The Patient-Centered Medical Home: History, Components, and Review of the Evidence

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OUTLINE

ABSTRACT

The US healthcare system is plagued by unsustainable costs and yields suboptimal outcomes, indicating that new models of healthcare delivery are needed. The patient-centered medical home is one model that is increasingly regarded as a promising strategy for improving healthcare quality, decreasing cost, and enhancing the experience of both patients and providers. Conceptually, the patient-centered medical home may be described as combination of the core attributes of primary care–access, continuity, comprehensiveness, and coordination of care–with new approaches to healthcare delivery, including office practice innovations and reimbursement reform. Implementation efforts are gaining momentum across the country, fueled by both private-payer initiatives as well as supportive public policy. High-quality evidence on the effectiveness of the patient-centered medical home is limited, but the data suggest that, under some circumstances, patient-centered medical home interventions may lead to improved outcomes and generate moderate cost savings. Although the patient-centered medical home enjoys broad support by multiple stakeholders, significant challenges to widespread adoption of the model remain. ***Mt Sinai J Med 79:433–450, 2012.*** *© 2012 Mount Sinai School of Medicine*

Key Words: care coordination, care management, chronic care model, health information technology, patient-centered medical home, population management, quality improvement, team-based care.

For nearly 2 decades, the US healthcare system has consistently fallen short in its efforts to provide high-value health services to its consumers.[1] Relative to other industrialized countries, the United States spends far more on healthcare yet lags behind on several key indicators of health. In 2009, the United States spent 17.4% of its gross domestic product on healthcare, almost 8 percentage points more than the average for the 34 countries in the Organization for Economic Cooperation and Development; and per-capita healthcare spending was $7960, 2.5× more than the average.[1] At the current

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Published online in Wiley Online Library (wileyonlinelibrary.com).
DOI:10.1002/msj.21326

rate, total health expenditures in the United States are projected to increase from $2.6 trillion in 2010 to $4.6 trillion in 2020.[2] Despite such spending, quality of care and health outcomes are suboptimal. A 2010 Commonwealth Fund report found that, compared with 6 other Western countries, the United States ranked at or near the bottom on measures of patient safety, care coordination, access, efficiency, overall quality, and healthy life expectancy.[3] One reason for this gap is that our healthcare-delivery system has failed to adapt to the changing needs of the population. Despite a rapidly aging patient base and an increasing prevalence of chronic disease, medicine continues to be practiced according to a model best suited for episodic care and acute illness. Furthermore, the current primary care workforce may lack the capacity to meet the rising demand, particularly in low-income communities.[4] According to the latest Council on Graduate Medical Education report, only 17% of medical school graduates chose primary care specialties as their first choice,[5] and, in a 2007 survey of fourth-year medical students, only 2% were planning careers in general internal medicine.[6] High workload and low reimbursement are among the most commonly cited reasons for decreased interest in the primary care fields.[5]

Overcoming these hurdles will require a fundamental transformation in how care is delivered. How best to accomplish this has been the subject of intense research and discussion in recent years. The patient-centered medical home (PCMH) is one model that is increasingly regarded as a promising strategy for improving healthcare quality, decreasing cost, and enhancing the experience of both patients and providers. By combining traditional strengths of primary care with newer practice innovations, the PCMH reorganizes systems of care to better align care processes with patient needs. The PCMH is defined by 7 core principles: (1) enhanced access, (2) continuity, (3) comprehensiveness, (4) team-based care, (5) care coordination and management, (6) a systems-based approach to quality and safety, and (7) reimbursement structures that reflect the added value of PCMH functions. At its essence, the PCMH seeks to foster robust, ongoing partnerships between patients and their healthcare team. In doing so, it capitalizes on new staffing models and technologies to facilitate proactive interactions with patients that optimize preventive and chronic illness care. This article will provide an overview of the PCMH concept, including its history, the key elements, and an update on the evidence for its effectiveness. Although a substantial amount of work on the PCMH has been reported in the pediatric literature, this review will focus on the PCMH model as it applies to adult medicine.

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HISTORY OF PATIENT-CENTERED MEDICAL HOME

The concept of the PCMH has roots as early as 1967, when the American Academy of Pediatrics (AAP) introduced the term "medical home" to describe the role of the primary care pediatric practice as the repository of medical records for chronically ill children.[7–9] The AAP later expanded the definition to include primary care that is accessible, continuous, comprehensive, coordinated, family-centered, and culturally effective.[10]

The World Health Organization's International Conference on Primary Health Care at Alma-Ata in 1978, which outlined the scope of primary care as a practice domain, incorporated a number of concepts now described as part of the PCMH. These include access to care, continuity of care, comprehensiveness and integration of care, patient education and participation, team-based care, and public policy that supports primary care.[11] These precepts were embraced by the Institute of Medicine (IOM) in the 1990s in a series of reports on primary care that made specific reference to the term "medical home."[12] In 1996, Dr Ed Wagner, director of the McColl Institute for Healthcare Innovation at Group Health Cooperative of Puget Sound, introduced the chronic care model, which has also made important contributions to the development of the PCMH. The chronic care model offered a set of new approaches to chronic disease care, with an emphasis on team-based care, patient self-management support, and the use of information technology to support evidence-based care processes.[13] Building on both the chronic care model and the medical home concept promoted by the IOM, the American Academy of Family Practice (AAFP) called for "a personal medical home for each patient" as part of its Future of Family Medicine project in 2004. The AAFP report described how elements of the chronic care model could be

DOI:10.1002/MSJ

Table 1. *Joint Principles of the Patient-Centered Medical Home.*

Personal physician	Each patient has an ongoing relationship with a personal physician trained to provide first-contact, continuous, and comprehensive care.
Physician-directed medical practice	The personal physician leads a team of individuals at the practice level who collectively take responsibility for the ongoing care of patients.
Whole-person orientation	The personal physician is responsible for providing for all the patient's healthcare needs or taking responsibility for appropriately arranging care with other qualified professionals.
Care is coordinated and/or integrated	Across all elements of the complex healthcare system (eg, subspecialty care, hospitals, home health agencies, nursing homes) and the patient's community (eg, family, public and private community-based services). Care is facilitated by registries, information technology, health information exchange and other means.
Quality and safety	Are hallmarks of the medical home and are achieved by incorporating a care-planning process, evidence-based medicine, continuous quality improvement and performance measurement, information technology, patient-centered care, collection of patient feedback, patient participation in quality improvement activities, and a voluntary medical home recognition process.
Enhanced access	Care is available through systems such as open scheduling, expanded hours, and new options for communication between patients, their personal physician, and practice staff.
Payment	Appropriately recognizes the added value provided to patients who have a patient-centered medical home beyond the traditional face-to-face visit.

Abbreviations: PCMH, patient-centered medical home. Summarized from American Academy of Family Physicians *et al.*, Joint Principles of the Patient-Centered Medical Home.[16]

applied more broadly in the primary care setting.[14] In 2006, the American College of Physicians (ACP) published a description of the "advanced medical home," which affirmed the AAFP position and emphasized the need for a reformed reimbursement structure to support medical home functions.[15] The next year, the AAP, AAFP, ACP, and the American Osteopathic Association further refined the medical home concept, highlighting the importance of patient-centeredness, in their Joint Principles of the Patient-Centered Medical Home (Table 1).[16] The PCMH was soon endorsed by dozens of other medical trade groups, including several subspecialty societies and the American Medical Association.

Healthcare professionals were not alone in their pursuit of delivery system reform. Frustrated with the inefficiencies of the healthcare system, several major national employers reached out to physician groups in 2006 to form the Patient-Centered Primary Care Collaborative (PCPCC). Joined also by national health plans, consumer groups, labor unions, healthcare quality improvement organizations, and others, the PCPCC served as a major catalyst for the development of the Joint Principles and became a key advocate for the PCMH. In order to create industry standards and ultimately facilitate provider reimbursement for PCMH functions, the PCPCC drafted eligibility criteria for recognition as a PCMH, which were adopted by the National Committee for Quality Assurance (NCQA) in 2008 and updated in 2011 (Table 2).[17] Although the NCQA has been an early leader in PCMH recognition, other accrediting bodies have since offered PCMH-recognition programs, including the Accreditation Association for Ambulatory Health Care,[18] URAC (formerly the Utilization Review Accreditation Commission),[19] and the Joint Commission.[20]

COMPONENTS OF PATIENT-CENTERED MEDICAL HOME

Although a number of different definitions of the PCMH now exist,[16–22] most are consistent with the framework laid out in the Joint Principles. Conceptually, the model may be described as combination of the core attributes of primary care–access, continuity, comprehensiveness, and coordination of care–with new approaches to healthcare delivery, including office practice innovations and reimbursement reform. The practice innovations that characterize the PCMH serve as tools to actualize the core primary care attributes and other desired outcomes of the PCMH. Such innovations include new options for access and patient-provider communication; team-based care; systems of care coordination, population management, and care management; new tools for quality improvement and patient safety; and effective use of health information technology (HIT). Many of these practices emerged as a result of learning collaboratives sponsored by the Institute for Healthcare Improvement,[23–25] experience from the AAFP

DOI:10.1002/MSJ

Table 2. *NCQA PCMH 2011 Standards*

Standard	Content Summary
Enhanced access/continuity	Access to culturally and linguistically appropriate routine/urgent care and clinical advice during and after office hours; electronic access; continuity and team-based care.
Identify/manage patient populations	Collection of demographic and clinical data for population management; assessment and documentation of patient risk factors; identification of patients for proactive and point-of-care reminders.
Plan/manage care	Implementation of evidence-based guidelines; identification of patients with specific conditions, including high-risk or complex care needs; previsit planning; care management; medication reconciliation at visits and posthospitalization; e-prescribing.
Provide self-care support/community resources	Assessment of patient/family self-management abilities; referral to community resources for self-management support; collaborative self-care planning; counseling patients on healthy behaviors; assessment and treatment or referral for mental health/substance abuse.
Track/coordinate care	Coordination and tracking of tests and referrals; postdischarge follow-up.
Measure/improve performance	Performance measurement and reporting, including externally; use of performance data for continuous quality improvement; demonstration of improved performance; use of certified EHR technology.

Abbreviations: EHR, electronic health record; NCQA, National Committee for Quality Assurance; PCMH, patient-centered medical home. Summarized from the NCQA PCMH 2011 standards.[17]

National Demonstration Project,[22] and recommendations from the IOM.[26,27]

Core Attributes of Primary Care

The core attributes of primary care, so named because their synergy appears to underlie the value of primary care,[28–31] have been integral to the medical home concept from early on. Access refers to ready access to first-contact care with the health system. At a minimum, access requires the elimination of financial barriers to care. Ideally, ready access is provided not solely to a particular facility, but to one's individual primary care provider (PCP) or other members of the healthcare team with whom the patient has a personal relationship. Continuity has been described as patient-centered relationships that are developed in the context of family and community and are sustained over time.[29] Comprehensiveness refers to the provision of the full spectrum of the patient's physical and mental healthcare needs or taking responsibility for arranging referral when appropriate. Coordination of care involves guiding access to services and communicating with other healthcare providers, community-based services, and family.

Practice Innovations

Enhanced Access

The practice innovations incorporated into the PCMH support these core attributes as well as introduce new dimensions to the mechanism of primary healthcare delivery. Enhanced access refers to the use of open scheduling (also known as open-access scheduling or advanced-access scheduling), expanded hours of operation, and new options for communication between the patient and his or her care team. Open scheduling involves a reengineering of the scheduling grid to allow patients to access their own PCP on short notice. In pure open-scheduling systems, distant appointments are left unscheduled, and patients return for visits when it is most convenient for them. Partial open access maintains routine scheduling practices for most visits while reserving a limited number of appointments in a given PCP's schedule for urgent visits with his or her own patients. Expanded office hours include evening and weekend hours as well as 24-hour phone access to an on-call provider able to retrieve patients' electronic health records (EHRs). New options for communication between the patient and his or her care team include phone consultations and various forms of electronic communication, ranging from secure messaging to Web-based patient portals. Web portals may enable patients to view and manipulate the content of their EHRs, request or directly schedule appointments, request medication renewals, access health education and disease self-management tools, or navigate to relevant community-based resources.

Team-Based Care

Another practice-level innovation essential to the PCMH is the use of multidisciplinary teams to deliver care and execute quality-improvement initiatives.

DOI:10.1002/MSJ

Effective utilization of team-based care capitalizes on the strength of each team member's skill set while enabling cross-training of staff to improve the care team's capacity. Moving beyond the traditional physician-centered care model poses significant financial, professional, and cultural challenges; however, given the current primary care physician workforce uncertainties and the number of new processes required to sustain a PCMH, asking members of the care team to work at the top of their license and/or skill level is essential.

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In the PCMH, nonphysician staff members assume prominent roles in both direct patient care and care-coordination activities. For example, at some centers, medical assistants are responsible for previsit planning and leading "huddles" to anticipate care needs prior to patients' visits, as well as conducting postvisit follow-up on issues such as medication tolerance and adherence.[32–34] Medical assistants have also been trained to conduct certain routine physical-examination components, such as the monofilament foot examination to screen patients with diabetes for peripheral neuropathy.[32,33] Furthermore, medical assistants and others of similar training levels may be used to conduct population-management activities for average- or moderate-risk patients, as described below.[34] According to most models of team-based care, registered nurses assume care management roles for higher-risk patients with chronic disease. Other staff members, such as social workers, nutritionists, referral coordinators, and registrars, may also assume enhanced roles. With adequate support for administrative tasks and routine clinical care, physician effort is freed up to focus on complex medical management.

Critical to the success of team-based care is optimal communication among team members. Daily or twice-daily huddles serve as a reliable opportunity for staff communication, providing a forum to troubleshoot both patient and team issues. In many practices, communication is further facilitated by consistent PCP–medical assistant pairing. In addition, regular team meetings are necessary to nurture relationships among team members and address operations issues as they arise.

Team meetings may also provide a setting for rapid-cycle quality improvement, another important component of team-based care. Team members learn to work in a collaborative, nonhierarchical manner to identify areas for improvement, carry out tests of change, and measure progress. In the PCMH, continuous quality improvement is a core team function, serving not only to drive practice improvement but also to help maintain the integrity of the teams themselves.

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Population Management

The team structure lends itself well to practices of proactive patient care, including population management, care coordination, and care management. Population management involves the use of electronic patient registries to identify patients due for routine health maintenance interventions or patients with chronic conditions who have gaps in their care. Outreach is then performed in order to link patients to needed services. Registry data are also used for population profiling, in which patients are risk-stratified and selectively targeted for various condition-specific interventions. In order to preserve continuity and enhance coordination, population management is often conducted at the level of individual patient panels. For example, in practices that utilize PCP–medical assistant pairs, or "teamlets," the medical assistant may serve as "panel manager" for that teamlet's panel of patients.[34]

Care Coordination

Certain approaches to care coordination also represent relatively recent developments in practice organization. In particular, team-based care and advances in HIT have led to more reliable systems of referral and transition care management. Referral management includes referral coordination and referral tracking; it is typically performed by administrative staff but may be performed by nurse care managers in medically complex patients. Transition care refers primarily to postdischarge follow-up and most often involves outreach by nursing staff. Care coordination also entails the maintenance of collaborative relationships among members of the "medical

DOI:10.1002/MSJ

neighborhood'' within which the PCMH is situated.[35] For example, the use of formal care coordination agreements between PCPs and subspecialist physicians has been promoted by the ACP as a means to improve the quality and efficiency of care for shared patient populations.[36] At some institutions, salaried physicians are provided with dedicated time for care coordination, including real-time electronic consultation with specialists.[34]

Care Management

Patients who are identified as high risk for disease-related complications or recurrent resource utilization through population profiling or other referral mechanisms may be enrolled in care management programs. In the context of the PCMH, care management is usually led by nursing staff but requires frequent communication with the PCP and ongoing coordination with all members of the care team. Elements of care management include assessment, collaborative care planning, patient self-management support, ongoing monitoring using evidence-based practice protocols, and medication management. Population management and care coordination for high-risk patients is also performed by care managers. Patient-centered interactions inform all aspects of care management. For example, collaborative care planning explicitly incorporates the expressed needs and values of the patient, and often the family, in the care-planning process; and techniques of self-management support, such as assessment of readiness to change, motivational interviewing, and goal-setting, encourage patient-driven behavior change.

Systems-Based Approach to Quality and Safety

Patient-centered medical home performance is optimized by a systems-based approach to quality and safety. Mechanisms to monitor and improve quality and safety are prioritized at the highest levels of practice leadership and constitute some portion of the routine activities of every member of the care team. Continuous quality improvement is guided by a leadership team or teams and is largely carried out through rapid-cycle change processes at the level of the patient care teams. Clinical information systems are leveraged for performance measurement at the provider, team, and institutional level; and internally and publicly reported outcomes are used to spur practice improvement. In addition, patient feedback is systematically collected and patients are recruited to participate in quality-improvement initiatives—an exercise that has been shown to enhance patient-staff interactions and increase patients' participation in their own care.[37]

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Finally, practices seeking PCMH status are expected to demonstrate accountability by participating in a voluntary recognition process, such as that administered by the NCQA.

One quality indicator that the PCMH draws specific attention to, as its name implies, is patient-centeredness. Definitions of patient-centeredness have evolved over the years, from descriptions of interactions within the patient-physician interview to broader considerations of how health services are administered. In its pivotal 2001 report *Crossing the Quality Chasm*, the IOM defined patient-centered care as ''healthcare that establishes a partnership among practitioners, patients, and their families (when appropriate) to ensure that decisions respect patients' wants, needs, and preferences and that patients have the education and support they need to make decisions and participate in their own care.''[26] Others have described patient-centered interactions in terms of multiple modes of communication, including communication with office staff, written materials, phone calls, and electronic correspondence.[38] The term has also been used to describe health-system designs in which resources and services are organized around patients rather than around service providers.[38] Examples include enhanced access, streamlined office flow, and colocation of services. Whether at the provider, staff, or systems level, the notion of patient-centeredness simply implies viewing the world from the perspective of the patient. Patient-centeredness is infused throughout nearly all aspects of the PCMH, from office operations to clinical processes of care to measurement of ''patient-centered outcomes,'' such as patient satisfaction.[39]

Health Information Technology

Health information technology supports a wide array of PCMH functions and includes EHRs, computerized provider order entry, clinical decision support systems, population-management applications, and quality measurement and reporting tools. In addition to providing a reliable, portable clinical database,

DOI:10.1002/MSJ

EHRs can serve as a powerful vehicle for promoting patient self-efficacy, through such measures as a written care plan and after-visit summary. As previously mentioned, patient portals also offer opportunities for self-management support as well as creating new options for access and communication. Interoperable EHRs facilitate coordination among care providers, and referral-tracking capabilities ensure appropriate follow-up of external specialty services. Test tracking, medication alerts, and electronic prescribing are intended to provide important patient safety functions. Health maintenance care prompts and embedded clinical prediction rules allow systematic application of evidence-based medicine, and patient registries facilitate population- and disease-management activities. Advanced health information systems offer performance measurement functions that are readily manipulated without technical support.

Reimbursement Reform

One of the major challenges of transforming a practice into a PCMH is that many of the essential functions of the PCMH are not supported by traditional fee structures. In order for activities such as population management, care coordination, and care management to be sustainable, payment schemes that either directly reimburse for these functions or incentivize their intended outcomes are needed.

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Support for HIT infrastructure and other capital improvements is also frequently required. Many payment models have emerged, and a number have recently become available on a large scale. These models fall into 5 broad categories: (1) modified fee-for-service (FFS) systems, (2) blended payments, (3) shared savings, (4) comprehensive payments, and (5) grant-based payments.

Fee-for-service reimbursement structures can be modified to support PCMH activities by either offering payment for traditionally nonbillable codes or by offering enhanced rates for qualifying practices. The Texas Medicaid program, for example, reimburses for care management services provided to children as part of its Health Steps Early and Periodic Screening, Diagnosis, and Treatment program.[40] Horizon Blue Cross Blue Shield of New Jersey offers similar reimbursements.[41] Blue Cross Blue Shield of Vermont and Blue Cross Blue Shield of Michigan pay enhanced rates to qualifying practices for a variety of codes.[41]

Blended payment models include FFS plus lump sum payments, FFS plus a per-member-per-month (PMPM) care coordination fee to cover non–visit-based care, and FFS with both a PMPM fee and a pay-for-performance (P4P) component. Insurers participating in the Pennsylvania Chronic Care Initiative provide periodic lump sum payments to practices based on the level of NCQA PCMH achievement.[42] The North Carolina, Rhode Island, and New York Medicaid programs offer additional PMPM payments for practices attaining NCQA PCMH recognition,[41–43] and Medicare now features a PMPM care coordination reimbursement for qualifying practices.[44] EmblemHealth in New York and Colorado's Multi-Payer Initiative provide FFS payments with both PMPM and P4P features.[45,46]

Shared savings models allow practices or networks of providers to share in any cost savings that result from decreased health service utilization among patients under their care. Shared savings programs usually occur as part of a blended payment model, whereby provider entities that meet certain quality targets qualify for 50/50 shared savings using a formula that compares total practice costs with expected expenditures. The Pennsylvania Chronic Care Initiative[42] and the Geisinger Health Plan[47] utilize blended payments with shared savings components, and the Medicare Shared Savings Program is currently accepting applications from entities seeking to benefit from this model by becoming accountable care organizations (ACOs).[48] Accountable care organizations spread accountability beyond individual practices by reimbursing networks of physicians, hospitals, and other providers for collectively improving quality and reducing costs for a defined population of patients. Although past experience is limited, Medicare ACOs are considered a potentially important vehicle for large-scale cost management in healthcare. By relying on physician leadership and incorporating quality metrics, ACOs are thought to avoid some of the pitfalls of the failed managed care schemes of the 1980s and 1990s. Eventually, multi-payer ACOs may emerge as strategy to broaden the model to even larger patient populations.

The comprehensive payment model is similar to a capitation model but moves beyond simple capitation by including enhanced payments to support PCMH functions. It includes a risk-adjusted

DOI:10.1002/MSJ

PMPM payment for all primary-care services, with a P4P bonus. The Capital District Physician Health Plan of New York is one payer that is piloting this approach.[49]

Grant-based payments remain a common form of reimbursement for PCMH efforts. Federal programs are among the most notable recent examples. Financial support for the adoption of HIT has been made available through the Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act of 2009 to promote the "meaningful use" of HIT.[50] The Medicare Medical Home Demonstration, which started in 2007 and provided a care management fee to qualifying practices, was replaced in 2011 with the Multi-payer Advanced Primary Care Practice Demonstration and the Federally Qualified Health Centers Advanced Primary Care Practice Demonstration.[51,52] The Affordable Care Act includes 2 major demonstration programs that support PCMH systems: the Medicaid Health Homes Initiative[53] and the Center for Medicare and Medicaid Innovation Health Care Innovation Challenge,[54] both of which are in the process of being rolled out.

EVIDENCE FOR EFFECTIVENESS OF PATIENT-CENTERED MEDICAL HOME

Fueled in part by new reimbursement opportunities, the PCMH movement has gained significant momentum all across the country. Health maintenance organizations, networks of Medicaid providers, community health centers, private integrated delivery systems, and the Veterans Health Administration have all demonstrated leadership in implementing PCMH interventions. In 2008, when the NCQA introduced its standards for PCMH recognition, 28 practices achieved NCQA PCMH recognition. Today, more than 1500 sites across the country are NCQA-recognized PCMHs, the greatest number being found in New York State.[17]

As investment in the PCMH deepens, rigorous assessment of the model's ability to improve quality, enhance patient experience, and reduce healthcare costs is increasingly important. The evidence for effectiveness of the PCMH is largely indirect and of mixed quality but overall points in a positive direction. Much of the data cited in support of the PCMH come from studies of individual components of the PCMH, including enhanced access, continuity, patient-centeredness, patient self-management support, and use of HIT. Some of the highest-quality studies of PCMH components include randomized controlled trials (RCTs) of interventions based on the chronic care model or related models of chronic disease care. Evaluations of interventions that incorporate most or all elements of the PCMH are only recently beginning to emerge.

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Patient-Centered Medical Home Components

Enhanced access, which includes open-access scheduling, expanded office hours, and new options for communication between patients and members of their care team, may have positive effects on a number of measures. In a recent systematic review of open-access scheduling interventions, open-access scheduling was reported to improve timeliness of care, increase continuity, and reduce no-show rates. However, effects on patient satisfaction and utilization were mixed, and data on clinical outcomes and loss to follow-up were sparse. Furthermore, the potential for bias in the studies was high, as the majority of the studies were uncontrolled before-and-after evaluations, and many sites implemented other practice initiatives simultaneously.[55]

Expanded office hours, particularly Saturday appointments, may increase patient satisfaction and decrease demand for additional office hours.[56] New options for patient-provider communication also appear to be bearing fruit. For example, RCTs have demonstrated that the use of patient Web portals can improve adherence to treatment in patients with congestive heart failure (CHF)[57] as well as a number of processes and outcomes in patients with diabetes mellitus (DM), including patient-provider communication, patient satisfaction, disease biomarkers, DM-related emotional distress, and urgent-visit utilization.[58–62]

Continuity of care has been associated with improvements in a number of processes and outcomes, although the studies are largely observational and employ inconsistent definitions of continuity. In general, greater continuity has been linked to increased delivery of preventive services, improved medication adherence, decreased hospitalizations and emergency-department utilization, and increased patient satisfaction.[63–69] Studies evaluating the benefits of continuity with an individual

DOI:10.1002/MSJ

provider compared with continuity with a physical site alone report higher patient satisfaction but no consistent improvements in outcomes or cost savings.[68,70–73]

Similar to the literature on continuity, evaluations of the effects of patient-centeredness are plagued by methodological problems and lack of consensus around the definition of the term and measurement methods. Many studies of patient-centered interactions have focused on patient satisfaction, with some reporting increased patient satisfaction[74–77] and others failing to do so.[78–81] One study found no association between objective measures of patient-centered communication and outcomes but reported that patients' own perceptions of the patient-centeredness of the encounter did predict subsequent health status and resource utilization.[82] A recent systematic review of RCTs of shared decision-making supported by patient decision aids revealed that the use of patient decision aids led to improvements in patients' decision-making process and decreased utilization of health services, including prostate-specific antigen testing for prostate cancer screening and major elective surgery.[83]

Another important component of the PCMH is self-management support for patients with chronic disease. High-quality data are limited and results are mixed, but some RCTs have shown benefit. Self-management support interventions targeting patients with DM have produced the most consistently positive findings. Two consecutive systematic reviews of RCTs found that group-based, structured DM self-management support led to statistically significant improvements in glycated hemoglobin, blood pressure, body weight, foot care, diet, exercise habits, DM knowledge, feelings of empowerment, treatment satisfaction, and quality of life.[84,85]

The impact of self-management support on outcomes for adults with asthma, hypertension, hyperlipidemia, CHF, and other chronic conditions is less clear.[86–90] Battersby *et al.* recently identified a number of specific principles of self-management support that have been linked to improved outcomes, such as shared decision-making, collaborative problem-solving and goal-setting, and the delivery of self-management support by diverse providers and in diverse formats.[91]

As previously described, HIT underlies a number of critical functions of the PCMH, and efforts to understand its impact are mounting. Although the quality of data is variable and outcomes are mixed, evidence of the benefits of HIT appears promising. Ninety-two percent of the studies in a recent review reached overall positive conclusions, linking HIT to improvements in access to care, delivery of preventive services, processes of care, effectiveness of care, efficiency of care, patient safety, and patient satisfaction. The impact on provider satisfaction was less positive, with providers citing upfront cost and unsatisfactory technical support as barriers to successful adoption of HIT.[92] Indeed, only one-third of ambulatory practices currently use EHRs of any kind,[93–95] and only a small proportion routinely use decision support and disease management technologies.[96–98]

Chronic-Disease Care

Further indirect evidence for the effectiveness of the PCMH comes from studies of integrated multidisciplinary team-based interventions aimed at managing patients with chronic disease. Team-based care and chronic-disease management are important aspects of the PCMH, and evidence of the success of such approaches has been instrumental in guiding efforts to incorporate these strategies into broader systems of primary care delivery. There is tremendous heterogeneity in the designs described in the literature, but, in general, interventions that have been shown to be successful employ one or more elements of the chronic care model; these elements include delivery-system changes, decision support, expanded use of clinical information systems, patient self-management support, organizational commitment to quality and safety, and mobilization of community resources. Substantial data from RCTs indicate that integrated multidisciplinary chronic disease management interventions can improve patient satisfaction, processes of care, and clinical outcomes. A more limited body of literature demonstrates favorable impacts on resource utilization and cost. Whereas some programs target high-risk, multimorbid patients,[99–102] the majority involve disease-specific intervention strategies, typically for the management of type 2 DM, depression, asthma, chronic obstructive pulmonary disease (COPD), or CHF.

Improved patient satisfaction is among the most commonly reported outcomes in RCTs of disease-management interventions.[84,85,99–110] Some studies have also demonstrated improvement in patient-perceived coordination of care.[100,105] Few studies have included provider satisfaction as an outcome measure. One trial involving elderly, multimorbid patients found no statistically significant difference in provider satisfaction with chronic illness care but did find increased provider satisfaction with patient and family communication and knowledge of patients' clinical characteristics.[99,111]

DOI:10.1002/MSJ

Improvements in processes of care and clinical outcomes have also been shown in a large number of trials. Care processes that have been reliably shown to be improved by such interventions include appropriate laboratory testing and complication screening for patients with DM, namely lipid testing, screening for microalbuminuria, and foot examination[107,112,113]; and appropriate use of medications for depression,[102–104,114] DM,[108] and CHF.[115,116] A number of trials have also demonstrated improved patient knowledge,[108,117] self-efficacy,[109] and self-care in patients with DM[107,108–122] and CHF.[115,123] Positive clinical outcomes have included decreased glycated hemoglobin,[59,106–109,117,121,122,124–136] blood pressure;[59,108,113,127,130–133] lipids,[59,106,107,117,126,130–134] and body weight[59,117,126] in patients with DM; improved disease-specific symptomatology in patients with depression[102–104,114] and asthma[137–142]; improved New York Heart Association class in patients with CHF[116]; improved quality of life in patients with asthma,[138–142] COPD,[143–147] and CHF[115,148]; and decreased mortality in patients with CHF.[116,123,149]

A significant number of RCTs of disease-management interventions targeting COPD and CHF have demonstrated decreased resource utilization and cost. Studies have shown decreased rates of urgent visits, emergency department visits, and hospital admissions and readmissions, as well as net cost savings.[116,123,143,149–163] A small number of trials involving DM care have reported decreased hospitalizations and cost.[109,121,164] It is possible that interventions directed at DM may have more substantial impact on utilization and cost in the long term; however, few trials extend beyond 1 year, and the complications of DM may take decades to develop. Evidence of beneficial effects on utilization and cost among trials of depression management interventions is even more limited. A recent systematic review of healthcare expenditures for patients enrolled in disease management programs for depression, DM, COPD, or CHF found that only 1 of the 4 RCTs focusing on depression reported cost savings.[165] Of note, disease management programs that are well integrated into physician practices may be more likely to realize cost savings than those that are not. A 2012 Congressional Budget Office report on Medicare disease management demonstration projects indicated that programs in which care managers had substantial direct interaction with physicians and significant face-to-face communication with patients were more likely to reduce Medicare spending than were external disease management programs.[166]

Patient-Centered Medical Home Interventions

Ultimately, the value of the PCMH will be determined by evidence from interventions that include a wide variety of PCMH components. Although hundreds of PCMH pilots are currently taking root across the country, most are either in the early stages of development or have yet to be evaluated using high-quality research designs. To date, there are only 3 comprehensive PCMH interventions that have produced peer-reviewed publications: the AAFP National Demonstration Project, the Geisinger ProvenHealth Navigator model, and the PCMH model developed at Group Health Cooperative of Puget Sound.

The National Demonstration Project, a multicenter RCT of facilitated versus self-directed PCMH interventions, was launched in 2006 by the AAFP in response to the practice redesign recommendations of the 2004 Future of Family Medicine report that called for a "new model of family medicine." The trial included 36 independent family-medicine practices from across the United States. Facilitated practices received ongoing consultant support, whereas self-directed practices received access to Web-based practice-improvement tools without consultant support. No practices received additional financial support. The practice model was developed by TransforMED, an AAFP subsidiary, and, although it predated the Joint Principles and NCQA PCMH standards, its elements are consistent with both.[22] The principal findings of the first 2 years of the trial were that it was difficult but feasible to adopt a large number of PCMH components in both the facilitated and self-directed practices; that quality measures significantly improved in both groups; and that adoption of PCMH components was associated with improved access and enhanced quality of care for both preventive and chronic-care services. However, there were no significant differences in outcomes between the facilitated and self-directed groups, which may be an effect of the benefits seen in the self-directed group rather than a lack of benefit in the facilitated group (Table 3).[167,168]

At about the same time, similar PCMH models were being developed at Geisinger Health System in Pennsylvania and Group Health Cooperative of Puget Sound, 2 not-for-profit integrated delivery systems that have been on the forefront of healthcare-delivery innovation since the 1990s. Both PCMH models include all capabilities described in the Joint Principles and the NCQA PCMH standards, as well as additional features. The PCMH functions at both sites are supported by robust HIT systems and appropriately aligned reimbursement structures.

DOI:10.1002/MSJ

Table 3. *Outcomes of Comprehensive PCMH Interventions*

Intervention	Study Design, Setting	Clinical Outcomes, Patient/Provider Satisfaction	Utilization	Cost Savings
National Demonstration Project[168]	Multicenter RCT, independent family medicine practices	Improved ACQA and chronic-care quality scores in control and intervention groups; no significant differences in outcomes between groups	Not reported	Not reported
Geisinger ProvenHealth Navigator[169–171]	Controlled cohort studies, integrated delivery system	Decreased odds of DM-related foot amputation or ESRD	18% reduction in hospital admissions and 36% reduction in readmissions	4.3%–7.1% savings (depending on prescription drug coverage interaction effects)
Group Health Cooperative PCMH[34,172]	Controlled cohort studies, integrated delivery system	20%–30% greater improvements in composite HEDIS scores, increased patient satisfaction, decreased provider emotional exhaustion	29% reduction in emergency department visits, 6% reduction in hospitalizations	Estimated total savings of $10.30 per member per month ($P = 0.08$)

Abbreviations: ACQA, Ambulatory Care Quality Alliance Starter Set; DM, diabetes-related; ESRD, end-stage renal disease; HEDIS, Healthcare Effectiveness Data and Information Set; PCMH, patient-centered medical home; RCT, randomized controlled trial. All results statistically significant unless otherwise specified.

In 3 separate observational studies using historical and cohort controls, Geisinger's ProvenHealth Navigator model was associated with improved clinical outcomes,[169] decreased hospital admissions and readmissions,[170] and cost savings.[171] A pre-post controlled cohort study of the Group Health PCMH pilot reported increased patient satisfaction, decreased staff burnout, improved composite quality measures, and fewer emergency department visits in the intervention group (Table 3).[34] A follow-up analysis also demonstrated a reduction in hospitalizations and a trend toward cost savings.[172] Although these results are encouraging, the data from both Geisinger and Group Health must be interpreted with caution. Not only are conclusions limited by the observational nature of the research designs employed, but the generalizability of the findings beyond integrated delivery systems with progressive reimbursement structures is unclear.

A number of non–peer-reviewed evaluations of PCMH interventions have also generated positive findings. Other private integrated delivery systems, the Veterans Health Administration, private payer–sponsored initiatives, and Medicaid-supported efforts have given rise to PCMH interventions associated with improved quality, decreased utilization, and cost savings.[173–179] In addition, the Commonwealth Fund 2006 Health Care Quality Survey revealed that patients treated at practices possessing certain PCMH characteristics were more likely to report receiving preventive care reminders, report that their chronic conditions were controlled, and report that their care was coordinated, compared with patients treated at practices without these characteristics.[180] Interpretation of these results is limited by the narrow medical home definition used in the study and the self-report nature of the data.

CHALLENGES

Although early implications of the PCMH movement are promising, formidable hurdles remain. Reimbursement reform is in its infancy, and misaligned incentives continue to reinforce the status quo. Moreover, transformation into a PCMH requires practices to adapt and grow in ways that represent unprecedented challenges. Creating the infrastructure to support the PCMH often necessitates tremendous investment in internal practice capacity. Building capacity at the practice level involves a wide range of efforts, including facilitation of staff buy-in, creation of effective patient-care teams, workforce development and workflow redesign, optimization of HIT, and establishment of linkages to local community-based organizations. Practices frequently require external facilitation of such measures,[167] and larger practices with greater technological resources are more likely to achieve success.[181]

DOI:10.1002/MSJ

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As noted from the National Demonstration Project, practice transformation is not solely a matter of added resources and new technologies.[167] It requires committed leadership, a robust "core structure," and adequate "adaptive reserve"–or institutional resiliency in the face of continual change. Furthermore, embracing the PCMH calls on staff to adopt new mental models of patient care. For example, in moving toward team-based care, physicians are forced to re-examine their professional identity and replace traditional authoritarian leadership styles with facilitative leadership skills. Nonphysician team members face similar challenges to their work identity as their roles and responsibilities expand.[182]

CONCLUSION

Despite these challenges, mounting pressures to rein in healthcare costs, coupled with supportive public policy and private-payer trends, have created fertile ground for widespread efforts toward PCMH implementation. The extent to which these efforts achieve the full intent of the PCMH model and whether or not large-scale PCMH adoption can meaningfully impact clinical outcomes and bend the healthcare cost curve for the country as a whole remain to be seen. For the time being, the PCMH can be regarded as a contemporary approach to primary care that aligns care processes, incentives, and patient needs and, under the best of circumstances, is likely to improve the quality of care, enhance patient and staff experience, and generate moderate cost savings. As options for PCMH recognition continue to be refined and scholarly activity around the PCMH grows, we will have more opportunities to accurately measure to the impact of the model and predict its role in addressing the inadequacies of the current healthcare system.

DOI:10.1002/MSJ

DISCLOSURES

Potential conflict of interest: Nothing to report.

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