

Patient-Centered Medical Home Transformation With Payment Reform: Patient Experience Outcomes

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Objective: To examine changes in patient experience across key domains of the patient-centered medical home (PCMH) following practice transformation with Lean quality improvement methodology inclusive of payment reform.

Study Design: Pre-intervention/postintervention analysis of intervention with a comparison group, a quasi-experimental design. We surveyed patients following office visits at the intervention (n = 2502) and control (n = 1622) practices during the 15-month period before and 14-month period after PCMH Lean transformation (April-October 2009).

Methods: We measured and compared pre-intervention and postintervention levels of patient satisfaction and other indicators of patient-centered care. Propensity weights adjusted for potential case-mix differences in intervention and control groups; propensity-adjusted proportions accounted for physician-level clustering.

Results: More intervention patients were very satisfied with their care after the PCMH Lean intervention (68%) compared with pre-intervention (62%). Among control patients, there was no corresponding increase in satisfaction (63% very satisfied pre-intervention vs 64% very satisfied postintervention). This comparison resulted in a statistical trend ($P = .10$) toward greater overall satisfaction attributable to the intervention. Post-intervention, patients in the intervention practice consistently rated indicators of patient-centered care higher than patients in the control practice, particularly in the personal physician and communication domain. In this domain, intervention patients reported superior provider explanations, time spent, provider concern, and follow-up instructions compared with control participants, whereas control group ratings fell in the postintervention period (P for difference $\leq .05$).

Conclusions: In a pilot PCMH transformation including Lean enhancement with payment reform, patient experience was sustained or improved across key PCMH domains.

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The patient-centered medical home (PCMH) has emerged as a patient-focused, quality-driven, cost-effective model to revive primary care. A growing body of literature supports the notion that health systems emphasizing the role of primary care can achieve superior outcomes at a lower cost.¹ The PCMH joint principles were developed into a set of best practices by the National Committee for Quality Assurance and have been used as the blueprint for organizational change for many recent PCMH demonstration projects. As preliminary results of PCMH demonstration projects emerge, successes have shown that the PCMH has the potential to reduce cost and improve quality,^{2,3} although transformation is often challenging⁴ and short-term declines in satisfaction may be observed following interventions to implement the PCMH model.³ Coupling practice transformation with payment reform may encourage more rapid adoption of the PCMH model, and both private and public payers are starting to invest heavily in such transformation pilots. Lean quality improvement methodology have been incorporated with some PCMH transformations to help facilitate PCMH practice improvements, but did not integrate changes to the current resource-based relative value scale.³ Therefore, if the PCMH model is to be widely utilized, it will be vital to demonstrate that its implementation with concurrent payment reform results in favorable outcomes with respect to quality and cost, as well as patients' perceptions of care.

Overlooked for many years, patient experience has recently gained increasing prominence. The Affordable Care Act of 2010 calls for novel approaches to increase patient access and enhance patient-centered care in order to improve patient experience and outcomes.⁵ In general, patient-centered care experiences and outcomes-oriented research are becoming increasingly recognized as a core element of quality health-care delivery in the United States and other countries.⁶ In their pursuit of a 3-part aim to improve quality, cost, and patient experience, some health plans and health systems have begun to link measures of patient satisfaction to provider payment.⁷

Few data have been available regarding the effect of PCMH transformation, with or without Lean quality improvement methodology, on patient experience in the setting of payment reform. To assess the impact on patient experience of transformation of care to a medical home linked with implementation of a new

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physician reimbursement scheme, we undertook a 3-year quasi-experimental study. We assessed patients' experience with office visits at a clinic site where these interventions were implemented compared with a control site, both within a high-performing, large, multispecialty group practice. We evaluated the effect of PCMH transformation, including Lean quality improvement methodology, on patient experience with a widely used survey for measuring patients' experience with outpatient care.

METHODS

Study Design and Data Collection

Following Cook and Campbell's classification of quasi-experimental studies, we used an Untreated Control Group Design with Pretest and Posttest.⁸ In both the experimental and control groups, we conducted cross-sectional surveys of patients' experiences with care before and after the implementation of the PCMH model in the experimental site. We studied responses to a mail copy of the medical experience survey developed by Press Ganey (www.pressganey.com), a widely used, commercially available tool for measuring patients' experience with outpatient care. All surveys were mailed 1 week after a patient's encounter. Survey response rates across all clinic sites in the integrated system were 28.1% in 2008, 28.3% in 2009, and 36.6% in 2010. The study protocol was approved by the Partners Healthcare Institutional Review Board.

Setting and Participants

The study was conducted within Harvard Vanguard Medical Associates, a large multispecialty group of 14 practices in eastern Massachusetts, frequently recognized for achieving high scores in quality metrics.⁹ For this study, we included 2 of the 14 practices: 1 practice that underwent PCMH transformation with payment reform in 2009 and 1 practice, 12 miles away with a similar demographic composition, that served as the control. Patients who had at least 1 internal medicine office visit from 2008 through 2010 were stratified by primary care provider. For each provider, surveys were mailed to 200 randomly selected patients, evenly distributed over the course of each of the 3 study years; each patient was surveyed only once per year. Between January 2008 and June 2009 (pre-intervention), a total of 2027 patients completed the survey: 1224 at the intervention site and 803 at the control site. Between July 2009 and December 2010 (postintervention), we collected 2097 completed surveys: 1278 from the intervention

Take-Away Points

Using a quasi-experimental design, we evaluated patient experience following patient-centered medical home (PCMH) practice transformation with Lean enhancement coupled with payment reform.

- Compared with controls, intervention participants were more likely to report faster speed of registration ($P = .04$) and provide higher ratings across the personal physician and communication domain ($P \leq .05$) after the pilot program.
- 62% of intervention participants were very satisfied pre-intervention versus 68% post-intervention ($P = .004$).
- Future studies are needed to determine if physicians, over time, will thrive under an adjusted salary-based reimbursement system in the PCMH.

site and 819 from the control site. Intervention and control participants were propensity weighted to adjust for possible case-mix differences between these 2 groups (see the Statistical Analysis section for more detail).

The Intervention

The intervention was a pilot that started in April 2009 in the internal medicine department of 1 clinic site. It consisted of team restructuring in addition to a series of process improvements including use of Lean reengineering,¹⁰ centered around optimizing chronic disease management and reassigning tasks traditionally performed by a physician to medical assistants or nurses. For example, nurses were trained to use medication titration protocols for virtual management of many chronic diseases, shifting simple visits off provider schedules, and medical assistants took over many administrative duties traditionally completed by physicians. Components of the intervention are summarized in **Table 1** and are described in greater detail elsewhere.¹¹

Changes in physician payment were structured around the proposal by Goroll and colleagues¹² that involved replacing productivity-based (fee-for-service) compensation with a salary and bonus scheme. Each physician's base salary was determined by their highest earnings over the prior 4 quarters. The pilot salary scheme did not have penalties for low productivity; it also incorporated quality-based bonuses for reaching benchmarks in the Healthcare Effectiveness Data and Information Set performance metrics and for responsiveness to patient communication (via telephone or secure message). Initially, 5 physicians were enrolled in the salary and bonus scheme. By the end of the pilot intervention's implementation in October 2009, a total of 14 physicians (100% of the internal medicine department) had joined the salary scheme. All physicians at the intervention site remained salaried for the duration of the postintervention period.

Main Outcomes

The primary outcome was overall visit satisfaction,

■ **Table 1.** Practice Management and Care Delivery Changes at the Intervention Clinic

Component	Feature
Health information technology	
Virtual medicine	Financial bonuses for timely response to secure e-mail messages and telephone encounters
EHR use	Advanced, multifunctional EHR including electronic prescribing, complex disease management program, and registry capability
Chronic disease management	
	Nurse-run chronic disease management program capitalizing on integrated EHR capabilities
Practicewide changes	
	Lean quality improvement methods facilitated by external consultants; daily care team huddles focusing on process improvement measures (eg, phone call response rates) and visible display of progress made toward these targets
Team care	
	Uprtrained MAs to work 1 to 1 with physicians; MAs were taught to perform tasks traditionally completed by physicians such as health maintenance review, pre-visit laboratory ordering, and basic medication reconciliation
Quality improvement measures	
	Tracking of patient flow and practice process (eg, appointment access, visit wait times); targeted chronic disease management (eg, LDL-C, hypertension); monitoring of cost and utilization
Payment model	
	Salary based on highest earnings in prior 4 quarters; bonus payments (\$10,000-\$30,000) available for particular quality metrics

EHR indicates electronic health record; LDL-C, low-density lipoprotein cholesterol; MA, medical assistant.

measured on a 5-point Likert scale. Patients were asked to indicate their “overall rating of care provided” for the survey-tagged visit. Satisfaction was analyzed as a dichotomized variable “very good” versus “good,” “fair,” “poor,” or “very poor.” Secondary outcomes were drawn from the 5 domains within the Press-Ganey survey that reflect the core principles of the PCMH: enhanced access to care (3 items), visit coordination and care (3 items), physician communication (4 items), and whole-person orientation of care (3 items).¹³ Responses to items within each domain were measured on the same 5-point Likert scale and dichotomized as described above. Individual survey responses were linked to each patient’s medical record, providing demographic information (age, sex, race, insurance status), healthcare utilization (the number of internal medicine and urgent care visits in the 6 months preceding the surveyed visit), certain medical conditions (hypertension, diabetes, cardiovascular disease), body mass index (dichotomized as less than 25 kg/m² vs 25 kg/m² and greater), and primary care provider characteristics (sex and number of years since hire).

Statistical Analysis

All variables used in the patient experience analysis are dichotomous, so descriptive statistics of patient characteristics and experiences in the control and intervention groups in the pre-intervention and postintervention periods were calculated using proportions. Our main analysis was to

compare control and intervention groups with respect to patient experiences; however, because of possible baseline differences in patient experiences in the control and intervention groups, we compared the postintervention minus pre-intervention experiences in the control group with the postintervention minus pre-intervention experiences in the intervention group, commonly referred to as a difference-in-differences analysis.

Propensity score weighting was used to adjust for case-mix differences between patients in the control and intervention groups in the pre-intervention and postintervention periods.¹⁴ In general, propensity score methods permit control for observed confounding factors that might influence both the outcomes (in our study, patient experiences) and the comparison groups (for control and intervention groups in the pre-intervention and postintervention periods) using a single composite measure. The propensity score attempts to balance patient characteristics between the comparison groups, as would occur in a randomized experiment. The propensity of being in the 4 groups (control and intervention groups in the pre-intervention and postintervention periods) was calculated using multinomial logistic regression models with all patient characteristics available to us as predictors: patient age, sex, race, insurance status (Medicare or Medicaid vs private insurance), the number of active medications, healthcare utilization (number of internal medicine and urgent care visits in the 6 months preceding the visit referenced in the patient

experience survey), and whether the patient had any or all of the following chronic conditions: diabetes, hypertension, heart disease, or overweight.

To calculate propensity-adjusted proportions using the propensity-weighted approach, each patient was weighted by the inverse propensity score of being in their observed treatment group. *P* values comparing propensity-adjusted proportions across treatment groups were calculated using generalized estimating equations¹⁵ to account for physician-level clustering.

For all analyses, a *P* value of $\leq .05$ was considered statistically significant. All analysis was completed using SAS/STAT 9.2 (SAS Institute Inc, Cary, North Carolina).

RESULTS

Between January 2008 and June 2009 (pre-intervention), a total of 2027 patients completed the patient experience survey: 1224 at the intervention site and 803 at the control site. Between July 2009 and December 2010 (postintervention), we collected 2097 completed surveys: 1278 from the intervention site and 819 from the control site. After propensity weighting on all available demographic and clinical status variables, the intervention and control sites were similar with respect to all baseline variables (Table 2).

The propensity-weighted proportions, accounting for provider-level clustering (Table 3), show that overall satisfaction was higher at the intervention site following the intervention (68% indicated “very good” postintervention versus 62% pre-intervention, $P = .003$). In contrast, at the control site, 63% of patients felt satisfied pre-intervention versus 64% postintervention ($P = .58$). Using a difference-in-differences approach, we did not detect a statistically significant difference in overall satisfaction when the 2 sites were compared ($P = .10$), though a trend was apparent. However, at the intervention site, we noted a clear pattern of consistent or improved patient satisfaction across the personal physician and communication domain, which focused on perceptions of the care provider’s characteristics during the visit referenced in the survey. In this domain, improved ratings of provider explanations, time spent, concern, and follow-up instructions were observed compared with responses from control participants, whose ratings fell during the postintervention period ($P \leq .05$ for all differences).

Although intervention participants rated their care equal or better across the access to care, coordination of care, and whole-person orientation of care domains postintervention, these ratings did not reach statistical significance compared with those of the control group. An exception was observed for speed of registration in the access to care domain: 62% of patients at the intervention site rated this element of care

as “very good” pre-intervention, increasing to 66% postintervention, compared with 63% pre-intervention and 60% postintervention at the control site ($P = .04$ for difference).

DISCUSSION

In this study of patient satisfaction before and after a pilot PCMH implementation with payment reform including Lean quality improvement methodology for chronic conditions within a large multispecialty practice in eastern Massachusetts, we did not observe significant statistical differences in overall patient-reported satisfaction when comparing the intervention and control sites, though there were some trends toward improvement. Notably, contrary to previously reported PCMH transformations without Lean quality improvement methodology, we found no short-term declines in patient experience despite the widespread, practice wide transformation that occurred.

We also found that patients were significantly more satisfied following the pilot implementation at the intervention site when asked to rate physician attributes and communication. These findings may provide reassurance to clinicians and health system administrators who harbor concerns about the potential for medical home transformation initiatives to compromise patient satisfaction with their provider over the short term. In fact, they suggest the possibility that medical home transformation may bolster or at least maintain patient-provider relationships within a team-based setting.

Of interest was the fact that we observed a decline in patients’ perceptions of physician communication in the control practice. Several possible explanations could account for this finding. For example, it may reflect increasing external pressures within primary care following Massachusetts’s 2006 mandate for universal health coverage. The fact that we observed the opposite trend in the intervention site could indicate that PCMH transformation with Lean quality improvement methodology and payment reform may fortify primary practices to weather such external pressures. We did note that 1 of 10 physicians left the internal medicine department in 2010 at the control site, potentially contributing to loss of morale and increased workload among providers during this time period. We were unable to identify additional local-level influences such as support staff turnover, structural renovations, or similar specific attributes to support these findings.

It is possible that the negative pattern in the personal physician and communication domain leading to the observation of relatively superior ratings at the intervention site may also be explained by changes in physician behavior. According to the qualitative analysis of this transformation, the interven-

■ **Table 2.** Baseline Characteristics at the Intervention Site (Medford) and Control Site (West Roxbury): Unadjusted (Unweighted) and Adjusted (Using Propensity Weighting)

Variable	Control, n (%)		P	Intervention, n (%)		P	P for Difference in Differences
	Pre-intervention (n = 803)	Postintervention (n = 819)		Pre-intervention (n = 1224)	Postintervention (n = 1278)		
Age >65 years							.48
Unweighted	283 (35)	291 (36)	.90	507 (41)	533 (42)	.89	
Weighted	296 (37)	320 (39)	.44	474 (39)	492 (39)	.90	
Male sex							.82
Unweighted	267 (33)	289 (35)	.39	496 (41)	517 (41)	.97	
Weighted	307 (38)	319 (39)	.74	460 (38)	500 (39)	.51	
White race							.89
Unweighted	557 (70)	587 (72)	.29	1094 (90)	1134 (90)	.94	
Weighted	661 (83)	675 (82)	.93	1009 (82)	1051 (82)	.92	
Insurance status Medicare/Medicaid							.61
Unweighted	281 (35)	267 (33)	.31	535 (44)	545 (43)	.59	
Weighted	302 (38)	328 (40)	.33	475 (39)	507 (40)	.69	
Healthcare utilization							
Internal medicine visits ≥5 in prior 6 months							.96
Unweighted	530 (66)	549 (67)	.66	895 (73)	585 (67)	.001	
Weighted	545 (68)	562 (69)	.80	838 (68)	882 (69)	.78	
Urgent care visits ≥2 in prior 6 months							.66
Unweighted	360 (45)	358 (44)	.65	436 (36)	422 (33)	.17	
Weighted	298 (37)	310 (38)	.82	468 (38)	476 (37)	.66	
Chronic conditions							
Hypertension							.98
Unweighted	321 (40)	376 (46)	.02	495 (40)	575 (45)	.02	
Weighted	351 (44)	356 (43)	.92	533 (44)	553 (43)	.93	
Cardiovascular disease							.65
Unweighted	56 (7)	78 (10)	.06	160 (13)	149 (12)	.28	
Weighted	89 (11)	84 (10)	.63	132 (11)	139 (11)	.93	
Diabetes							.76
Unweighted	118 (15)	131 (16)	.47	179 (15)	211 (17)	.19	
Weighted	115 (14)	129 (16)	.60	189 (15)	203 (16)	.81	
Tobacco							>.99
Unweighted	362 (47)	385 (47)	.81	516 (47)	562 (46)	.40	
Weighted	396 (49)	407 (50)	.89	548 (45)	576 (45)	.89	
Six or more medications							.95
Unweighted	546 (57)	479 (58)	.49	710 (58)	783 (61)	.10	
Weighted	465 (58)	482 (59)	.82	717 (59)	756 (59)	.86	

tion site physicians experienced reduced time pressure as a result of delegation of administrative tasks to the team, freeing up time for longer encounters and more detailed discussions.¹¹ Newly salaried physicians, no longer conforming to

the fee-for-service model, may have felt more freedom to prioritize topics on their patients' agenda or engage in traditionally poorly reimbursed activities such as discussion of social issues or matters of behavioral health. These factors may have

Table 3. Visit Experiences Among Patients Receiving Care at the Intervention and Control Sites: Percentage in Each Group Reporting “Very Satisfied”^a

Visit Experience	Control, %				Intervention, %				P for Difference in Differences
	Pre-intervention (n = 803)	Post Intervention (n = 819)	Difference	P for Difference	Pre-intervention (n = 1224)	Post intervention (n = 1278)	Difference	P for Difference	
Enhanced access to care									
Ease of scheduling appointment	65	63	-2	.30	65	65	0	.89	.55
Ability to get desired appointment	37	47	-10	.002	40	52	12	<.001	.51
Promptness in returning calls	46	42	-4	.19	47	48	1	.82	.21
Coordination of care									
Speed of registration	63	60	-3	.13	62	66	4	.17	.04
Wait before exam room	51	50	-1	.77	44	44	0	.99	.82
CP information from specialist physicians	50	52	2	.56	49	52	3	.24	.65
Personal physician/communication									
CP explanation of problem	82	75	-7	.006	77	77	0	.94	.05
Time CP spent with patient	70	66	-4	.26	68	72	4	.07	.05
Concern expressed by CP	82	74	-6	<.001	76	76	0	.74	.02
CP instructions for follow-up	70	64	-6	.002	66	68	2	.37	.01
Whole-person orientation of care									
Sensitivity to patient’s needs	55	52	-3	.21	55	58	3	.32	.11
CP’s knowledge of you	61	61	0	.97	58	61	3	.52	.64
Patient’s confidence in CP	79	76	-3	.25	75	78	3	.25	.10
Overall impressions									
Overall assessment of care	63	64	1	.58	62	68	6	.004	.10
Recommend CP	75	73	-2	.36	71	73	2	.55	.28

CP indicates care provider.
^aPropensity-adjusted proportions.

contributed to stable ratings at the intervention site, while physicians burdened with maintaining patient volume and executing a myriad of administrative items tasked to a primary care doctor may have felt less inclined to invest in discussion or longer encounters.

A trend toward improvement in overall satisfaction at the intervention site relative to the control site postintervention was observed in our study. Although participants provided ratings that were either sustained or improved postintervention across the access to care, coordination of

care, and whole-person orientation of care domain, these improvements did not reach statistical significance compared with ratings in the control group. Possible reasons for these findings include the following: (1) Harvard Vanguard already was considered a high-performing medical system, leading to a ceiling effect for detecting substantial change from the pilot intervention, and (2) changes within team structure and work flow in the medical home pilot intervention may have been too subtle for patients to appreciate, or too early to have seen sustained effects. Other surveys of

PCMH endeavors with Lean quality improvement methodology have found that sustained outcome changes could take up to 5 years.¹⁶

Taken together, the findings in this study provide timely information and implications for design and implementation of medical home models. In order to align patient satisfaction with care transformation endeavors, practices interested in transforming toward a medical home model may want to consider physician payment reform in the early phases of implementation in order to potentially enhance patients' relationships with their provider. This study also underscores potential problems associated with evaluating patient satisfaction following implementation of measures that may be patient centered but less visible to patients and therefore less likely to receive a high rating. Longer follow-up periods may be necessary to tease out sustained effects on patient experience of PCMH transformation with Lean quality improvement methodology and payment reform. It is unclear to what extent Lean practice improvements for patients with chronic conditions may have influenced patient satisfaction ratings; future studies could address this issue.

To date, few data have been available regarding the effect on patient satisfaction of medical home transformation with payment reform. In this setting, transformation efforts were led by physicians and staff familiar with the Lean reengineering process of improvement, a well-established tool for practice change.^{10,11} Another strength of this study was that patients' recall bias regarding their experience and satisfaction was minimized by surveys being mailed within a week of their encounter.

Several limitations should be considered, primarily the small number of practices and the patient survey response rate. We evaluated only 2 practices in an integrated delivery system in 1 region, and these results may not be representative of other practices or regions. Although this overall response rate is typical of patient experience surveys in nonresearch settings,^{17,18} the possibility of nonresponse bias remains a concern. Our ability to detect differences was limited by a relatively short time frame. Institutional review board stipulations did not permit identification of nonrespondents to identify systematic differences between the 2 groups. Because this study was not randomized, it is possible that patients systematically chose 1 clinic site over another; however, we used propensity scores, an established method for balancing the observed differences between individuals who self-select to participate in an intervention and those who do not.¹⁹ In a practice transformation intervention with many components, we are limited in our ability to associate a single causal factor with an observed outcome.

Many payers have begun to recognize the importance of

patient experience and have begun to tie measures of patient satisfaction to provider payment. This recent shift may allow providers and healthcare systems to directly understand patient perceptions of their care delivery and may serve as motivation for providers to dedicate time and resources toward activities and programs without direct reimbursement. Upholding the patient-provider relationship as central to the foundation of primary care, our findings suggest that efforts geared toward medical home transformation coupled with physician payment reform can be met with a favorable patient response, particularly with respect to core patient-physician relationship attributes. Additional research should focus on the relative contribution of different factors in improving physician-patient communication and determine whether these satisfaction levels, and other measures of patient satisfaction, can be sustained in the long term as efforts to implement a medical home continue. Future studies should also examine whether physicians and patients, over time, will thrive under a reimbursement scheme where the traditional fee-for-service is replaced with salary-based compensation for PCMH, with or without Lean quality improvement methodology.

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