studies. Berry and colleagues found that continuity was a key feature of small primary care practices in New York City that implemented PCMH elements. Ninety percent of the practices studied indicated that their patients usually or always saw the same clinician, and 57 percent of practices reported that all patients could identify their primary care providers by name.²⁷ Another study, led by Magill, included 10 primary care practices in Utah and determined that continuity with the clinician and care team was associated with improved clinical quality (i.e., the provision of chronic and preventive services), greater patient satisfaction, and lower health care costs primarily among patients with chronic conditions.¹⁰ The study also noted the tension that is inherent to providing timely access and ensuring that patients consistently see the same provider and suggested that practices monitor and adjust related activities as needed to reach desired goals.

Comprehensive Care and Prevention

Multiple studies provide evidence suggesting that PCMH transformation enhances the comprehensiveness of care. Two studies highlighted efforts by small practices (i.e., ≤5 physicians) to enhance the comprehensiveness of care. One study of small practices in New York City led by Berry found that providers in a majority of the practices increased the comprehensiveness of care by usually or always discussing diet, exercise, and stress and anxiety with patients.²⁷ In a study led by Scholle, providers from small practices in 23 States that achieved NCQA PCMH recognition reported that after becoming a PCMH, their care was more comprehensive and efficient, leading to better patient care and improved health outcomes.⁴ Findings from two additional studies offered further information about the relationship between PCMH transformation and comprehensive care and preventive practices. In North Carolina, Donahue and colleagues monitored key clinical processes associated with diabetes and asthma care (e.g., nephropathy screening for patients with diabetes and annual flu immunization for patients with asthma) and found that performance improved in 68 to 78 percent of practices within the first year of PCMH implementation. The researchers also found that the odds of making practice changes (i.e., performing nephropathy screening) were greater for practices with higher leadership scores.³ Practices participating in the Chronic Care Initiative in Pennsylvania studied by Gabbay and colleagues reported using protocols and practices developed for diabetes patients to manage other patients with chronic diseases and to support preventive care for their entire population.¹⁹

Coordination and Teamwork

Two studies linked increased care coordination and teamwork to improvements in clinical quality. Magill and colleagues found that multiple PCMH elements involving coordination and team function (e.g., contacting patients after hospital discharge, medication reconciliation, and implementing after-visit summaries and advance directives) were associated with improved clinical quality.¹⁰ Coordination and teamwork were also found by Calman and colleagues to be essential elements of an integrated mental health model adopted by Federally Qualified Health Centers in New York.¹⁷ The model, which involved universal depression screening and expanded access to mental health providers, was found to facilitate communication among providers and a consistent approach to care and was especially beneficial to patients with complex conditions and multiple psychosocial stressors.

Overall Quality

The relationship between PCMH implementation and overall quality was examined by Fetters and colleagues in a study of more than 2,000 primary care practices in Michigan that sought to implement a PCMH model encompassing 13 domains and 128 discrete capabilities. Quality was assessed using composite quality and preventive scores derived from individual quality and preventive measures defined by Healthcare Effectiveness Data and Information Set (HEDIS), a tool used to measure performance on important dimensions of care and service, and Blue Cross Blue Shield of Michigan.²⁵ Based on the results of partial implementation, the study team estimated that full implementation of the PCMH model would yield a 3.5 percent increase in the

quality composite score and a 5.1 percent increase in the preventive composite score for adults, and a 12.2 percent increase in the preventive composite score for pediatrics.⁴⁰ Estimates indicate that incremental implementation was also associated with improved quality for both adult and pediatric populations.

Health Outcomes

The PCMH model is considered especially well-suited for patients with chronic disease, who benefit from its focus on enhanced continuity, care coordination, and comprehensive care. Five of the TPC studies examined whether the PCMH model fulfilled its promise for chronic disease patients by measuring the impact of PCMH transformation on two of the most common chronic diseases encountered in primary care, diabetes and cardiovascular disease. Results from each of the studies are summarized in **Appendix B**. All of the studies found improvements in the target indicators following PCMH transformation, suggesting that care practices and processes implemented as part of PCMH transformation benefited patients with chronic disease.

However, researchers from two studies offered caveats that highlight the variable performance of practices in each study. In the TransforMN Study conducted by Solberg and colleagues, PCMH practices achieved a 2.1 percent increase in the number of patients achieving optimal diabetes measures and a 4.4 percent increase in patients achieving optimal cardiovascular measures. In responding to these findings, the researchers observed, “The extensive variation among Health Care Home (HCH) clinics, their overlap with non-HCH clinics, and the small change in performance over time suggest that medical homes are not similar, that change in outcomes is slow, and that there is a continuum of transformation.”¹² Variability in performance by PCMH practices was also highlighted by Gabbay and colleagues, who ranked primary care practices undergoing PCMH transformation in Pennsylvania according to their level of improvement in clinical indicators and found striking differences between the five most-improved and five least-improved practices. As noted in **Appendix B**, the five most-improved practices achieved noteworthy gains in each measure, while performance by the five least-improved practices declined.¹⁹ A physician champion from one of the practices in the study offered the following comment on the difficulties of achieving clinical improvement. “You have to make a lot of little incremental changes, but there are lots and lots of incremental changes, and you have to train the staff to do things to a high level of proficiency on every single one of those things and make sure they do it every single time.”¹⁹

Several of the studies linked improvements in clinical measures to specific PCMH processes such as care management, team-based care, and monitoring and outreach. For example, when comparing practices that had the greatest improvement in diabetes outcomes to those with the least improvement, Gabbay and colleagues found that the more improved practices reported more involvement of patient-centered care managers, greater integration of the care manager into the overall care team, and improved messaging and patient tracking using the electronic medical record.³⁰ Calman and colleagues studied PCMH transformation in Federally Qualified Health Centers and highlighted the importance of population monitoring and outreach with their finding that patients whose diabetes was not well controlled at baseline (defined as a baseline hemoglobin A1c level of $\geq 9\%$) improved more than patients who were in control, linking the

improvement to the Centers' efforts to target poorly-controlled patients for enhanced services.¹⁷

⁴¹ In a third example, Solberg and colleagues identified six factors that were most strongly associated with higher performance measures for diabetes and cardiovascular outcomes: reminders for clinicians during care about services needed for chronic conditions; registries for tracking care for patients with chronic conditions; designated primary care teams that collaborate in the care of a defined group of patients; routine use of secure email to support self-management for patients and their families; routine exchange of data and health records with patients through an EHR; and a process for systematically screening patients for depression and dementia.⁴²

Utilization

Several studies from this initiative provided evidence suggesting that PCMH transformation can lead to reductions in health care utilization. The evidence was strongest for reductions in emergency care and primary care services, though studies also found some evidence of reduced hospitalization. Factors that contribute to utilization trends, such as the extent of PCMH transformation and differences in patient morbidity, were also noted.

Emergency Room Utilization

Three studies found evidence of reduced emergency room utilization by PCMH practices. At Southcentral Foundation in Alaska, Driscoll and colleagues found that emergency care use was increasing prior to PCMH implementation and declined significantly during and after implementation before stabilizing in the later post-implementation period.³³ The trend applied to emergency care use overall and to asthma and unintentional injury specifically. Southcentral patients and primary care clinicians suggested that the decrease was a result of the improved access to primary care services that occurred with PCMH transformation. At Group Health, Reid and colleagues examined utilization data for patients who received care from a PCMH clinic to those receiving care from a (nonPCMH) community network practice. The researchers determined that compared to what would be expected with no PCMH implementation, PCMH practices had an 18.3 percent reduction in emergency room visits but a 10 percent increase in specialty care visits and no significant change in inpatient admission rates.² In Minnesota, Solberg and colleagues found that emergency care utilization varied with the extent of PCMH implementation. Specifically, practices that adopted more PCMH processes and systems were more likely to have lower emergency care and health care utilization for the most complex patients, but not lower inpatient admissions.⁴²

Hospitalization

In contrast to the findings of no link between PCMH transformation and hospitalization reported by Reid and Solberg, two studies found evidence that hospitalizations decreased following PCMH implementation. At Southcentral Foundation, Driscoll found trends for hospitalization similar to those for emergency care. Specifically, the percent of PCMH patients hospitalized per month (overall and for asthma and unintentional injury specifically) declined steadily immediately following PCMH implementation and then stabilized at a lower level compared to

before or during PCMH implementation.⁴³ In Oregon, Meenan and colleagues studied 12 clinics that underwent PCMH transformation and found that hospital admissions decreased more rapidly in the PCMH clinics than the nonPCMH clinics. Trend analyses predicted that the decline in hospital admissions would increase over time, from 5.39 fewer inpatient admissions per month in PCMH clinics in the first year after PCMH implementation to 16.03 fewer admissions per month 3 years after implementation.²⁹

Primary Care and Specialty Care Visits

Several studies examined factors that influence primary care and specialty care utilization. As noted earlier, researchers at Group Health and the Palo Alto Medical Foundation examined the relationship between electronic access and primary care and specialty visits and found mixed results.^{36, 37, 38} Other analyses examined links between ambulatory utilization and patient morbidity and highlighted how PCMH practices tailor their services in accordance with a patient's needs and severity of illness. For example, at Group Health, Reid and colleagues determined that patients with hypertension experienced a 4 percent decline in specialty visits and a 13 percent decline in cardiology visits in the first year after PCMH implementation. However, closer examination revealed that the decline was limited to low- and mid-morbidity patients, while high-morbidity patients experienced an increase in specialty care utilization. Based on these results, the researchers suggested that PCMHs prioritize high-morbidity, clinically complex patients when seeking to improve coordination between primary care and specialist services.⁴⁴ In another study, Calman and colleagues examined utilization patterns among patients with diabetes and found that utilization varied with the patient's baseline hemoglobin A1c level. Specifically, encounters with primary care providers remained relatively steady in patients whose baseline level was 9 percent or less. For patients whose level was greater than 9 percent, encounters with primary care providers declined, while encounters with outreach, diabetes education, and psychosocial care increased, consistent with the PCMH clinics' efforts to target high-risk patients for enhanced services.⁴¹

Health Care Costs

Evidence from three studies suggests that improvements in continuity, teamwork, and other changes implemented as part of PCMH transformation can help lower the costs of care. At Group Health, Reid and colleagues compared a PCMH prototype clinic to 19 nonPCMH clinics and found that patients at the PCMH clinic experienced a modestly improved quality of care and a 7 percent reduction in total health care costs, largely due to reduced utilization of inpatient and emergency/urgent care.⁴⁵ In Utah, Magill and colleagues found that using a care team and expanding the role of MAs allowed providers to be more efficient. While staff costs per visit increased by \$8.27 because of staffing increases, staff cost per physician work relative value unit (which calculates the amount of effort expended by a physician) decreased by \$6.98.¹⁰ The researchers also determined that a 10 percent increase in continuity of care was associated with a \$350 decrease in annual health care spending, largely due to reductions in inpatient care for patients with chronic conditions who were commercially insured.

Cost projections by Feters and colleagues in Michigan, who studied the impact of implementing a PCMH model that encompassed 13 domains, also linked PCMH transformation and cost savings. The researchers estimated that full implementation of the PCMH model would lower per member per month medical costs for adult patients by \$26.37; however, full implementation would likely yield no reductions in costs for pediatric populations, and incremental implementation was not associated with cost savings for either population.⁴⁰ The findings suggest that multiple changes and PCMH elements, rather than a single element or practice improvement, are necessary to achieve cost savings.

Provider and Patient Satisfaction

Provider and patient satisfaction was studied by multiple researchers. Overall, the evidence suggests that PCMH transformation is associated with improved satisfaction scores for both patients and providers and with lower rates of clinician burnout. As previously discussed, however, improvements in patient or provider satisfaction may involve tradeoffs because of the different ways changes in care impact the patient and provider experience.

Provider Satisfaction

For PCMH providers, improvement in the quality of care and in their ability to provide the kind of care needed by patients was a key source of satisfaction. Clinicians and care coordinators in a sample of pediatric practices studied by Cooley and McAllister described the enhanced sense of personal and professional satisfaction they obtained after PCMH transformation and identified the pediatric medical home as a more gratifying career path.⁴⁶ One physician champion noted, “I love what I do, in part because of the medical home. I have more time with my patients; I earn less, but am happier.”⁴⁶ A satisfaction survey completed by providers from PCMH practices in Utah (PI: Magill) revealed a similar sentiment, with results indicating that providers were most satisfied with the “quality of care” and their “interactions with patients” and least satisfied with “time spent working,” “paperwork,” and “compensation.”⁴⁷ At Group Health, Reid and colleagues found that work satisfaction and burnout rates among providers and staff improved after PCMH transformation, with the percentage of staff reporting that they were “extremely” satisfied with their workplace increasing from 38.5 percent at baseline to 42.4 percent, and rates of reported burnout decreasing from 32.7 to 25.8 percent.² Provider satisfaction was also evident in comments in which physicians and staff noted that the PCMH focus on improving primary care performance and the patient experience was the “right work” and “right thing to be doing.”²

Patient Satisfaction

Patient ratings and feedback provided important information about the impact of PCMH transformation on patients and families and suggested that PCMH practices were largely successful in improving the patient experience. At Group Health (PI: Reid), satisfaction surveys conducted before and after PCMH implementation revealed small but statistically significant improvements in four of seven areas: access, communication, followup, and knowledge of context.² Cooley and McAllister reported that pediatric practices that transformed into medical

homes scored above the mean on national Consumer Assessments of Healthcare Providers and Systems® benchmarks, and that family satisfaction appeared to stem from better access, care, and safety and having a strong relationship with their health care team.⁴⁶ Improved relationships with physicians were also reported by PCMH patients receiving care at Southcentral Foundation in Alaska, who described improved communication with physicians and increased feelings of safety and trust (PI: Driscoll),²² and by patients at the Palo Alto Medical Foundation who participated in shared medical appointments and said these appointments changed the power dynamic between patients and physicians and fostered a more relaxed environment (PI: Tai-Seale).³⁸

Conclusions and Implications

There is growing momentum in the United States to implement changes to the health care system that will reduce costs, improve the quality of care provided, and improve the patient's experience with care, and there is mounting evidence that transforming primary care practices into PCMHs is one way to achieve these goals.⁴⁸

Findings from the TPC grants show that primary care transformation efforts have the potential to improve access to care; improve patient satisfaction with care; reduce utilization of unneeded care, particularly in emergency departments; and improve the quality of care and health outcomes, particularly for patients with chronic illnesses. However, the studies also reveal that transforming the way primary care is delivered is a complex and difficult process and will require ongoing work and investment.

This body of work also highlights a number of areas for future research. While many of the TPC grants set out to measure the costs related to primary care transformation, only a few grants were able to achieve this. To support further investigation in this area, AHRQ funded the Estimating the Costs of Supporting Primary Care Practice Transformation grant initiative, which focuses on measuring the direct and indirect expenses of primary care transformation efforts. The experiences of the TPC grantees suggest that in addition to estimating the costs of PCMH transformation, it is important to also measure and understand the costs of maintaining a PCMH and to determine whether PCMH transformation is associated with any reductions in the cost of providing primary care over time.

Only five of the 14 TPC grants reported that patients were involved in the design of primary care transformation efforts in the practices they studied, usually as part of a board or patient advisory committee. The investigators reported that this was in part because patient-centered care, self-management, and shared decisionmaking were not widely applied concepts at the time these transformation initiatives began. Additional research is needed to identify how to successfully incorporate the patient perspective into primary care redesign efforts.

Small, independent practices and safety net clinics face additional barriers to transformation because they do not have access to the resources and infrastructure available to larger, better-funded practices. The costs of implementing EHR systems, applying for PCMH recognition, and obtaining other needed resources can be out of reach for small clinics, even when financial incentives are available. Policy efforts to determine how to best support the transformation of small, independent practices and safety net clinics will be essential to ensuring these practices can provide the best care for their patients and survive in the future environment of primary care.

The successful redesign of primary care requires fundamental changes in how providers, payers, and patients think about primary care. In particular, the current physician-led model must be replaced by a patient-centered model, where care is provided by teams, and the focus is not just to improve the health of individual patients but the entire population of patients. Given the scope of this change, additional modifications to the U.S. health care payment model are needed to

reward practices for improving the quality of care and the patient's experience of care and to help sustain primary care transformation over time.

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Appendix A. Key Characteristics of Transforming Primary Care Grants

PI Name; Project Title	Unique Element	Number of Practices	Practice Type	Practice Size	Location	EHR Status	Transformation Efforts	Recognition Status/Type
Carolyn Berry, PhD; Health Care Transformation Among Small Urban Practices Serving the Underserved	Small, urban primary care practices participating in the New York City Department of Health and Mental Hygiene's Primary Care Information Project	83	Primarily solo and independent primary care practices serving racially diverse and predominantly low-income adults	Very small; all had 5 or fewer physicians, two thirds were solo practices	New York City	21% of practices had EHRs before participating in the project; all practices used EHR system provided through project for at least 1 year	73% of practices implemented processes to remind patients of appointments, follow up on missed appointments, and monitor patients with chronic conditions. Close to half of the practices reported having informal care teams and monthly or more frequent meetings to discuss patient care, while 40% began using staff at the top of their skill set (e.g., engaging nurses or medical assistants in patient education, taking histories, or chronic disease screening). More than half of the practices implemented QI efforts to improve patient satisfaction and reported using data to assess the impact of QI efforts.	47 practices applied for NCQA PCMH recognition and either achieved recognition (Level 1) or were awaiting notification when the study ended. The remaining practices did not pursue recognition.
Neil Calman, MD; A Study of the PCMH: Lessons From a New York State Community Health Center Network	Federally Qualified Health Centers in the Institute for Family Health Network	14	Federally Qualified Health Centers	Varied; majority were small—between 4 and 8 primary care clinicians (although some included large sites)	Medically underserved communities in New York State, including the Bronx, Manhattan, and the Mid-Hudson Valley	Implemented in 2002 (just prior to when PCMH transformation began); enhancements added as part of transformation	Central elements included: developing patient registries and reports using the EHR to support outreach, monitoring, and management of patient populations (focusing on patients at highest risk of poor outcomes); implementing workflow changes (e.g., shifting some screening and educational tasks to nurses); and introducing online tools, including clinical decision supports, a visit summary for patients, and a patient portal	All of the Community Health Centers achieved Level 3 NCQA PCMH certification in 2009

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Carl Cooley, MD; Medical Home Transformation in Pediatric Primary Care: What Drives Change?	The top performing pediatric primary care practices that participated in the Medical Home Learning Collaborative	12	Mix of types, including independent and hospital- owned practices, an academic clinic, and a Federally Qualified Health Center	Varied in size, with between 528 and 27,597 patients	Connecticut, Pennsylvania, Ohio, Michigan, Minnesota, North Carolina, Utah, Texas, and Illinois	Practices did not have an EHR in place before redesign. EHR implementation occurred in parallel with PCMH transformation. By the end, most had some EHRs in place.	Practices used QI techniques and other strategies to enhance care coordination and facilitate family-centered, team-based care. Practices partnered with patients and families to incorporate goals and care strategies into individualized care plans. Practices strengthened their linkages with community resources and partners and implemented strategies to enhance access to care (e.g., by responding to patient concerns by phone). All but the smallest practice introduced care coordinators.	One practice attained Level 3 NCQA PCMH recognition; one practice attained PCMH recognition from a State program; and the remaining 10 practices opted not to pursue PCMH recognition
Katrina Donahue, MD, MPH; Transforming Primary Care Practices in North Carolina	Practices participating in a statewide QI initiative in North Carolina	76	42% family medicine, 13% internal medicine, and 26% pediatric practices. Range of structure types, but mostly independent.	32 practices with seven or more clinicians, 26 practices with four to six clinicians, and 18 practices with three or fewer clinicians	North Carolina (49% rural)	50% of practices had an EHR prior to the initiative	Onsite Quality Improvement Consultants were provided through the North Carolina Area Health Education Centers to serve as practice coaches and assist with practice change. They helped set goals for practice improvement, trained staff on QI methodology, and assisted in the creation of patient data registries to track clinical outcomes for asthma or diabetes; they also provided practices with monthly practice change and leadership ratings to track implementation and use of disease registries, planned care templates, care protocols, and patient self-management support tools.	At the time of the study, 22 had NCQA recognition, and 17 were actively working on attaining recognition

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David Driscoll, MPH, MA; Transforming Primary Care Practice	A tribally owned and managed primary care system serving primarily American Indian and Alaskan Native patients	Not applicable; not structured as discrete practices	Tribally owned and managed primary care system	48,000 adult and pediatric patients in 2009 across system	Southcentral Alaska	Had a pre-existing EHR system commonly used by Indian Health Service	Introduced the Southcentral Foundation Nuka System of Care, a PCMH model developed with input from patients. The model emphasizes enhanced access; team-based care and care coordination; and patient empanelment.	Recognized as a NCQA PCMH Level 3 in 2010. Also earned the Malcolm Baldrige Award for quality excellence in 2011.
Michael Fetters, MD, MPH, MA; Multimethod Evaluation of Physician Group Incentive Programs for PCMH Transformation	Practices enrolled in Blue Cross Blue Shield of Michigan Physician Group Incentive Program	2,432	Varied; includes adult and pediatric practices and 60% solo practices	Varied in size	Michigan (including urban, suburban, and rural areas)	Some, but not all practices had EHR in place	Practices implemented a PCMH model defined by Blue Cross Blue Shield of Michigan and encompassing 13 domains: patient-provider partnership, patient registry, performance reporting, individual care management, extended access, test results tracking and followup, e-prescribing, preventive services, linkage to community services, self-management support, patient web portal, coordination of care, and specialist referral process	No information available
Robert Gabbay, MD, PhD; A Multipayer Patient-Centered Medical Home Initiative in Pennsylvania	Adult primary care practices participating in the first regional rollout of Pennsylvania's statewide Chronic Care Initiative	25	Varied; includes private practices, Federally Qualified Health Centers, and practices belonging to health systems	Practices varied in size from two to 25 providers; including some nurse practitioner-led practices and Federally Qualified Health Centers	Southeast Pennsylvania (including inner-city, suburban, almost-rural, and underserved communities)	Not all practices had an EHR at baseline, some implemented it over the course of the project; some only used a registry provided by the State	Practices varied in their approaches to PCMH transformation. Some practices regularly shared performance data with staff, while others did not. All practices enhanced care management capabilities for high-risk patients, but differed in how they defined the role of care managers and how they incorporated them into the care team. Many practices trained medical assistants to serve as health coaches and/or outreach workers or engaged them in population management activities.	All of the practices achieved NCQA PCMH recognition in the first year of the initiative

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PI Name; Project Title	Unique Element	Number of Practices	Practice Type	Practice Size	Location	EHR Status	Transformation Efforts	Recognition Status/Type
Michael Magill, MD; Transformed Primary Care by Design™	Clinics run by the University of Utah and implemented Care by Design™	10	University-owned family medicine and pediatrics clinics	70 primary care providers and 100,000 patients across all 10 clinics, between three and nine primary care providers per clinic	Utah	Implemented EHR prior to this initiative	Implementation initially focused on improving access through same-day appointments. By 2006, the model incorporated team-based care and more comprehensive planned care. Care teams were used to enhance efficiency through better use of support staff time and skills. Medical assistants assumed increased responsibilities. Planned care included creating registries of chronic care patients and introducing reminders for preventive services to enhance continuity and integration of care. Standardized order sets were included in the EHR to improve follow-through on recommended care.	Did not apply for PCMH recognition
Richard Meenan, PhD, MPH, MBA; Transformation to Patient-Centered Medical Home in CareOregon Clinics	Selected safety net primary care practices that implemented the Primary Care Renewal project, supported by CareOregon, a large nonprofit Medicaid managed care plan	17	Safety net primary care practices; mixed type of ownership, all with large percentage of Medicaid patients	Ranging in size from 630 to 8,000 or more CareOregon (Medicaid) patients per clinic	Portland, Oregon	Varied; some but not all practices had EHR in place. Many of those who had it were in the early stages (i.e., not ready for PCMH QI and population management).	Included team-based and customer-driven care, barrier-free access through same-day and telephone appointments, proactive panel health improvement, and onsite or otherwise integrated behavioral health	All PCR clinics achieved the highest level of certification in Oregon's Patient-Centered Primary Care Home Program
Robert Reid, MD, PhD, MPH; Transforming Primary Care: Evaluating the Spread of Group Health Medical Home	Group Health owned and operated clinics	26	Integrated health system (nonprofit, consumer-governed)	Practices ranged in size from about 5,000 to more than 20,000 patients	Washington (Puget Sound and Spokane regions) and northern Idaho	Well established	Implemented reduced patient panel size, longer patient visits, and reduced the number of face-to-face visits per day; increased care team staffing. Implemented virtual visits through nurse call line and secure emailing, chronic disease management, previsit preparation, and outreach.	Level 3 NCQA recognition was achieved at all 26 practices

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PI Name; Project Title	Unique Element	Number of Practices	Practice Type	Practice Size	Location	EHR Status	Transformation Efforts	Recognition Status/Type
Diane Rittenhouse, MD; Transforming Primary Care Practice: Lessons From the New Orleans Safety Net	Safety net clinics in New Orleans serving predominately African American, low-income, and uninsured patients	5	Three nonprofit clinics (one of which is faith-based) and two university-owned clinics	10 or fewer clinicians	New Orleans, LA		Statewide QI program included minimum quality standards, such as establishing a quality assurance program, 24-hour phone urgent access, same-day appointments, and implementing and assessing the use of clinical evidence-based guidelines	All five clinics achieved NCQA PCMH recognition
Sarah Hudson Scholle, DrPH; Understanding the Transformation Experiences of Small Practices With NCQA's Medical Home Recognition	Small practices that achieved NCQA PCMH recognition prior to 2011	249	Varied; includes Federally Qualified Health Centers and/or Community Health Centers; independent, physician-owned practices; and practices affiliated with larger groups or owned by a hospital/health system	Very small; fewer than five physicians per clinic. One third were solo practices.	Across 23 States representing all major U.S. regions	77% of practices had EHRs at time of evaluation	Strategies implemented by more than 80% of practices included working with patients to develop care plans, reconcile medications, address barriers to self-care, and review progress between visits; referring patients to community programs; and providing evidence-based patient education. More than 60% of practices delegated some aspects of self-management support or other elements of patient care to nonclinicians.	All had NCQA recognition prior to participation. 33 of the surveyed practices (13%) changed from NCQA Level 1 recognition to Level 3 during the survey period.
Leif Solberg, MN; TransforMN Study	Primary care clinics certified as health care homes by the Minnesota Department of Health	132	75% of the health care homes were part of large medical groups with 20 or more clinics, nearly all were owned by a medical system	77% of the clinics had one to 10 primary care physicians, and nearly all had nurse practitioners or physician assistants	Minnesota	All practices had EHRs in place	Continuous access and communication between health care homes and the patient and family; electronic searchable registry to identify gaps in care and manage services; care coordination for more patient- and family-centered care; care plans for patients with chronic or complex conditions and their family; and continuous improvement in experience, health outcomes, and cost-effectiveness.	All 132 practices in this study were certified as health care homes by the Minnesota Department of Health

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PI Name; Project Title	Unique Element	Number of Practices	Practice Type	Practice Size	Location	EHR Status	Transformation Efforts	Recognition Status/Type
Ming Tai-Seale, PhD, MPH; Primary Care Transformation in a NCQA Certified Patient-Centered Medical Home	Clinics at Palo Alto Medical Foundation	13	Large, nonprofit multispecialty medical group that serves about 850,000 patients	Practice size ranges from three to 300 physicians	Northern California	Well established	Enhancements to patient access and outreach; shared medical appointments; team-based care and cross-trained staff; bringing best evidence to the point of care through use of self-management protocols, EHR alerts, and linked orders; encouraging shared decisionmaking and family involvement in care; coordination of care throughout system and with community resources; new methods of measuring and improving quality and safety; innovations in practice management; advanced information systems and technology; and changes to physician reimbursements	In 2007, four primary care practices were recognized by the NCQA as Level 3 PCMHs, five were recognized as Level 2, and four did not seek recognition. In 2009, PCMH recognition was allowed to lapse.

Abbreviations: EHRs = electronic health records; QI= quality improvement; NCQA = National Committee for Quality Assurance; PCMH = patient-centered medical home.

Appendix B. Health Outcomes Reported in Transforming Primary Care Studies

Study/PI	Chronic Disease	Clinical Measures	Reported Results
A Study of the Patient-Centered Medical Home: Lessons From a New York State Community Health Center Neil Calman, MD	Diabetes	HbA1c	<ul style="list-style-type: none"> Overall 0.5% decrease in mean annual HbA_{1c} from baseline to end of the 6-year transformation period Results by baseline HbA_{1c}: <ul style="list-style-type: none"> ≥9%: 2.38% decrease <9%: 0.34% increase
Transforming Primary Care Practice in North Carolina Katrina E. Donahue, MD, MPH	Diabetes	<ul style="list-style-type: none"> HbA_{1c} <9% LDL cholesterol <100 mg/dL Blood pressure <130/80 mm Hg 	<p>Percent of practices that increased the proportion of patients achieving the target value in the first year of PCMH transformation:</p> <ul style="list-style-type: none"> HbA_{1c}: 50% of practices LDL cholesterol: 55% of practices Blood pressure: 73% of practices
Transforming Primary Care: Evaluating the Spread of Group Health's Medical Home Robert Reid, MD, MPH, PhD	Diabetes Cardiovascular disease	<p>Diabetes:</p> <ul style="list-style-type: none"> HbA_{1c} <9% LDL cholesterol ≤100 mg/dL <p>Cardiovascular</p> <ul style="list-style-type: none"> Blood pressure <140/90 mm Hg 	<p>Diabetes:</p> <ul style="list-style-type: none"> Statistically significant increase in the proportion of patients with diabetes who achieved HbA_{1c} or LDL cholesterol target <p>Cardiovascular:</p> <ul style="list-style-type: none"> Statistically significant increase in the proportion of patients who achieved blood pressure target
TransforMN Study Leif Solberg, MD	Diabetes Cardiovascular disease	<p>Diabetes:</p> <ul style="list-style-type: none"> HbA_{1c} ≤7% Blood pressure ≤130/80 mm Hg LDL cholesterol ≤100 mg/dL <p>Cardiovascular disease:</p> <ul style="list-style-type: none"> Blood pressure ≤130/80 mm Hg LDL cholesterol ≤100 mg/dL 	<p>Diabetes:</p> <ul style="list-style-type: none"> 2.1% increase (p<0.001) in the proportion of PCMH clinics in which all patients achieved all target diabetes measures (optimal care) 24.6% of patients in PCMH clinics vs. 16.6% in nonPCMH clinics achieved all target diabetes measures <p>Cardiovascular</p> <ul style="list-style-type: none"> 4.4% increase (p<0.001) in the proportion of health care home clinics in which all patients achieved all target cardiovascular measures (optimal care) 41.6% of patients in PCMH clinics vs. 31.4% in nonPCMH clinics achieved all target cardiovascular measures
A Multipayer Patient-Centered Medical Home Initiative in Pennsylvania Robert A. Gabbay, MD, PhD	Diabetes	<ul style="list-style-type: none"> HbA_{1c} <7% Blood pressure <130/80 mm Hg LDL cholesterol <100 mg/dL 	<ul style="list-style-type: none"> Percent of patients achieving the target values increased slightly following PCMH transformation Level of improvement varied by practice: <ul style="list-style-type: none"> In the five most-improved practices, the percent of patients meeting the target values for HbA_{1c}, LDL cholesterol, and blood pressure increased by 8.8%, 14.9%, and 19.4%, respectively In the five least-improved practices, the percent of patients meeting the target values for HbA_{1c}, LDL cholesterol, and blood pressure decreased by 11.8%, 8.3%, and 13.2%, respectively

Abbreviations: HbA_{1c} = hemoglobin A1c; LDL = low-density lipoprotein; mg/dl = milligrams per deciliter; mm Hg = millimeter of mercury