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Increasing Capacity for Quality Improvement in Underresourced Primary Care Settings

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While hospitals have widely adopted quality improvement (QI) initiatives, primary care practices continue to face unique challenges to QI implementation. The purpose of this article is to outline a strategy for promoting QI in primary care practices by introducing specially trained nurses. Two case examples are described, one with a QI nurse external to the practice and one with a nurse internal to the practice. Lessons learned and barriers and facilitators to QI in primary care are presented. Barriers and facilitators are identified in the following categories: practice infrastructure, practice leadership, and practice organizational culture. Implications for primary care practitioners and avenues for future work are discussed.

Key words: *Lean Six Sigma, organizational culture, primary health care, quality improvement*

Ongoing quality improvement (QI) is critical to improving efficiency, patient safety, delivery of evidence-based health care, and better health outcomes. Hospitals were early adopters of QI; however, barriers to implementing evidence-based interventions continue to exist in many primary care settings.[1] Primary care settings, unlike hospitals, often lack the infrastructure and capacity to drive the level of QI needed to make meaningful change.[2] A variety of approaches that are internal and external to a practice, including using benchmarking, expert consultation, policies that drive QI, and supporting interprofessional teams trained in QI, have been proposed for primary care settings to build needed capacity.[2,3] This article describes 2 approaches, one internal and one external,

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to implementing QI in 2 practice sites and identifies barriers and facilitators to QI.

SETTING

The Care Coordination Institute (CCI) Practice Network (formerly known as OQUIN) receives recurring data by downloading medical summary data from various electronic health record (EHR) systems used by approximately 200 clinical sites, with more than half in South Carolina.[4] A HIPAA, HiTech 2009–compliant Business Associate Agreement establishes CCI as the QI arm of each practice and permits use of de-identified data for research. An advisory board, composed of representatives from various practices, reviews opportunities to improve quality and efficiency. At the CCI, we support QI through (1) audit and feedback reports, (2) continuing education, (3) promotion of American Society for Hypertension hypertension specialists training, and (4) monetary incentives provided by Blue Cross Blue Shield for attaining National Committee for Quality Assurance (NCQA) certification. For example, comparative performance reports on selected NCQA indicators for hypertension, lipids, and diabetes are returned to providers quarterly with a newsletter to facilitate QI. Providers can access a secure Web site to obtain information on which of their patients have uncontrolled risk factors, lack guideline-recommended laboratory data, have infrequent visits, and are lost to follow-up. The network has documented substantial improvements in multiple cardiovascular disease risk factor control.[5,6] Thus, a well-established data acquisition and management system focused on QI is in place. However, we documented variation among individual providers and entire practices in adherence with NCQA standards. By conducting focus groups and interviews with practice staff and administrators across the network, we learned that practices varied greatly in their knowledge and implementation of QI. Furthermore, while most practices used the audit and feedback report to monitor adherence with standards, some did not.

Recently, a grant from the Centers for Disease Control and Prevention to our state health department funded us to accomplish 2 aims: (1) to expand the number of practices (including pediatric practices) and (2) to improve the quality of care in network practices beyond our traditional approaches and in line with NCQA standards. On the basis of board recommendations, we developed an online Lean Six Sigma (LSS) training program in QI and, in a sample of practices, funded 20% to 40% of a practice staff member's time. This time was used to train the staff member to implement QI projects related to reducing cardiovascular disease risk.

QI METHOD

"Six Sigma" is one method that improves quality by reducing variation in the production of a product or delivery of a service, and the "Lean" method streamlines processes to improve efficiency. Lean Six Sigma became popular in the early 1990s by combining Six Sigma (created at Motorola) with Lean (developed at Toyota) to reduce waste and improve quality and efficiency in multiple industries.[7] Improvements were so successful that hospitals adapted the approach and its many tools to improve patient safety and reduce length of stay. Recently, LSS has been adopted in the primary care setting to improve workflow processes, patient satisfaction, and health outcomes.[8,9] Lean Six Sigma takes a student through a succession of QI processes with increasing complexity (White to Black Belt). White Belt provides an overview of LSS; Yellow Belt prepares the student for short, easy QI projects; and Green Belt adds complexity and cost. Black Belt addresses the most complex projects. We adopted LSS to improve quality of care and outcomes in our primary care network.

In 2011, we developed courses in White, Yellow, and Green Belt LSS and provided salary support for a part-time QI person in each of 5 practices and a half-time nurse who was employed by the network but led QI teams in several practices. We named these QI-trained individuals QI Pros (Quality Improvement

Professionals). The roles of the QI Pros were similar to the practice facilitators described by Taylor et al.[10] The aim was to increase each practice's capacity to use its data to improve care and efficiency. A secondary aim was to compare barriers and facilitators of QI using an internal QI Pro (nurse hired by the practice) with an external one (nurse hired by CCI). We hired an experienced, LSS Master Black Belt Instructor to create free online and face-to-face training in White, Yellow, and Green Belt LSS for anyone working in our network practices.

The 2 clinical sites in this article are described in additional detail in the case examples. Both sites have very busy practices, are new to QI and underresourced for conducting multiple QI projects, have been in the network for 5 years or more, use EHRs, and have demonstrated an active interest in providing consistent, high-quality, evidence-based care. Both are also focused on attaining Patient Centered Medical Home (PCMH) certification and had recently begun QI change processes when this project was initiated. We identified the barriers and facilitators to QI and then categorized these barriers and facilitators using the domains of the Consolidated Framework for Implementation Research (CFIR) as a guide.[11] The CFIR was constructed from multiple implementation theories and was developed in part to "help explain findings in research studies or quality improvement initiatives."[11(¶3)] The domains are the intervention, the inner and outer setting, the individuals involved, and the implementation process.

CASE EXAMPLES

Case example 1 (QI Pro external to the practice): Missed follow-up visits among patients with treatment-resistant hypertension

Site

The project was conducted at a family medicine residency clinic in a metropolitan area of South Carolina. The clinic employed 23 physicians in family medicine residency training (residents) and 14 faculty members with expertise in family medicine, pharmacotherapeutics, pediatrics, and mental health. They actively served more than 5000 patients from rural and urban areas and provided care for indigent populations. The QI Pro was a nurse employed half-time by the health system, but not the practice, and half-time by CCI and thus was external to the practice. The practice had a standing QI committee composed of representatives in each area of the practice and led by a quality coordinator with a background in hospital administration; this committee met every other week. Administration was supportive, but was neither trained in QI nor actively involved in most QI projects. To further support QI, residents were required to conduct Problem-Based Learning Initiative projects, which were frequently centered on quality and safety issues in the practice. Several local information technology (IT) staff members were available to assist with data acquisition as needed for baseline and change metrics, and the QI Pro also submitted queries to the CCI Practice Network data warehouse. The QI Pro spent 2 to 3 weeks attempting to identify and begin a project with little success. However, once she began collaborating with the quality coordinator, she was able to initiate a QI project.

QI project

For this project, the external QI Pro followed the LSS Define-Measure-Analyze-Improve-Control process.[7] She was introduced to the staff at a regularly scheduled QI meeting during which a few providers and staff members expressed concern that the QI process might make their practice "look bad" to the CCI Practice Network. The QI Pro assured the providers and staff that she was employed by the same organization as the providers and staff, although in a different location, and did not want them to "look bad" either. Most staff members were actively engaged in QI and expressed a desire to be helpful, but 2 or 3 staff members light-heartedly asked the QI Pro, "You aren't here to give us more work to do, are you?"

Next, the QI Pro brainstormed with key stakeholders in the practice to select a project. They

chose the follow-up visit process for patients with treatment-resistant hypertension (TRH) and titled the project: *Missed Follow-up Visits Among Patients With TRH.* A project team was formed, and they created a project charter that communicated key definitions, the project goal, and the project timeline. The QI Pro created flowcharts to define the process and interviewed staff to establish the voice of the customer. A cause and effect diagram was created to identify factors that were potentially contributory to the missed follow-up visit rate. The team developed an operational definition for missed follow-up visits among patients with TRH, which was used to submit a query to the CCI database that established a baseline missed follow-up visit rate at the practice. Over the 2 years preceding the project, 35.3% of follow-up visits of patients with TRH were missed. To determine the causes for missed follow-up visits, surveys of scheduling staff were conducted. During root-cause analysis (supported by a causal tree and the 5 Whys technique), the team discovered that missed follow-up appointments were most commonly attributed to transportation-related issues and to patients forgetting appointments.

After these causes were identified, the team brainstormed to identify possible solutions to be tested. A few of the suggested solutions were dismissed with comments such as "We already tried that and it didn't work." Initially, the team chose a 2-part improvement strategy that would potentially increase the number of patients reached during reminder phone calls and would enhance uniformity among the registration and checkout staff's approach to patients. However, local IT staff were hesitant to change the system and, when they did attempt the change, discovered the phone reminder system settings could not be altered without incurring a charge from the practice's EHR vendor. For this reason, the improvement was composed solely of one-on-one educational sessions between the QI Pro and each registration and checkout staff member. During the sessions, registration staff members were encouraged to verify that an accurate phone number was recorded in the EHR at every patient visit. Checkout staff members were asked to highlight the follow-up visit date and time on the discharge summary and to verbally communicate the date and time with every patient. After the session was completed and time elapsed to allow the change to take effect, the follow-up visit rate among patients with TRH was again obtained via the CCI database. Postimprovement, 23.9% of follow-up visits were missed, which was an 11.4% decrease from baseline. To ensure gains were held, the QI Pro gave a printed handout with reminders to each registration and checkout staff member and an electronic copy of the handout was given to an administrative team member. One staff member agreed to evaluate the rates of missed reminder phone calls on the daily phone call reports, and another staff member agreed to periodically obtain a snapshot of the follow-up visit rate to monitor the process. The project required 4 months to complete, with most delays caused by the process of establishing trust and familiarity with the practice and IT staff.

Case example 2 (QI Pro internal to the practice): *Obesity Identification Initiative*

Site

This project was conducted at a large pediatric ambulatory care center in South Carolina with approximately 18 000 pediatric patients and 50 000 visits per year. The center offered several specialty clinics including asthma, attention-deficit/hyperactivity disorder, adolescent counseling, and preemie follow-up. The QI Pro was internal to the practice and worked as a night clinic nurse at the center. She was also designated as the lead of their QI team, which was composed of representatives from each area of the practice. Information technology staff members were involved in projects depending on the project focus, and the IT staff member's area of expertise. Administrative personnel were supportive of the QI Pro but were not trained in LSS or actively engaged in the QI projects. Many change processes were underway simultaneously at this practice; therefore, administration was concerned with "overloading" staff

and wanted sequential, rather than concurrent, QI projects. The need to introduce projects when there are "no other stressors" led to delays in implementation.

QI project

The LSS Define-Measure-Analyze-Improve-Control process was also followed in this case study. The QI Pro and key stakeholders in the practice met initially to form a team and choose a project. The team members were interested in addressing pediatric obesity and identified a lack of body mass index (BMI) data in the EHRs. Accurate BMI data in the EHR are required for PCMH certification, so this QI project fit with an important goal of the practice. The project was titled *Obesity Identification Initiative.* A process map was developed to understand BMI procurement, and the voice of the customer was established. The team created a project charter that included the project goal of accurately diagnosing all patients aged 2 to 18 years with obesity (BMI >85th percentile). While attempting to contact the IT personnel responsible, the QI Pro found that staff and providers often worked in "silos," each with very specific areas of expertise that were not easily known to other team members. These silos existed even within specific areas such as the IT department. The QI Pro learned each person's role or area of expertise and determined that there were few communicative ties between IT and the practice. For example, the QI Pro repeatedly attempted to identify the appropriate IT personnel to facilitate the project. In an effort to gain more active support, the QI Pro began carbon copying the practice's director in every project-related e-mail, after which the e-mail response rate and time between responses improved. The communication barriers resulted in time wasted; to complete the project, the QI Pro formed essential new connections between IT and the practice. Once these new connections were made, a baseline measurement of the number of children with BMIs recorded in the EHR was obtained. During the 1-month period of baseline data collection, 22.45% of children did not have BMIs charted in the EHR. The group brainstormed about the causes for the missing BMIs. A cause and effect diagram was developed, and the team discovered that weights were being collected on every visit but heights were being collected only during well-child visits. Since the QI Pro was a nurse in the practice and the project was within nursing's domain, she was familiar with the BMI problem and related causes. This familiarity informed the root-cause analysis, and the team determined that the nurses and management did not realize that BMIs were retrievable for meaningful use (and supported PCMH certification).

Once the underlying causes of the problem were identified, the team presented the results of the baseline measurement and the root-cause analysis to the nursing staff. The importance of BMI collection was emphasized, and new check-in procedures for obtaining heights on all appropriate visits were instituted. After the presentation, the team collected data for a 1-month period to assess improvements and found the percentage of EHRs without a recorded BMI fell from 22.45% to 1.46%. The QI Pro attempted to hold the project gains by providing a summary of the efforts and discovery to key practice stakeholders. The team planned to assess compliance using random chart audits to check for BMI data. This project took approximately 3 months to complete. Deferrals in obtaining baseline and postintervention data contributed the most to delays.

FACTORS INFLUENCING QI IMPLEMENTATION

For both QI Pros, key factors influencing implementation were related to the practice's infrastructure, leadership, and organizational culture (Table). Components of each of these factors correspond to the domains of the CFIR. As seen in the 2 case studies, most factors that influenced QI implementation were similar for both QI Pros regardless of whether the QI Pros were internal or external to the practice. However, the external QI Pro faced additional

Table

FACTORS INFLUENCING QI IMPLEMENTATION

Category	Facilitators	Barriers
Practice infrastructure	IT systems capable of contributing to QI projects	IT personnel's lack of engagement in data collection IT located externally from practice Lack of funding for QI projects Lack of communication between IT and practice personnel
Practice leadership	Strong, consistent, committed leaders Leaders supportive of QI projects	Leaders unable to directly participate in QI projects
Practice organizational culture	Team devoted to QI in the practice Gatekeepers or collaborators available to advocate for QI efforts	Provider and staff resistance to change Practice undergoing frequent change Busy patient care environment with little "spare" time

Abbreviations: IT, information technology; QI, quality improvement.

barriers related to establishing trust and learning the institutional culture.

Infrastructure

Information technology was a vital component of each practice's infrastructure and was key to QI implementation in both settings. However, both QI Pros experienced difficulty engaging IT in data collection and, in the case of the external QI Pro, making a change in the telephone callback system. Both QI teams saw IT personnel as separate from the change process and not really part of the team effort. This perception may be influenced by the fact that IT often resides in locations external to ambulatory clinical activities, with few opportunities for easy access and communication.

A second barrier to QI, most pronounced in the first case example, was lack of funding available for QI projects. Whereas the practice was interested in QI, the choice of which change to implement was heavily influenced by the cost of the proposed improvement, limiting the scope and impact of the QI project. For these reasons, the change to the phone reminder system was abandoned as part of the improvement stage of the project. Lack of funds to support the time of busy staff to participate in QI was a problem in both practices.

Leadership

Involvement from leadership is critical to the success of a QI program. The presence of strong, consistent leadership in the chaotic, busy, frequently changing practice environment was a key facilitator to QI. In both practices, the QI Pros found that stalled projects regained momentum once administrative support was obtained and this support was publicized within the practice. However, despite receiving the public support of practice administration, the practice leaders were unable to provide more practical assistance.

Practice culture

Both QI Pros found that QI implementation was highly influenced by the practice's culture. The external QI professional attended QI committee meetings at the practice, which provided a venue for soliciting provider and staff involvement in the QI project. Issues considered highly problematic to each practice were selected, and providers and staff in both settings favored process improvement. Although

the practices were moving toward becoming more quality-focused, many staff members and providers were resistant to the change inherent to QI initiatives. A few practice personnel outwardly objected to adopting change. Others were not as change-resistant but were not interested in participating in the project either, most frequently citing a lack of time as the main barrier to participation. The QI Pros found that their efforts toward developing trust and establishing relationships with providers and staff were essential to implementing QI. Spending time with providers and staff and sharing details about the project and soliciting feedback fostered trust. Earning "buy in" from the practices was challenging for the QI professionals, and, at times, the providers and staff seemed suspicious of the external QI Pro's involvement at the practice.

Along with forming relationships with leaders in the practice, the QI Pros also established relationships with gatekeepers or other collaborators. These relationships provided the essential practical and daily support the QI professionals required to conduct QI projects. The external QI Pro began working closely with the practice's quality coordinator, who was familiar with QI methods (albeit not LSS) and with the practice's processes and staff roles. Similarly, the internal QI Pro eventually developed a close working relationship with an IT staff member. Since there was no established method for communication between practice and IT personnel and the focus of the project was on accurate EHR documentation, direct collaboration with a key IT professional was essential.

DISCUSSION

The key finding is that barriers and facilitators to implementing QI are common in primary care practices and are similar for QI Pros who are internal and external to the practice. The one difference was the internal QI Pro understood the organizational culture and knew the personnel and had less difficulty implementing her project. While our findings on facilitators and barriers to QI are generally consistent with that of others, we identified a few specific areas to explore further such as resistance from IT staff, siloed groups, and change overload within the busy practice.

Ongoing QI activities are relatively new to primary care, compared with acute, inpatient care. However, as a result of rapid changes in data-driven health care reforms such as meaningful use and reimbursement tied to quality standards, primary care practices are adopting QI to improve adherence to the new standards.

Several approaches to implementing QI in primary care have been described in the literature, including using audit and feedback of practice data to encourage adherence with standards; educating practice staff through such methods as academic detailing; receiving newsletters and attending meetings; establishing QI teams and training them in change processes; training local clinical experts; and bringing "facilitators" into the practice to assist practices conduct QI.[3,12-14] Institute for Healthcare Improvement also established a QI method (Model for Improvement) to facilitate QI implementation in health care.[15] All approaches have documented success in implementing QI, leading to improved adherence with practice standards, although no studies of long-term change (several years) have been undertaken.

Several research teams have identified criteria for successful primary care practice QI implementation.[16,17] Nemeth et al[16] distinguished 3 characteristics of "high-performing" ambulatory care practices for a colorectal cancer screening project in a practice-based research network: they were knowledgeable in the use of their EHR, teams were highly engaged in QI, and the practices were led by administration personnel who were focused on quality care. Another study involving 51 family medicine practices found 4 organizational attributes that influence change: communication (how team members relate to one another), decision making (how collaborative teams are), stress/chaos (how busy and stressful work is perceived to be), and the history of making changes.[17]

Parchman et al[3] developed practice facilitation, which uses professionals external to the practice

to engage the practice in change. This approach is similar to the one implemented by our external QI Pro.

The 2 case examples presented here limit interpretation of results to a large, general population. However, our experience mirrors that of others while adding context and detail to the root causes of barriers to implementing QI in busy, underresourced primary care practices. The Agency for Healthcare Research and Quality has published a helpful toolbox to assist practices in their QI efforts.[18] However, until we launch QI projects that address the root causes of the barriers to broad implementation of QI itself, primary care practices will continue to struggle to improve their processes of care.

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