Quality Approaches in Higher Education

Developing partnerships between academic and clinical faculty to teach quality improvement.

# Quality Comes Alive: An Interdisciplinary Student Team's Quality Improvement Experience in Learning by Doing—Healthcare Education Case Study

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***Abstract***

Quality Improvement (QI) and patient safety are recognized as important aspects of medical and nursing curricula; however, little literature has discussed implementing an interdisciplinary approach to these topics. Literature from all disciplines also lacks the perspective of students on methods for teaching these topics. This paper describes an interdisciplinary graduate-level course on quality improvement which incorporates real-life implementation of a QI project in a clinical setting. One student team's experience in the clinical QI project is presented as a case study to demonstrate how the tools taught in the course were implemented in the field project. In addition, challenges faced by the students and student reactions to the course are discussed. Overall, this paper presents a model for academic and clinical faculty to partner and teach QI to interdisciplinary teams.

***Keywords***

Quality Tools, Partnering, Teams, Hands-on Learning, Training

## Introduction

Healthcare professional students in the 21st century are learning new skills as a part of their training, including quality and safety practices (Dolansky, Singh, & Neuhauser, 2009; Silow-Carroll, Alteras, & Meyer, 2007). Medical, nursing, and public health professionals are explicitly exposed to QI methods and are challenged to work as a team to change the culture of the healthcare system and promote patient safety (DesHarnais & Nash, 2011). Methods that were once a business strategy used only by corporations are now leading the way toward a safer, more accountable healthcare system (Silow-Carroll et al., 2007).

Patient safety and QI results are increasingly published (particularly with the advent of the *SQUIRE Guidelines* (SQUIRE Development Group, 2008)) and some strategies for incorporating QI into medical and nursing education have been published (Ogrinc, Nierenberg, & Batalden, 2011). The Association of American Medical Colleges and the Lucien Leape Institute have recognized the need to incorporate patient safety into medical education (Association of American Medical Colleges, 2001; Lucian Leape Institute, 2010). Despite this, a survey of medical students showed low knowledge and confidence in the areas of QI and patient safety, with previous coursework in these areas being associated with improved knowledge (Blasiak Stokes, Meyerhoff, Hines, Wilson & Viera, 2014). Physicians, particularly those in primary care specialties, are increasingly required to participate in QI activities for maintenance of certification.

Previous work describes steps individual disciplines have taken at varying points in the educational pathway to incorporate QI and patient safety into their curricula. For example, nursing programs use the resources of the Quality and Safety Education in Nursing Institute to include QI and safety in all aspects of learning (Beischel & Davis, 2014). The University of Chicago has implemented a quality and safety residency track, which

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includes completing a QI project at each resident's outpatient clinic. This program shows improved pre-/post-knowledge for participants versus their peers in another track of the program (Vinci, Oyler, & Arora, 2013). However, these programs all teach the disciplines independently, with the exception of a program in England in which nursing, pharmacy, and medical students collaborate on patient safety in medications using a case-based approach (Hardisty, Scott, Chandler, Pearson, & Powell, 2014).

Therefore, the pool of literature lacks descriptions of how QI can be taught in a multi-disciplinary manner and incorporated in additional disciplines such as public health. In addition, the literature reports few student perspectives on methods of education in this arena. The student experience in learning about and applying QI methodologies is important in understanding the future of QI and how educational curriculums can better serve students pursuing this field of study. The purpose of this paper is to present a combined didactic/experiential model for interdisciplinary healthcare QI education, with an emphasis on the student experience. This paper will describe the course structure and provide a specific example of the application in a field project conducted by the authors as part of the course. The model can be used by practitioners and faculty as they consider how to incorporate QI teaching into their education of many disciplines of medical professionals.

## Course Structure

The *Continual Improvement of Healthcare: An Interdisciplinary Course* was developed to give graduate-level healthcare professional students (medicine, nursing, health administration, nutrition, and others) the ability and confidence to use QI methods within their professions and contribute to continual improvement in healthcare. The course structure consists of 10, three-hour classes over the course of 15 weeks and an opportunity to apply the skills acquired in class to a hospital-based QI initiative. The first half of each of the ten classes includes a national quality issue such as value-based purchasing. The second half of the class covers the QI process action components that use the Institute for Healthcare Improvement (IHI) Open School Quality Modules (Institute for Healthcare Improvement, 2013). The IHI Open School Modules are web-based, multi-media mini-courses on different QI topics. Students watch videos, read accompanying material, take quizzes, and are directed to other resources for additional information. Required modules for this class were: QI 101: Fundamentals of Improvement; QI 102: The Model for Improvement: Your Engine for Change; QI 103: Measuring Improvement; QI 104: The Life Cycle of a Quality Improvement Project; QI 104 The Human Side of Quality Improvement; QI 106: Mastering PDSA Cycles and Run Charts as well as Patient Safety Module 100: Introduction to Patient Safety (Institute for Healthcare Improvement, 2013). Application of the concepts occurs in two phases. Students first apply the basic tools of QI by completing a personal improvement project guided by an online workbook (Neuhauser, Myhre, & Alemi, n.d.). After gaining confidence in applying rapid cycle QI concepts to a personal project, students then apply the concepts to a clinical QI field project.

The semester during which the authors were students was the 19th semester for the course. It is offered yearly in the fall. Ten students (one each of medical student and nutrition graduate student, two nursing Ph.D. candidates, along with six Master's of Public Health students) were enrolled in the class and three teams were formed, each with a unique project.

### Academic Practice Partnerships

The academic clinical partnership is a key strategic relationship in the course structure. It is designed to support the students' application of improvement science in the real world of healthcare delivery. The experiential approach exposes the students to the operational issues faced by interdisciplinary improvement teams as they strive to continuously improve patient safety, quality, and efficiency. The knowledge of improvement can seem straightforward when learning it in the classroom setting. However, when applied to the healthcare environment, students learn to understand and manage the complex aspects of creating successful organizational change including the influence of organizational culture.

Setting up the field projects requires the clinical sponsors to find leadership to coordinate student learning. In the summer prior to the academic year, hospital-based sponsors submit potential student QI projects and list available data to support the projects. Preference is given to projects that have available data and provide the necessary resources for student teams. Projects are chosen based on feasibility of integrating students into existing teams. Once projects and sponsors are chosen, clinical sponsors of these projects are oriented to the student assignments. Students in the course are assigned to clinical QI projects using an online survey, which assesses a student's project interest and levels of experience with healthcare, improvement, research, and discipline. The goal is to create interdisciplinary student teams with sponsors who lead clinical improvement projects.

### Course Schedule and Assignments

During each week of the semester, the students are given assignments to guide the application of the QI content into the clinical QI project as shown in Table 1. QIKat Assessments are short

Table 1: Course Tools, in Order of Introduction, and Their Purpose

| Week Assigned/ Taught | Tool/Assignment | Description/Purpose |
|---|---|---|
| 1-10 | IHI Open School Modules (Institute for Healthcare Improvement, 2013) | Introduce model of improvement and QI tools. |
| 1 and 15 | QIKat assessments (Ogrinc, Headrick, Morrison, & Foster, 2004) | Example: Improvement opportunities where students suggest a measure, aim, and solution in order to improve the problem presented. |
| 5 | Seven-step meeting process (Batalden & Stoltz, 1993) | Outlines a formal meeting structure including use of an agenda in order to run efficient meetings. |
| 5 | Organizational readiness assessment | A series of questions to determine a team's readiness for change. If a team is not ready, those areas can be addressed before beginning change to increase likelihood of success. |
| 7 | Industry assessment | Determine standards and best practices used by other facilities. |
| 5 | SMART aim statement (Institute for Healthcare Improvement, 2013) | Create a SMART project aim based on the problem identified. |
| 8,15 | Team Learning and Development Inventory© (Lingham, 2004) | Determine areas in which teams are strong and weak so communication and efficiency can be improved. |
| 10 | Process map | Determine the sequence of events and decision points for an action to occur. |
| 10 | Fishbone diagram | Determine the root cause of a problem by identifying contributing factors. |
| 7 | Control chart | Systematic way of displaying data over time to determine if a true change has occurred or if it is due to chance. |
| 8, 15 | Personal reflection | Determine how students viewed the course and interdisciplinary teamwork. |

scenarios that students must consider how to improve; providing a measure, objective, and suggested solution, and were used in this course as a pre-/post-test of knowledge at the beginning and end of the semester. The student teams are taught to use the seven-step meeting process and establish team ground rules (Scholtes, Joiner, & Streibel, 2003). The first field project assignment is a readiness assessment of the clinical partner team. The goal of the assessment is to determine the adaptive culture of the team, and it covers items such as support from senior leadership, resources needed to complete the project, the presence of an overall quality culture, customer focus, history of successful projects, ability to obtain data, and the absence of blaming behaviors. Another assignment is the industry assessment to determine standards and best practices related to the problem targeted by the QI project. Students also complete observations and collect data at the clinical site to begin defining and determining the cause of the problem, which is guided by process flow and fishbone diagram assignments. Students present the data to the clinical team and together develop an improvement plan using a SMART (specific, measurable, attainable, relevant, timely) aim and idea for the improvement. The student team, with the support of the clinical sponsor, implements the change using concepts from the psychology of change (Batalden & Stoltz, 1993) and Diffusion of Innovation theory (Rogers, 1983). Data are collected and control charts (Amin, 2001) are created to determine if a change was made as a result of their plan. Students also develop a timeline to guide the project accomplishments. During all phases of the project, information is presented to the sponsor team as well as to the instructors and other student teams.

In addition, reflection narratives are completed to assess individual and team progress and improve interdisciplinary team work. Another assignment includes the completion of didactic lessons on leadership and a teamwork assessment tool—the Team Learning and Development Inventory © (TLI) (Lingham, 2004). The TLI provides a framework for team members to develop an awareness of the elements of team function in order to improve. Team members answer the 30 inventory questions twice; first, when reflecting on real interactions with their team and then using a framework of ideal interactions (based on what

they would like their team functioning to be). Teams strive to improve on the areas with the largest gap between real and ideal.

## Case Study

The student authors of this paper were matched to a project on improving patient satisfaction in the ambulatory clinics of University Hospitals Case Medical Center's (UHCMC) new freestanding cancer hospital, Seidman Cancer Center. As described in the proposal presented to the author team, the overall project goal was to improve patient and staff satisfaction. The ambulatory clinics of Seidman contain four hallways of patient exam rooms, with different physician teams occupying the hallway each day of the week. Lower than desired patient satisfaction had been identified in recent Press-Ganey surveys, leading to the request for students from the class to collaborate on a QI project to improve patient satisfaction and throughput. The ambulatory clinic and hospital management teams had completed their own studies on patient wait times prior to the authors' arrival and determined that patient wait time had an impact on the satisfaction scores. The clinic/hospital management team (leadership team) that worked with the authors on the satisfaction project included the ambulatory clinic manager, the director of infusion and ambulatory clinics, patient access (scheduling) manager, business operations manager, and the chief medical officer, who also practices as a surgical oncologist.

Specific examples of how the author team implemented the course tools in their project are presented in Table 2. The root cause of the long patient wait times was determined to be providers not being aware that patients had entered the room or how long they were waiting. The change that was developed to solve this problem was to have providers track the arrival and departure of each provider in and out of the exam room. This would help increase provider awareness of patient wait times. The industry assessment showed that long waiting times do cause a decrease in patient satisfaction but the amount of time the physician spends with the patient can mediate this effect (Feddock, Bailey, Griffith, Lineberry, & Wilson, 2010). While no industry standard for waiting time has been established, ten minutes is the time after which patient satisfaction decreases (Feddock et al., 2010) and was established as the goal in this project.

While the author team project did not create a noticeable change in patient wait times, members were able to implement all of the course tools and were a highly successful interdisciplinary team, as shown by their TLI results. Students were able to apply the concepts and tools taught in class to a real world project. The experiential aspect of the course highlighted the challenges of improvement and working on a diverse team. No formal evaluation from the sponsor team was completed at the end of the project; however, feedback to the student team indicated that the sponsors were appreciative of the input from an outside party and felt that the lessons learned prepared them for success in future QI initiatives. The industry assessment and throughput data may be helpful for future QI initiatives on the same patient satisfaction problem.

Based on student course evaluations and change in QIKat scores, the course succeeded at achieving its objectives. The

**Table 2: Author Team's Application of the Tools in Case Study QI Experience**

| Tool/Assignment | Specific Application in the Example Project/Course |
|---|---|
| IHI Open School Modules (Institute for Healthcare Improvement, 2013) | Positive comments were received on course evaluations regarding the integration of the IHI modules and the field experience. |
| QIKat assessments (Ogrinc et al., 2004) | Used as pre-/post-course assessments, during the semester the authors were enrolled, mean pre-scores were 8.6 and post-scores were 13.5 (range 0-15). |
| Seven-step meeting process (Batalden & Stoltz, 1993) | Used to run efficient meetings with the sponsor team and show what could be realistically completed in the semester team handbook reference. |
| Organizational readiness assessment | Determined that the sponsor team was ready overall to change but there were some weaker areas. Determined that clarification was needed as to the perception of the customer: Was it the physician/provider or the patient? |
| Industry assessment | Determined that wait times are defined many ways, and longer wait times are associated with poor satisfaction. However, this can be mediated if the physician spends significant time with the patient once he/she arrives. |
| SMART aim statement (Institute for Healthcare Improvement, 2013) | "Decrease patient's solitary wait time in the exam room to no longer than 10 minutes prior to first provider entering the room." |
| Team Learning and Development Inventory (Lingham, 2004) | The author team reported small differences between the actual and ideal experiences in all four categories, indicating optimal team cooperation and efficiency. |

QIKat assessment scores increased from class one to the end of the semester, showing that students began with low scores but did gain knowledge of QI methods. Students gave the course an average rating of 4.3 out of 5 on overall quality and an average rating of 4.4 out of 5 in meeting the stated objectives. As stated by the students, the strengths of the class included the IHI Open School and field project. One student stated, "This course provided real time exposure to the challenges faced in a healthcare work environment and how to implement change. The structure and hands-on interaction with UHCMC staff and the on-line tutorials provided realistic skills on how to meet these challenges." The main weakness identified by students was the limited time in a semester to complete the field project. Finally, one student stated that they will "use the skills gained in this class personally and professionally from here forward."

### *Applying Knowledge to Real-Life: Facilitators and Barriers*

The field project allowed the students to put the methods of QI into practice. The hands-on experience helped the students understand the difficulties of implementing an improvement plan and managing change and why only 20-30% of projects succeed (Smith, 2002).

There were many aspects of the field project that facilitated success. The student team was truly interdisciplinary, including a Registered Dietitian Nutritionist (RDN) and two Master of Public Health (MPH) students with different tracks. All of the student team members had research experience, but were new to QI. This mixture of perspectives helped with the execution of the class project. In addition, the team was successful because of the match between expectations and actual team functioning as evidenced by their TLI scores and because of their use of the team tools introduced in the course.

There were barriers that impeded the success of the project. The sponsor team, while interdisciplinary with management buy-in, lacked involvement from the front-line staff. Engaging and educating front-line staff is challenging and resource intensive, but absolutely critical when promoting patient safety and quality (Pronovost, Berenholtz, Goeschel, Needham, Sexton, Thompson & Hunt. 2006). As a result of this, the change developed by the authors and leadership teams was not implemented successfully. The author team needed to stress the importance of facilitating change management (engage, educate, execute, and evaluate) with the front-line staff and encourage participation of the front line from the very beginning. An overall theme during the project was a discrepancy in expectations between the student and professional teams. The professional team expected the students to put forth more hours than was expected by the students based on the course timeline. The students, however, handled the expectations professionally and used the QI tools discussed in class, such as timelines, SMART aims, and the seven-step meeting process, to engage in productive discussions and keep the project as realistic as possible.

Finally, some concepts from the course were difficult for the student team to implement because they were not considered the project leads. For example, as mentioned above, buy-in from all stakeholders (leadership and front-line) was stressed in the coursework, but was difficult for the students to enforce. There was no front-line provider on the QI team, resulting in a lack of buy-in for the change. Although the student team tried to lobby for a front-line provider to be involved in selecting the change to be implemented, the professional team felt that this would be an imposition on the providers' time and preferred not to invite them to take part.

Other work has shown positive outcomes and experience ratings from students engaged in QI work, for example at the University of Connecticut School of Medicine, second-year medical students worked in groups on continuous quality improvement (CQI) projects on diabetes mellitus at community-based primary care practices. The rate of documentation of performances of foot and eye exams increased significantly from the baseline to the six-month mark, and students left with an understanding of the importance of clinical outcome measures. These results showed that student-driven CQI projects can improve quality of care, and input from students should be utilized to optimize CQI experiences and outcomes. (Gould, et al. 2002)

In a course similar to the one described here, senior nursing students learned QI with geriatric medicine fellows, with an emphasis on learning how to work together as a team, understanding the QI process, and being able to identify roadblocks during the QI process. Roadblocks identified by these students were similar to those described here: short course duration, coordination of student schedules, and lack of buy-in at the clinical site; however, the students were positive about the experience and found the experiential learning to be effective. (Dotson & Lewis, 2013). Along with being relatively unique in its focus on interprofessional education, this course fulfills all three parts of the organizational framework introduced by Wong, Levinson, and Shojania for QI activities in medical education: formula curricula, education activities related to specific skills, and a real-life experience in QI.

## Implications for Future Education

With the combination of the IHI Open School and the application of QI concepts into the field project, the students gained

a clear understanding of the importance and significance of QI and patient safety. The academic clinical partners also benefited from the project, gaining an outsider's perspective on their processes and QI team structure. Students are able to apply the concepts in the project and beyond in their careers. Facilitators and barriers to improvement in healthcare identified by students included clear goals, roles, expectations, and opportunity for bi-directional feedback.

Clinicians who have the opportunity to work with students engaging in QI courses are encouraged to do so, to adequately train the next generation of providers who will need these skills. In addition, facilities engaging in academic clinical partnerships should consider QI opportunities for their students for a mutual benefit of all parties. In addition, QI training should be offered to a range of health professionals in an interdisciplinary manner, rather than limited to physicians and nurses. Those engaging in QI work can consider the resources presented here as a baseline for developing their work and trainings.

**Acknowledgements:** Thanks to the staff at the clinical partner site for their cooperation in the project.

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