Original Research

Self-Assessment of Practice Performance: Development of the ABIM Practice Improvement Module (PIM^{SM})

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Background: *Quality measurement and improvement in practice are requirements for Maintenance of Certification by the American Board of Medical Specialties boards and a component of many pay for performance programs.*

Objective: *To describe the development of the American Board of Internal Medicine (ABIM) Practice Improvement Module (PIM^{SM}) and the average performance of ABIM diplomates who have completed the Preventive Cardiology PIM^{SM}.*

Design: *Observational study of self-administered practice quality improvement.*

Setting: *Office practices through the United States.*

Participants: *A total of 179 cardiologists and general internists completing requirements for ABIM Maintenance of Certification from 2004 through 2005.*

Measurements: *Physicians self-audited at least 25 charts to obtain performance measures, patient demographics, and coronary heart disease risk factors. At least 25 patients completed surveys regarding their experience of care in the physician's practice. Physicians completed a self-assessment survey detailing the presence of various practice systems.*

Results: *The mean rate for systolic blood pressure control was 48%, for diastolic blood pressure 84%, and for low-density lipoprotein (LDL) cholesterol at goal 65%. Of patients 61% rated the quality of care as excellent and 58% rated the practices excellent at encouraging questions and answering them clearly. More than 85% of patients reported "no problem" obtaining a prescription refill, scheduling an appointment, reaching someone in the practice with a question, or obtaining lab results. Targets for improvement were increasing the rates for LDL cholesterol or systolic blood pressure at goal, improving patients' physical activity, patient education, and accuracy of risk assessment. Improvement strategies included implementing chart forms, patient education, or care management processes.*

Limitations: *Patients and charts were selected by physicians reporting their performance for the purpose of MOC.*

Conclusions: *The Preventive Cardiology PIM^{SM} successfully provides a self-assessment of practice performance and provides guidance in helping physicians initiate a cycle of quality improvement in their practices.*

Key Words: *quality of health care, health care quality assessment, total quality management, continuing medical education, certification, specialty boards, self-evaluation programs*

If you want people to learn something, don't teach them; Instead give them a tool, the use of which will make them think differently.—Buckminster Fuller

Measurement of practice performance is important in health care policy today.[1–5] Success in reducing cardiovascular surgery mortality associated with measurement and

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public reporting, and improvement in care provided by health plans accredited by the National Committee on Quality Assurance (NCQA) fuel enthusiasm for this approach to quality.[6–9] Health care purchasers and payers are racing to apply similar approaches to the evaluation and payment of physicians.[10] However, quality improvement is also a central tenet of professionalism and self-regulation.[11] Within this context, the American Board of Internal Medicine (ABIM), and soon all members of the American Board of Medical Specialists (ABMS), will require performance measurement and engagement in quality improvement by physicians enrolled in their Maintenance of Certification (MOC) programs.[12]

Boards face several challenges in engaging physicians who lack training or experience in quality improvement. Performance measures do not exist for many conditions, particularly in subspecialties. Methods for evaluating physician-level contribution to quality of care are still being developed. Obtaining samples large enough to ensure reliable measurement of physician-level performance is impractical.[13] Therefore, ABMS boards chose self-assessment of practice performance and participation in rapid-cycle tests of change to promote competence in applying quality improvement in practice.[14,15]

ABIM developed Practice Improvement Modules (PIMs^{SM}) for use in its MOC program in 2003 as a novel Web-based learning and practice self-assessment tool to help physicians apply quality improvement principles in practice and to evaluate the ABMS and Accreditation Council for Graduate Medical Education (ACGME) competencies of system-based practice and practice-based learning and improvement.[16,17] PIMs^{SM} incorporate self-directed learning methods shown to be effective in translating guidelines into practice and apply industrial engineering principles to improve outcomes through developing deep knowledge about how work processes produce them; knowledge about practice processes begins with local measurement of performance and personal reflection on the systematic causes of the results.[18–20] This article first describes how ABIM developed PIMs^{SM} and then reports the experience of the first users of the Preventive Cardiology PIM (PC-PIM^{SM}). The psychometric characteristics and performance of the measures used in the PC-PIM^{SM} will be reported in subsequent publications.

Methods

Development of the Web-Based PIM^{SM}

This article describes the first example of a Web-based self-assessment tool to be used for evaluating performance and improvement in practice for Maintenance of Certification. FIGURE 1 shows the PIM^{TM} framework. Completion of a PIM^{TM} involves four main steps: (1) Collect data about the practice from medical record audit, patient surveys, and a questionnaire of the practice's microsystem; (2) review and reflect on performance in a comprehensive practice quality report; (3) develop and implement an improvement plan using a rapid-cycle test of change; (4) report and reflect on the impact of the improvement plan.

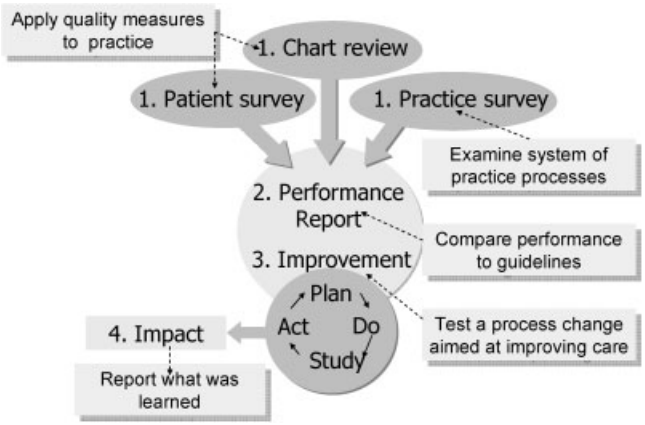

FIGURE 1. Practice Improvement Module (PIM) framework.

Step 1: Data Collection About Practice

Practice Sample The PIM^{SM} uses a visit-related sampling strategy to identify the denominator for calculating measures. Physicians invite twice the needed number of patients to complete a survey. From these patients and in no particular order they select 25 medical records for audit. This strategy produces overlapping but not identical chart audit and patient survey samples of the practice. The sampling process is determined by the physician; this method was considered to be acceptable because the primary goal of the PIM is improvement, and physician belief in the credibility of the data reported was more important than using the data to obtain an accurate estimate for comparison of one physician with another.

Chart Audit The PC-PIM^{SM} chart audit collects 36 data elements used to calculate 33 clinical measures from a sample of 25 patients. For example, 16 patient factors (eg, smoking, hypertension, dyslipidemia) are used to calculate a 10-year risk for a coronary heart event using the Framingham formula.[21] Because patient factors influence practice performance, the chart audit asks whether psychiatric or cognitive problems, adherence problems, other medical conditions, or social factors such as poverty prevent patient participation in self-care. Dates and clinical values for blood pressure, weight, and height and laboratory values for low-density lipoprotein (LDL) and high-density lipoprotein (HDL) cholesterol and triglycerides are used to calculate clinical outcome and process measures. All data collection in the PIMs is Health Insurance Portability and Accountability Act (HIPAA) compliant: no patient identifying information is transmitted to the ABIM. Physicians inform patients that

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they are participating in an ABIM practice improvement process but do not specifically obtain permission from them to abstract data from their medical records for the self-assessment.

To determine the performance measures for the PC-PIM[SM] medical record audit, the ABIM assembled a committee of experts in prevention and quality measurement from nominees provided by the American College of Physicians (ACP), the American College of Cardiology (ACC), the American Heart Association (AHA), and the Society of General Internal Medicine (SGIM). The committee selected candidate measures, approved chart audit forms and surveys, and recommended the final product for board approval.

The ABIM selects PIM[SM] topics that have high prevalence in internal medicine practice and for which evidence-based guidelines or measures exist. For the PC-PIM, good evidence and measures exist for the assessment and modification of risk for coronary heart disease through control of lipids and blood pressure and improvement in nutrition and physical activity. The National Committee on Quality Assurance (NCQA) had developed Health Employers Data Information Set (HEDIS) measures to assess health plan quality in lipid and blood pressure management,[22] and the AMA Physician Consortium for Performance Improvement (PCPI) had developed physician-level performance measures for use in the Center for Medicare and Medicaid Services (CMS) Doctor Office Quality program.[23] After modification for use at the physician level, cardiac disease measures that would be useful for quality improvement were incorporated into the PC-PIM[SM]. Other measures were developed from national guidelines using the principles established by the Joint Commission, NCQA, and PCPI.[24–29] The measures and their source are shown in TABLE 1.

Capturing claims data for MOC from myriad practice management systems was technically not feasible for the PIM[SM].[30] Moreover, as a quality improvement activity, it was important for physicians to gain knowledge from an examination of their actual records, rather than use derivative data such as diagnosis or procedure codes that are more appropriate for billing purposes. Additionally, the American Diabetes Association's Diabetes Recognition Program (now the NCQA Diabetes Physician Recognition Program) and beta-testing of the ABIM's diabetes PIM[SM] convincingly demonstrated that practices could reliably and accurately abstract and report data from their office medical records.[31–33] Therefore the ABIM concluded that self-audit of medical records would be an appropriate approach to collect data for quality measures used in all PIMs[SM].

In 2002, we tested a beta-version of the PC-PIM[SM] computer application with 75 randomly selected ABIM diplomates in general internal medicine, cardiology, and geriatrics; volunteers who completed the field test received MOC credit. This test demonstrated the program's functionality, successful two-way transfer of data over the Internet, and the accuracy of measure calculation. Sixty percent of field testers rated the overall value of the PC-PIM[SM] as very good to excellent and 92% rated the ease in using the computer application as very good to excellent. The average time to perform the chart audit was 10 to 15 minutes.

Patient Survey. A 25-item survey was adapted from Picker patient surveys[34] and the Consumer Assessment of Health Plans Survey (CAHPS).[35] Questions were modified for physician-level quality improvement, and questions about patient self-care were added. We interviewed 10 patients by telephone to clarify the language used in the survey. The final survey contains questions about patient demographics, participation in self-care, communication with the practice, access to the practice, and an overall rating of the quality of preventive cardiology care. The survey is administered by an automated computerized telephone system or over the Internet. Patients are invited to participate in the survey by the physician or practice staff. The survey form informs the patients that participation is completely voluntary and their participation will not affect their relationship with the practice. The survey contains no information that would permit the physician or the ABIM to identify a specific patient's response. The anonymous data are electronically transmitted to an ABIM computer server for analysis.

Practice Survey. The practice survey raises awareness about office systems and suggests changes that might improve care. The questions incorporate concepts of the Clinical Microsystem,[36,37] the Chronic Care Model,[38,39] principles of care management,[40] the Institute for Health Care Improvement (IHI) Idealized Office Design,[41] and high-performing practices.[42] The survey contains definitions and links to Internet information about system improvement. Answers to the survey stratify information management, patient education, access and communication, practice safety and efficiency, consultation and referral, practice staff functioning, and improvement processes into those that are working well and those that are not available or operational.

Step 2: Review and Reflect on Performance

A scoring algorithm calculates performance measures and generates a practice quality report from chart audit, practice system answers, and the patient survey. The quality report has five interactive Web pages that display 121 quality measures and indicators. These include patient characteristics, risk factors, barriers to self-care, rates of ideal clinical outcomes and process performance, rates of excellent ratings from patients, and a summary of the practice processes that are working well or could be improved. Users select measures that could be improved, and the program displays these on the final page of the quality report. The user then enters target values for improvement and indicates which practice system changes will be attempted.

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TABLE 1. Performance on Preventive Cardiology PIM Chart Audit Measures*

Patient Characteristics	Performance	Measure Source
Total number of charts	4,628	
Average number of charts (SD) per physician	26 (3.0)	
Mean age of patients (SD)	64 (5.2)	ABIM
Percentage male	58%	ABIM
Risk Factors for Coronary Heart Disease	**Chart Audit (Mean)**	**Source**
Age (M ≥ 45, F ≥ 55)	88%	ABIM
Diagnosis of HYPERTENSION	73%	ABIM
Elevated LDL cholesterol or taking lipid lowering medications	72%	ABIM
Other clinical coronary heart disease	56%	ABIM
Diagnosis of overweight or obesity	50%	ABIM
Physical inactivity	45%	ABIM
Abdominal obesity	41%	ABIM
Family history of premature CHD	33%	ABIM
Prior myocardial infarction	30%	ABIM
Low HDL cholesterol	30%	ABIM
Diabetes mellitus	26%	ABIM
Peripheral artery disease	13%	ABIM
Current tobacco smoker	13%	NQF PCPI
Symptomatic carotid artery disease	8%	ABIM
Abdominal aortic aneurysm	2%	ABIM
Patient Barriers to Self-Care	**Chart Audit**	**Source**
Other medical conditions take priority	18%	ABIM
Problems adhering to recommendations	14%	ABIM
Socioeconomic factors such as poverty	10%	ABIM
Psychiatric illness or cognitive impairment	4%	ABIM
Outcome Measures	**Chart Audit**	**Source**
Diastolic blood pressure less than 85 mm Hg	84%	ABIM
Systolic blood pressure less than 130 mm Hg	48%	ABIM
HDL cholesterol ≥ 40 mg/dl	69%	ABIM
LDL cholesterol in mg/dl at goal for the patient	65%	ABIM NQF NCQA
Triglycerides ≤ 150 mg/dl	58%	ABIM
Process Measures	**Chart Audit**	**Source**
Systolic and diastolic BP recorded at last visit	99%	PCPI
Weight recorded at last visit	98%	PCPI
Sufficient data recorded to make risk assessment	97%	ABIM
Lipid testing complied with recommended timeframe	96%	PCPI
Lipid testing complete	85%	PCPI
Height recorded at any visit	81%	PCPI
Lipid lowering medication	81%	PCPI
Screening high-risk patients for type 2 diabetes mellitus	79%	PCPI
ACE inhibitor or ARB	75%	ABIM
Beta blockers following myocardial infarction	74%	NCQA PCPI
Calorie restriction for weight control	73%	ABIM
Increase in fruits, vegetables, and dietary fiber	72%	ABIM
Waist circumference recorded	31%	ABIM

Legend: ABIM = American Board of Internal Medicine; CAHPS = Consumer Assessment of Healthcare Providers and Systems; NCQA = National Committee on Quality Assurance; NQF = National Quality Forum; PCPI = American Medical Association Physician Consortiou for Performance Improvement; Picker = Picker Institute.

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Step 3: Develop and Implement Improvement Plan

After choosing a performance measure to improve, the physician is expected to try a rapid cycle test of change (plan-do-study-act cycle in FIGURE 1).[16] The rapid cycle test of change involves using a small sample of patients over a relatively short period (eg, weeks) to try a new approach to patient care, such as implementing a flowchart for the medical record, instituting reminders, or changing responsibilities of office staff, all activities of the practice system. The goal for the physician is to link the performance deficiency uncovered from either the medical record or patient survey with missing or ineffective system processes uncovered by the practice system survey. By design, rapid cycle tests of change should involve remeasurement to determine whether the change is working and worth continuing and/or expanding.

Step 4: Report and Reflect on the Impact of the Improvement Plan

The program sends users periodic e-mail reminders to report the impact of a change on the practice. Physicians complete the report by writing responses to five reflective open-ended questions about what was done, what was learned, how impact was measured, whether improvement occurred, and what further changes are planned. On completion, the physician is awarded credit for the MOC practice performance requirement and is eligible for American Medical Association Physician Recognition Award Category 1 CME credits through the American College of Physicians.

Methods of Analysis

Physicians who voluntarily completed the PC-PIM[SM] as a component of their ABIM MOC are the subjects of this report. During MOC registration, these physicians provide consent, via a business associates agreement, to the ABIM to analyze and anonymously report aggregated performance data for purposes of understanding the feasibility of the PIM[SM] in improving practice. No physician personal identifiers were used in this analysis and all patient data are anonymous and HIPAA compliant.

Descriptive statistics were analyzed for the first voluntary users of the PC PIM[SM]. To classify the type of changes that physicians attempted in doing the PIM[SM] and to judge the quality of the improvement plan, three physicians (one expert and two general internal medicine fellows with knowledge of quality improvement) independently categorized the changes and rated a subsample of 92 impact reports. The raters used a structured rating form (available from the authors), which contained a taxonomy of change ideas derived from a chronic care model of systems improvements.[37–40] The raters classified up to five changes the physician actually attempted. Each change was rated using two questions with a 10-point response scale from *0 = none* to *9 = high* evaluating (1) the quality of the evidence that a change was made and (2) the likelihood that it would be sustained over time. Each rater also answered five questions using the 10-point scale to evaluate the overall quality of (1) the description of the improvement plan, (2) the method used to track the change made, (3) the evidence that remeasurement was performed, (4) the specific remeasurement method used, and (5) the probable impact of the change on patient care. Interrater consistency was determined by correlating the ratings between each pair of raters. Correlations ranged from .51 to .75, indicating adequate consistency in their assessments for the descriptive purposes of this pilot. The frequency of changes selected and the percentage of physicians with high (7, 8, and 9) ratings and percentage with low (0, 1, and 2) ratings for quality, remeasurement, and probable impact on patient care were computed.

Results of Early Experience Using the PC-PIM[SM]

From 2003 through 2005, 179 physicians voluntarily completed the PC-PIM. Their mean age was 46.5 years (5.5 SD range from 35 to 71). Average time since graduation from medical school was 20.3 years ($SD = 5.2$, range 11–48). The majority were male (88%) and cardiologists (77%); 20% were general internists. Fifty-eight percent were in single-specialty group practice, 24% in solo practice, and 19% in multispecialty group practice. The mean performance rates for the characteristics, indicators, and source of measures reported in the PC-PIM[SM] quality report are shown in TABLE 1.

Patient Characteristics

As one would expect, the chart audit sample demonstrated high rates of occurrence of common risk factors for future coronary events: age (88%), diagnosed as overweight or obese (50%), hypertension (73%), elevated LDL cholesterol (72%), and diabetes mellitus (26%). Patient surveys showed low adherence to health-related behaviors such as reading nutrition labels when purchasing food (45%) or eating five or more servings of fruits or vegetables a day (24%). Physicians reported that 18% of the patients had competing medical conditions, 14% had problems adhering to recommendations, 10% had socioeconomic factors that interfered with care, and 4% had psychiatric or cognitive impairment.

Clinical Measures

TABLE 1 provides the mean performance for the clinical measures. The mean rate for systolic blood pressure control to < 130 mm Hg was 48% and 65% met LDL cholesterol goals (ie, < 100 mg/dl for patients with coronary disease, < 130 for those with two or more risk factors, and < 160 for all others). Few patients (3%) reported good fitness level and only 35% engaged in physical activity four or more times a week. Most patients (61%) rated the quality of preventive cardiology care as excellent, 29% as very good, 9%

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TABLE 2. Performance on Preventive Cardiology PIM Patient Survey

Patient Survey	Performance (Mean)	Source
Total number of surveys	5,963	
Average number of surveys (SD) per physician	33 (9.5)	
Patient Characteristics		
Mean age of patients	62 (5.9)	
Percentage male	56%	
Family history of premature coronary heart disease	43%	ABIM
Patients with leg pain on exercise	41%	ABIM
Patients with prior heart attack or stroke	37%	ABIM
Patients reporting excellent or very good health	32%	SF-36
Patients reporting fair or poor health	27%	SF-35
Patients with diabetes	26%	ABIM
Overall Rating of Prevention Care		
Patient rating of prevention care "excellent"	61%	Picker
Patient Self-Care Support		
Self-reported compliance with recommendations		
Know the blood pressure results taken at the last visit	97%	ABIM
Know the cholesterol results taken in the past 5 years	95%	ABIM
Smokers reporting they had been advised to quit	85%	CAHPS
Reads nutrition labels most of the time.	45%	ABIM
Exercising at least 30 minutes four or more times a week	35%	ABIM
Eating five or more servings of fruits or vegetables per day	24%	ABIM
Communication With Practice		
Patients rating practice as "excellent" on		
Encouraging questions and answering them clearly	58%	ABIM
Providing information about how to prevent heart attacks	50%	ABIM
Providing information on side effects of medications	41%	ABIM
Patient Access to Practice		
Patients reporting "no problem" with the following components of access to the practice:		
Scheduling an appointment	90%	CAHPS
Obtaining a prescription refill	89%	CAHPS
Obtaining results of laboratory tests	87%	CAHPS
Reaching the practice with a question or concern	86%	CAHPS
Obtaining a referral	69%	CAHPS

as good, 2% as fair, and none as poor. The physician's estimation of a patient's 10-year risk for a coronary event was surprisingly inaccurate. Using the ABIM risk algorithm along with the Framingham risk calculator and data for each patient, the average percentage of correct estimates was only 41%. Risk was underestimated in an average of 53% and overestimated in 5%.

TABLE 2 highlights the results from the patient survey. Practice communication with patients showed the most room for improvement: 58% of patients rated practices as excellent at encouraging questions and answering them clearly, 50% excellent in giving instructions about diet and exercise, and only 41% excellent at giving information about medication side effects.

Office Systems

Most of practices used medication lists (98%), allergy lists (95%), and templates for documenting history and physical examination data (82%), including patients' smoking status (50%). Problem lists were used by 78% and two-thirds used clinician reminders to document medication problems, symptoms, and functional status. Few used decision support tools to remind providers to intensify therapy to reach treatment goals (33%).

Many practices provided a means for patients to report home blood pressure monitoring (78%). Over half of the practices assigned staff to provide nutrition (68%), exercise (60%), and smoking cessation counseling (53%). Referrals to community nutrition (eg, Weight Watchers—74%) and exercise programs (eg, YMCA—78%) were common, as was the use of behavioral change techniques for assessing lifestyle changes (62%), documenting stage of change (69%), providing written medication instructions (51%), and having a written self-care plan (48%). Processes for monitoring patient physical activity or dietary choices were less common (41%).

Hospital discharge summaries were generally available in the office (81%) and 67% had office records available in

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the hospital. Only 45% of practices had office records available to after-hours covering physicians and only 43% systematically cross-check prescriptions for medication interactions. Some practices have electronic medical records that can provide registry-type quality improvement data, such as lists of patient test results (41%) or clinical data (37%) for patients with a specific diagnosis. About half (54%) report participation in quality improvement activity: 52% hold staff meetings for quality improvement, 51% use patient surveys, and 42% have access to quality reports for their practice.

There is room for improvement in interactions between primary care and consulting physicians. While 75% of consulting practices reported their availability to teach primary care physicians about advances in their field, only 59% of the primary care practices reported availability of such teaching.

Within the practice, 74% of physicians reported their team members have clear roles and responsibilities; 75% have a designated resource manager and 66% a designated clinical team leader. However, clinical and laboratory data are available at the start of the visit for 70% of practices, and in only 53% of the practices do all clinicians report they start appointments on time.

Selections for Quality Improvement

From the 121 quality measures, indicators, and process improvements, physicians were directed to select up to 8 measures for improvement and up to five system enhancements that might lead to that improvement. After trying the idea in a rapid cycle test of change, physicians were asked to report its impact on the practice. As shown in TABLE 3, the most commonly selected measures for improvement were increasing the proportion of patients at goal for LDL cholesterol or systolic blood pressure. The practice system process changes chosen were reported by the physician in the impact section of the PIM (FIGURE 1, step 4).

Report of the Impact of Tests of Change on Practice

With regard to specific practice system changes, the most common process changes instituted were protocols/reminders or medical record information organizers (TABLE 4). Some physicians attempted multiple process changes. For example, approximately 30% of physicians attempted to incorporate flowsheets for tracking medications and lipid values and added a medical record template to remind them or their staff to collect lifestyle information or laboratory data. A quarter of the physicians added patient education materials or made them available during visits. Some physicians (20%) made changes in the way they manage care:12% delegated care management responsibilities; less than 5% changed staff structure to include nutritional or exercise counseling; a few increased their referral to community resources, such as Weight Watchers or physical activity programs; one physician implemented a process for audit and feedback.

When reporting the impact of the change on the quality of practice, 95% of physicians reported subjectively that the change was working. In terms of the raters' assessment of the impact reports, only 25% (averaged across raters) of physicians provided concrete evidence of measuring the impact of the test of change and approximately 45% showed no evidence of remeasurement. These data support the finding that physician self-assessment, without data, may be unreliable.[43]

Discussion

This PC-PIM[SM] performed well as a self-administered tool for assessment of the quality of practice using performance measures and obtaining feedback from patients. Importantly, the PC-PIM[SM] identified meaningful clinical gaps in physician knowledge and skill needed to apply quality improvement methods to change practice systems and improve these measures.

TABLE 3. Measures Selected for Improvement Plan

Measures Selected for Improvement	Percentage of Physicians Selecting Measure*
Total number of practices	179
Increase the proportion of patients with the LDL cholesterol at goal	68%
Increase the proportion of patients with the systolic BP $<$ 130 at the last visit	64%
Increase the proportion of patients exercising at least 4 days per week	48%
Increase the percentage of patients rating the practice as "excellent" in providing information on preventing coronary heart disease	52%
Increase the percentage of patients rating the practice as "excellent" in providing information on medication side effects	47%
Improve accuracy of 10-year CHD risk assessment	44%
Increase the percentage of patients rating the practice as "excellent" in encouraging and answering questions clearly	38%
Increase the percentage of charts with a recorded waist circumference	35%
Increase the proportion of patients with complete lipid testing	32%

*Physicians could select multiple measures for improvement.

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TABLE 4. Practice Process Changes That Were Implemented

Practice Process Changes Implemented	Percentage of Physicians Making Change*
Total number of practices	179
Use protocols and clinician reminders for appropriate testing or treatment	43%
Use medical record information organizers (eg, medication lists, laboratory flow sheets, and treatment plans)	43%
Use templates and reminders to ensure documentation of clinical data (eg, history and physical examination for CHD risk, health-related behaviors, functional status, and self-care)	39%
Use the medical record system so that it becomes an effective tool for coordinating care among providers and staff	37%
Provide useful written information to patients	34%

*Physicians could implement multiple changes.

Performance on several measures for this sample of ABIM diplomates enrolled in MOC was higher than that reported in recent studies.[44] There are several explanations. The physicians who participated in the PC-PIM[SM] were self-selected and were mostly cardiologists who were motivated to maintain their certification and may represent higher than average performers. The selection of patients invited to complete the patient survey and charts selected for audit was not standardized and may have resulted is bias toward more positive physician performance. There is also a possibility of response bias from the patients who chose to answer the survey.

The overall process of practice self-assessment and performing practice quality improvement was novel for most physicians; they were able to complete the chart audit, patient survey, and practice system survey with little difficulty. Reviewing charts felt burdensome to many but also provided experiential learning about problems documenting clinical data and transferring laboratory and consultation information. The patient survey provided insight into the way the practice communicates with patients and stimulated improvement in patient education and activation to participate in their care. One important observation was the discordance between the physicians' rather low perception of adherence problems in the medical record audit compared to patient self-report on the survey, supporting the value of the patient survey also to identify gaps in the physician's ability to self-assess their patients' needs without systematic data accurately.

The practice system survey and quality improvement exercise plowed new ground for assessing physician understanding of systems-based practice and the role of information management, care management, and quality improvement processes in medical care.[45,46] When the PIM[SM] was developed, little was known about individual physician use of performance data for quality improvement. Therefore, the ABIM chose to help physicians measure their performance in practice and permit an open-ended approach to improving quality. This approach provides a window on the current state of physician knowledge about quality improvement and a perspective on the barriers to making changes in practice. The pilot study suggests that few physicians, even those who are highly motivated and perform well on other measures of competence, have sufficient experience or work in organizational structures that use performance measurement and improvement methods. There is much room for future research to identify which factors might help physicians apply quality improvement methods in their practices and which educational approaches might be helpful.

ABIM is currently revising the PIM[SM] model to provide more guidance in how physicians might introduce elements of the chronic care model or patient-centered medical home into their practices. Improvements in the practice system survey are currently being tested and a more explicit model of office practice is being developed.

The results of the PC-PIM[SM] demonstrate the need to redesign continuing medical education activities to help physicians acquire the knowledge and skills needed to collect evidence of performance in practice, to learn from it, and to use it to improve practice. Education will need to focus on changing the attitude that physicians have sole responsibility for the care delivered. This attitude impedes effective teamwork and appropriate delegation of care management tasks. Physicians also will need to learn how to apply statistical methods to the measurement of their work and principles of work-flow design that are needed to create lasting changes in the processes of care.

In summary, the ABIM PC-PIM[SM] contributes to the field of physician self-assessment, practice-based learning and improvement, and systems-based practice. It introduces the skills of using quality measures to assess practice performance, learning, and improvement of practice. It is but a first step in the long journey that will end in the transformation of medical care from a solo to a team sport and from a personal and private enterprise to one that includes community well-being and the use of transparent information for improving health.

References

1. Blumenthal D. The role of physicians in the future of quality management. *N Engl J Med.* 1996;335:1328–1331.

DOI: 10.1002/chp

2. Galvin RA, McGlynn EA. Using performance measurement to drive improvement—a road map for change. *Med Care*. 2002;41(suppl): I-48–I-60.
3. Casalino LP. The universal consequences of measuring the quality of medical care. *N Engl J Med*. 1999;341:1147–1150.
4. Jencks MD, Stephen F. Clinical performance measurement—a hard sell. *JAMA*. 2000;283:2015–2016.
5. Brook RH, McGlynn EA, Cleary PO. Measuring quality of care. *N Engl J Med*. 1996;335:966–970.
6. Steinbrook R. Public report cards–cardiac surgery and beyond. *N Engl J Med*. 2006:355(18);1847–1849.
7. Berwick DM, James B, Coye MJ. The connections between measurement and reporting. Med Care 2002;41(suppl):I-30–I-38.
8. Marshall M, Shekelle PG, Leatherman S, et al. What do we expect to gain from the public release of performance data? A review of the evidence. *JAMA*. 2000;283:1866–1874.
9. National Committee on Quality Assurance: The State of Healthcare Quality: 2005. Available at: http://www.ncqa.org. Accessed October 28, 2006.
10. Rosenthal MB, Landon BE, Normand ST, Frank RG, Epstein AM. Pay for performance in commercial HMOs. *N Engl J Med*. 2006; 355:1895–1902.
11. ABIM Foundation, ACP-ASIM Foundation and the European Federation of Internal Medicine. Medical professionalism in the new millennium: A physician charter. *Ann Intern Med*. 2002;136:243–246.
12. Wasserman SI, Kimball HR, Duffy FD, for the Task Force on Recertification. Recertification in internal medicine: A program of continuous professional development. *Ann Intern Med*. 2000;133:202–208.
13. Landon BE, Normand SD, Blumenthal D, Daley J. Physician clinical performance assessment prospects and barriers. *JAMA*. 2003;290: 1183–1189.
14. Berwick DM. Developing and testing changes in delivery of care. *Ann Intern Med*. 1998;128(8):651–656.
15. Jamtvedt G, Young JM, Kristofforsen DT, et al. Audit and feedback: Effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2000;(2):CD000259.
16. Nelson EC, Batalden PB, Godfrey MM. *The Model for Improvement in Quality by Design*. San Francisco, Calif: Jossey-Bass; 2007:271–283.
17. Batalden P, Leach D, Swing S, Dreyfus H, Dreyfus S. General competencies and accreditation in graduate medical education. *Health Aff*. 2002;21(5):103–111.
18. Davis DA, Thomson MA, Oxman AD, et al. Changing physician performance: A systematic review of the effect of continuing medical education strategies. *JAMA*. September 6, 1995;274(9):700–705.
19. Davis D, O'Brien MA, Freemantle N, et al. Impact of formal continuing medical education: Do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or healthcare outcomes? *JAMA*. 1999;282(9):867–874.
20. Demming WE. *The New Economics for Industry, Government, Education*. 2nd ed. Cambridge, Mass: The MIT Press; 1994:92–115.
21. Framingham 10-year CVD Risk Calculator. Available at: http://hp2010.nhlbihin.net/atpiii/calculator.asp?usertype=prof. Accessed on November 30, 2006.
22. McGlynn EA. Choosing chronic disease measures for HEDIS: Conceptual framework and review of seven clinical areas. *Manage Care Q*. 1996;4(3):54–77.
23. The Physician Consortium for Performance Improvement. Accessed November 20, 2006, at http://www.ama-assn.org/ama/pub/category/2946.html.
24. Chobanian AV, Balnis GL, Block HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *JAMA*. 2003;289:2560–2572. Available at www.nhlbi.nih.gov/guidelines/hypertension.
25. National Cholesterol Education Program recommendations. Available at http://www.nhlbi.nih.gov/guidelines/cholesterol. Accessed November 20, 2006.
26. United States Preventive Services Task Force recommendations. Available at http://www.ahrq.gov/clinic/uspstf/uspschol.htm. Web site was accessed on November 20, 2006.
27. Smith SC, Blair SN, Bonaw RO, et al. AHA/ACC guidelines for preventing heart attack and death in patients with atherosclerotic cardiovascular disease: 2001. Update: A statement for healthcare professionals from the American Heart Association and the American College of Cardiology. *Circulation*. 2001;104;1577–1579.
28. Garber AM, Browner WS. American College of Physicians guidelines for using serum cholesterol, high-density lipoprotein cholesterol, and triglyceride levels as screening tests for preventing coronary heart disease in adults. *Ann Intern Med*. 1996;124:515–517.
29. McGlynn EA. Selecting common measures of quality and system performance. *Med Care*. 2002;41(suppl):I-39–I-47.
30. HEDIS. Available at http://www.ncqa.org/communications/publications/Tech_Spec_MD_Executive_Summary.pdf. Accessed November 20, 2006.
31. NCQA Diabetes Recognition Program. Available at http://www.ncqa.org/dprp/listall.asp. Accessed June 17, 2003.
32. Greenfield S, Kaplan SH, Kahan R, Ninomiya J, Griffith JL. Profiling care provided by different groups of physicians: Effects of patient casemix (bias) and physician-level clustering on quality assessment results. *Ann Intern Med*. 2002;136:111–121.
33. Holmboe ES, Meehan TP, Lynn L, Doyle P, Sherwin T, Duffy FD. The ABIM Diabetes Practice Improvement Module: A new method for self assessment. *J Contin Educ Health Prof*. 2006;26:109–119.
34. Cleary PD, Edgman-Levitan S. Health care quality: Incorporating consumer perspectives. *JAMA*. 1997;278(19):1608–1612.
35. Schneider EC, Zaslavsky AM, Landon BE, et al. National quality monitoring of Medicare health plans; the relationship between enrollee's reports and quality of clinical care. *Med Care*. 2001;39(12):1313–1325.
36. Nelson EC, Batalden PB, Huber TP, et al. Microsystems in health care: Part 1. Learning from high performing front-line clinical units. *Jt Com J Qual Saf*. 2002;28(9):472–493.
37. Clinical Micro Systems Workbook: Primary Care. Accessed January 28, 2007, at http://dms.dartmouth.edu/cms/materials/workbooks/outpatient-primary-care.doc.
38. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Millbank Q*. 1996;74(4):511–544, 1996.
39. Improvement in Chronic Illness Care: The chronic care model. Accessed November 30, 2006 at http://www.improvingchroniccare.org.
40. Weingarten SR, Henning JM, Budamgarav E, et al. Interventions used in disease management programs for patients with chronic illness—which ones work? Meta-analysis of published reports. *BMJ*. 2002;325: 925–932.
41. Institute for Healthcare Improvement. *Idealized Design of Clinical Office Practice*. Boston, Mass: Institute for Healthcare Improvement; 2000.
42. Nelson EG, Batalden PB, Huber TP, et al. Microsystems in health care: Part 1. Learning from high-performing front-line clinical units. *Jt Comm J Qual Improv*. 2002;28(9):472–493.
43. 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.
44. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348: 2635–2645.
45. Chaudhry B, Wang J, Wu S, et al. Systematic review: Impact of health information technology on quality, efficiency, and costs of medical care. *Ann Intern Med*. 2006;144:E-12–E-22.
46. Shojania KG, Ranji SR, McDonald KM, et al. Effects of quality improvement strategies for type 2 diabetes on glycemic control: A meta-regression analysis. *JAMA*. 2006;296:427–440.

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