

## Introduction

The American Medical Association (AMA) approved the three stage Performance Improvement (PI) educational process as a strategy for improving patient care in 2004.<sup>1</sup>

Recognizing the need for improved patient care for the increasing population of patients with type 2 diabetes within primary care clinics, Med-IQ initiated an AMA-style PI program in 2008. We have demonstrated significant improvements in clinician performance following completion of the PI initiative.<sup>2,3</sup>

As of January of 2013, 1566 clinicians have registered for the diabetes PI initiative, 387 have completed all three stages, and 25,588 charts have been entered. However, the patient impact of clinician participation in, and completion of, the PI process is largely unknown.

To evaluate the clinical effectiveness of PI CME on patient outcomes, Med-IQ conducted a focused research activity.

Specific Aims:

1. Evaluate impact of completion of the three-stages of PI CME on patient health
2. Evaluate the impact of participation in traditional CME activities compared to PI CME
3. Assess the value of the final chart review in PI
4. Explore the hypothesis that PI completers represent a sub-group of practitioners who are more aligned with national standards of diabetes care

## Methods

### Specific Aims 1-3: Effect of PI CME on Patient Health

Patient-level clinical data were collected retrospectively for US-based clinicians who participated in Med-IQ diabetes PI programs launched in 2008 and 2009. Clinicians were grouped into three categories based on level of participation:

- **PI completers:** clinicians who completed Stages A, B, and C of a PI initiative
- **PI partial completers:** clinicians who completed only Stages A and B of a PI initiative
- **Traditional CME completers:** clinicians who completed a traditional CME activity (webcast or print-based publication) designed to enhance PI education, but who did not participate in a PI initiative

Clinicians in all three categories provided chart-review data from both the pre- and post-intervention periods for 10 patients with type 2 diabetes mellitus (T2DM). Data collected for this study were independent of chart data collected during the PI-CME activity; clinician participation was incentivized with a small stipend distributed after receipt of 10 completed patient forms.

Patient inclusion criteria:

- Established patient with T2DM
- At least two clinic visits in each of the pre- and post-activity periods
- HbA1c above patient's individual goal in at least one pre- and one post-activity visit.

Patient exclusion criteria:

- Pregnancy at any visit
- Age <18 years or > 75 years at any visit

Time periods for abstracted data were as follows:

- PI Completers: One year prior to PI registration, one year after PI completion
- PI Partial Completers: One year prior to PI registration, one year after PI registration
- Traditional CME completers: One year prior to participation in activity, one year after participation in activity

A minimum of 2 and maximum of 4 clinical measurements at each time point were collected. Measures were:

- Glycated hemoglobin (HbA<sub>1c</sub>)
- Blood pressure (BP)
- Low-density lipoprotein (LDL)
- High-density lipoprotein (HDL)

For patients with multiple visits, the earliest valid pre-activity and latest valid post-activity measures were used.

## Methods – Cont'd

An independent Institutional Review Board (Chesapeake IRB, Inc.) reviewed the study and determined it to be exempt from oversight.

Mean HbA<sub>1c</sub>, LDL-C, and HDL-C level for patients in each participant group were calculated for pre- and post-activity periods. BP, HbA<sub>1c</sub>, and LDL-C levels were grouped categorically as follows:

- BP: <130/80 or ≥130/80 mm Hg
- HbA<sub>1c</sub>: <7%, 7–7.5%, 7.6–9.0%, or >9.0%
- LDL-C <100 or ≥100 mg/dL

Multi-level models incorporating random effects at the patient and provider levels were estimated to compare patient outcomes and participant practices between the pre-activity and post-activity periods and between participant groups. Linear models were estimated for HbA<sub>1c</sub>, LDL-C, and HDL-C. Logistic regression models were estimated for categories of BP and LDL-C levels. An ordinal logistic regression model was estimated for categorical HbA<sub>1c</sub> levels.

Key comparisons were tested for statistical significance, including differences between PI completers and traditional CME participants, between PI completers and PI partial completers, and the amount of change from pre- to post-activity measured between groups.

*Specific Aim 4: Baseline Performance of PI Completers Compared with Partial Completers*

The diabetes PI activity launched in 2009 included a required self-assessment questionnaire evaluating clinician-reported practice patterns related to general diabetes care, prevention and detection of diabetes-related complications, and glycemic control.

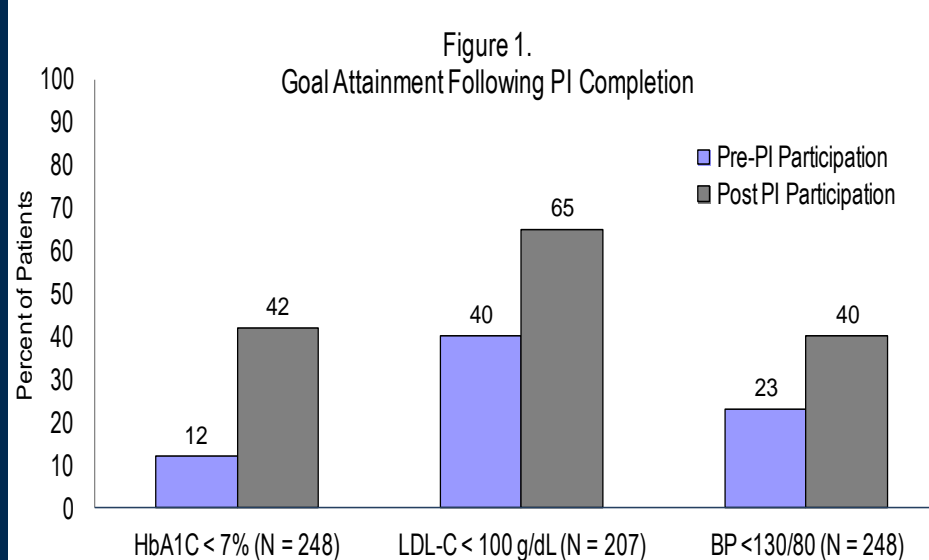
These data were used to assess the similarity of PI completers to non-completers (clinicians who completed stage A only).

Multi-level logistic regression models incorporating random effects at the provider level were estimated to compare participant self-assessment practices between the PI completers and non-completers.

## Results

### Specific Aim 1: Evaluate impact of completion of the three-stages of PI on patient health

- One hundred twenty-five past PI participants were eligible for inclusion in this study, and 44 (37%) of these participants submitted 248 patient charts which met the study inclusion criteria.
- A statistically significant improvement was observed in the percentage of patients achieving an HbA<sub>1c</sub> level <7%, a BP <130/80 mm Hg, and an LDL-C level <100 mg/dL after PI activity completion (Figure 1). Statistically significant improvements from the pre-activity to the post-activity period were also observed for mean HbA<sub>1c</sub>, LDL-C, and HDL-C values (Table 1). The improvement in this latter percentage was especially dramatic, doubling between the 2 periods.



### Specific Aim 2: Evaluate the impact of participation in traditional CME activities compared to PI-CME

Patients treated by traditional CME participants demonstrated statistically significant improvements in all measured values, except BP (Table 1). A comparison of patient clinical indicators between PI completers and traditional CME participants showed statistically significant differences in categorical HbA<sub>1c</sub> values that favored PI completers. At study completion, PI completers had a greater percentage of patients with HbA<sub>1c</sub> levels <7% and fewer patients with HbA<sub>1c</sub> levels between 7.6% and 9.0% compared with traditional CME participants. Changes in the percentage of patients below goal BP, mean HbA<sub>1c</sub>, mean (or distribution of) LDL-C, and mean HDL-C values were not significantly different statistically between these participant groups.

## Results – Cont'd.

Table 1. Patient Outcomes for PI Completers vs. Traditional CME Participants

	PI Completers			Traditional CME Participants			Change for PI completers vs. change for traditional CME	P
	Pre-activity period	Post-activity period	P Change	Pre-activity period	Post-activity period	P Change		
<b>HbA<sub>1c</sub> (%)</b>	(n=248)			(n=225)				
Mean	8.4	7.5	<0.001	8.1	7.7	0.031	-0.5	0.112
<7%	13	42		19	32		16	
7.6–9.0%	21	26		27	27		5	<0.001
>9.0%	40	20	<0.001	31	28	<0.001	-17	
	25	11		23	12		-3	
<b>BP (%)</b>	(n=248)			(n=224)				
<130/80 mm Hg	20	40	0.003	27	34	0.330	13	0.066
<b>LDL-C</b>	(n=207)			(n=208)				
Mean (mg/dL)	111	94	<0.001	102	91	0.008	-6	0.155
<100 mg/dL (%)	38	66	<0.001	49	64	0.002	13	0.100
<b>HDL-C</b>	(n=209)			(n=217)				
Mean (mg/dL)	44	46	0.007	44	46	0.009	0	0.923

### Specific Aim 3: Assess the value of the final chart review in PI

Patients of PI completers experienced statistically significant changes in all clinical indicators from the pre-activity to the post-activity period (Table 2). Patients treated by PI partial completers similarly demonstrated statistically significant improvements in all clinical values, with the exception of BP, and no statistically significant differences in patient improvements achieved over time were found between the groups

### Specific Aim 4: Explore the hypothesis that PI completers represent a sub-group of practitioners who are more aligned with national standards of diabetes care

One hundred fifty PI completers from the Diabetes PI 2009 activity were compared with 71 participants who completed only the Stage A chart review. Initial self-assessment data revealed similar demographic and practice characteristics, with the exception that PI completers (n = 71) were more likely to have a Certified Diabetes Educator on staff than were non-completers (n = 38); 61% vs. 36% (P = 0.028). The 2 clinical groups were also very similar in the care provided to patients. The only significant difference identified was that PI completers were more likely to discuss smoking cessation with patients than were non-completers (data not shown).

Table 2. Patient Outcomes for PI Completers vs. Partial Completers

	PI Completers			Partial Completers			Change for PI completers compared to change for partial completers	P
	Pre-activity period	Post-activity period	P	Pre-activity period	Post-activity period	P		
<b>HbA<sub>1c</sub> (%)</b>	(n=323)			(n=65)				
Mean	8.4	7.5	<0.001	8.2	7.5	0.042	-0.1	0.789
<7%	12	39		20	46		1	
7.0–7.5%	21	26		19	29		-5	0.952
7.6–9.0%	44	22	<0.001	43	11	<0.001	10	
>9.0%	23	13		19	14		-5	
<b>BP (%)</b>	(n=320)			(n=65)				
<130/80 mm Hg	23	39	0.001	28	42	0.227	2	0.801
<b>LDL-C</b>	(n=287)			(n=64)				
Mean (mg/dL)	110	94	<0.001	121	98	0.001	7	0.356
<100 mg/dL (%)	39	63	<0.001	41	61	0.041	4	0.610
<b>HDL-C</b>	(n=290)			(n=63)				
Mean (mg/dL)	44	45	0.048	43	46	0.028	-2	0.237

## Discussion

It is our belief that this was one of the first studies providing clinical evidence that strongly supports a positive relationship between to conclusively demonstrate that clinician participation in PI CME positively affects and patient outcomes. Previous analyses of the initial 2008 diabetes PI initiative by this group found significant improvements in measures of process change, but only mild improvements in patient health as measured by glycemic control (HbA<sub>1c</sub>).<sup>3</sup> However, that activity did not mandate data from the same patient in the pre- and post-activity periods and therefore did not allow for an accurate assessment of patient health changes over time. This study demonstrated that patients with diabetes cared for by clinicians who complete all 3 stages of the PI CME initiative experienced significant improvements in clinical measures of patient health (HbA<sub>1c</sub>, BP, and LDL-C). Importantly, traditional CME participants demonstrated measurable improvements in HbA<sub>1c</sub>, LDL-C, and HDL-C. However, categorical improvements in HbA<sub>1c</sub> levels were significantly greater for clinicians who completed the entire PI initiative than for traditional CME participants. Patients whose clinicians completed most, but not all, of the PI-CME activity also showed significant changes in these clinical measures. However, clinical improvements in patients of the partial completer group were similar to those of patients of the PI completer group. Although our sample size was limited for this study component, the data suggest that the second chart review within the PI educational process may have less influence on patient outcomes than the initial chart review and development of an implementation plan.

PI completers were similar to their peers, with few exceptions. Compared with non-completers, PI completers discussed smoking cessation more often and more frequently had a Certified Diabetes Educator as part of their clinic staff. These results and the finding of similar changes in patient health outcomes between the completer and non-completer groups suggest that clinicians who participate in the majority of PI activity have the potential to achieve similar improvements in patient health.

Overall, this study provides a detailed examination of the impact of several of the components of PI CME on patient health. Completion of all 3 stages of PI CME appears to provide categorical improvements in HbA<sub>1c</sub> compared with participation in more traditional CME activities. These findings suggest that self-assessment, improvement planning, implementation based on review of one's own data, and reassessment of the success of that improvement plan contribute to improvements in patient health. Although participation in the PI process does not appear to provide additional clinical benefit, the overall more intensive process of PI relative to traditional CME efforts appears to have an important impact on patient health. As the healthcare system has shifted toward a more performance-reimbursement model, the focus on the quality of clinician performance has become increasingly important. Such education provides a focused, time-intensive, but effective educational endeavor that may help clinicians achieve performance goals and improve patient health.

References:

1. American Medical Association. Performance improvement CME: core of the new CME. CPPD Report, 2007. Available at: <http://www.ama-assn.org/resources/doc/cme/cppd22.pdf>. Accessed January 28, 2013.
2. Stowell SA, Karcher RB, Carter RD, et al. Outcomes measurement design for a performance improvement initiative in diabetes care. *CE Meas.* 2009;3:76–83.
3. Stowell SA, Karcher RB, Bartel RC, et al. Results of a performance improvement initiative in diabetes care. *CE Meas.* 2010;4:34–39.

## Acknowledgments

The authors sincerely thank Sharon Howard for data entry and concierge services; Deborah Onheiser for data entry oversight; Rebecca Jones, Rhonda Nethen, and Samantha Roberts for data entry; Kieran Hartsough and Kimberly Keaton for assistance with data analysis; and Lisa Rinehart and Brenda Milot for editorial assistance.

This work has been published: Stowell SA, et al. *Clinical Diabetes.* 2014;32:18-25.

Supported by an educational grant from Sanofi U.S. Inc.