

Will the patient-centered medical home improve efficiency and reduce costs of care? A measurement and research agenda

Appendix

This Appendix describes the evidence-informed conceptual model that formed the basis for the recommendations identified in the related commentary.

Conceptual Model

There are few studies of the cost or efficiency effects of introducing a PCMH in the extant literature (Paulus et al. 2008; Reid et al. 2009). The limited evidence, however, suggests some early successes in reducing avoidable emergency department and inpatient care related to the introduction of more integrated case management services. Such changes are likely to improve efficiency (by improving outcomes in a cost-effective way) and may also reduce total costs. The recent PCMH evaluation by Reid et al. (2009) is the most comprehensive to date although the nature of the practice setting and intervention limit generalizability to most ongoing PCMH pilots. In this study, implementation of a PCMH in a staff-model health maintenance organization resulted in reduced primary care contacts, emergency department use, and ambulatory care sensitive admissions although to date, there has been no statistically significant change in total costs due to offsetting increases in primary care and specialist costs.

To augment these insights from the emerging literature on PCMH experiments we developed a logic model for the PCMH based on a simple characterization of the prototypical PCMH pilot along two dimensions: new payment incentives introduced as part of the pilot and structure/process improvements as described by the NCQA PPC-PCMH assessment criteria. Table 1 summarizes the linkages among the elements of the PCMH as implemented in the prototypical pilot and a set of proposed measures or proxies for cost and efficiency.

Payment Incentives

Most PCMH pilots involve new payments to participating practices that are allocated based on the number of eligible patients attributed to the practice. In at least one demonstration, such per-person payments will completely replace standard fee-for-service payments, although in most demonstrations these payments are in addition to standard fee for service. To the extent such payments are sufficient to cover the incremental costs of becoming a PCMH, they encourage participation and recruitment/retention of eligible patients. Theoretically, these payments are designed to compensate PCMH practices for non-visit based care and enhanced capabilities for care and population health management that is delivered through these practices (Huang et al. 2008). In addition to participation payments, some PCMH pilots include new pay for performance incentives specifically designed as part of the pilot (other participating plans have existing pay for performance, but if there are no changes these programs should not enter the logic model). Pay for performance might be used to target cost and/or efficiency either directly or indirectly. For example, specific utilization and spending (including, for example, a case-mix adjusted measure of cost per episode) targets might be included in a bonus arrangement. Likewise, pay for performance might be used to reward practices for reducing overuse of services such as imaging for low back pain, or for increasing generic prescribing.

Alternatively, pay for performance might affect cost or efficiency through targeting intermediate health outcomes for chronically ill patients (e.g., blood pressure control for patients with CAD), which in turn is tied to reductions of costly future events. For

instance, improved blood pressure management among diabetic patients might delay the onset of cardiovascular or renal complications. Pay-for-performance programs that solely target process measures of performance such as HEDIS-like prevention, screening, and chronic care management measures are less likely to have a beneficial effect on costs or efficiency, although some measures have been found to be cost-saving or cost-effective (Neumann and Levine, 2002). For the purposes of the logic model, pay for performance might be linked to cost or efficiency through both direct and indirect means, depending upon the specific measures included.

Structural and Process Change Elements of PCMH Pilots

Although each PCMH pilot will vary in terms of the scope and nature of practice re-engineering that will be undertaken by participating practices (often in conjunction with collaborating organizations and health plans), three key structural domains of the PCMH can be identified: enhanced access, informed care management, and care coordination (Table 1). These domains, and the structural and process changes that populate them, correspond to high-level domains of the NCQA PPC-PCMH assessment tool, as well as to the core elements outlined in the joint principles. Individually and together, the structural and process improvements act as levers to improve patient care and may be associated with changes in utilization and cost that impact efficiency.

Enhanced access

PCMH interventions attempt to increase access to primary care by establishing an explicit link between each patient and a primary care physician, and by improving

both visit and non-visit based access to that physician and other members of the health care team within the practice. Expanding the methods a patient can interact with their provider outside of an office visit, increasing the hours to receive care in the out-patient setting, and removing some of the language, cultural, and other barriers preventing people from accessing care should improve the delivery of more timely, patient-centered, effective care. With the emerging shortage of primary care physicians, increased access in the PCMH through approaches other than face to face visits with a physician will become a major focus of attention. Experimentation with such approaches is well underway and draws upon a long history of similar approaches used by staff and group model health plans and large capitated physician groups. Examples include expanded telephone and email access to the practice, offering information through practice or organizational websites, the use of group visits, and the use of case managers embedded in practices. In theory, primary care visits – only one element of primary care access – may decrease, as access to non-visit based care, and team visits substitute for traditional physician visit-based care. Alternatively, aspects of the primary care visit might be performed by other staff thus freeing clinicians to see larger numbers of patients.

The effect of this transformation on specialty care use is as yet unknown. Specialist visits may increase or decrease depending upon whether they complement rather than compete with or substitute for primary care. In particular, as multifaceted access to primary care increases, the ways in which primary care physicians and specialists collaborate may well change resulting in increased but more effective consultations.

Studies of these individual access components of the PCMH provide some insights into expected cost or efficiency changes. Previous studies have shown that areas with greater access to primary care physicians experience lower total health care costs and hospitalizations. In some studies, having a continuous primary physician has been found to be one of the most significant factors in explaining total health care costs (De Maeseneer et al. 2003). While PCMH interventions will sometimes create access to primary care where there was none, in many cases the PCMH is intended to enhance existing relationships and interactions. For example, one area the PCMH aims to improve is the availability of primary care for urgent needs. The inability of patients to receive outpatient care when needed increases emergency department utilization, which can lead to unnecessary diagnostic studies and more inpatient hospitalizations. Access to a primary care physician with knowledge of the patient's history, co-morbid conditions and responses to prior therapy might avert some admissions (Billings et al. 1996). This increased access can be brought about through open access scheduling, expansion of practice hours, offering expanded access to the practice team through phone or email consultation, or developing new creative approaches to meeting patients' needs. Barriers to access for primary care services, including the inability of patients to visit during practice hours and being unable to see a physician promptly, have been associated with increased use of emergency departments (Rust et al. 2008).

While the use of health information technology (e.g., personal health records) and email communication for patient care is relatively nascent, there is some evidence to suggest that such contact will reduce the need for more intensive services. For example, studies have found that after-hours telephone calls to nurses from primary

care providers' offices have been associated with reduced hospital admissions resulting in lower health costs (Lattimer et al. 2000).

Another example of enhanced access covered by the PCMH is the provision of language access services. Individuals for whom English is a second language receive inadequate primary care services when they encounter physicians who cannot speak their language or understand their views and beliefs, or attend facilities with no interpreter. This can lead to poor primary care and, in some cases, preventable hospitalizations. Some observational studies suggest that adequate interpreter services can reduce the cost of care by preventing resource over-utilization caused by language barriers. It has been found that patients needing but lacking a professional interpreter have a higher incidence and costs of tests received in the emergency department as well as being more likely to be admitted to the hospital than patients using interpreters or not requiring interpreter services (Hampers and McNulty 2002). Reviews of the literature examining language services find that more research is needed about the costs of linguistic services weighed against the monetary savings they could provide (Flores 2005; Jacobs et al. 2006).

Informed care management

Another core element of the PCMH is the prospective management of the practice population's health, with a particular focus on individuals with chronic medical conditions. The PCMH requirements for infrastructure and capabilities to manage such patients effectively are derived in large part from the Chronic Care Model (CCM) (Pawlson et al. 2009). Improved care management, which involves extensive non-visit

based care, might increase or decrease both primary care and specialist visits (and thereby payer costs) by the same logic described in the previous section on access. For most major chronic conditions, where adherence to recommended prescription drug treatment is an important element of care, prescription drug utilization and possibly cost might increase if the PCMH were successful. Likewise, for chronic conditions where increasing recommended test frequency is an element of quality improvement, utilization of tests may increase as a result of the PCMH.

Further, while there is an evidence base supporting a connection between the CCM and cost and efficiency, findings must be qualified based on the population and the specific components of the CCM that were tested. Two systematic reviews of the literature on the impact of the CCM address cost impacts, although the earlier study alone provided a detailed synthesis of studies on these outcomes (Bodenheimer et al. 2002; Coleman et al. 2009). This study found 27 articles that reported utilization or cost outcomes and relied on research designs with a comparison group (experimental or quasi-experimental) (Bodenheimer et al. 2002). In this review, interventions all involved patient education and self-management support; some also included the deployment of case managers, team-based care, and other elements of practice redesign. Overall, the results were mixed but with a number of very positive findings in support of utilization or cost reductions attributable to the CCM. Three of five, 8 of 13, and 7 of 9 CCM studies targeting CHF, asthma, and diabetes, respectively, showed a reduction in utilization or costs. Not surprisingly, reductions in hospital admissions (disease-specific) were the primary source of reduced resource use and savings. For asthma, emergency department visits were also reduced in some studies.

Another source of evidence to support a logical relationship between the PCMH and costs or efficiency comes from studies connecting improved processes of care with improvements in intermediate health outcomes and potentially decreased utilization and costs. One observational study by Wagner et al. (2001) found reductions in hospitalization, ED visits, and physician consultations among diabetes patients who had improvements in glycosylated hemoglobin (reduction of 1% or more). Similar findings have been demonstrated for improved control of hypercholesterolemia and hypertension (Rizzo and Simons 1997; Sokol et al. 2005). Some other studies of implementations of the CCM have shown improvements in either processes of care or intermediate outcomes of care, although some studies have shown no effect (Homer et al. 2005; Asch et al. 2005; Chin et al. 2007; Landon et al. 2007; Vargas et al. 2007).

Coordination of care

One of the most compelling components of the medical home model is the provision of care coordination through the integration of care managers into the practice (or community in some cases) and the development of systems to coordinate and track patient care outside the practice (i.e., test and referral tracking systems). These practice capabilities are particularly important for improving transitions in care, an area of health care that has dramatically worsened over time (Sharma et al. 2009). One recent study found that only 23% of PCPs communicated directly with in-patient doctors, and that a discharge summary 2 weeks after discharge was available for only 42% of patients (Bell et al. 2009.) The consequences of poor care coordination are substantial (Coleman et al. 2006.) In Medicare, 20% of discharged patients are re-hospitalized within 30 days

and half of those re-hospitalized patients have not had an ambulatory visit before the re-hospitalization (Jencks et al. 2009.) Bringing case managers into the ambulatory practice offers direct communication with PCPs and the potential to improve practice efficiency by utilizing an interdisciplinary team to ensure that appropriate follow-up is provided without asking the PCP to be responsible for implementing the plan. Moreover, there is emerging evidence that practice-based care management can reduce readmissions. Recently, Geisinger Health System experienced a 20% reduction in readmission rates following the introduction of case managers in their ambulatory practices (Paulus et al. 2009.)

Other care coordination efforts have been less successful in reducing utilization and costs. The Medicare Health Support demonstration, a set of parallel randomized, controlled trials of care management delivered by third parties to disease-specific populations concluded with little effect on health care spending or quality (Peikes et al. 2009.) These findings, however, may be less relevant to the PCMH than practice-based interventions (such as the Geisinger Health System approach) because Health Support relied on telephonic third-party care managers without direct involvement of the physician or care team.

Cost Measures

While changes in cost are anticipated only as a direct result of changes in utilization (as opposed to prices), many stakeholders will be interested in dollar-denominated effects. Translating utilization effects into costs is useful not only for interpretability of category-specific results but also because it allows for aggregation of

positive and negative changes across categories of utilization (e.g., prescription drugs and inpatient care). Calculating payer costs using actual dollars paid (“allowed amounts” reported on claims data) may be the simplest approach for evaluators examining single payer interventions involving fee for service (as compared to prepaid or salaried). Actual paid amounts, however, will generally vary across providers according to negotiating power in addition to resource intensity. To facilitate comparison across evaluations and within pilots that involve multiple providers and payers, therefore, we recommend that researchers use a common fee schedule to yardstick; another approach would be to use average rates calculated from all-payer, all-provider data.

Summary measures of spending across categories of utilization will also be needed. There are two obvious approaches to summarizing spending: spending per case (episode) and risk adjusted spending per member (or “attributed” patient) per month. Cost per case, calculated using standard episode grouper software has the advantage of accounting for case mix differences. Costs per member per month have the advantage of simplicity and the ability to detect changes in the number of episodes as well as cost per episode, but requires risk adjustment. Both types of spending measures can be calculated using standard software. In addition to total spending for the entire enrolled population, cost/efficiency measures should be calculated for subsets of patients who might benefit most from the PCMH (e.g., patients with diabetes, CAD, or multiple chronic conditions). Ultimately, evaluations of total costs will require accounting for the costs of implementing PCMH incentives or programs, which may not be reflected in claims data but nevertheless add to costs for payers. Moreover, the costs of

implementing the PCMH should be expressed in a manner that facilitates comparison with other costs of care (Huang et al. 2008.) Evaluators should endeavor to collect information on all of these relevant costs.

Table 1. Logical Connections between PCMH Pilots and Utilization, Cost Measures

PCMH Pilot Element	Utilization/Spending Affected	Basis for Expected Effect, Measure Specification
Pay for Performance	Potentially anything measurable that contributes to cost and efficiency, including measures of over use and misuse	Mixed evidence of improvement on targeted process measures and intermediate outcomes with one study finding cost savings; no evidence for over use and misuse
Enhanced Access Expand non-visit modes 24/7 availability Personal physician Language/culture/disability sensitive communication	Primary care visits/primary care spending	Minimal evidence; visits, billed services could increase or decrease
	Specialist visits	Minimal evidence; specialist visits, billed services could increase or decrease. Coordinated and comprehensive primary care has been cross-sectionally associated with less frequent use of specialist referrals
	Hospital admissions: ambulatory care sensitive	Management of chronic disease in comprehensive, coordinated way (such as in the Chronic Care Model) in outpatient setting can lead to fewer hospitalizations and lower overall costs (costs of intervention of improved care on front end is offset by costs of avoided hospitalizations) in

		Medicaid patients. Findings in children that more continuous care with a primary care provider leads to less emergency department visits and hospitalizations (Christakis, Mell et al. 2001)
	Hospital readmissions: all-cause and ambulatory care sensitive. Ambulatory care sensitive ED visits	Evidence of language concordance between attending physician and patient in inpatient settings leads to slightly lower costs and lowers return visits to the emergency department.
Informed Care Management Registries Care management function Support for self-care Electronic prescribing	Physician visits	Studies of the chronic care model for individual chronic conditions have found reductions in physician visits.
	Tests	Testing recommendations for chronic illness would suggest that improved care management would increase certain tests, such as HbA1c and cholesterol tests.
	Prescription drugs	Pharmaceutical treatments are recommended for maintenance of major chronic conditions and underused in standard settings so QI would imply increased utilization of prescription drugs
	Ambulatory-care sensitive admissions	Studies of the chronic care model for individual chronic conditions

		have found reductions in admissions and readmissions.
	Hospital readmissions	Same as above.
	ED visits for chronic conditions, particularly asthma	Studies of the chronic care model for asthma have found reductions in ED visits.

Coordination of Care Test tracking Referral Tracking Management post-discharge for all patients	Readmission (all cause)	Practice-based and community-based management of transitions in care have been shown to reduce readmissions
	Testing	Theoretically could be increased or reduced by better tracking
	Referrals to specialists	Theoretically could be increased or reduced by better tracking

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