Evidence-Based Quality Improvement Training Programs

CE 1.5 Contact Hours

Building Staff Capability and Organizational Capacity

Laura Sarff, DNP, RN, MBA, CPHQ, NEA-BC; Roxanne O'Brien, PhD, RN, CPHQ

ABSTRACT

Background: Patient harm from medical errors is frequently the result of poorly designed systems. Quality improvement (QI) training programs should build staff capability and organizational capacity for improving systems.

Problem: Lack of internal expertise in QI and financial impact of hiring consultants deter organizations from developing QI training.

Approach: One safety net hospital, with minimal resources, used evidence-based elements to create a Quality Academy Program.

Outcomes: Significant outcomes demonstrated individual capability in undertaking QI initiatives. Staff who continued QI posttraining and the number of initiatives launched demonstrated organizational capacity. Feedback showed an increase in confidence with projects intended to improve care processes and patient outcomes.

Conclusions: The elements shown to be essential in QI programs to build capability and capacity for organizational improvement can improve patient outcomes and organizational work processes as well as impact staff engagement and morale.

Keywords: organizational capacity, quality improvement, quality improvement training programs, staff capability, training programs

Medical errors continue to plague health care settings, and current studies have estimated that more patients are injured than previously thought. Estimates of patient harm in the United States are now 250 000 to 400 000 annually based on newer techniques for data collection and interpretation.[1] Some organizations have reported reduced patient harm after investing in quality improvement (QI) training for staff. These results included lower hospital readmission rates, decreased hospital-acquired pressure ulcers, improved mobility for patients after hip surgery, improved management of sepsis, improved hand hygiene, reduced falls, and improved access to care.[2,3] Yet, many of these organizations also reported failure to follow through with implementation of QI initiatives and QI initiatives that did not achieve defined goals.[4,5]

Training efforts are intended to build capacity and capability to lead QI initiatives, which would be expected to improve work processes and ultimately, patient outcomes. Capacity is defined as enough people trained to execute QI activities, and capability is defined as the confidence and skills achieved by training to direct QI projects.[6] From the perspective of the organization, having skilled staff with knowledge of QI tools and techniques can provide insight into opportunities and actions to improve patient outcomes. Unit-based QI teams with capacity can use these skills to improve hospital-acquired infection rates and fall rates or reduce hospital-acquired pressure injuries. Capability encompasses the confidence, skills, knowledge, and abilities to plan, develop, and implement strategies to improve clinical or operational performance. At the bedside, individuals with

Author Affiliations: *LAC + USC Medical Center, Los Angeles, California (Dr Sarff); and Department of Nursing, The California State University, Fullerton (Dr O'Brien).*

The authors declare no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.jncqjournal.com).

Correspondence: *Laura Sarff, DNP, RN, MBA, CPHQ, NEA-BC, LAC + USC Medical Center, 2051 Marengo St, Los Angeles, CA 90033 (lsarff@dhs.lacounty.gov).*

Accepted for publication: April 11, 2019

Published ahead of print: May 24, 2019

DOI: 10.1097/NCQ.0000000000000416

capability can use knowledge about Plan-Do-Study-Act cycles and can analyze run charts and control charts to better inform their practice.

The literature reports a spectrum of methodological and educational approaches to build individual capability from informal exchange to formal didactic classes with prework, homework, and an assigned QI project. Building capacity, however, is dependent on having adequate numbers of capable staff. Organizational factors such as leadership support and an innovative culture lead to development of capacity. The literature acknowledged both capacity and capability as interrelated components for sustainability of QI initiatives.[6,7]

Building capacity and capability may lead to greater work engagement. Dempsey and Assi[8] describe nurse engagement as a critical component to productivity, citing a lack of engagement resulting in "more than $22,000 in lost revenue due to lost productivity."(p280) In addition, lack of engagement may lead to higher turnover and reduced job satisfaction. White et al[9] found statistically significant improvements in work engagement, measured by the Utrecht Work Engagement Scale, for teams that had training in and conducted QI activities compared with those that had neither used QI nor been trained.

To build capacity and capability among staff to sustain QI initiatives, 1 academic safety net hospital sought to develop sustainable QI training, using current staff knowledge and skills. The goal was to work with limited resources to ensure that the training program included evidence-based elements supporting staff capability and organizational capacity that would provide the foundation for effective QI sustainability. The purpose of this article is to describe the evidence-based elements that organizations can use to develop their own training programs and discuss the application of these elements in our hospital-based QI training program.

CURRENT STATE OF QI TRAINING

A literature search using computerized databases was conducted to identify publications related to implementation of QI training programs. Search terms included various combinations of the following words: quality management, QI training programs, QI capacity, QI capability, building capacity, building capability, QI curriculum, and QI culture. Date delimitations were set from 2003 to 2017. This time frame was chosen to coincide with the expansion of QI training recommendations by the Institute of Medicine.[10]

Evidence-based curriculum elements

The literature review found a total of 39 elements supporting capacity and capability for sustaining QI initiatives.[11-18] These elements were sorted into 3 nondiscrete categories of (*a*) organizational elements, (*b*) participant elements, and (*c*) curriculum elements (see Supplemental Digital Content Table 1, available at: http://links.lww.com/JNCQ/A600).

Organizational elements

While individual capability is important, building an organizational culture committed to QI requires widespread training and adoption of QI knowledge and skills. Several studies reported successful QI programs using formal education strategies with experiential projects and mentors assigned to individuals or teams.[3,12,19,20] Studies showed statistically significant improvement in the use of evidence-based guidelines after implementation of formal QI training.[21,22] Morganti et al[12] reported that organizational training led to increased use of QI tools and improved organizational outcomes. In contrast, Filardo et al[4] randomly assigned participants into 1 group with informal QI training and another group without training across 47 hospitals to address community-acquired pneumonia and congestive heart failure metrics, finding no improvement in outcomes. Scanlon et al[5] randomized 16 community health clinics into those who had informal training and those that did not, finding no differences in meeting outcome metrics. These mixed results suggest that formal, rather than informal, training programs may play a larger role in successful QI implementation.

Organizational culture influences whether QI capacity is achieved and sustained. Cultural characteristics such as trust and open communication predicted sustained use of QI tools.[11,12] In examining work engagement as a cultural construct, work engagement was statistically higher in units trained in QI.[9] Similarly, Babich et al[7] found a stronger QI culture in organizations that supported a QI infrastructure (eg, investing in staff and other resources to support QI) rather than those who just provided QI training. A positive correlation between leadership's behavior and a culture of innovation predicted the successful use of QI tools and methods (such

as clinical audits and cycles of improvement) in practice.[23] In a qualitative study of primary care providers, Goldberg et al[24] found that leadership support for innovation influenced willingness to engage in QI activities. Eid and Quinn[16] and Mery et al[18] identified contextual elements influencing an organization's success in building capacity in the work environment and in relationship with coworkers.

Participant elements

Interprofessional participants in QI training programs included physicians, nurses, administrators, and ancillary staff. Participants across all educational levels showed the same ability to learn QI concepts and implement QI projects.[15] Studies disagreed on priorities for training. Kaminski et al[19] recommended training for leadership first, before frontline staff, to ensure organizational support. Daugherty et al[15] recommended training and engaging frontline staff first. Choosing participants for QI training varied, with staff volunteering for QI training, while other participants were chosen with specific personality characteristics (eg, curiosity, humility, and conscientiousness).[17] Participants also described QI training as an opportunity for professional growth, which may have influenced their choice to enroll.[25]

Participant attitudes influenced whether QI efforts continued posttraining. Positive attitudes toward change were predictive of successful QI project completion.[16] Negative attitudes toward QI were attributed to lack of time to conduct QI projects, perception of more work associated with QI activities, nonsupportive organizational culture, and inadequate resources for QI.[24,25] Participants who did not complete the program or did not attend all sessions were less successful at implementing projects.[4,14] Projects related to specific clinical goals were more likely to have staff involved who were interested in improving the work environment.[12,15]

Curriculum elements

The literature reported a variety of curriculum elements used to train staff in QI. General course descriptions included courses in developing QI projects, basic statistical analyses, and courses covering concepts and tools used in QI. Specific course components such as class plans, specific content, and time commitment to each topic were not described in detail. Most studies included a combination of didactic and experiential training with a culminating project.[14-17,19-22,26]

Most QI training programs developed their own models using selected content from commercially available programs such as Six Sigma, Lean, or the Model for Improvement.[3-5,7,10,12,14-17,19,20,23,26] An advantage to using selected content is the ability to tailor the training to the organization's culture and use portions of each program to build a more comprehensive training program. Disadvantages include the preparation time required to develop the curriculum internally, changing the culture to accommodate new approaches to QI, and financial constraints if consultants are brought in for training.

The literature strongly advocated for the use of mentors to assist with QI projects during training sessions.[3,18,25-27] Mentors were experts in QI who provided coaching and assistance with various aspects of the QI projects. They were deployed as 1:1 partners with participants, or were assigned to a team newly engaged in a QI project for the duration of the program. Barriers to the use of mentors included not enough trained staff to function in this role, especially in the early stages of program development, and the expense of hiring staff with this experience.

USING EVIDENCE-BASED ELEMENTS IN A QI TRAINING PROGRAM: CASE STUDY

In early 2015, a team from a 600-bed academic safety net hospital was tasked with using minimal resources to develop a quality academy program (QAP). This team met for several months identifying evidence-based elements, developing criteria for enrollment in the program, developing the curriculum, and securing leadership support for staff time and program materials. Faculty chosen to teach the didactic sessions and serve as mentors were staff who had attended a 9-month improvement advisor course offered by the Institute for Healthcare Improvement.

Per evidence-based guidelines, the program was designed to provide both experiential skills and didactic knowledge with each participant required to complete a QI project with an assigned one-to-one mentor (described in Supplemental Digital Content Table 2, available at: http://links.lww.com/JNCQ/A601). The QAP has launched 3 cohorts (called Waves) between 2016 and 2018. Evidence-based organizational elements of

strong leadership support, resource allocation, and a developing culture of innovation were critical in organizing and presenting the QAP.

Participants enrolled themselves in the QAP on the basis of professional interest, curiosity, motivation to learn, and with support from their supervisor (all evidence-based participant elements). Participants included frontline nurses, providers, and management staff. Each participant completed a formal application, identifying a project of interest to work on during the 6-month program. Supervisors were required to approve the projects to ensure consistency with the goals of the department. Supervisors also committed to allowing approximately 25% full-time equivalent hours to participate in the course and complete a formal QI project for the 6-month duration of the program. Each participant completed a project charter identifying aim statements, data sources, and outcome measures.

The QAP included both didactic and experiential activities. Didactic content included practical experience developing driver diagrams, completing process mapping, and conducting Plan-Do-Study-Act cycles (see Supplemental Digital Content Table 2, available at: http://links.lww.com/JNCQ/A601). Additional content concentrated on tools useful for QI projects (eg, fishbone diagrams, effort/impact matrix, and brainstorming). Lectures complemented practicums, using dynamic data sets for creating run charts and control charts. Didactic classes were held for 4 hours biweekly for the first 3 months, with monthly classes held the last 3 months for a total of 8 didactic sessions. During a final graduation from training, the participants presented the results of their QI projects to senior leadership and executive staff.

RESULTS

For this study, capability was operationally defined as the confidence, skills, knowledge, and abilities to plan, develop, and implement strategies to improve clinical or operational performance. To measure capability, respondents from each Wave were asked to use a survey to report their levels of proficiency across 5 domains both pre and post and 6 months post-Academy. A 5-point Likert scale scored from not at all proficient to extremely proficient was used to measure self-reported proficiency. Questions were grouped into 5 domains of QI proficiency: (*a*) knowledge of QI models, (*b*) knowledge of QI tools, (*c*) use of analytical and statistical tools, (*d*) managing the QI process, and (*e*) leading and sustaining QI activities.

Each domain included several subcomponents (see Figure). For instance, respondents were asked to rate their proficiency in the subcomponents of Lean, Six Sigma, the Model for Improvement, and Plan-Do-Study-Act for the composite domain of knowledge of QI models. For the composite domain of QI tools, respondents were asked to rate their level of proficiency across 13 subcomponent tools (eg, value stream mapping, driver diagrams, fishbone diagrams, and others). For the statistical and analytical tools domain, respondents rated subcomponents including the use of statistical process control charts, Pareto charts, run charts, and scatterplots. Examples

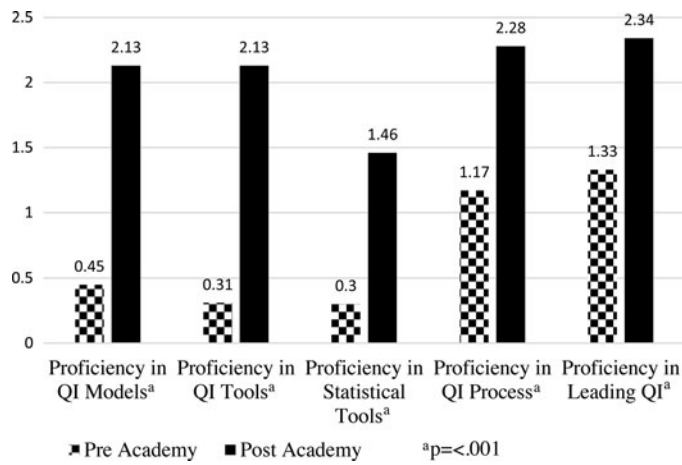

Figure. Mean composite proficiency scores across 5 domains. QI indicates quality improvement.

of subcomponents in the QI process domain included rating proficiency in managing a project, defining a problem statement, and aligning projects to organizational goals. Subcomponents related to proficiency in leading and sustaining QI activities included whether the respondent was proficient in promoting a culture of improvement, identifying barriers that might impede change, and knowledge of sustainability methods and measures.

Across all 5 domains, paired sample *t* tests of the pre– and post–mean proficiency scores were statistically improved ($P < .001$) post-Academy, indicating development of individual capability to conduct QI activities across participants (Figure). Post-QAP, in addition to the questions of proficiency across the 5 domains, an additional 3-point Likert scale question asked how confident the respondent was in starting a new QI project, choosing responses of very confident, somewhat confident, or not confident. Assessment of self-reported confidence postacademy indicated mean levels between somewhat and very confident posttraining. This self-reported level of confidence suggests that individuals developed capability within the 5 domains.

Capacity was operationally defined as having enough people trained to conduct QI activities. In measuring capacity, the goal would be for each participant to continue participating in, and leading, new QI projects within their work unit, thereby increasing the total QI activity across the organization. To assess for capacity building in the 6-month postsurvey, respondents in the first 2 Waves were asked whether they had participated in, or led, 1 or more QI projects. Chi-square goodness-of-fit analysis resulted in statistically significant yes responses ($P = .004$), indicating that respondents continued to participate in QI activities 6 months post-QAP training. Overall, 74% (28/38) of participants reported continued participation in QI activities, thereby building organizational capacity in QI.

In addition to attending didactic sessions, each participant was required to lead a QI project as part of the QAP. This project served as an objective example of the development of capability, demonstrating integration of the skills, knowledge, and tools taught in the QAP. Participants completed a total of 63 QI projects, with several demonstrating improvement within the 6-month time frame. Examples of projects and outcomes that had impact to the facility included improving handoff communication by 57%, reducing fall rates on 1 unit from 5.5/1000 patient days to 3.3/1000 patient days, the elimination of catheter-associated bloodstream infections in 1 unit, and a 4-fold decrease in endotracheal pressure ulcers in the surgical intensive care unit. Although not specifically measured in this study, these results were achieved by improvements in efficiencies and the development of capability of staff at the unit level to reduce patient harm.

LIMITATIONS

The lack of standardized measures to assess organization capacity and individual capability limits the ability to compare programs empirically. In addition, there are inherent biases in self-reported data. This article discusses 1 organization's experience with a relatively small sample, which influenced the type of statistical tests used. Composite variables for domains were created to address some of the sample size deficiencies. In addition, the construct of the survey questions created some limitations in that the questions were developed internally and the compound wording of some of the questions created limitations in interpretation. For example, 1 question asked participants to identify their level of proficiency with defining the problem statement, the goals, and the scope of a project. This question would have been better asked as 3 separate questions. Finally, no financial data were collected for the QAP analysis.

IMPLICATIONS FOR PRACTICE

In many organizations, financial pressures limit development of comprehensive programs designed to teach QI principles and achieve sustained improvement in patient care or work processes. Integrating commercial QI programs into organizational culture requires significant resources and risks discordance with the organization's existing culture. Incorporating the evidence-based elements described in the literature, and proven successful in other organizations, provides the foundation for organizations with limited resources to structure successful QI training programs. These programs can build a strong QI culture that is consistent with the existing organizational culture, thereby increasing staff capability and organizational capacity in QI.

The opportunity for staff to learn skills related to implementing QI projects that improve

patient care outcomes and work processes links that training to a more engaged workforce. A positive work environment supports staff interests and efforts in achieving quality goals for the organization.[8] The evidence-based elements of success (listed in Supplemental Digital Content Table 1, available at: http://links.lww.com/JNCQ/A600), such as infrastructure to support QI, communication, positive attitude to change, managerial support, and QI in the natural work environment, support this connection between QI and a more engaged, positive workforce.

CONCLUSION

Health care organizations are under pressure to reduce medical errors and improve patient outcomes, yet barriers exist in implementing training programs to address these goals. Many develop their own homegrown QI training programs, drawing from a variety of resources including commercially available programs and open source methodologies and yet fail to sustain improvement goals. Incorporating the evidence-based elements described here can reassure leaders that their investment will be successful. Individuals can develop capability to conduct QI projects and organizations can build capacity through a structured educational program. Having a workforce skilled in QI methodology across all disciplines and patient care areas creates an environment of continuous improvement and improved morale. Developing a training program using evidence-based organizational, participant, and curriculum elements shown to be essential in successful QI training programs can enhance staff learning and confidence, contribute to the completion of projects, and sustain improvement in patient outcomes and organizational work processes.

REFERENCES

1. Makary MA, Daniel M. Medical error-the third leading cause of death in the US. *BMJ*. 2016;353:i2139.
2. Moore S, Stichler JF. Engaging clinical nurses in quality improvement projects. *J Contin Edu Nurs*. 2015;46(10):470-476.
3. Schilling L, Chase A, Kehrli S, Liu AY, Stiefel M, Brentari R. Kaiser Permanente's performance improvement system, part 1: from benchmarking to executing on strategic priorities. *Jt Comm J Qual Patient Saf*. 2010;36(11):484-498.
4. Filardo G, Nicewander D, Herrin J, et al. A hospital-randomized controlled trial of a formal quality improvement educational program in rural and small community Texas hospitals: one year results. *Int J Qual Health Care*. 2009;21(4):225-232.
5. Scanlon DP, Beich J, Leitzell B, et al. The Aligning Forces for Quality initiative: background and evolution from 2005 to 2015. *Am J Manag Care*. 2016;22(12 suppl): s346-s359.
6. Bevan H. How can we build skills to transform the healthcare system? *J Res Nurs*. 2010;15(2):139-148.
7. Babich LP, Charns MP, McIntosh N, et al. Building systemwide improvement capability: does an organization's strategy for quality improvement matter? *Qual Manag Health Care*. 2016;25(2):92-101.
8. Dempsey C, Assi MJ. The impact of nurse engagement on quality, safety, and the experience of care. *Nurs Admin Q*. 2018;42:278-283.
9. White M, Wells JSG, Butterworth T. The impact of a large-scale quality improvement programme on work engagement: preliminary results from a national cross-sectional-survey of the "Productive Ward." *Int J Nurs Stud*. 2014; 51(12):1634-1643.
10. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: The National Academies Press; 2001.
11. Shortell SM, O'Brien JL, Carman JM, et al. Assessing the impact of continuous quality improvement/total quality management: concept versus implementation. *Health Serv Res*. 1995;30(2):377-401.
12. Morganti KG, Lovejoy S, Beckjord EB, Haviland AM, Haas AC, Farley DO. A retrospective evaluation of the Perfecting Patient Care University training program for health care organizations. *Am J Med Qual*. 2014;29(1):30-38.
13. Kaminski GM, Britto MT, Schoettker PJ, Farber SL, Muething S, Kotagal UR. Developing capable quality improvement leaders. *BMJ Qual Saf*. 2012;21:903-911.
14. Ruud KL, Leland JR, Liesinger JT, Johnson MG, Majka AJ, Naessens JM. Effectiveness of a quality improvement training course: Mayo Clinic Quality Academy. *Am J Med Qual*. 2012;27(2):130-138.
15. Daugherty JD, Blake SC, Kohler SS, Culler SD, Hawley JN, Rask KJ. Quality improvement training: experiences of frontline staff. *Int J Health Care Qual Assur*. 2013;26(7): 627-641.
16. Eid A, Quinn D. Factors predicting training transfer in health professionals participating in quality improvement educational interventions. *BMC Med Educ*. 2017;17(26): 1-9.
17. Brownlee K, Minnier TE, Martin SC, Greenhouse PK. A paradigm shift toward systemwide quality improvement education: meeting the needs of a rapidly changing health care environment. *Qual Manag Health Care*. 2013;22(1): 25-35.
18. Mery G, Dobrow MJ, Baker GR, Im J, Brown A. Evaluating investment in quality improvement capacity building: a systematic review. *BMJ Open*. 2017;7(2):16.
19. Kaminski G, Schoettker PJ, Alessandrini EA, Luzader C, Kotagal UR. A comprehensive model to build improvement capability in a pediatric academic medical center. *Acad Pediatr*. 2014;14(1):29-39.
20. McGrath SP, Blike GT. Building a foundation of continuous improvement in a rapidly changing environment: the Dartmouth-Hitchcock Value Institute experience. *Jt Com J Qual Patient Saf*. 2015;41(10):435-444.
21. Lee SK, Aziz K, Singhal N, Cronin CM. The evidence-based practice for improving quality method has greater impact on improvement of outcomes than dissemination of practice change guidelines and quality improvement training in neonatal intensive care units. *Paediatr Child Health*. 2015;20(1):e1-e9.
22. Whippy A, Skeath M, Crawford B, et al. Kaiser Permanente's performance improvement system, part 3: multisite improvements in care for patients with sepsis. *Jt Com J Qual Patient Saf*. 2011;37(11):483-493.

23. Apekey TA, McSorley G, Tilling M, Siriwardena AN. Room for improvement? Leadership, innovation culture and uptake of quality improvement methods in general practice. *J Eval Clin Prac*. 2011;17(2):311-318.
24. Goldberg DG, Mick SS, Kuzel AJ, Feng LB, Love LE. Why do some primary care practices engage in practice improvement efforts whereas others do not? *Health Serv Res*. 2013;48(2, pt 1):398-416.
25. Jeffs L, Lo J, Beswick S, Campbell H. Implementing an organization-wide quality improvement initiative: insights from project leads, managers, and frontline nurses. *Nurs Admin Q*. 2013;37(3):222-230.
26. Fok MC, Wong RY. Impact of a competency based curriculum on quality improvement among internal medicine residents. *BMC Med Educ*. 2014;14:1-10.
27. Pearson ML, Needleman J, Beckman R, Han B. Facilitating nurses' engagement in hospital quality improvement: the New Jersey Hospital Association's implementation of transforming care at the bedside. *J Healthc Qual*. 2016;38(6):64-75.

For additional continuing nursing education activities on quality improvement topics, go to nursingcenter.com/ce.