Optimizing the Implementation of Practice Improvement Modules in Training: Lessons from Educators

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Abstract

Background The American Board of Internal Medicine approved the use of Practice Improvement Modules (PIMs) to help training programs teach and assess practice-based learning and improvement (PBLI) and systems-based practice (SBP).

Methods We surveyed individuals who ordered a PIM in a residency or fellowship training program between June 2006 and August 2009. The 43 programs that volunteered to participate completed a 30-minute anonymous online survey.

Results Program directors or associate program directors led the PIM process in 30 programs (70%). Trainees' degrees of involvement in PIMs were highly variable between programs, and several respondents felt that trainees were either not sufficiently engaged or not engaged with enough consistency. The most common activity for trainee involvement was data collection through patient surveys or chart review, although only 17 programs (40%) provided protected time for this activity. Few trainees participated in higher level activities such as data analysis or identification for areas of improvement or were given leadership roles; yet most respondents reported that completing the PIM helped trainees learn basic principles of QI and develop competence in PBLI and SBP and that PIM completion improved the program's ability to develop QI initiatives and resulted in program or institutional improvements, including sustainable improvement in patient care. Most respondents reported that the outcome warranted the effort to complete PIMs.

Conclusions PIMs may be a valuable but underused educational experience for trainees as well as training programs. Focusing on particular themes and facets of PIMs may facilitate implementation.

Editor's note: The online version of this article contains the survey used in this study.

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Introduction

Internal medicine training programs are expected to teach residents quality improvement (QI) skills and behaviors and assess residents' on practice-based learning and improvement (PBLI) and systems-based practice (SBP), yet few validated approaches exist to facilitate the development of these competencies. The American Board of Internal Medicine (ABIM) offers Practice Improvement Modules (PIMs) to internal medicine residency and fellowship programs to use as a part of their QI curricula.

While PIMs were originally designed as a tool for self-evaluation of practice performance for use by individual practicing physicians completing Maintenance of Certification (MOC),[1,2] they are also used by physicians-in-training to facilitate learning about QI. Trainees collect baseline clinical performance data, survey patients, and examine local practice systems to identify areas of improvement. After choosing an area for improvement, trainees complete a Plan-Do-Study-Act QI cycle[3] and report on that improvement. Academic faculty can request MOC credit for participating in a PIM in training.

Prior research on the completion of PIMs in training reveals a positive learning experience for trainees, including demonstrated benefits in areas of teamwork[4] and QI awareness, ownership, and skills.[4–7] Use of PIMs has furthermore been linked to improvement in clinical outcomes in ambulatory settings[4] and was reported to be a catalyst for change and for increased engagement in the QI process.[6] However, most of the studies with positive outcomes were carried out in the context of supported research conducted at a single institution. Less is known about how well these tools facilitate residents' educational development and local change without external support. Also, the impact of the PIM on programs and institutions has been largely unexplored. Finally, a deeper understanding of factors that systematically facilitate and/or hinder implementation across a broad range of programs is needed.

We examined these questions from the perspectives of educators who have led and implemented a PIM in training, as there is increasing recognition of the need for physician leadership in quality and patient safety[8] and emerging evidence that physician leadership contributes to successful QI project implementation.[9]

What was known

Residents need to become familiar with and be assessed on competency in practice-based learning and improvement (PBLI) and systems-based practice (SBP).

What is new

Internal medicine programs that reported use of Practice Improvement Modules (PIMS) found the modules helped residents learn quality improvement (QI) principles and develop competence in PBLI and SBP. PIM completion frequently resulted in program or institutional improvements, including sustainable improvements in patient care.

Limitations

Nonvalidated survey instrument and the potential for response bias with respondent programs "ahead of the curve" in QI.

Bottom Line

PIMs may be a valuable but currently underused educational experience and approach to QI for trainees and residency programs.

Methods

Individuals who ordered a PIM in a residency or fellowship training program between June 2006 and August 2009 (N = 58) were e-mailed and asked to identify the person who was most responsible for implementing and completing the PIM at their program. Those who volunteered to participate completed a 30-minute anonymous online survey (provided as online supplemental material). The Internet-based survey was developed by ABIM staff and was not piloted; thus, no validity evidence is available. Follow-up e-mails were sent at 1 and 3 months. Participants were notified that data would not be used in accreditation or certification processes or decisions. The study was approved by the Henry Ford Hospital Institutional Review Board and completion of the survey implied informed consent. Respondents received a small financial incentive.

Descriptive statistical analyses were used to analyze quantitative data. Conventional content analysis was used to analyze the open-ended qualitative data. In conventional content analysis, coding categories are derived directly from text data. Researchers then quantify and analyze the presence, meanings, and relationships of codes and concepts, and make inferences about the messages within the texts.[10]

Results

In May 2011, there were 380 internal medicine training programs and 1637 fellowship programs with a total of 33 297 trainees in the United States.[11] Of the 58 programs that had ordered one or more PIMs, 43 responded, yielding a response rate of 74%. TABLE 1 shows the distribution and type of program, including the number and level of trainees. The Diabetes PIM was the module most frequently chosen, used by 14 programs (33%). All PIMs available at the time of the study were chosen at least once (BOX).

PIM Implementation

PIMs were used primarily longitudinally over the course of a year (N = 30, 71%). Seven programs (17%) used PIMs as part of a block rotation. Most trainees were not given protected time to complete the activities required for the PIM (26 of 43; 60%).

Educators reported that a majority of programs (37; 86%) used trainees to collect baseline and postintervention clinical data via chart audits. Patient surveys were completed by patients in the waiting room (N = 13; 30%) or during the clinic checkout process (N = 10; 23%). Both trainees and clinic staff were described as helpful in the

BOX **Available PIMs for Training Programs**

- Asthma
- Cancer Screening
- Care of Vulnerable Elderly (COVE)
- Colonoscopy
- Communication
  - Primary Care
  - Subspecialists
- Diabetes
- Hepatitis C
- HIV
- Hypertension
- Osteoporosis
- Preventive Cardiology
- Clinical Supervision (Faculty Only)

TABLE 1 **Characteristics of Programs Who Completed a PIM in Training June 2006 to August 2009 (N = 43)**

Type of Program	N (%)
Categorical internal medicine	24 (49)
Primary care internal medicine	4 (9)
Fellowship	17 (40)
Other	1 (2)
Number of Trainees Who Completed the PIM	
<10	23 (54)
10–20	12 (28)
20–50	7 (16)
50–100	1 (2)
>100	0 (0)
Level of Training for Those Completing the PIM	
PGY-1	18 (42)
PGY-2	25 (58)
PGY-3	21 (49)
Fellow 1	13 (30)
Fellow 2	15 (35)
Fellow 3	8 (19)
Other	1 (2)

Abbreviations: PIM, practice-improvement module; PGY, postgraduate year.

distribution and collection of the surveys. When asked to recall how they collected information to complete the systems portion of the PIM, educators described a number of processes including interviews and/or discussions with staff, personal observation, and document reviews. This section was challenging for many educators, and several could not recall this portion of the PIM (N = 7; 16%). Reasons given for choosing measures for improvement included a suboptimal baseline rate in a particular aspect of care and/or an area targeted for improvement (N = 22; 51%), trainee interest (N = 9; 21%), or ease or feasibility of implementation (N = 7; 16%).

Impact of the PIM

A majority of respondents (N = 31, 72%) felt that the overall experience and impact of the PIM in training was positive, that the outcome of the PIM was worth the effort (N = 36; 84%), and that the PIM was easy to use (N = 31; 71%).

Impact on Trainees

PIMs reportedly facilitated trainees' learning of basic principles of QI (N = 36; 88%) and development of competence in PBLI (N = 34; 83%) and prepared trainees for MOC (N = 30, 73%). In addition, programs reported that the PIM process benefitted trainees in a variety of ways (TABLE 2). A number of respondents felt that the tool was too limited in its breadth and depth and that residents may not have been interested or invested enough to develop sustainable skills in QI.

Impact on Programs and/or Institutions

More than half of the respondents stated completion of a PIM resulted in changes or enhancements in a process or system in their program (N = 25; 61%) and/or institution (N = 26; 63%). The improvements most commonly reported included clinic changes, such as orienting residents to the clinic; increased documentation or screening procedures; and increased communication (TABLE 3). Four respondents (9%) reported that some of these improvements might have been isolated or not sustainable, particularly due to graduation of residents or the structure of the PIM itself, which was frequently reported as too isolated and not part of a larger program or institutional context (N = 7, 16%). Notably, a majority of respondents reported that the PIM resulted in sustainable improvements in patient care outcomes or delivery of patient care (N = 30; 73%).

Facilitators for Implementing PIMs

We surveyed respondents on the facilitators for implementation of PIMs. Findings suggest that no single factor can be considered responsible for the successful implementation of a PIM (TABLE 4). Several themes emerged that may influence the ease and impact of implementing a PIM in training, which are discussed below.

Engaged Leadership

TABLE 5 describes the leaders of the PIM process. Consistent with prior studies, educators highlighted leadership as an essential component of implementation (N = 16; 37%) and articulated a broad range of leadership roles. Five respondents (12%) reported they played a central role in PIM implementation, facilitating all aspects of the module. Another 5 described a minimal role, indicating that they, for example, played "no role other than support" or "encouraging it [the PIM] but not being directly involved." The majority (N = 33; 77%) reported they led specific administrative duties (eg, ordering and funding the PIM, assigning faculty, making sure trainees completed the chart audits). These respondents also reported delegating and assigning tasks to trainees and/or dedicated faculty leaders (N = 18; 42%).

TABLE 2 **Examples of Educators' Perspectives on the Impact of the PIM on Trainees**

Positive Responses
"The PIM reinforced the need [for residents] to be data driven, and not decide on projects based on the gestalt."
"Residents stated, 'I was doing a QI project and did not even know it.'"
"We tried to make [the process] as painless as possible so they would see it as something they could do in their own practices later."
"The working relationship between clinic faculty and the residency is better."
"It allowed [residents] to reflect on their practices, and to get a sense of what basic standards are of care for cardiovascular preventive medicine."
"They will certainly be required to do a similar project in the future for MOC. At least they are now familiar with the process."
Negative Responses
"The number of man-hours required was excessive, so it was not a very efficient exercise (investment>output)."
"The ad hoc nature of our PIM effort and the lack of a consistent QI curriculum limited the impact of our PIM experience."
"Yes [it was worth it], but only for those [residents] who actually did it. Several failed to participate."
"Residents were not involved enough at a deep level, or with enough consistency."
"The short duration was a drawback on one side; however I doubt I could have kept the attention of 10 residents for too long."
"They [residents] are still unaware of the need to complete a PIM for MOC. They are just focused on completing residency and passing the board exam."

Abbreviations: PIM, practice-improvement module; MOC, Maintenance of Certification; QI, quality improvement.

TABLE 3 **Changes or Enhancements to Programs and Institutions after Completing a PIM in Training**

Patient Level	Program/Clinic Level	Institution Level	Reasons Given for No Changes or Enhancements
Improved adherence to standards of care	Implemented questionnaire for all patients 65 years and older on an annual basis	Improved online system	"The changes made were unable to be sustained because it was a stand-alone project, so it does not get revisited."
Better patient understanding of their disease processes	Documentation process was enhanced	Shared action plans so others could implement something similar	"It was too isolated and not part of a larger context. No follow-up or feedback."
Improved rates of screening	Obtained height and weight data for all patients, to get a BMI assessment	Created an endoscopy committee	"Loss of momentum with graduation of resident participants."
Better notification of patients of their laboratory results	Established electronic flow sheet for use with patients with diabetes	Established a new set of orders and guidelines	"I see very little value in this for a hospital-based training program."
Gained greater attention to hepatitis vaccination for HIV-positive patients	Enhanced resident orientation to clinic	Revision of hospital consent form for colonoscopy	"We have not completed another PIM because of the lack of support I received."
	Enhanced understanding of the basics of QI made it easier to undertake other QI projects	More structured research activities	"No formal curriculum was developed, and therefore residents learned little about basic QI principles. In retrospect, this was a major shortcoming. Perhaps the greatest lost opportunity was in exposing our residents to QI principles so they could have had some exposure for their career."

Abbreviations: PIM, practice-improvement module; BMI, body mass index; HIV, human immunodeficiency virus; QI, quality improvement.

TABLE 4 **Reported Critical Factors for the Successful Implementation of a PIM in Training**

Factor	Why It Was Critical	How It Was Maximized (If Applicable)
Computer-based clinic system/IT systems/ electronic health record	Facilitated chart audits; provided a mechanism to customize and document the intervention for each patient	
Full faculty support	Provided role modeling to trainees; promoted efficiency	Maintenance of certification credit for faculty
Clinic administrator involvement	Coordination of clinic activities	
Trainee motivation and participation	Assisted trainees to learn basic principles of QI	Program director ability to use the PIM process to fulfill other program requirements; protected time for PIM activities; including trainees in the process early; scheduling the activities during "lighter months" in clinic; developing feasible intervention plans; streamlining the chart abstraction process
Patient participation	Efficient data collection	Ancillary staff assistance with data collection
Scheduled time for chart audits	Trainee buy-in and participation; consistency in abstraction process	
Choosing a simple, practical improvement plan	Assisted trainees to learn basic principles of QI	Involve residents in the design of the improvement plan
Partnering with other committees or departments	Dovetailed with improvement projects; promoted efficiency	Foster relationships with key stakeholders
Central workstation to maintain data collection forms/intervention tools and submit data collected	Maximized organization; fostered face-to-face collaboration and learning	

Abbreviations: PIM, practice-improvement module; IT, information technology; QI, quality improvement.

Support and Buy-In

A common theme in facilitating PIM implementation was trainee-level and program-level support and buy-in. One educator summarized: "It is a good tool and requires significant leadership, but also institutional buy-in and resources (personnel and financial), otherwise it is person-specific and set up for failure."

Understanding of roles and expectations emerged as a subtheme within support and buy-in. Trainees' responsibilities were described within the context of basic QI activities, including enrolling patients and collecting data via medical record review and patient surveys. Only a few educators described trainee involvement within the context of complex aspects of the PIM process, including data analysis, QI plan development and implementation, and data recollection after intervention (N = 8; 19%). Several educators (N = 6; 14%) lamented they did not engage trainees enough, and some felt programs should identify opportunities to involve larger numbers of trainees in the design and implementation of the QI intervention.

Faculty Involvement and Professional Development

Other than program directors, clinical faculty involvement in the PIM process was reported to be limited. Most educators discussed the faculty role as one aspect of the PIM (N = 28, 65%), for example, "being kept notified of the results of the PIM," "supervising trainees," or "attending meetings." Nine programs (21%) reported that faculty had "no role." Many educators stated they would encourage additional faculty participation if their program completed another PIM (N = 13, 30%). More than half (57%) of educators believed that faculty earning credit for MOC was a valuable incentive for faculty buy-in, but it is unclear from our analysis whether faculty participation in PIMs in the responding programs resulted in earned MOC credits.

Teaching QI Principles

The majority (N = 32, 78%) of QI interventions were developed as part of a stand-alone project (designed specifically for the PIM), while a small number (N = 5, 12%) of interventions dovetailed with ongoing QI projects.

More than half (N = 24; 59%) of programs used regular meetings, such as a clinical conference, to discuss the PIM and ongoing QI intervention. One fourth (N = 11; 26%) used a formal QI curriculum to teach trainees and/or faculty about the principles of QI prior to or during the implementation of the PIM. Others reported that the structure of the PIM served as their curriculum (N = 6, 14%).

At the program level, many educators desired more hands-on mentorship in developing a basic QI curriculum

TABLE 5 **Leaders of the PIM Process in Training**

Personnel	N	%
Program director	18	43.9
Associate/assistant program director	12	29.3
Clinical faculty	6	14.6
Hospital/department QI personnel	0	0
Clinic medical director	1	2.4
Other or not stated	6	14.0
Reasons Given for How/Why These Personnel Became Leaders[a]		
Interest in content area of PIM	6	14.0
Role as program director or associate program director	21	48.9
Relationships with residents and clinic staff	7	16.3
Oversee clinic sites	4	9.3
Vision for QI	4	9.3
Interest in PBLI	2	4.7
Engage trainees in QI and PBLI	2	4.4
Falls under job description	2	4.4
Studying for recertification examination	5	11.6

Abbreviations: PIM, practice-improvement module; QI, quality improvement; PBLI, practice-based learning and improvement.

[a] These data were collected using an open-ended survey. Numbers do not total 100%.

(N = 11; 26%) and more assistance in designing a curriculum that could be implemented within the time constraints of a residency program.

Discussion

Many of our findings corroborate earlier results showing the facilitators and benefits of the use of PIMs in teaching settings[4–7] and affirming that many educators in leadership roles find the PIM to be a feasible, useful tool to teach and assess the PBLI and SBP competencies. This work also extends findings from earlier studies[12] showing that use of PIMs led to a positive programmatic or institutional change in a diverse group of internal medicine training programs in the absence of external research support or funding.

Despite these benefits, our results raise several concerns. First, PIMs are designed to guide an individual physician through a critical review and redesign of a patient care delivery system. When used in training, this process is adapted to allow a group to complete a similar task, yet the structure of a PIM used in this setting may not allow all participants to be actively involved in the QI process. This may explain the lower number and limited involvement of faculty and trainees in this study. Roles, levels of involvement, and expectations for those participating in a PIM in training should be clearly defined.

From a trainee perspective, this lack of adequate involvement in "top-down" QI processes may lead to passive involvement in QI projects,[13] potentially reducing impact on learning. Engaging trainees in every aspect of the PIM, rather than relegating their role to data collection or data entry, could translate to trainees developing their own improvement plans and lead to greater understanding of QI in practice. Our findings also suggest that trainees would benefit from receiving program and institutional support for curricular and improvement activities and protected time for completing PIM-related activities.

PIMs can provide valuable work-based experience addressing multiple general competencies (SBP, PBLI, and patient care). However, they cannot serve as a stand-alone QI curriculum. The role a PIM plays in a larger competency-based curriculum, therefore, should also be clearly defined to maximize the learning potential of the exercise. Because a PIM is a complex intervention,[17] opportunities exist to embed it as part of a curriculum on complex adaptive systems and how best to use multiple sources of performance data to stimulate change in the training environment. Future work should explore the specific mechanisms about how the PIM process and data may lead to change in these environments. Identifying key mechanisms must be interpreted in the contexts where the PIM is implemented, anticipating that certain contexts may be more supportive than others.

Our study has several limitations. We report on the perspectives of educators who have led and implemented a PIM in training, and we acknowledge that these perspectives may not fully capture those of others, including trainees or faculty involved in the PIM process. Furthermore, as our survey lacks validity evidence, questions may have been interpreted differently by responders. While our response rate was adequate, it is also important to recognize that we focused on a small number of training programs that completed a PIM and that of these programs, not all responded to our survey. Future work around barriers to PIM completion and nuanced differences between small and large programs is warranted. The programs that responded may not be representative of all residency and fellowship programs in the United States. We furthermore recognize that a period of time elapsed between the survey and completion of the PIM, potentially limiting respondents' ability to recall details effectively or accurately.

Conclusions

QI is a complex "team sport," and trainees need effective role modeling and physician "champions" to implement

and sustain successful QI interventions. Future studies addressing PIMs or other QI interventions should focus on the faculty role and consider faculty development to motivate and train faculty in the essentials of QI. A team approach, as well as initial and continued faculty engagement in the QI process, may contribute to success.

These concerns aside, this naturalistic descriptive study of PIMs in multiple programs provides additional evidence for their effectiveness in clinical settings. Results are particularly salient for smaller training programs that may not have sufficient local resources and need to use PIMs or other tools to facilitate learning in PBLI and SBP. We hope that educators outside of internal medicine may be able to apply our findings to their own training programs, but future work will address this more systematically.

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