

A Scholarly Pathway in Quality Improvement and Patient Safety

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Abstract

Problem

There are several challenges to teaching quality improvement (QI) and patient safety material to medical students, as successful programs should combine didactic and experiential teaching methods, integrate the material into the preclinical and clinical years, and tailor the material to the schools' existing curriculum.

Approach

The authors describe the development, implementation, and assessment of the Quality Improvement and Patient Safety (QuiPS) Scholarly Pathway—a faculty-mentored, three-year experience for students interested in gaining exposure to QI and patient safety concepts at the

Medical College of Wisconsin (MCW).

The QuiPS pathway capitalized on the existing structure of scholarly pathways for MCW medical students, allowing QI and patient safety to be incorporated into the existing curriculum using didactic and experiential instruction and spanning preclinical and clinical education.

Outcomes

Student reaction to the QuiPS pathway has been favorable. Preliminary data demonstrate that student knowledge as measured by the Quality Improvement Knowledge Assessment Tool significantly increased after the first year of implementation.

Next Steps

A novel curriculum such as the QuiPS pathway provides an important opportunity to develop and test new assessment tools for curricula in systems-based practice and practice-based learning and improvement. The authors also hope that by bringing together local QI and patient safety experts and stakeholders during the curricular development process, they have laid the groundwork for the creation of a more pervasive curriculum that will reach all MCW students in the future. The model may be generalizable to other U.S. medical schools with scholarly pathways as well.

Problem

Medical school graduates can expect to practice in an increasingly complex system which demands better, safer, and more cost-effective care. The Institute of Medicine, the Association of American Medical Colleges, and the Carnegie Foundation have all called for an overhaul of medical education to prepare students for such an environment.¹⁻³ In response, a growing number of medical schools have added elements of quality improvement (QI) and patient safety into their curricula, but the approaches are quite diverse, with no “perfect blueprint.”^{4,5} There are several challenges

to teaching this material to medical students; however, experts suggest that successful programs would combine didactic and experiential teaching methods, integrate the material into the preclinical and clinical years, and tailor the material to the schools' existing curricula.

Scholarly concentrations, or pathways, are longitudinal programs of study that parallel the medical school curriculum and allow for the combination of didactic and experiential learning. Scholarly pathways also provide the infrastructure and mentorship to promote academic development. At the Medical College of Wisconsin (MCW), we capitalized on the structure of a scholarly pathway to integrate the core concepts of QI and patient safety into the existing curriculum. In this article we describe the development, implementation, and assessment of the Quality Improvement and Patient Safety (QuiPS) Scholarly Pathway—a faculty-mentored, three-year experience for students interested in gaining exposure to QI and patient safety concepts. We also suggest important lessons to help guide others interested in developing a pathway or other

curriculum in QI and patient safety for medical students.

Approach

The MCW Scholarly Pathways Program

In 2010, as a part of the shift to a systems-based curriculum, MCW implemented the Scholarly Pathways Program to facilitate individualization of medical training. Five pathways were initially developed (Physician Scientist, Urban and Community Health, Global Health, Clinician Educator, Master Clinician). All incoming students must choose a pathway after attending a series of presentations given by pathway directors detailing the structure and content of their pathway.

The pathways are two years long with an optional third year for students interested in more extensive content. Each pathway is characterized by a set of competencies delivered through a series of “core” sessions and an experiential component guided by an individualized learning plan (ILP) created in collaboration with a student-chosen faculty advisor. Students have one afternoon of protected time every week (“noncore hours”) to pursue these ILP goals.

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QuIPS Scholarly Pathway development

A sixth pathway, the QuIPS Scholarly Pathway, was developed between September 2011 and June 2012 and was implemented in the fall of 2012. The decision to add the QuIPS pathway to the Scholarly Pathways Program stemmed from both the administration's desire to increase the number of pathway options available and faculty interest around the incorporation of systems-based practice and problem-based learning and improvement in the curriculum. Outside of the QuIPS pathway, student exposure to core concepts related to QI and patient safety is limited. Currently, all MCW students hear a 90-minute lecture focused on communication, error, and systems analysis during their second year; attend a one-day intersession on patient handoffs; and receive a lecture on patient safety prior to the start of their clerkships.

Development of the framework for the QuIPS pathway curriculum followed the model of Kern et al.⁶ A literature review was conducted between January and March 2012 to understand existing models for QI and patient safety education. The list of all articles included in the literature review is available as Supplemental Digital Appendix 1 at <http://links.lww.com/ACADMED/A283>. Focus groups with medical students and risk management professionals were held in April and June 2012 to obtain stakeholder input. A faculty summit facilitated by an expert in quality and patient safety curricula was held in June 2012 to synthesize the information and recommend core content, goals, and objectives for the curriculum.

On the basis of this preparatory work, development of the QuIPS pathway focused on combining didactic and experiential teaching methods; integrating the core concepts of systems and systems theory, patient safety principles, and QI methodology into each core session; and recruiting an adequate number of experienced and committed faculty to serve as advisors and mentors. The overall goal was to move medical students from novices to advanced beginners by the end of the curriculum.

QuIPS Scholarly Pathway structure

The QuIPS Scholarly Pathway structure includes four main components: (1) a series of interactive sessions to deliver

core content, (2) small-group experiences aimed at teaching QI methodology through work on an advanced case study, (3) weekly protected time to facilitate completion of noncore activities, and (4) a mentored scholarly project focused on a QI- or safety-related topic.

Core sessions. In the first year, content is taught during a series of five 3-hour core sessions incorporating lectures, hands-on exercises, simulation, and interactive discussions. The objectives focus on learning terminology basic to QI and safety science; understanding the concept of systems and human factors science; process analysis; and demonstrating the importance of teamwork and communication.

Second-year students attend seven core sessions that expand the concepts of systems and safety to include the patient experience. Students hear from clinicians and patients about how system design impacts chronic disease, and how adverse events affect the patient, their family, and the involved health care professionals. To help prepare students for third-year clerkships, we also discuss how the traditional medical hierarchy can compromise patient safety, the concept of resilience, and how to prevent burnout.

Although it was originally developed as a three-year curriculum, the third year of the Scholarly Pathways Program was made optional across all pathways for the class of 2016 after a group of students expressed concern over missing time on their clerkships to attend pathway activities. Students interested in continuing in the pathways in their third year submit an ILP to the pathway directors in March of their second year explaining how they will use protected time to further their pathway-specific experience. Third-year QuIPS students attend 11 core sessions that use a journal club approach focused on more advanced topics such as the Dartmouth Atlas of Health Care, the Affordable Care Act and accountable care organizations, and how to use and interpret statistical process control charts. These students further enhance their skills by helping facilitate the small-group sessions in the core sessions for first- and second-year students.

Each year culminates in a simulation session and an expert panel discussion attended by all QuIPS students. During

the simulation, students must identify systems-based and process-based errors during a simulated clinical encounter and practice disclosing the error to the patient's family. The expert panel members include institutional and regional leaders who discuss their own experiences and answer student questions about implementing and leading large-scale change in the health care setting. Additionally, every other year all QuIPS students participate in the performance of the play *Bedside Manners*⁷ with other health care professional students in an effort to demonstrate through role-play the skills needed to work in a multidisciplinary team. A complete list of the core session learning objectives is available as Chart 1.

Small-group learning. During the final hour of five of the core sessions each year, first-, second-, and third-year students are brought together to work in small groups. The hour begins with a 15-minute presentation on a core concept in QI methodology. The task of each group over the course of the five sessions is to apply these concepts and design an intervention around a quality- or safety-related problem using the Institute for Healthcare Improvement's (IHI's) Model for Improvement.⁸ Each group is guided by a faculty member with expertise in QI work. The aim of this exercise is to help students develop competence in designing and conducting QI projects using established, rigorous methods.

Noncore activities. Students individualize their learning outside the core sessions through activities conducted during protected noncore time. Each QuIPS student's ILP details how they will spend the required noncore time (33 hours in the first year, 45 hours in the second year, and 66 hours in the third year) and maps each activity to one of the six domains of quality care (safe, timely, equitable, effective, efficient, and patient centered).

Scholarly project. All students, regardless of their pathway, are required to complete a scholarly project by the end of their third year. The scholarly project is a graduation requirement for all MCW students and may be any scholarly driven activity (e.g., clinical, basic, or translational research; educational, QI, or community service learning project). It must meet Glassick and colleagues⁹ criteria for scholarship and be presented at an MCW scholarship forum.

Chart 1

Learning Objectives for the Medical College of Wisconsin QuIPS Scholarly Pathway Core Sessions

Year 1	Year 2	Year 3
<ul style="list-style-type: none"> Define safety in systems and human factors science Describe the concept of process mapping in the health care setting Create an overall process map Explain the importance of systems design in decreasing the potential for human error Evaluate the strength of different types of quality improvement interventions Demonstrate through role-play the skills needed to work in a multidisciplinary team Explain why physicians are integral to QI efforts Demonstrate through a simulated patient interaction the skills needed to recognize a medical emergency, ask for appropriate resources, and identify systems-based and process-based failures 	<ul style="list-style-type: none"> Describe the interactions between systems of care and their impact on a patient with a chronic illness Rate the understanding of patient experience as valuable in health care systems design Recognize the impact of an adverse event on the patient, the patient’s family, and the patient’s physicians Define “root cause analysis” and explain its importance to process improvement List three process improvement techniques and describe how each technique attempts to influence changes associated with systems Balance one’s own responsibilities and goals for patient care with the role of a team member in shared decision making Define “medical hierarchy” and “culture of safety” Explain and list examples of how the medical hierarchy may prevent medical students from reporting and preventing errors during clerkships Describe how a medical student might bring an error or “near miss” to the attention of a supervisor List and practice three skills that can improve resilience and prevent burnout in medical school Describe some of the challenges of engaging physicians in QI efforts Demonstrate how to disclose an adverse event to a standardized patient following a simulated patient interaction 	<ul style="list-style-type: none"> Explain effective care, supply-sensitive care, and preference-sensitive care as defined by the Dartmouth Atlas of Health Care Describe the misuse of preference-sensitive care as it relates to the care of patients with benign prostatic hypertrophy Examine the relationship between patient satisfaction and health care utilization and expenditures Explain the origin of the SQUIRE publication guidelines and identify how a group of authors used the guidelines to publish their work Explain how to choose the appropriate statistical process control chart for a particular set of data Interpret and critique quality improvement research Identify and critique the components of the Affordable Care Act related to quality improvement Describe important aspects of physician resilience List three strategies to engage health care providers in QI efforts Lead a simulated patient interaction and help first- and second-year QuIPS pathway students identify systems-based and process-based failures Prepare an annotated curriculum vitae that reflects the knowledge, skills, and experiences gained through the QuIPS curriculum

Abbreviations: QuIPS indicates Quality Improvement and Patient Safety; QI, quality improvement; SQUIRE, Standards for Quality Improvement Reporting Excellence.

All students may use protected time for noncore hours to work on their scholarly project if it relates to their pathway focus. This gives QuIPS pathway students the opportunity to apply the knowledge and skills obtained during the core sessions and small groups in a clinical setting, and engage them in hospital- or clinic-based QI and patient safety efforts. Each student works with a faculty mentor in an arrangement similar to that available to students conducting more traditional research at MCW. This structure also serves to validate QI and patient safety work as a scholarly enterprise consistent with the academic mission of our institution.

Program implementation

In the fall of 2012, 29 of the 210 first-year students chose the QuIPS pathway. In the fall of 2013, that number grew to 41. Nine people, including the pathway codirectors, faculty members, nurses, and a continuous improvement expert, delivered the didactics and facilitated small groups during the first year of

implementation. In the second year, this number increased to 13. Thirty-eight faculty members currently serve as mentors and/or advisors for the QuIPS pathway. These faculty are drawn from the existing pool of experts on campus as well as the graduates from the MCW Faculty Scholars Program in Quality and Safety, a faculty development program designed to teach participants how to teach about quality and safety principles.

Outcomes

Educational outcomes

During the first two years of the pathway (academic years 2012–2013 and 2013–2014), students used noncore hours to shadow patients, attend hospital sentinel event reviews and patient safety rounds, and complete Web-based modules for the IHI’s Open School. Students also used noncore time to work on their scholarly projects. Seventeen projects have been completed to date covering a variety of QI- or safety-related topics (see List 1). Three students have presented at

international meetings, and one has had a paper accepted for publication.

Assessment data are limited because, as of this writing, no students have yet completed the full curriculum. Preliminary data demonstrate that student knowledge as measured by the Quality Improvement Knowledge Assessment Tool (QIKAT), a standardized instrument used to assess the application of knowledge in QI to clinical cases,¹⁰ significantly increased after the first year of the curriculum (mean QIKAT score out of 15 [SD]: pretest = 7.07 (2.05), posttest = 9.59 (2.24), *P* < .001). All of the 29 first-year students who began the QuIPS pathway in 2012 completed both tests.

Program evaluation

Evaluation of the pathway includes Web-based, anonymous surveys of student experiences following each core session and at the end of each year; review of the students’ noncore activities; and the tracking of completed student scholarly

List 1

Examples of Noncore Activities and Scholarly Projects in the Medical College of Wisconsin QuIPS Scholarly Pathway**Noncore activities**

- Shadow surgical patients
- Attend hospital sentinel event reviews
- Participate in hospital patient safety rounds
- Complete Web-based modules for the IHI Open School
- Shadow resident physicians to observe patient handoffs

Scholarly projects

- Blunt liver injury triage: A retrospective quality improvement study
- Effect of follow-up calls on reducing sickle cell disease readmissions
- Documentation of pressure ulcers by nursing and physician staff in the pediatric intensive care unit
- Evaluation of whiteboard use in a pediatric intensive care unit
- Improved obstetrical care after a Medicaid pilot project
- Decreasing the use of Filshie clips for postpartum sterilization
- Controlling *Clostridium difficile* infections at Froedtert Hospital
- Feedback to achieve improved sign-out technique
- Preventing infant abusive head trauma: assessing compliance with Act 165
- Physician documentation of central line reason for use
- Intraoperative antibiotic redosing standardization at Froedtert Hospital

Abbreviations: QuIPS indicates quality improvement and patient safety; IHI, Institute for Healthcare Improvement.

projects. A pathway council made up of faculty members and QuIPS students meets monthly to review the student evaluations and to modify the pathway accordingly.

Student reaction to the QuIPS pathway has been favorable, with 46 of 56 respondents (80%) to the course survey administered by MCW indicating that their overall impression of the QuIPS pathway was “outstanding” or “very good.” The majority of students agreed that the core sessions and noncore time enhanced their understanding of QuIPS content, that the material was presented at an appropriate level of difficulty, and that they were challenged to apply learned principles. Comments in the open response section showed that students liked the core session topics but felt that the small-group sessions and the organization of the course could be improved.

On the basis of this survey, the core session evaluations, and course faculty feedback, we made several changes to the structure and content of the curriculum during the first two years. In our first year, the small groups researched and proposed an intervention to reduce the readmission rate at the local hospital, but students felt that they did not have

enough firsthand knowledge of the problem to connect with the material effectively. During the second year, the small groups worked on problems related to their everyday experiences as medical students, but they missed the connection to clinical material. This year we plan to present a case study of a patient written for medical students and ask them to answer a structured set of questions aimed at guiding them through the identification of the problems, the definition of key measures, and the proposal of system-level changes.

Next Steps

We developed and implemented a new scholarly pathway that gives interested medical students the opportunity to learn and apply core concepts and skills related to QI and patient safety. To our knowledge, there are only three medical schools with a scholarly pathway in QI and/or patient safety; none of these curricula are described in the literature. The growing number of medical schools with scholarly pathway programs means that our model for teaching QI and patient safety to preclinical medical students may be increasingly generalizable.

The next step in the maturation of the QuIPS Scholarly Pathway at MCW is to determine how best to evaluate its effectiveness. Last year we developed and piloted a more detailed tool to assess medical student knowledge, beliefs, and attitudes around QI and patient safety. We plan to continue to study this tool in the upcoming year. We also plan to develop and administer an objective structured clinical examination at the end of this year to assess performance in quality measurement, root cause analysis, evidence-based medicine, teamwork, and prescription errors.

An important limitation of the scholarly pathway structure is that only students who select the QuIPS pathway will be exposed to this curriculum. We anticipate that this engaged group will spread these ideas and function as teachers and role models for their peers in other pathways and in their future residencies. The pathway has also served to bring together local QI and patient safety experts and stakeholders both during the curricular development process and as participants leading the core sessions. We are working with the medical school curriculum leadership to lay the groundwork for the creation of a curricular thread that will introduce key QI and safety concepts throughout the four years of medical school.

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