Original Research

Effect of a Performance Improvement CME Activity on Management of Patients With Diabetes

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Introduction: *Primary care in the United States faces unprecedented challenges from an aging population and the accompanying prevalence of chronic disease. In response, continuing medical education (CME) initiatives have begun to adopt the principles of performance improvement (PI) into their design, although currently there is a dearth of evidence from national initiatives supporting the effectiveness of this methodology. The specific aim of this study was to demonstrate the value of a national PI-CME activity to improve the performance of physicians treating patients with diabetes.*

Methods: *We analyzed data from the American Academy of Family Physicians' METRIC® PI-CME activity in a cohort of family physician learners. The study utilized the 3-stage design standard approved for PI-CME. Baseline and follow-up performance data across a range of clinical and systems-based measures were compared in aggregate.*

Results: *Data were assessed for 509 learners who completed the activity. Statistically significant changes occurred both for self-assessment of a range of practice aspects and for diabetes care measures. Learners recognized that the organization of their practices had improved, and mechanisms were in place for better staff feedback, as well as aspects of patient self-management. Based on the clinical data obtained from 11 538 patient charts, 6 out of 8 diabetes measures were significantly improved.*

Discussion: *The activity appears to have had a positive, measurable impact on the medical practice of learners and suggests that, when appropriately designed and executed, PI-CME on a national scale can be a useful vehicle to influence performance change in physicians and to inform future CME activities.*

Key Words: *diabetes, performance improvement, PI-CME, family physician*

Introduction

Since its publication over a decade ago, the Institute of Medicine's "To Err Is Human" has become a landmark article providing a wake-up call to the state of American health care.[1] Recognition of the fundamental necessity of performance measurement and improvement now impacts all of health care, from national to state levels, all the way to individual clinicians. Performance-based incentive programs such as the Centers for Medicare & Medicaid Services' Physician Quality Reporting System (PQRS) have seen increased year-on-year participation since inception in 2007. Beginning in 2015, this program will impose financial penalties for nonreporting of performance data.[2] The Affordable Care Act is likely to further alter the landscape, requiring health plans and insurance issuers to furnish information on how health outcomes are improved through several means, including comparing indices of quality. Performance measurement as part of an improvement cycle is integral to physician training, as it is already a required component of the American Board of Medical Specialties' Maintenance of Certification (MOC-Part IV) and the Federation of State Medical Boards' Maintenance of Licensure (MOL) framework and is becoming a standard in many residency programs. Although progress has been made, continuing to

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instill the concept of regular measurement of quality and performance as a routine part of improving patient care has never been more important, given the unprecedented challenges faced by the US health care system in the 21st century.

Diabetes represents a grave threat to the long-term health of Americans. Currently, almost 26 million people (more than 8% of the population) have the disease, and many more are at risk.[3] Unfortunately, despite high expenditures for diabetes care, only 7% of patients are currently at goal for hemoglobin A_{1C}, blood pressure, and LDL cholesterol.[4–7] Given its association with poor outcomes and high cost of care, diabetes is an ideal disease state for adoption of both the Chronic Care and Patient-Centered Medical Home (PCMH) models in the primary care environment. At their core, both models highlight the importance of patient-centered care, self-management, patient empowerment, and a team-based approach for improving the management of disease.[4,8–11] Physicians who specialize in primary care—particularly family medicine—are well positioned to maximize the benefits of these care models, as they may have patients of all ages and are often responsible for their care over many years. However, as the front line in the fight against diabetes, these physicians are also the ones who may benefit most from participation in quality/performance improvement (QI/PI) activities in which they can self-assess their practice and make individualized plans to correct deficits with systematic solutions.

Although PI is gaining ground as an accepted methodology for measuring and changing practice, compared to the volume of published material demonstrating the ability of education to change knowledge and competence, evidence of its effectiveness remains scarce. Yet some important articles have begun to enter the literature documenting successes and notable barriers to implementing the methodology and coupling it with CME credit (PI-CME). Findings from the study conducted by the Cease Smoking Today (CS2day) collaborative indicated that educational interventions improved the performance of health care provider learners in utilizing evidence-based smoking cessation procedures.[12] Of importance to the concept of PI, this study also linked education to patient-level outcomes, as indicated by an almost 50% sustained quit rate in patients from participating practices. Boyle et al's study from a PI activity that involved a cohort of elderly patients with diabetes similarly noted that improved utilization of evidence-based procedures corresponded with a sustained reduction in the rate of hypoglycemic events.[13] However, both studies indicated that to be effective the education in the PI activity must account for the complexity of medical practice and have sustained engagement of all stakeholders. In describing their PI model, Brown et al suggested that there are fundamental barriers that need to be overcome to make the methodology more accessible and acceptable to learners, including a general lack of awareness about PI, challenges in adopting a paradigm shift directed at performance-based activities, and time constraints of those engaging in the activity.[14]

In this study, we show results from the American Academy of Family Physicians' (AAFP) METRIC® (Measuring, Evaluating and Translating Research Into Care) PI-CME module on diabetes care in a cohort of family physician participants. The question that guided this study was: *Does PI-CME on a national scale impact the diabetes care given by family physicians across a range of clinical and systems-based quality measures?*

Methods

The PI-CME Activity

Developed by the AAFP, METRIC was designed to provide a completely online experience and a convenient environment to engage learners in the PI process. The online platform was maintained by CECity (CECity Inc., Homestead, PA). Consistent with the 3-stage model for PI-CME jointly developed by the AAFP and the American Medical Association (AMA), METRIC stimulated learning from (a) current practice performance assessment, (b) the application of performance improvement interventions to patient care, and (c) evaluation of the PI results.

Details of these steps as they were applied in METRIC are as follows:

Stage A: Learning from current practice performance assessment (Baseline). In Stage A, participants completed a Practice Self-Assessment Questionnaire (PAQ) and submitted deidentified clinical chart data from at least 10 patients with diabetes. The online PAQ was based on the Assessment of Chronic Illness Care (ACIC) survey that was modified by expert faculty for use in family medicine.[15] The PAQ contained 15 questions that were designed to provoke self-assessment, reflection, and learning in 6 key areas of the Chronic Care model, including organization of practice, community linkages, patient self-management support, decision support, delivery system design, and clinical information systems. By stimulating reflection of their current environment, learners were encouraged to move from "precontemplation" or "contemplation" toward the "preparation" stage in Prochaska and DiClemente's Stages of Change model.[16]

Data elements collected during the chart review were based on the AMA's Physician Consortium for Performance Improvement® (PCPI) measurement set.[17] From the beginning, a balance was sought to facilitate participation by requiring a feasible number of patient charts, while including enough data to show meaningful change as a result of learner participation in the activity. There were

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no specific selection requirements for patients included in the chart review, other than they had been diagnosed with diabetes at least 12 months prior. Using these broad inclusion criteria, learners were advised to pick 10 random cases for inclusion. Learners or their staff were required to manually enter data elements into METRIC's online reporting tool. Following data entry completion, learners were given instantaneous feedback in the form of benchmarking of their own scores compared with the national average of their peers. This feature was designed to facilitate identification of practice gaps.

Stage B: Learning from the application of performance improvement interventions to patient care. The fully online and automated METRIC interface led learners into the second stage of the process, which was to generate and implement an action plan to correct gaps identified in Stage A. METRIC supplied a number of evidence-based and/or expert faculty guided interventions associated with the practice areas covered in the clinical self-assessment. A total of 16 interventions were offered for incorporation into the action plan (TABLE 1), however, in order to concentrate their efforts on properly implementing interventions, learners were advised to focus their action plan on just 3 to 4 of these. Educational strategies for promoting learning during formulation of the action plan included providing links to online resources such as diabetes guidelines, instructional videos, and published articles, as well as downloadable tools and resources for use by physicians, staff, and patients. Learners were encouraged to consult with their colleagues to obtain group buy-in as the action plan was developed, and during implementation maintain compliance with the plan by regularly revisiting it as a group. The online resources on the METRIC Web site were available for consultation throughout the remainder of the activity. Resources did not fundamentally change during the lifetime of the module, although they were periodically reviewed and, if necessary, updated to account for new guidelines or pertinent information.

After submitting their action plan, learners were required to spend at least 1 month, but not more than 12 months, implementing their plan in their practices. This period was consistent with requirements for AAFP/

TABLE 1. Practice Interventions Offered to Learners

	Area of Practice					
Intervention	Organization of Practice	Community Linkages	Patient Self-management Support	Decision Support	Delivery System Design	Clinical Information Systems
Assessment of Chronic Illness Care (ACIC) Survey	X	X	X	X	X	X
Become a Community Leader		X				
Build a Diabetes Care Team	X			X	X	
Build a Patient Registry				X		X
Flow Sheets	X				X	
Group Visits	X			X	X	
Improve Communication With Other Providers	X			X	X	X
Improve Sensitivity to Cross-Cultural Issues in Diabetes Care		X	X			
Medical Nutrition Therapy (MNT)			X	X		
Negotiated Goal Setting			X			
Online Video: The Path to Better Care	X	X	X	X	X	X
Planned Visits and Patient/Staff Reminders			X		X	
Put Guidelines Into Practice				X		
Shared Care Plan	X		X	X		
Smoking Cessation			X			
Volunteer at a Diabetes Camp		X				

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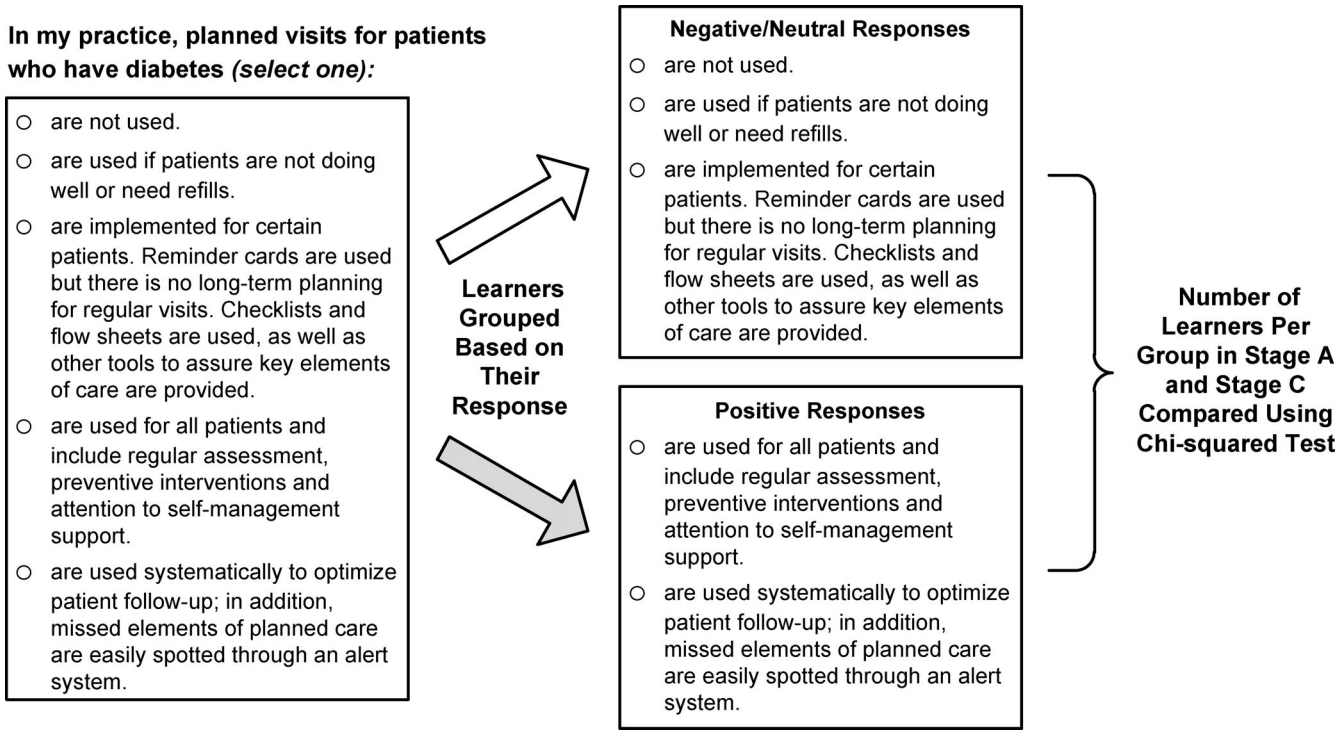

FIGURE 1. Example of Practice Self-Assessment Questionnaire (PAQ) Data Grouping

AMA PI-CME credit and for American Board of Family Medicine (ABFM) MOC Part IV, and provided time for embedding changes into the practice workflow.[18] The implementation time span also provided learners in different practice environments with flexibility in utilizing the action plan and the opportunity to build confidence that it was effectively employed in their practice.

Stage C: Learning from the evaluation of the performance improvement results (Follow-up). The PI cycle was completed when learners resubmitted the practice self-assessment questionnaire and deidentified chart review data for another 10 patients with diabetes. Each learner was then instantaneously given comprehensive benchmarking information showing their own practice performance change, along with the aggregate national change of their peers in both chart and bar graph formats.

Study Methodology

Data Collection and Analysis. Data for practicing family physician (postresidency) learners who had completed both Stages A and C between January 2005 and June 2012 were included in the analysis. Only data from the learners' first passage through the module were used. Because just 10 charts were reviewed per stage, in order to perform a meaningful statistical analysis, all data were compared in aggregate.

Aggregated clinical data from patient charts meeting the care criteria were compared in Stage A and Stage C. The PAQ used appropriately phrased 4- or 5-point scales giving participants a graded range of negative (low), neutral, or positive (high) response options (FIGURE 1). The scale phrasing also allowed learners to visualize the direction they needed to take their practice in order to improve. During analysis, aggregate responses to the PAQ were grouped such that for each question the 2 positive responses were statistically compared against the 2–3 neutral and negative responses. These measurement tools collected both subjective and objective performance (level 5) data on the diabetes care that was provided to patients.[19]

Where appropriate, pre- and postintervention data were compared using the chi-squared test to determine significance. Analyses were considered significant when $p < .05$. All statistical analyses were performed using JMP 10.0 software (SAS Institute, Inc., Cary, NC).

CME Accreditation/MOC Approval

The METRIC diabetes module was certified by the AAFP for Prescribed CME credit and *AMA PRA Category 1 Credit*™. The ABFM approved the METRIC module as an alternative activity for Part IV of Maintenance of Certification for Family Physicians (MC-FP). Learners who had completed the activity were eligible for 20 PI-CME credits and

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TABLE 2. Practice Self-Assessment Questionnaire (PAQ) Data in Stage A (Baseline) and Stage C (Follow-up)

Measure	Stage A Positive Questionnaire Responses ($N = 509$)	Stage C Positive Questionnaire Responses ($N = 509$)	Difference in Number of Learners	Difference in Percentage Points	p Value
Practice Organization	318 (62.5%)	376 (73.9%)	58	11.4	<.001
Linking Patients With Community Resources	161 (31.6%)	198 (38.9%)	37	7.3	.028
Forming Partnerships With Community Organizations	281 (55.2%)	287 (56.4%)	6	1.2	.39
Providing Patient Self-Management Support	153 (30.1%)	181 (35.6%)	28	5.5	.054
Tackling Patient Self-Management Issues	324 (63.7%)	376 (73.9%)	52	10.2	<.001
Implementing Patient Behavioral Change Strategies	132 (25.9%)	169 (33.2%)	37	7.3	.028
Implementation of Evidence-Based Guidelines	132 (25.9%)	169 (33.2%)	37	7.3	.028
Informing Patients About Evidence-Based Medicine	194 (38.1%)	227 (44.6%)	33	6.5	.041
Implementing a Team-Based Approach to Care	98 (19.3%)	128 (25.1%)	30	5.8	.047
Implementing an Effective Patient Follow-up Strategy	216 (42.4%)	250 (49.1%)	34	6.7	.040
Implementing an Effective Patient Planned Visit Strategy	279 (54.8%)	316 (62.1%)	37	7.3	.027
Implementing and Effectively Utilizing a Patient Registry	139 (27.3%)	182 (35.8%)	43	8.5	.005
Implementing Electronic Reminders	172 (33.7%)	211 (41.4%)	39	7.7	.009
Implementing Performance Feedback Strategies	122 (24.0%)	172 (33.8%)	50	9.8	<.001
Incorporating Treatment Targets and Goals Into Practice	170 (33.4%)	203 (39.9%)	33	6.5	.036

were provided with evidence of completion of a Part IV MC-FP module.

Results

A total of 509 practicing physician participants completed the module as first-pass learners and were included in the study. Of these, 51% were male. Learners had a mean age of 44.1 ± 0.5 (±SE) years and were 13.6 ± 0.2 years postresidency at the time they completed the METRIC module. The mean amount of time taken to complete the module was 179.1 ± 4.1 days; the median was 156.5 days. Across all learners who began the module, the completion rate was 43%. Approximately 35% of completers went on to repeat the activity at least once.

Selection of Interventions

Learners selected a mean of 2.9 ± 0.2 (±SE) interventions for their action plans from the 16 available in METRIC's resource list. When grouped together based on practice aspect, uptake of these selections, in order, were: Delivery System Design (38.4 %); Decision Support (22.7 %); Self-Management Support (21.4 %); Clinical Information Systems (10.9 %); Organization of Practice (3.5 %); and Community Linkages (3.1 %). Individual interventions with the greatest uptake were: "Put Guidelines Into Practice" (22.6 %); "Flow Sheets" (14.0 %); "Planned Visits and Patient/Staff Reminders" (11.4 %); and "Build a Patient Registry" (10.9 %).

Practice Self-Assessment Data

Comparison of aggregate learner Stage A and C (baseline versus follow-up) PAQ data showed a modest increase in the number of positive responses across all 15 question items (TABLE 2). With the exception of the questions asking how well practices formed partnerships with community organizations and provision of patient self-management support, all changes were statistically significant ($p < .05$). The greatest areas of improvement were found for how well practices were organized, their ability to tackle patient self-management issues, and implementation of performance feedback strategies. There was some evidence of a slight decline in overall PAQ improvement values (averaged from all 15 PAQ question items) based on time to complete the activity. However, no significant differences could be determined in the data. For learners who completed the activity between 1 and 3 months, mean improvement on the PAQ was 12.9 ± 3.0%; at 4 to 6 months, improvement was 11.4 ± 1.3%; at

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TABLE 3. Chart Review Data in Stage A (Baseline) and Stage C (Follow-up)

	Stage A			Stage C				
Measure	Number of Charts Meeting Criteria (Percentage Total)	Total Number of Charts in Sample	Total Number of Charts Excluded (Charts Excluded Because of Unknown Status)	Number of Charts Meeting Criteria (Percentage Total)	Total Number of Charts in Sample	Total Number of Charts Excluded (Charts Excluded Because of Unknown Status)	Difference in Percentage Points	*p* Value
A_{1C} Was Measured in the Past 12 Months	5460 (94.6%)	5769	0 (0)	5581 (96.7%)	5769	0 (0)	2.1	.069
Urine Microalbumin Was Measured in the Past 12 Months	3647 (66.8%)	5456	313 (164)	4297 (78.5%)	5472	297 (135)	11.7	<.001
Lipid Profile Was Measured in the Past 12 Months	4817 (88.3%)	5456	313 (313)	5052 (92.3%)	5472	297 (297)	4.0	.031
Blood Pressure Was Measured in the Past 12 Months	5726 (99.3%)	5769	0 (0)	5744 (99.6%)	5769	0 (0)	0.3	.28
A Dilated Retinal Exam Was Performed in the Past 12 Months	2605 (58.1%)	4486	1283 (1193)	3515 (71.4%)	4921	848 (742)	13.3	<.001
A Foot Exam Was Performed in the Past 12 Months	3651 (63.5%)	5753	16 (0)	4585 (79.7%)	5757	12 (0)	16.2	<.001
A Flu Vaccination Was Given in the Past 12 Months	2969 (57.8%)	5140	629 (473)	3836 (71.9%)	5338	431 (290)	14.1	<.001
Smokers Who Were Counseled to Quit in the Past 12 Months	890 (66.7%)	1335	4434 (0)	901 (75.1%)	1199	4570 (0)	8.4	.006

7 to 9 months, improvement was 6.9 ± 1.7%; and, at 10 to 12 months, improvement was 7.1 ± 1.6%.

Clinical Practice Data

Deidentified data from a total of 11,538 patient charts were assessed by the 509 learners in this study. From this total, patients were excluded from the analysis if their information was not recorded in the chart ("unknown status") and if they could not be included in a measurement (eg, patients who were blind were not included in the retinal dilation examination measure) (TABLE 3). Assessment of the 8 clinical performance measures revealed several areas of improvement between Stages A and C. Although improvements were noted for the number of patients for whom A_{1C} and blood pressure had been measured in the past 12 months, changes were not statistically significant. However, in baseline, these measures were already commonly recorded and thus further

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improvement was limited by a "ceiling effect." In contrast, statistically significant ($p < .01$) improvement occurred in the number of patients given a urine microalbumin test in the past 12 months, patients referred for a dilated retinal examination in the past 12 months, patients who had been given a foot exam in the past 12 months, patients who had been given an influenza vaccination in the past 12 months, and patient smokers who had been counseled to quit. For each of these measures the baseline values were relatively low. Data for patients who had their lipid profile assessed in the past 12 months indicated an improvement that was statistically significant ($p < .05$), although the high baseline value for this measure suggests the scope for change was limited.

Across all but one of the measures, patients listed with unknown status were $\leq$8.2% of the total per stage (TABLE 3). An exception was noted for the number of patients referred for a dilated retinal exam in the past 12 months. For this measurement in Stage A, 20.7% of patients ($n = 1193$) were recorded as unknown, compared to 12.8% of patients ($n = 742$) in Stage C. Analysis of these data using the chi-squared test suggest results for the 2 stages were significantly different ($p < .01$).

Discussion

With the increasing pressure on the US health care system, it is critical that enhanced practice efficiency and physician performance are linked to reduced costs and improved patient health outcomes. PI methodology is recognized by federal organizations, medical specialty and state licensure boards, medical societies, and CME providers as a modality with the potential to promote lasting changes in practice. This study presents the first description of data from a national PI-CME activity that is also approved for Part IV of MOC.

Our data suggest METRIC had an impact on the quality of care given to patients with diabetes. Although, because of the large sample size, data from several measures in the PAQ indicated statistically significant improvement, actual changes were relatively modest. An explanation for this may be found in the fact that most learners selected only 2 or 3 of the 16 intervention options, leaving the possibility that implementing a few of the proposed interventions might not have the leverage to impact a specific measure, while implementing all of the interventions may have a more dramatic effect. Interestingly, however, greater than one-third of the learners included in this study went on to complete the activity more than once. This reengagement is consistent with the principles of the plan-do-study-act (PDSA) cycle and continuous quality improvement, as learners may have utilized their first experience as a foundation for further, cumulative, system-based practice change.[20] Notably, we could not determine a significant difference between learner improvement data based on the time it took them to complete the activity. Although this could be a reflection of the quantitative limitations of our analysis, it may also suggest logistical factors that might be expected to impact learner engagement and ability to benefit from PI methodology (eg, the effect of practice size, or availability of resources) were not influential in this study.

Clinical data also significantly improved across a range of measures. From these data it appears that in aggregate, learners made improvements in their performance with regard to implementing evidence-based procedures in their practices and accurately recording patient referral histories into their charts. Boyle et al's work is of particular importance to this study.[13] While not specifically focused on physicians or family medicine, their findings are consistent with our results, in that some of the greatest performance changes observed centered on improved provision of foot care and appropriate referral for eye examinations. Given that both Boyle et al's findings and those of the CS2day partnership indicated that improved procedural performance is concomitant with improvement in patient-level outcomes, this allows us to speculate that the performance improvement in our study may also result in an improvement in patient care.[12–13] Furthermore, it is notable that for measures associated with low baseline scores, if these findings are extrapolated to the general family physician population, then this hints at a number of important areas for improvement that may inform future PI-CME activities. Thus, based on these data, there may be a need for activities that address referral strategies for eye examinations, necessity of foot care, smoking cessation, microalbumin testing, and flu vaccination in diabetic patients.

In evaluating the impact of our study, the limitations and compensating strengths of the overall methodology need to be considered. To date, measurement of the effectiveness of PI-CME has been hindered by low completion rates and high attrition among learners.[14] Difficulties in performing meaningful statistical analysis on what is often complex, disparate, clinical and/or systems-based learner performance data further confound efforts to prove the benefit of the education. Moreover, studies of social change in complex adaptive systems are not well suited for a classical randomized controlled trial (RCT), prompting Don Berwick and others to question the assumption that RCTs are always the most meaningful way to show change in a clinical environment.[21] Given the complexity of physician medical practice, multicomponent interventions such as the one implemented in this study essentially stimulate a process of social change occurring at a microsystem level, related to the knowledge and skills physicians obtain as a result of building and applying their action plan. We postulate, therefore, that

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the validity of the data in this study should not be considered based on a discrete RCT design, but instead on a model that more appropriately accounts for the complexity and nature of the changes in practice, such as Pawson and Tilley's "CMO" (context + mechanism = outcome) evaluation methodology.[22] METRIC was designed to meet the needs of learners using educational criteria developed by the AMA and AAFP, and mandated by the ABFM as part of the continuous professional development of board-certified family physicians. The 3-stage PI-CME model utilizes initial learner self-reflection of their current practice compared with national standards of care (in METRIC this was achieved through benchmarking comparisons with peers) as a motivator to instill the need for lasting change across a wide spectrum of medical practice. This methodology seems to be more effective in changing performance than passive approaches to learning.[23] However, although our study model compared the performance of the same physician learners before and after they had modified their practice, it did not place such tight restrictions that engaging in the activity would become overly burdensome.

We must also consider the ways in which sampling procedures may have impacted our findings. Although our study uses pre-/postintervention testing, limitations must be recognized based on the fact that there were no standardized control groups or monitoring to make sure the data entered were completely unbiased. The validity of self-reported data is the subject of debate, with some researchers believing it is prone to false reporting based on disparities between perceived and actual performance and to "halo" effects.[24–28] Sampling errors may be present in the clinical data generated in this study, though multistage data collection and aggregate-level data analysis serve to reduce the impact of performance change confounders such as socioeconomic-related patient health disparities between practices.[29] Conversely, the use of group statistics may also mask learners who made substantial improvement and those who did less well—precipitating a loss of potentially useful information on causative factors. While the use of a limited data set per learner (a total of 20 patient charts, 10 per stage) is likely to have promoted completion of the activity, it precluded robust statistical analysis for each participant. Thus, although our study allows for group changes to be assessed, we can say little about the quantitative and qualitative impact of this activity on individual learners. Finally, we cannot rule out the possibility that learners selected patient chart data in the postintervention stage that reflected their "best performance." Yet this last point is thought-provoking when considered in the context of METRIC as an educational modality. In order to perform a selective chart review, we suggest that learners must *know* the difference between patients who were given appropriate treatment and those who were not. This may be an unintended consequence of their participation in the activity.

Lessons for Practice

- PI-CME activities have the potential to produce measurable, valid changes in physician performance.
- Careful interpretation of the data is needed to appropriately account for the impact of potentially problematic self-reported information, analysis of aggregate data, and nonrandomized selection of patient charts.
- The outcomes generated using a PI approach have important applications in measuring how well the educational activity bridges quality and performance gaps, and to validate emerging areas of need to inform further CME initiatives.

In conclusion, the PI methodology employed in this national CME activity appears to have had a positive impact on family physician learners who care for patients with diabetes. We acknowledge the limitations of this methodology, but our results in aggregate do suggest improvement in both systems-based and clinical performance. Improved utilization of evidence-based clinical procedures of the type addressed in this study is likely to improve long-term patient health. Our study also illuminated several potential gaps in practice that should inform further educational programming. Finally, we suggest that PI-CME activities such as METRIC are important because they help cultivate a philosophy change among learners to a state where continuous performance and quality improvement is viewed as an essential part of medical practice. This mindset will not only allow physicians to benefit from performance-related financial incentive programs such as PQRS and fulfill certification/licensure requirements, but will also facilitate proactive streamlining of their practices and point-of-care learning throughout their careers.

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References

1. Institute of Medicine. To err is human: building a safer health system. http://www.iom.edu/Reports/1999/To-Err-is-Human-Building-A-Safer-Health-System.aspx. Accessed February 19, 2013.
2. Centers for Medicare and Medicaid Services. Physician quality reporting system. http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/PQRS/index.html. Acessed February 19, 2013.
3. Centers for Disease Control. National diabetes fact sheet 2011. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf. Accessed February 19, 2013.
4. Bojadzievski T, Gabbay RA. Patient-centered medical home and diabetes. *Diabetes Care.* 2011;34(4):1047–1053.
5. Saydah SH, Fradkin J, Cowie CC. Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. *JAMA.* 2004;291(3):335–342.
6. Cowie CC, Rust KF, Ford ES, et al. Full accounting of diabetes and pre-diabetes in the U.S. population in 1988–1994 and 2005–2006. *Diabetes Care.* 2009;32(2):287–294.
7. Spann SJ, Nutting PA, Galliher JM, et al. Management of type 2 diabetes in the primary care setting: a practice-based research network study. *Ann Fam Med.* 2006;4(1):23–31.
8. Patient-Centered Primary Care Collaborative. Joint principles of the patient-centered medical home. http://www.pcpcc.net/content/joint-principles-patient-centered-medical-home. Accessed February 19, 2013.
9. Piatt GA, Orchard TJ, Emerson S, et al. Translating the chronic care model into the community: results from a randomized controlled trial of a multifaceted diabetes care intervention. *Diabetes Care.* 2006;29(4):811–817.
10. Warm EJ. Diabetes and the chronic care model: a review. *Curr Diabetes Rev.* 2007;3(4):219–225.
11. Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff (Millwood).* 2001;20(6):64–78.
12. Shershneva MB, Larrison C, Robertson S, Speight M. Evaluation of a collaborative program on smoking cessation: translating outcomes framework into practice. *J Contin Educ Health Prof.* 2011;31(Suppl 1):S28–S36.
13. Boyle PJ, O'Neil KW, Berry CA, Stowell SA, Miller SC. Improving diabetes care and patient outcomes in skilled-care communities: successes and lessons from a quality improvement initiative. *J Am Med Dir Assoc.* 2013;14(5):340–344.
14. Brown JA, Beaser RS, Neighbours J, Shuman J. The integrated Joslin performance improvement/CME program: a new paradigm for better diabetes care. *J Contin Educ Health Prof.* 2011;31:57–63.
15. Bonomi AE, Wagner EH, Glasgow RE, VonKorff M. Assessment of chronic illness care (ACIC): a practical tool to measure quality improvement. *Health Serv Res.* 2002;37(3):791–820.
16. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol.* 1983;51:390–395.
17. American Medical Association. PCPI-approved quality measures. http://www.ama-assn.org/ama/pub/physician-resources/physician-consortium-performance-improvement.page. Accessed February 19, 2013.
18. American Board of Family Medicine. Maintenance of certification Part IV—performance in practice. https://www.theabfm.org/moc/part4.aspx. Accessed February 19, 2013.
19. Moore DE Jr, Green JS, Gallis HA. Achieving desired results and improved outcomes: integrating planning and assessment throughout learning activities. *J Contin Educ Health Prof.* 2009;29(1):1–15.
20. Langley GL, Nolan KM, Nolan TW, Norman CL, Provost LP. *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance.* 2nd ed. San Francisco, CA: Jossey-Bass; 2009.
21. Berwick DM. The science of improvement. *JAMA.* 2008;299(10):1182–1184.
22. Pawson R, Tilley N. *Realistic Evaluation.* London, England: Sage; 1997.
23. Mann KV, Lindsay EA, Putnam RW, Davis DA. Increasing physician involvement in cholesterol-lowering practices: the role of knowledge, attitudes and perceptions. *Adv Health Sci Educ Theory Pract.* 1997;2:237–253.
24. Chan D. So why ask me? Are self-report data really that bad? In: Lance CE, Vandenberg RJ, eds. *Statistical and Methodological Myths and Urban Legends: Doctrine, Verity and Fable in the Organizational and Social Sciences*. New York, NY: Routledge; 2009:309–335.
25. Kruger J, Dunning D. Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *J Pers Soc Psychol.* 1999;77(6):1121–1134.
26. Davis DA, Mazmanian PE, Fordis M, Van Harrison R, Thorpe KE, Perrier L. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA.* 2006;296(9):1094–1102.
27. Nisbett RE, Wilson TD. The halo effect: Evidence for unconscious alteration of judgments. *J Pers Soc Psychol.* 1977;35(4):250–256.
28. Palmer JK, Loveland JM. The influence of group discussion on performance judgments: rating accuracy, contrast effects, and halo. *J Psychol.* 2008;42(2):117–130.
29. Adler NE, Newman K. Socioeconomic disparities in health: pathways and policies. *Health Aff (Millwood).* 2002;21(2):60–76.

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