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Weaving quality improvement and patient safety skills into all levels of medical training: an annotated bibliography.

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**Weaving Quality Improvement and Patient Safety Skills into All
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With the launching of the Liaison Committee on Medical Education's new accreditation Standard ED-19-A in July 2013, a new era in quality improvement/patient safety (QI/PS) has begun. Core curriculum of medical schools must now include multidisciplinary teamwork; that is, inclusion of practitioners and/or students from other health professions. This Standard ED-19-A is harmonious with the earlier Accreditation Council for Graduate Medical Education's (ACGME) Competency IV.A.5.c., which calls for QI to be integrated into residents' training curricula. Residents need to be able to determine their strengths and deficiencies. ACGME requires residents to systematically analyze practice using QI methods; to incorporate formative evaluation feedback into daily practice; to locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems; and to participate in the education of patients and families. ACGME also specifies that residents use information technology to optimize their learning.

In a 2009 annotated bibliography, Moskowitz and Nash focused on teaching trainees the tenets of quality and safety. In this 2013 annotated bibliography, Mochan and Nash focus on how teaching these tenets might be implemented successfully. Articles were chosen to reflect various approaches and content areas in medical, nursing, and pharmaceutical education. In addition, the authors also have selected articles that explore efforts to weave quality improvement (QI) and patient safety (PS) into beginning levels of the curricula.

At all levels, the authors observed recurring useful themes in these articles. These themes include: (1) longitudinal mentorship, (2) a culture of safety/transparency, (3) engagement of patients and their families, (4) safety systems knowledge, (5) teamwork, (6) interorganizational sharing, (7) faculty experts in the field of QI/PS, and (8) evidence-based theory.

It became evident in study after study, including those not contained in this bibliography, that *longitudinal mentorship* was vital to cultivating sustained and meaningful involvement of medical care trainees in QI/PS. Students have many responsibilities and projects competing for their time, so just a few lectures or a single small project will not give them the kind of learning and skill acquisition to develop what Ogrinc et al call eyes to "see" QI/PS issues in every patient

encounter. Faculty experts in QI/PS need to meet regularly with students and oversee ongoing projects, with the goal of instilling enthusiasm and competency in QI/PS.

The *culture of safety/transparency* in health care settings, both inpatient and ambulatory, is necessary so teams of health care givers can learn from their mistakes and prevent them from recurring. It is nonproductive to teach students in the classroom about the value of an open, honest environment and then send them to clinical settings that hide and deny medical errors.

With regard to *engagement of patients and their families*, Sklar points out in a February 2013 article (*Acad Med.* 2013;88:147-148), titled “Quality and Spaghetti Sauce,” that “one size does not fit all.” Students need to learn to incorporate into decision making and treatment options the valuable data they should gather from hearing patients and family members speak.

In today’s high-tech, often chaotic, and rushed world, knowledge of *safety systems and safety science* is primary in the health care giver’s arsenal of tools. Too many patients are harmed when caregivers are fatigued or overworked, but outstanding systems can build in protections to “catch” what humans miss and can prevent many mistakes.

The old rigid hierarchies of medical care, particularly in hospitals, are now obsolete. Medicine is too complex and far too evolved now for any one individual to have the whole picture. *Teamwork* and shared expertise lead to better outcomes. As a Japanese proverb says, “None of us is as smart as all of us.” Similarly, with the fast-paced acquisition of data and knowledge today, *interorganizational sharing* makes caregivers across the nation more proficient in giving their patients efficient, lower cost, and often quicker solutions to many medical problems.

There is definitely no time to waste in building a cadre of *faculty experts in the field of QI/PS*. These faculty experts must know how to teach and inspire students to respect the ever-growing insights and skills for safer medical care. *Evidence-based theory* is at the core of QI/PS. Researching and applying actual case histories of various diseases not only corroborates the “one size does not fit all” axiom but also opens new doors to determining what is best for any individual patient.

There is a natural overlap among the 8 categories, and that is a positive trend in the considerable progress that has been made since the 2009 annotated bibliography. Core skills are taught today in many health care environments. Some of the articles in this 2013 bibliography discuss general core principles, tools, and skills, and some discuss locale-specific ones. Even those discussions that are locale-specific shed light on what works and what does not work universally. For example, the study “Teaching quality essentials: the effectiveness of a team-based quality improvement curriculum in a tertiary health care institution,” by Majka et al from the Mayo Clinic’s Division of Internal Medicine in Rochester, Minnesota, engaged all members of the team, from secretaries to physicians. Participants from all levels of the team noted improvements in QI after completing the QI modules.

As a result of compiling this bibliography, the authors saw that it is never too early (eg, during orientation of first-year medical students at Dartmouth Medical School) or too late (eg, at Continuing Medical Education conferences for practicing physicians of varied specialties using data-driven case studies at Mercy Health System) for QI/PS training to have a significant impact on health care professionals’ behaviors and competencies.

The 30 selected references here from 2009 to September 2013 were obtained through a review of the MEDLINE literature database, and from references in key articles. Keywords used in the search for articles were: quality improvement, patient safety, safety systems, and culture of safety/transparency.

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LONGITUDINAL MENTORSHIP

1. Levitt DS, Hauer KE, Poncelet A, Mookherjee S. An innovative quality improvement curriculum for third-year medical students. *Med Educ Online*. Epub ahead of print May 16, 2012. doi: 10.3402/meo.v17i0.18391.

Levitt et al review the self-directed quality improvement (QI) skills curriculum for medical students at the University of California San Francisco that was constructed as a pilot study in the academic year 2009-2010 for a small number (2 groups of 4 each) of third-year medical students in a longitudinal clerkship. Self-directed learning was chosen to avoid overloading already full faculty and student schedules. The curriculum director gave an hour-long lecture to introduce students to basic QI science. The curriculum director also advised students to focus on a specific measurable gap relating to a theme they chose. The first group chose “inadequacy of pain control at the end of life.” The second group chose “preventable causes of delirium.” The first group, who studied nursing documentation around pain control, concluded the existing medical record keeping could result in confusing data overload, so they proposed a clearer, simpler score system similar to the APGAR score used for evaluating newborns. But this first group had no consistent mentorship and their proposed intervention was lacking in precision and did not have measurable goals. The second group did better because they found an ongoing mentor as well as concrete ways to determine if hospital staff knew which patients had appropriate/inappropriate urinary catheters (UCs) and learned how to survey residents to measure awareness of proper indication for UC placement; they also developed guideline recommendations for UC placement for the residents to use.

The overall result of the 2009-2010 pilot study taught the curriculum planners 4 lessons: (1) the project was feasible in that students could identify and quantify a quality gap, address the problem, and identify relevant stakeholders; (2) students should be explicitly taught the knowledge objectives of QI via scheduled didactic sessions throughout the curriculum; (3) early establishment of project-specific mentorship is vital; and (4) students need explicit instruction and mentorship to determine clear project goals and measurement systems for their proposed interventions. This pilot study was small, but it sheds light on how educators teaching QI can better target necessary competencies. There was more improvement in attitudes and

confidence than there was in knowledge. Specifically, Levitt et al note that Attitude Assessment was as follows, with the maximum scores for topics 1,2,3,4 being 15,15,10, and 20 respectively: (1) perception of value of QI projects went from a pre-mean score of 9.9 (1.8) to a post-mean score of 12.6 (1.9), $P=0.03$; (2) importance of QI projects in improving care systems went from 11.0 (1.4) to 12.3 (1.5), $P=0.12$; (3) importance of QI projects in physician's practice went from 7.0 (1.3) to 8.0 (1.7), $P=0.07$; and (4) students' confidence in their own QI skills went from 13.4 (2.8) to 16.1 (3.0), $P=0.05$.

2. O'Neill SM, Henschen BL, Unger ED, et al. Educating future physicians to track health care quality: feasibility and perceived impact of a health care quality report card for medical students. *Acad Med.* 2013;88:1564-1569.

O'Neill et al note that quality improvement (QI) requires measurement but few medical schools provide opportunities for students to measure their patient outcomes. Therefore, first in the 2011-2012 academic year, they tested the feasibility and potential impact of a quality metric report card that was used in an Education-Centered Medical Home (ECMH) longitudinal clerkship at Northwestern University Feinberg School of Medicine. This clerkship was developed to provide teams of medical students for outpatient clinics that focus on adopting the principles of the patient-centered medical home. This includes continuity with a personal physician, team-based care, care coordination and integration, quality and safety, and enhanced access to care. In the 2011-2012 year, 56 students worked across 4 pilot clinics with success. Then, in the 2012-2013 year, 202 students worked across 13 clinics.

A core objective of the ECMH curriculum was for student teams to be assigned to a panel of patients. Students performed retrospective chart reviews and identified data on 30 nationally endorsed QI metrics for each of their assigned patients. In addition, each team created a scorecard and conducted a pre/post QI skills analysis. Lastly, 405 patient charts were abstracted by 149 students, and were confirmed as a high-risk patient panel. Initial performance on abstracted quality measures varied from 100% adherence (eg, beta-blockers in post myocardial infarction patients) to 24% (eg, on diabetic eye exams).

After grand rounds and background readings, there was student self-assessment of QI skills, which remained rather low. The metrics were focused on learning objectives and included such items as “using measurement to improve your skills,” “making changes in a system,” and “identifying best practices and comparing these to your local practice/skills.” The confidence ratings generally went from “slightly” confident to between “slightly” to “moderately” confident, an increase $<.001$, with 75% of students completing both the pre and post surveys. The authors write, “Sixty-six percent of students agreed or strongly agreed with the statement ‘reviewing the quality of care for my individual patients was a valuable exercise.’” Also, 77% agreed or strongly agreed with the statement ‘prospectively following ECMH quality metrics going forward will be a valuable exercise.’” In the 2012-2013 academic year 76% of students abstracted at least one patient chart, with a total of 405 patient record abstractions. (Third-year students abstracted 3.3 records on average, while first-year students abstracted 1.6 records on average.) From these studies, it appears feasible to create a quality “report card” for a longitudinal experience, so as to improve student perception of QI skills, which in turn, can lead to improving clinical efforts. The study also had the benefit of giving students an opportunity to be health coaches to patients, under the supervision of a clinic preceptor.

CULTURE OF SAFETY/TRANSPARENCY

1. Ginsburg LR, Tregunno D, Norton PG Self-reported patient safety competence among new graduates in medicine, nursing and pharmacy. *BMJ Qual Saf.* 2013;22:147-154.

Ginsburg et al studied anonymous responses of 1247 newly graduated licensed/registered nurses, pharmacists, and physicians (mean age=27.5 years) in the province of Ontario, Canada in 2010. Ontario has 6 medical schools, 15 nursing schools, and 2 training programs for pharmacists. Ginsburg et al used a survey with 6 sociocultural areas of competency developed by international professional bodies and the World Health Organization: culture, teamwork, communication, managing risk, responding to risk and understanding human factors. The cross-sectional survey is called the Health Professional Education in Patient Safety Survey (H-PEPSS). It asks about confidence in patient safety (PS) learning in both the classroom and

clinical settings on 16 items. Very importantly, the respondents are asked to respond separately on each item about what they learned in the classroom versus what they learned in the clinical setting. Nurses scored higher than the pharmacy and physician groups for learning in the classroom; nurses scored lower than physicians for working in teams in the clinical setting. Nurses scored higher than physicians for learning in clinical settings for the other 5 competencies. There were 3 key findings from all the results: (1) there is a need to introduce how to handle errors and concepts from “safety science” into health professional education; (2) nurse trainees find it easier to deal constructively with errors in the present medical culture; and (3) generally, health professionals learn confidence in PS best with hands-on experiences. However, the hierarchical nature of health care and different perceptions and responses to conflict between physicians and nurses make it difficult for nurses to feel confident. Good examples must be set by faculty preceptors so that nurses will feel more respected in teamwork. While the H-PEPSS study has some limitations (eg, respondents may be unaware of what they do not know, respondents may underrate or overrate their competencies), the survey results show a need to improve the civility in the culture in which PS is to be a primary competency.

2. Leape L, Berwick D, Clancy C, et al for the Lucien Leape Institute at the National Patient Safety Foundation. Transforming healthcare: a safety imperative. *Qual Saf Health Care*. 2009;18:424-428.

The Lucian Leape Institute was established by the US National Patient Safety Foundation to give direction to patient safety work. Leape et al summarize how to make medical care safer using 5 concepts: transparency, care integration, patient/consumer engagement, restoration of joy and meaning at work, and medical education reform. They discuss the challenges to implementing their concepts, and give recommendations for policy makers. Leape et al believe there must be a culture of trust, reporting, transparency, and discipline to achieve safe health care. Currently, medical staff have to spend more time on records than tending to patients. Practitioners function in “silos” rather than in teams. Health care entities need to become

“high-reliability organizations” centered on teamwork. Specifics in transparency include 4 aspects: caregivers need to share information openly about hazards and errors; caregivers need to be open with patients when things go wrong; organizations should exchange information about injuries and hazards; there should be public reporting of harmful accidents.

Integrated care platforms involve the following: patient-centeredness, work assignment that strives to maximize the performance capability of each individual, a support framework, community linkage, variation management that is adaptive and evolving, and transparency. Because 60% of US physicians have considered leaving medical practice, it is vital to put satisfaction back into medical work. Of paramount importance in reform of medical education is emphasis on the development of skills, behaviors, and attitudes needed by practicing physicians. Medical education needs to train future physicians in the ability to manage information, understand basic concepts of human interaction, and use health care systems theory.

3. Pringle J, Weber RJ, Rice K, Kirisci L, Sirio C. Examination of how a survey can spur culture changes using a quality improvement approach: a region-wide approach to determining a patient safety culture. *Am J Med Qual.* 2009;24:374-384.

The major objective of this was to examine safety climates within a group of regional hospitals to assess health care workers’ perceptions of their hospitals’ safety reporting and safety problem solving. Also, the study examined how regional initiatives and health care organizations use safety information to improve safety outcomes. Their approach involved identifying 25 Western Pennsylvania hospitals in which to conduct a survey involving Likert scale questions.

A total of 30 out of 38 hospitals participated; 11,004 surveys were distributed, 671 were returned as extra, and 2838 surveys were completed and returned. Response rate was different for each hospital. Aggregate results showed that respondents strongly agreed that leadership in their hospitals made safety a priority and encouraged reporting of error, and that

integrated health care teams were used to address patient safety issues. There was variation in respondents' scores in different age groups and different levels of education. At completion of this study, 60% of the hospitals reported actively using this survey to address patient safety culture. The survey provided a focus with which regional groups and hospitals could identify interventions to improve patient safety culture. This suggests that this type of instrument may be useful to identify and reinforce aspects of safety. However, because of the complexity and diversity of these health care systems in Western Pennsylvania, (eg, some urban, some rural), determining precisely how these surveys can be used will require further investigation.

4. Robson J, de Wet C, McKay J, Bowie P. Do we know what foundation year doctors think about patient safety incident reporting? Development of a web based tool to assess attitude and knowledge. *Postgrad Med J.* 2011;87:750-756.

Robson et al report on a United Kingdom pilot study that used a 25-item questionnaire to assess how knowledgeable foundation year (FY) 1 and FY2 (similar to interns in United States) medical doctors in Scotland are about health care safety issues. Content validity and clarity of the questions were endorsed by experts in medical education on patient safety (PS). Robson et al believe that this tool has the potential to provide National Health Service (NHS) employers and deaneries (medical jobs clearing houses in the United Kingdom) with information on the safety knowledge and attitudes of junior trainees. Also, this tool will help education providers with information for planning curricula. Robson and colleagues point out that inculcating positive PS attitudes and behaviors at an early stage in career development is clearly a desirable goal for future NHS clinical leaders and decision makers.

In May 2010, 27 FY1 and 46 FY2 doctors from 3 Scottish NHS board areas answered the questionnaire online. The majority of respondents gave positive responses to questions related to PS principles. All respondents felt that reporting PS incidents is valuable, but only a minority felt that those who speak out are treated fairly. Most respondents had not formally reported any PS incidents in the current academic year, and of those who did, only 55.6% felt they had received feedback following the investigation. All respondents admitted to being involved in

some type of medication incident, 29% of which were reported. Respondents involved in communication errors indicated that only 12% had been reported.

Further work with the pilot questionnaire and with a larger group of participants is required to establish reliability. In its first use, there were no significant differences between FY1 and FY2 doctors. Only 73 of the 110 doctors invited to participate actually participated. Forty-eight percent of respondents believed that most safety incidents were caused by things they could do nothing about. Robson et al suggest that annual use of an attitudinal survey of foundation doctors would provide valuable information with which to build more effective PS incident reporting structures and learning systems.

5. Wong BM, Etchells EE, Kuper A, Levinson W, Shojania KG. Teaching quality improvement and patient safety to trainees: a systematic review. *Acad Med.* 2010;85:1425-1439.

Wong et al systematically reviewed 41 published quality improvement (QI) and patient safety (PS) curricula used from January 2000 to January 2009 for medical students and/or residents to (1) determine educational content and teaching methods, (2) assess learning outcomes achieved, and (3) identify factors promoting or hindering curricular implementation. Wong et al classified learning outcomes using Kirkpatrick's model. They also used the BEME (Best Evidence in Medical Education) protocol rating system for strengths of findings, using considerations of sample size, number of sites, study design, completeness of data, and response rate. Most of the 41 curricula came from US training programs, 2 came from Canada, and 1 from the United Kingdom. Participating learners were medical students in 14 studies (7 for preclinical medical students and 7 for clinical medical students), residents in 24 studies, and both medical students and residents in 3 studies. Also, curricula for residents came primarily from internal medicine and family medicine. Most curricula combined didactic and experiential learning (rather than detailed case discussions or Web-based learning). Concepts of continuous QI systems thinking and root cause analysis were the most common topics covered.

The majority of learners were satisfied with the QI curricula. Only 2 studies had low satisfaction, and they were conducted with first-year and second-year medical students. Acquisition of knowledge, both self-assessed and quantified, showed significant improvements. Only 5 studies reported behavioral changes; of those only 2 pertained to behaviors targeted by the curricula. As for changes in clinical processes, 7 of 13 studies reported significant improvements in processes of care. Two studies measured benefits to patients in intermediate clinical outcomes.

Wong et al conclude that, even with optimal delivery of the target educational content, the degree to which organizational or patient outcomes might improve remains unclear. They do find that residents' involvement in QI and PS curricula can lead to real improvements in clinical processes. They find that important barriers to implementation of curricula in both the undergraduate and postgraduate setting are: small numbers of faculty members with interest in teaching the curriculum and competing educational demands. Neither of these barriers is an insurmountable obstacle. Also needed to make the implementation a success are availability of clinical data through information systems and a local "safety culture."

ENGAGEMENT OF PATIENTS AND THEIR FAMILIES

1. Han E, Scholle SH, Morton S, Bechtel C, Kessler R. Survey shows that fewer than a third of patient-centered medical home practices engage patients in quality improvement. *Health Aff (Millwood)*. 2013;32:368-375.

Han et al present a survey of 112 patient-centered medical home practices in 22 states for assessment of involving patients in quality improvement. Because the Institute of Medicine considered patient-centeredness an important component of quality in health care, Han et al studied practices recognized by the National Committee for Quality Assurance (NCQA) as Patient-Centered Medical Homes as of March 1, 2010, to see how and what they are doing to achieve patient involvement in quality improvement. The practices (which varied in size) reported on whether they involved patients or families in 4 types of feedback/involvement: (1)

suggestion box, (2) surveys of patients and/or families, (3) feedback from small groups of patients in interviews and group meetings, and (4) utilization of patients and/or families on an ongoing basis through teams or councils. Interviews with the practices were conducted by 2 NCQA staff experienced in qualitative research. Results are considered preliminary. However, they reveal some interesting aspects regarding types of involvement of patients and motivations for involvement of patients. Interestingly, physician-owned practices usually used surveys and suggestion boxes; practices serving low-income patients tended more toward both surveys and patient advisers. The majority of practices gathered patient/family feedback to alert themselves of potential problems rather than to partner with patients/families to redesign processes. Some practices did not truly believe in the value of patient feedback. External incentives, such as financial inducements and reporting requirements, were strong motivators for sustained and comprehensive patient involvement, as well as cost savings and resolutions of access problems. Despite some skeptical practices, it seemed the real barrier to participation was lack of resources and knowledge about how to set up successful methods of patient/family feedback. As is so often the case in today's environment, time and resource crunches can be daunting, so demonstrating successful models that prove to save time and improve efficiency are key. Also, how-to guides and recognition for implementing them, as well as testimonials from practices using patient feedback will no doubt encourage more practices to use patient/family feedback. Culturally, there is a need to do more to overcome the medical field's views about doing things to patients, and not with patients.

SAFETY SYSTEMS KNOWLEDGE

1. Aboumatar HJ, Thompson D, Wu A, et al. Development and evaluation of a 3-day patient safety curriculum to advance knowledge, self-efficacy and system thinking among medical students. *BMJ Qual Saf.* 2012;21:416-422.

Aboumatar et al report on curriculum development and evaluation of a 3-day clinical patient safety intersession implemented at the Johns Hopkins School of Medicine (JHSOM) in January 2011. This patient safety curriculum was designed to impact medical students' safety

knowledge, self-efficacy, and system thinking. A total of 119 second-year students participated in the intersession. These students were not volunteers; they were expected to attend. Also, these students had benefitted from a 10-month longitudinal clerkship in which they worked with a primary care provider for one half day per week. The intersession material focused on teamwork, communication, and system thinking. The curriculum had 3 goals: (1) to describe how medical errors may occur, how we can learn from them, and how we can prevent their recurrence, at the health care provider level, team level, and system level; (2) to provide the necessary knowledge and skills to practice safely as individual providers and within the health care team; (3) to advance system-based thinking as a means to improve patient safety and quality of care. This third goal included helping the learners to see systems and to understand basic principles of designing safety systems. The intersession faculty were selected from multiple disciplines.

Three evaluations were done: (1) pre-post intersession evaluation of student knowledge, awareness of safety problems, self-efficacy, and system thinking; (2) post-intersession assessment of student intentions to apply safety practices and satisfaction; and (3) review by the JHSOM's Student Assessment and Program Evaluation Committee 1 month after the intersession. There was a 19% increase in mean knowledge scores, and students had statistically significant increases in self-efficacy rating for 9 assessed skills; 85% of students reported they will speak up about safety concerns and 95% said they plan to use the "teach back" technique to ensure patient understanding. The intersession was then "buttressed" by additional elements throughout medical school training.

2. Kim CS, Lukela MP, Parekh VI, et al. Teaching internal medicine residents quality improvement and patient safety: a lean thinking approach. *Am J Med Qual.* 2010;25:211-217.

Quality improvement (QI) and patient safety (PS) are considered to be among the highest priorities for developing a successful health care system. Resident physicians are usually at the front lines of providing care for patients. But many times residents are excluded from QI and PS

training. In order to deal with this issue, Kim et al proposed developing a new program that would align the goals of the health system with those of the residency program at the University of Michigan, Department of Internal Medicine.

Background knowledge for QI and PS concepts included: human factors engineering (HFE), medical sociology, educational assessment, clinical team, individual team, environmental factors in the hospital, and adverse events. Core developments of the curricula were delivered to residents through seminars offered each month on the PS problem, and then seminars on errors reporting and solution design. A broad range of the faculty learned to use analytic tools of the HFE-based treatment hierarchy, cause and effect diagrams, and the 5 principles of causation, so they could teach them to residents.

Each resident team (10-11 residents and 1 faculty advisor) identified a project with PS concerns. One team used a lean thinking approach to evaluate an in-hospital cardiopulmonary arrest. They used value stream mapping (VSM) and found that 52 of 387 cardiopulmonary arrest reports in 2007 showed the response by the code team needed improvement. Then, using VSM, the team developed future state VSM showing how an ideal cardiopulmonary arrest response could be performed. Key stakeholders within the institution were identified and could then share in developing lasting solutions to this and other problems.

3. Ogrinc, G, MD, Nierenberg, DW, MD, Betalden, PB, MD. Building experiential learning about quality improvement into a medical school curriculum: the Dartmouth experience. *Health Aff (Millwood)*. 2011;4:716-722.

Ogrinc et al present an optimistic overview of a program they ran at Dartmouth Medical School from 2006 through 2010 to embed quality improvement (QI) into all years of the medical school curriculum, although the school had earlier experience incorporating QI and systems into the curriculum. Starting in 2006, the medical education committee recommended this important content could be part of first- and second-year curricula. There was core material for all students in year 1 and 2; and there was elective experiential learning for year 2

students to apply what they learned from the core curriculum in a clinical setting. Specifically, in year 1, there was a 1-hour large group session on geographic variation and a second 1-hour lecture on the basic concepts of systems and patient-centered care. The year 2 Health Leadership Practicum (HeLP) elective ran from September to March, and students worked in groups applying QI concepts in a local setting with an on-campus faculty mentor and a faculty site coach. They also met on campus every 6 weeks, following a standardized module and worksheet coupled to the textbook *Fundamentals of Healthcare Improvement* (copyright 2008 by G. Ogrinc and L. Headrick; a second edition published in January 2012).

Ogrinc and colleagues explain that the textbook focuses on the following: finding evidence, focusing an aim, process analysis, measurement, and making changes. Dartmouth faculty used the Realist Evaluation Framework from Ray Pawson and Nick Tilley to test the validity of context and action mechanisms in their students' clinical projects. Roughly 5% of students each year (4 years) completed 9 projects. Students used existing electronic data and most used statistical process-control charts to evaluate outcomes. Two examples of projects were: (1) studying ways to get urine samples from all pregnant patients in the first trimester (2007), and (2) studying ways to improve colonoscopy follow-up from fecal occult blood testing (2008). Most student groups prepared posters to present at a national student meeting. Ogrinc et al stress the importance of faculty coaches who have QI expertise. They also observe that students acquire "a new lens through which to view clinical care." The students in the HeLP elective learned to "see" broken systems and worked to repair them.

4. Rudd 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;27:130-138.

Rudd et al point to the increasing awareness of the importance of group culture and multidisciplinary team approaches for quality improvement. Mayo Clinic espouses teamwork as a core value. Thus, beginning in August 2006, Mayo Clinic established the Quality Academy and several large-scale education and training programs, including Teams Training and a

Champions Course. A study was done for the population of Mayo Clinic employees attending the course in 2008 (n=103). A pretest-posttest design assessed learning by participants, and gain score analysis was conducted using paired *t* test procedures.

The Teams Training curriculum was designed to incorporate principles of adult learning. The course design has evolved based on feedback from participants and faculty. It now consists of six 1- or 2-day sessions, for a total of 9 days over a span of 3 months. The Teams Training is offered at all 3 Mayo Clinic sites (Minnesota, Florida, and Arizona), but the particular evaluative study considered in this article was for 3 cohorts at Mayo Clinic's Rochester, Minnesota, campus in 2008; there were 103 participants on 14 teams. Participants were all ages and with 28 different job titles. Rudd et al evaluated their results using the Kirkpatrick framework, which consists of 4 "levels" of outcomes: reaction (participants' satisfaction), learning (change in participants' knowledge, skills, attitudes), behavior (application of learned skills to the work setting), and results (organizational changes). Participants reacted favorably to the training and especially to specific tools, such as value stream mapping, pull versus push concepts, spaghetti diagrams, and the A-3 communication tool. Pretests and posttests showed that participants gained knowledge. Survey results showed a significant increase in self-reported use of process improvement tools in the work setting. All 14 teams in the study cohorts were successful with their projects, resulting in organizational change.

Although the Quality Academy Teams Training was developed internally for Mayo Clinic employees, other health care institutions may benefit from implementing comparable quality-related training programs that teach employees process improvement tools and methods.

TEAMWORK

1. Blegen MA, Sehgal NL, Alldredge BK, Gearhart S, Auerbach AA, Wachter RM. Improving safety culture on adult medical units through multidisciplinary teamwork and communication interventions: the TOPS project. *Qual Saf Health Care*. 2010;19:346-350.

Blegen and colleagues implemented the Triad for Optimal Safety (TOPS) project at one inpatient medical unit from each of 3 hospital settings in the San Francisco Bay Area: an academic university medical center (University of California San Francisco [UCSF] Medical Center), a nonteaching community hospital (El Camino Hospital), and an integrated healthcare system hospital (Kaiser Permanente-San Francisco Hospital). All 3 hospitals were of medium size, the units had 26-34 beds, and had similar nurse staff (1 registered nurse for every 4-5 patients). The physician care models differed (community-based physicians, physicians employed by a managed care organization, and physicians based in medical schools). Both pharmacy presence and the use of health information technology also differed.

The purposes of the TOPS project were to develop and pilot test (a) an interdisciplinary team training intervention, (b) a unit-based safety team to continue the safety-focused teamwork, and (c) a method to engage patients with the multidisciplinary team. The leadership team came from the UCSF Schools of Medicine, Nursing, and Pharmacy. Blegen et al gave 4-hour multidisciplinary teamwork training sessions that included: (a) an introduction to safety culture and local problems, (b) a presentation using the "First, Do No Harm" video, (c) a didactic presentation on teamwork behaviors and communication skills by a consultant from aviation safety, (d) small-group role-playing clinical scenarios to practice new skills, and (e) a facilitated closing session to determine lessons learned and next steps. The 454 participants in the training sessions included both unit-based providers and staff, and service-based providers.

Health care providers from the 3 units in the study rated the safety culture dimensions higher after the TOPS intervention. Five dimensions that clearly stood out as improved were: supervisor manager expectations, organizational learning, communication openness, hospital handoffs and transitions, and nonpunitive response to error. However, sometimes there were significant differences in scoring across the major disciplines.

2. Brock D, Abu-Rish E, Chiu C-R, et al. Interprofessional education in team communication: working together to improve patient safety. *BMJ Qual Saf.* 2013;22:414-423.

Brock and colleagues present a program conducted at the University of Washington, Seattle, to train student interprofessional teams to improve attitudes, knowledge, and skills around interprofessional communication. They used the Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) that has been used more widely with health care teams than with students. In this undertaking, 306 students (among whom were fourth-year medical students, third-year nursing students, second-year pharmacy students, and second-year physician assistant students) completed the training, but only 149 (48.7%) students completed both the pre and post assessments. The 4-day program took place during the capstone week at the end of classes.

Students had the option to participate in one of 3 trainings: (1) adult acute care, (2) pediatric, or (3) obstetric cases. In each area, there was both a didactic session and 3 simulated exercises. Two exercises used a manikin simulator and a standardized family member, and the third used a standardized patient. Every simulation was preceded by an introduction with case materials and ground rules, and was followed immediately by a facilitated debriefing session. Student teams met as a large group at the end of the 4 days for a final wrap-up with facilitators to review what they had learned.

There were 3 training goals: (1) positive attitudinal shifts (including motivation and self-efficacy), (2) providing students the opportunity to observe and practice team communication skills, and (3) increasing student understanding of team skills.

Pre and post surveys were administered online. Analysis of variance was used to explore differences across professional student groups. Overall, significant upward shifts were reported for knowledge, advocating for patients, and communicating in interprofessional teams.

3. Kiersma ME, Plake KS, Darbshire PL. Patient safety instruction in US health professions education. *Am J Pharm Educ.* 2011;75(8):162.

Kiersma et al's thorough study of 23 articles published up to December 2010, chosen to describe patient safety in health professional curricula, including medicine, nursing, pharmacy,

and dentistry, describes various educational methods used in health professions curricula to improve patient safety (PS). Thirteen of the studies were from medicine, 4 from nursing, 3 from pharmacy, and 3 from interprofessional efforts. Kiersma et al narrowed the number of articles down to 23 because they sought 3 criteria: safety management, PS, and curriculum. Only 23 of 154 articles met all 3 criteria. Kiersma et al found the most frequently used instruction methods were lectures, case-based exercises, active-learning exercises, and discussion. There also were simulation exercises, including using standardized patients, and role play, as well as projects and presentations. Only 1 article described a self-directed curriculum, and that was for medical residents to acquire skills in diabetes care. There also were varied methods of assessing the effectiveness of the modes of instruction, such as self-assessment and knowledge examinations. Also, there was post assessment and ongoing assessment.

Students in medicine, nursing, pharmacology, and other health professions need real competencies in PS, and faculty need to learn how to teach these competencies with measurable results and in interdisciplinary groups, so that when students graduate, safety and quality will be in the forefront of their actions and integral to well-coordinated team efforts for patients.

4. Lewis SE, Nocon RS, Tang H, et al. Patient-centered medical home characteristics and staff morale in safety net clinics. *Arch Intern Med.* 2012;172:23-31.

Lewis and colleagues' discussion of morale, satisfaction, and burnout in 5 patient-centered medical homes (PMCHs) in vulnerable communities shows a strong correlation between quality improvement efforts and morale/job satisfaction. Quality improvement may not help much with burnout, however. There is much hope that the PMCH will improve patient outcomes, but in order to have improved patient outcomes, Lewis et al indicate, "success and sustainability are dependent on provider and staff buy-in to the model" of the PMCH. Lewis et al quote a 2009 article by Quinn et al as follows: "Physicians whose practices engaged in quality improvement noted significantly less isolation, stress, and dissatisfaction with their work."

Lewis et al conducted a mailed self-administered survey in 2010 among providers and clinical staff among Safety Net Medical Homes in Colorado, Idaho, Massachusetts, Oregon, and Pennsylvania. Lewis et al aimed for a 70% response rate from the 5 regional coordinating centers totaling 391 providers and 382 clinical staff. This was the first year of the 5-Year Safety Net Medical Home Initiative supported by The Commonwealth Fund. Providers and staff had been encouraged to use a framework of 8 change concepts, and the first 2 for that year were (1) empanelment of patients to providers; and (2) continuous and team-based healing relationships linking patients to a provider and care team. About half the clinics were located in a city.

Lewis et al had results showing “the access to care and communication with patients subscale score correlated with higher staff morale and the quality improvement subscale score correlated with more staff freedom from burnout.” In fact, “the quality improvement subscale score was the most consistent independent correlate.”

5. Majka AJ, Cook KE, Lynch SL, et al. Teaching quality essentials: the effectiveness of a team-based quality improvement curriculum in a tertiary health care institution. *Am J Med Qual.* 2013;28:214-219.

Majka et al report on a unique quality improvement curriculum implemented within the Mayo Clinic’s Division of General Internal Medicine (GIM) in March 2011. Not only did the curriculum address the entire GIM team, but it also gave physicians credit for the quality component of the American Board of Internal Medicine Maintenance of Certification, and gave nurses continuing medical education credit.

First, back in September 2010, GIM began a quality initiative for all 242 of its staff. Coursework was offered to the multidisciplinary team of physicians, physician assistants, nurse practitioners, and allied health staff. All members achieved Bronze Quality certification within 3 months, with understanding of the Mayo Value Equation: “value increases when quality (defined as safety, outcomes, and service) is improved and when cost is decreased.” Then,

building on this Bronze initiative, GIM utilized 4 learning modules: Quality Management Tools (QMT), Selecting Quality Improvement Methods (SQIM), Champions Training (CHAMP), and Applied Quality Essentials (AQE). A total of 62 leaders in health care and 9 quality subject matter experts were invited to participate in these 4 modules for 1 month (March 2011). Of the 62 persons invited, 36 responded and participated.

Pretests containing 10-14 questions each were given for 3 of the 4 modules within the first 10 minutes of each session. There was no pretest during AQE because that module uses hands-on learning. The sessions were 2 hours each for QMI, SQIM, and CHAMP, and 4 hours for AQE. After completion of each module, participants were given time to evaluate the relevance and effectiveness of the training material. Posttests also were given on the modules. Pretest scores averaged 71%, and posttest scores averaged 92.7%. There was no negative feedback regarding course content.

The study has some limitations, however. Results and analysis represent a single institution. The time between pretest and posttest was brief. Anonymity prevented tracking individual progress. Participants were volunteers, so they may have been highly motivated in this endeavor.

6. Schleyer AM, Best JA, McIntyre LK, Ehrmantraut R, Calver P, Goss JR. Improving resident engagement in quality improvement and patient safety initiatives at the bedside: the Advocate for Clinical Education (ACE). *Am J Med Qual.* 2013;28:243-249.

Seeing that there was need for a bedside quality improvement (QI) and patient safety (PS) program for residents, Schleyer et al from the University of Washington and Harborview Medical Center, Seattle, chose to do a study with medicine and surgery teams. In July 2009, they used a 23-item questionnaire to survey all medicine and surgery attendings and residents at Harborview Medical Center, a 413-bed urban academic tertiary care center. The survey highlighted self-reported adherence to quality practices and attitudes. It targeted 4 quality and safety domains: professionalism (introductions and identification badges), infection control

(hand hygiene and contact precautions), appropriate interpreter use (medicine only), and pain assessment with wound care on rounds (surgery only). In all, 53% of internists attending completed this baseline survey, and 60% of internal medicine residents completed it; 80% of attending surgeons and 45% of surgical residents also completed it.

Schleyer and colleagues also designed and implemented a 4-month QI initiative—The Advocate for Clinical Education (ACE) program—on the medicine and surgery services at Harborview. The ACE they chose was a practicing trauma intensive care unit nurse working at Harborview for more than 10 years, so she was familiar with the hospital system. The ACE collected 1 month each of baseline observational data related to the prespecified behaviors on medicine and surgery during morning rounds—resident and attending physicians on medicine and residents only on surgery. The teams received appropriately timed education and feedback about performance at the bedside after each patient encounter. The ACE also gave aggregate feedback at a separate time and location.

After the 4-month observation period, all attendings and residents observed by the ACE were asked to rate program satisfaction using a 5-question Catalyst survey. The data on physician satisfaction were maintained by the QI department; the investigators did not have access to the data. To evaluate performance change during the ACE work, composite behaviors were calculated. The ACE had observed 2862 physician-patient interactions performed by 28 attending and 150 resident physicians.

Schleyer et al note: “100% of internists observed by the ACE ‘strongly agreed’ or ‘agreed’ that ‘team-level feedback was useful’; 60% of surgeons observed ‘strongly agreed’ or ‘agreed.’ Among internists, 33% ‘strongly agreed’ that their ‘clinical care improved as a result of this program’, 67% were ‘undecided.’ Among surgeons, 86% ‘strongly agreed’ or ‘agreed’ that care improved, 14% ‘disagreed.’ Also, 100% of internists and 75% of surgeons ‘would recommend this program to a colleague.’”

Overall, statistics indicated “that physicians are aware of appropriate practices, but overestimate their own performance.” This suggests the need to study “barriers” preventing

implementation at bedside. The program is very likely “adaptable to the unique needs of diverse clinical settings,” and it needs to include the “sustainability of improvements.”

7. Stueven J, Sklar DP, Kaloostian P, et al. A resident-led institutional patient safety and quality improvement process. *Am J Med Qual.* 2012;27:369-376.

Stueven et al describe how to engage residents and medical students in quality improvement and patient safety using a method that does not add substantially to their workload, but is successful and effective. The process first used resident-generated surveys in 2007. Then, in 2010, resident-generated and third- and fourth-year medical student-generated surveys were used for prioritization of safety and quality issues, participation in large group (retreat) and small group (workgroup) meetings, and continued reassessment of progress using the Plan-Do-Study-Act tool. Issues identified in the survey as being of greatest concern were prioritized for discussion at meetings attended by faculty, hospital administration, nurses, and residents in the University of New Mexico School of Medicine and the University of New Mexico Hospital.

The theory of the project is based on sociocultural models that emphasize the significance of context to learning and the value of participation and action in problem solving to stimulate learning. Residents from different departments identified key problem areas, and then participated in problem solving with administrators, nurses, and faculty responsible for quality of clinical care. The interdepartmental aspect gives added “potential to identify themes in institutional quality that overlap and extend beyond departmental boundaries.”

Interestingly, responses to surveys from 500 residents in 2007 and from 545 residents in 2010 show that concern for patient safety dropped significantly, but the ranking of areas of concern stayed about the same. Nearly all the top 13 specific areas of concern showed significant improvement, with the exception of ambulatory care access. Medical students (95 out of a possible 150 responded to the 2010 survey) had similar perceptions to those of residents. Medical students, however, noted the problem of fatigue from lack of sleep more than did the residents.

Workgroups assigned to each prioritized topic identified progress and obstacles and set new goals. The workgroups consisted of 5 to 8 residents, 1 hospital administrator, 1 faculty member, and 1 nurse. There was monthly follow-up at resident council meetings. Stueven et al describe their project as “focused on engagement, empowerment, and culture changes.”

INTERORGANIZATIONAL SHARING

1. Cresswell K, Howe A, Steven A, et al. Patient safety in healthcare preregistration educational curricula: multiple case study-based investigations of eight medicine, nursing, pharmacy and physiotherapy university courses. *BMJ Qual Saf*. Epub ahead of print June 1, 2013. doi: 10.1136/bmjqs-2013-001905v.

Cresswell et al conducted a study using the techniques developed by Professor Michael Eraut of the United Kingdom, who is a researcher studying how professionals learn, both formally and informally, in the workplace. Cresswell et al wanted to learn the formal and informal ways “preregistration” students (those who have not yet been licensed) in medicine, nursing, pharmacy, and allied health care professions learn about patient safety (PS). Cresswell and colleagues did a series of in-depth comparative qualitative case studies of 8 university courses. They conducted 38 focus groups with 162 participants, did 82 observations of learning activities, 33 semi-structured interviews, and analyzed 44 documents. They found that students were mostly taught about safety issues in limited discrete topic areas or implicitly. There were few opportunities for interprofessional learning and few between educational, practice, and policy contexts. Cresswell and colleagues concluded that medical educators should be encouraged to work across disciplines and topic areas, and that there should be development of strong links with organizational systems to promote student engagement with organization-based safety practice.

Cresswell et al advocate for the appointment of “patient safety champions” to foster strengthening of the explicit role of PS in curricula, and they want to see these champions work

across health care profession disciplines and training programs. For example, they point out that safety in physical therapy has a different context from safety in internal medicine, but there may be only patient in both contexts, and there must be good interdisciplinary communication about this patient. Further, there is a need for teamwork and integrating explicit (taught) and implicit messages about patient safety.

2. Kalanithi L, Coffey CE, Mourad M, Vidyarthi AR, Hollander H, Ranji SR. The effect of a resident-led quality improvement project on improving communication between hospital-based and outpatient physicians. *Am J Med Qual.* 2013;28:472-479.

Kalanithi et al studied an internal medicine resident (IMR) quality improvement (QI) program designed to improve communication between IMRs and their patients' primary care physicians (PCPs). This program at the University of California-San Francisco Medical Center involved education on care transitions, standardization of documentation, audit/feedback of PCP communication rates, and financial incentives.

After the implementation of this program, PCP communications with patients increased from 55% to 89.3% (ie, 2477 of 2772 discharges). In addition, this program was associated with increased referring PCP satisfaction with communication at hospital admissions from 27.7% to 58.2%.

This study illustrates how one IMR program changed resident behavior, as well as how it dealt with addressing a pressing quality gap through a QI program. In addition, this study points out the value of residents as potential key drivers of quality care at teaching hospitals.

3. Tudiver F, Click IA, Ward P, Basden JA. Evaluation of a quality improvement curriculum for family medicine residents. *Fam Med.* 2013;45:19-25.

Tudiver et al at the East Tennessee State University's Department of Family Medicine initiated quality improvement (QI) training at its 3 residency programs in 2008. Their purpose was to develop, implement, and assess a formal curriculum and experiential learning program

to train family medicine residents in QI knowledge and skills. This was necessary because implementation of continuous QI is one of the “must pass” elements to achieve Patient-Centered Medical Home recognition. Tudiver notes that “pay for performance makes it particularly important for medical residents to be trained in how to develop and implement a QI process within their practices.” The residents in this project would be working with Medicare and Medicaid patients in an underserved rural area.

In setting up the Residency Training in Primary Care QI for Rural Health project, Tudiver and colleagues had 2 goals: (1) develop a formal curriculum, and (2) implement an experiential learning process to train and evaluate family medicine residents in evidence-based QI of primary care. Three objectives were set to meet the above goals: (a) develop a curriculum for providing family medicine residents with clinical and didactic experiences for utilization of the QI process in their practice of medicine, focusing on cultural competence, health literacy, and health disparities; (b) prepare family medicine residents with the knowledge, skills, and attitudes to utilize evidence-based QI processes in their medical practice; and (c) share information about the process with other resident programs.

The first year of the project was dedicated to planning the curriculum and to training family medicine faculty members in QI theory and design. The second and third years of the project had individual teams of second-year family medicine residents in 3 affiliated residency clinics receive QI training and complete at least one Plan-Do-Study-Act cycle on team projects. The QI knowledge and skills application were assessed on the 37 residents participating in 2 groups. There were 18 residents in Group 1 and 19 residents in Group 2.

Results were that residents’ self-assessed QI proficiency improved after receiving a day-long training program; this was consistent for both groups of residents. Application of QI knowledge, however, did not improve following QI project participation in resident Group 1, but did improve by 24% in resident Group 2. Faculty and residents had competing time demands that may have limited improvement.

FACULTY EXPERTS IN THE FIELD OF QI/PS

1. Myers JS, Tess A, Glasheen JJ, et al. The quality and safety educators academy: fulfilling an unmet need for faculty development. *Am J Med Qual*. Epub ahead of print April 11, 2013. doi: 10.1177/1062860613484082.

Myers et al view developing trainees in the principles of quality improvement (QI) and patient safety (PS) as working to fulfill a national imperative. They point out that few programs have sufficient skills and resources to be successful. Consequently, they developed a 3-day conference to provide medical educators with an in-person academic program designed to help educators develop current knowledge and tools to incorporate QI and PS concepts into their training programs. This conference also would focus on curriculum development and assessment, change management, as well as professional development, while fostering peer networking and mentorship.

In order to set up the University of Pennsylvania Faculty Development Program at the Perelman School of Medicine, Myers et al attempted to create a unique program that focused on developing the skills and careers of the teachers of quality and safety. A collaboration with the Society of Hospital Medicine and the Alliance for Academic Internal Medicine led to a faculty development conference titled the Quality and Safety Educators Academy. The goal of this conference was to focus on key QI and PS curriculum development, teaching methods, and participants' evaluation. This intense 3-day program included: educational design principles, mentoring and networking, internal medicine and pediatric faculty serving as program directors, medical school leaders or clerkship directors, junior faculty with a role in QI/PS education, and faculty with a QI/PS role who wished to acquire new teaching skills in QI/PS.

Prior to the program, the 90 participants (63 internal medicine, 9 pediatrics, 7 med-peds, 11 unspecified) from 68 institutions reviewed a 38-item e-mail survey on demographics and the current QI/PS curricula at their institutions. Also incorporated were case-based lectures/modules with videos, contributing factors to an error, ranked action plans for improvement, fishbone diagrams illustrating differences between cognitive and system errors, and overarching concept maps (ie, Miller's learner assessment pyramid).

Attendees evaluated (1=poor, 5=excellent) program content (4.6), faculty (4.7), and supplemental materials (4.6). They assessed that the program improved their QI/PS skills (4.6), curriculum development and assessment skills (4.7), and the ability to effectively engage trainees (4.6) and leaders (4.6) in QI/PS educational activities.

2. Stille CJ, Savageau JA, McBride J, Alper EJ. Quality improvement “201”: context-relevant quality improvement leadership training for the busy clinician-educator. *Am J Med Qual.* 2012;27:98-105.

Stille et al discuss a University of Massachusetts Medical School (UMMS) scholars program in quality improvement (QI), developed in collaboration with the UMass Memorial Health Care Department of Quality and Patient Safety (DQPS). The project was shared among UMMS’s Department of Family Medicine and Community Health, the Division of Pediatrics, and the Division of General Internal Medicine. When the project began, the DQPS already had developed a cadre of 8 physician quality officers to lead improvements. The goal of the program was to develop additional clinician leaders in QI who could facilitate QI efforts in the clinical setting.

The project, 9 months in duration, started in the 2009-2010 academic year. Although it would be conducted again in the 2010-2011 academic year, this article reviews only the first year. The participants that year were 10 “Quality Scholars” from among the 339 primary care teaching faculty of UMMS. Department chairs agreed to offset 10% of the scholars’ time to enable focused study and time for project activities. Scholars’ time in the program was split fairly evenly between didactic and project-based activities. They met biweekly from 7:30 to 9:30 AM. Each scholar was required to identify, lead, and complete a QI project within their clinical setting and within the 9-month time frame. Each QI project was to include a representative team of stakeholders and be in alignment with the system’s strategic goals. Project milestones were assigned for each session, and each scholar was assigned a project mentor with QI experience. Scholars were expected to present their project results at the end of the program at a system-wide quality symposium.

Scholars, who were of varied ages, rank, and experience, completed a pretest and a posttest consisting of 26 knowledge-based questions and 10 attitudinal questions. The scholars also evaluated each biweekly session. Lastly, there was a post-program summative evaluation. The curriculum focused on both knowledge of QI principles and leadership skills. The mentoring program was critical to scholars' success. Also, participants indicated a need for practical training on software tools to assist with their projects. There were "just in time" training sessions for such things. Most of the scholars preferred group discussion and troubleshooting on projects over topic-specific learning. They preferred teaching topics that enabled "hands-on" learning. The composite knowledge score increased from a pretest mean of 31.5 to a posttest mean of 36.7 out of a possible score of 51.

3. Teigland CL, Blasiak RC, Wilson LA, Hines RE, Meyerhoff KL, Viera AJ. Patient safety and quality improvement education: a cross-sectional study of medical students' preferences and attitudes. *BMC Med Educ.* 2013;13:16.

Teigland et al review results of an electronic survey, developed from focus groups, literature review, and local experts, that was sent via email to all medical students at University of North Carolina School of Medicine in the spring of 2012. A total of 450 of 790 students participated. The survey respondents represented the demographics of the entire school, and the results were predominantly in favor of hands-on learning. Hands-on-learning allows students to work with and to follow up with actual patients. It is active involvement with real patients rather than passive learning from books, lectures, and computer modules. Interestingly, this was in contrast to a similar survey by Thain et al the previous year in Singapore, wherein students did not object to Internet modules as a way of learning quality improvement (QI) and patient safety (PS). At the University of North Carolina, students comparing the importance of PS knowledge to basic science knowledge gave a mean rating of 3.7 out of 5, and students comparing QI knowledge to clinical knowledge gave a mean rating of 2.7 out of 5. Of interest, 47% of students preferred that PS education be taught during clinical rotations and 27% during clinical skills class in years 1 and 2. But the highest rated methods were physician-guided QI projects

with real patients and real-life examples presented by physicians. The study points out the shortage of available educators and the high cost of “hands-on” training. Involving students in QI projects can improve the quality of care for patients. Until there are enough trained faculty for this, the use of standardized patients is a good compromise. Teigland et al acknowledge that the persons responding to their survey may have been more interested in QI and PS than those who did not bother to take the survey, so preferences may not be totally useful for generalizing at both their university and at other schools.

4.Vinci LM, Oyler J, Arora VM. The quality and safety track: training future physician leaders. *Am J Med Qual.* Epub ahead of print August 16, 2013. doi: 10.1177/1062860613498264.

Vinci et al present an innovative Quality and Safety Track (QST) used at the University of Chicago Pritzker School of Medicine. It is a 4-year mentored elective scholarly project, called the “Pritzker Initiative,” that strives to meet the Association of American Medical Colleges’ mandate to integrate “quality improvement and patient safety concepts into every facet of medical education, beginning in the first year of medical school.” Its goal is not only to train medical students in the principles of safety and quality improvement (QI), but also to train future leaders in safety and quality. The QST program described in this article requires a student to complete 12 Institute for Healthcare Improvement Open School online modules and an individual scholarly project. There is also an optional first-year medical school (MS1) elective that starts with lectures in the fall quarter from physician leaders in various disciplines, as well as a presentation of the scholarly projects of 2 senior QST students. In the spring quarter the elective is “Fundamentals of Quality Improvement and Patient Safety,” meeting 2.5 hours weekly and teaching core improvement skills: process mapping, fishbone diagramming, using Plan-Do-Study-Act cycles, choosing measures, designing interventions, pay for performance, among others. The percentage of MS1s who felt comfortable “making changes in a system” improved from less than 40% to more than 90% after the QST elective.

Students work in groups to develop project proposals, and have longitudinal mentoring throughout their 4 years, as well as the opportunity to complete, describe, and exhibit their results during their fourth year. They earn credits for their completed work. Further, the faculty benefit from having trained students work on these projects.

5. Weigel C, Suen W, Gupte G. Using lean methodology to teach quality improvement to internal medicine residents at a safety net hospital. *Am J Med Qual.* 2013;28:392-399.

Weigel et al developed a quality improvement (QI) and public health (PH) program that included students at the Boston Medical Center. This program involved 90 internal medicine residents and 8 PH students. Each group participated in four 60- to 90-minute interactive and hands-on QI sessions for 4 months. The QI curriculum was facilitated by faculty members experienced in QI. Pre- and post-attitude surveys were analyzed and could be useful for future studies.

The QI teams proposed 17 project plans. The faculty leaders felt that the main strengths of the 17 QI teams were: successful definition of the project, clear objectives, providing good background information, sharing of simple and easy-to-follow process maps and fishbone diagrams, and identification of various stakeholders who needed to be involved in projects. Scored from 0 to 10, the average content score was 6.3 and the average presentation score was 6.7

Most teams needed to improve on: narrowing the scope of the project, creating measurable goals, and establishing communication with stakeholders earlier in the process.

Lastly, the faculty mentors felt that this QI curriculum could be an educational model of how health care trainees can work collaboratively to improve health care quality.

EVIDENCE-BASED THEORY

1. Cammisa C, Partridge G, Ardans C, Buehrer K, Chapman B, Beckman H. Engaging physicians in change: results of a safety net quality improvement program to reduce overuse. *Am J Med Qual.* 2011;26;26-33.

Cammisa et al report on a study and intervention on overuse of health care resources in the treatment of acute and chronic back pain. The overuse can harm patients and wastes money. Partnership HealthPlan of California (PHC) worked with 2 data companies – Ingenix and Focused Medical Analytics (FMA) – to determine areas of overuse.

PHC is a Medicaid-managed care plan in northern California, serving approximately 100,000 Medicaid recipients and 4000 members eligible for both Medicare and Medicaid. Cammisa et al assert that PHC “maintains an active commitment to quality improvement.” Utilizing the data management company Ingenix and the data analytic group FMA, PHC assembled a group of practitioner experts to look at episode treatment groups where there might have been overuse or misuse of services. PHC set up a physician outreach program to discuss reasons for variation in back treatment between practices and/or practitioners.

In 2007, the American College of Physicians published clinical practice guidelines on the management of back pain that contained very specific evidence-based recommendations. PHC then convened an expert group from their local practitioner panel that consisted of 1 pain management specialist, 2 anesthesiologists, 2 psychologists, 2 physiatrists, 1 neurologist, 1 family practitioner, 1 physical therapist, and 1 orthopedist to review the guidelines and reach consensus on overuse and underuse of services for acute and chronic back pain. They developed 4 main messages for primary care practices: (1) the risk of long-term muscle relaxant therapy outweighs the benefit; (2) the overall benefit of opioid therapy is limited for the management of back pain; (3) there is limited evidence for the long-term effectiveness of spinal injections; and (4) in the absence of red flags, magnetic resonance imaging (MRI) should not be performed until at least 4 to 6 weeks after the onset of a back pain episode.

PHC staff made outreach visits to primary care practices to discuss the 4 messages. The plan medical director and the plan pharmacy director discussed the recommendations in a respectful, nonjudgmental manner with primary care physicians. The combination of peer-

comparison data in respectful conversation, as well as the collection of feedback on the visits to physicians did lead to quality improvement. Cammisa et al write: “differences were statistically significant ($p < .0001$) for muscle relaxant use, narcotic use, overall MRI use, and spinal injections.” There was continuous refinement and expansion of the program during a 1-year postintervention period.

2. Eiser AR, McNamee WB Jr, Miller JY. Integrating quality improvement into continuing medical education activities within a community hospital system. *Am J Med Qual.* 2013;28:238-242.

Eiser et al discuss interest on the part of the continuing medical education (CME) community and the accrediting organization, the Accreditation Council for Continuing Medical Education, to have CME activities be an integral part of patient safety (PS) and quality improvement (QI) efforts of health care facilities and systems. They refer to an article by Van Hoof and Meehan that states that CME needs to be more data driven. Eiser and colleagues cite efforts of a medium-sized regional health care system to integrate PS and QI into CME using different types of CME activities. The authors examined CME in the Mercy Health System in suburban Philadelphia, where efforts are still at an “intermediate stage of development.” Evaluation forms for the CME conferences ask participants to specify how knowledge covered in the CME will be applied in their clinical practice. Data show case presentations are very useful when shared among physicians from varied specialties with varied knowledge and insights. Data also show that efforts are most effective when the CME activity combines nationally recognized guidelines with local clinical data and results in local policy changes. CME activities in the Mercy Health System have been steadily meeting more Quality Improvement Criteria set forth by the Pennsylvania State Board of Medicine.

3. Thomas L, Galla C. Building a culture of safety through team training and engagement. *Postgrad Med J.* 2013;89:394-401.

Thomas and Galla report on the implementation of Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) at the North Shore-LIJ Health System in New York State, 2007-2010. The North Shore LIJ Health System consists of 15 hospitals, 2 skilled nursing facilities, an institute of medical research, and a medical school. Convinced that teamwork is vital to patient safety and clinical outcomes, this health system wanted “to build a culture of patient safety within a structure that optimized teamwork and ongoing engagement of the health care team.” They trained 32,150 members of their health care team, including both clinical and nonclinical staff, with a goal of sustainability and daily practice, rather than one more strategy perceived as the “flavor of the month.” TeamSTEPPS is an evidence-based framework that creates transformational and/or incremental changes in organizations or in specific problem areas, aspires to zero tolerance for errors, and promotes empowerment of staff to speak up and influence actions for safety. TeamSTEPPS was developed by the Agency for Healthcare Research and Quality and the Department of Defense. Its framework is supported by 20 years of research and was field-tested in tertiary, community, civilian, and army hospitals. Its curriculum provides an infrastructure that includes leadership at the executive level as well as interdisciplinary frontline staff, together known as the Change Team, who drive implementation. The teams are not disbanded and so support the message of permanence. There was a pilot program in one hospital before expanding the program to the entire Health System.

The curriculum included: (1) a 2.5-day Master Trainer course for those who would train TeamSTEPPS coaches and trainers; (2) a 4-hour TeamSTEPPS Fundamentals course for staff who gave direct patient care; and (3) a TeamSTEPPS Essentials course for all nonclinical staff. Classes used facilitation rather than a pure didactic approach. “Physician participation was essential to lend credibility and maintain engagement of the multidisciplinary teams.” Staff were trained in cohorts representing their work teams, with a short time between training and adopting the TeamSTEPPS core skills. Thus, a large number of classes were offered in a short time, and at all times of day, evenings and weekends. Some of the tools, such as Briefs, Huddles, and Debriefs, were easy to implement and led to team cohesion. Others, such as Handoff and Conflict Resolution, take more time and customization. TeamSTEPPS has 5 core

principles: Team Structure, Leadership, Situation Monitoring, Mutual Support, and Communication. The principles and their accompanying skills lead to changes in knowledge and attitudes, with a shared mental model, mutual trust, and team orientation. Employees created posters proudly sharing their actual achievements in safety improvements. TeamSTEPPS competencies are reviewed annually. In 2010, all competencies showed significant improvement, with 3 dimensions (Organizational Learning, Supervisor/Manager Expectations, and Teamwork within Units) being organizational strengths (>75%). More specific improvements were as follows: communications/openness 7.7%, feedback and communication about errors 9.3%, frequency of events reported 2.6%, hospital handoffs and transitions 11.3%, hospital management support for patient safety 11%, nonpunitive response to error 15.9%, organizational learning-continuous improvement 11.71%, overall perceptions of safety 11.8%, staffing 15.8%, supervisor/manager expectations and actions promoting patient safety 10.9%, teamwork across hospital units 14.1%, and teamwork within units 11.9%.