Teaching for Quality

Integrating Quality Improvement and Patient Safety Across the Continuum of Medical Education

Report of an Expert Panel

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Executive Summary

Background

The past decade has seen remarkable shifts in health care delivery, the product of reports on the need for quality improvement and patient safety (QI/PS), changes in the health care system itself, and new regulations and accreditation requirements. These shifts have resulted in innovations in QI/PS education among U.S. medical schools and teaching hospitals, fostered in part by *Integrating Quality*, a five year-old initiative of the AAMC (Association of American Medical Colleges) and Best Practices for Better Care, a joint initiative of the AAMC and the University HealthSystem Consortium (UHC).

To augment these initiatives and to support faculty development in QI/PS, this report, "Teaching for Quality," articulates a broad vision for health care delivery, offers a strategy to increase faculty capacity, and makes three core recommendations. Throughout, the report emphasizes that teaching is conceived of as a broad concept—including curriculum design, competency assessment, experiential learning, and aspects of the hidden curriculum such as role modeling.

Vision, Goals, and Objectives

To support a national collaborative faculty development initiative, and to ensure the proficiency of all clinical faculty members in QI/PS, the report offers:

o **A Vision for the Future**

It is 2022. U.S. medical schools and teaching hospitals are successfully leading enormous changes in health care, aided by educational programs that embed QI/PS across the continuum of physician development. This process depends on alignment of the clinical and educational missions, and has been supported by rigorous evaluation and scholarship and fueled by extensive faculty development efforts.

o **Goal**

To ensure that every medical school and teaching hospital in the U.S. has access to a critical mass of faculty that are ready, able, and willing to engage in, role model, and lead education in QI/PS, and in the reduction of excess health care costs.

o **Objectives**

- All clinical faculty members will need to be **proficient**, that is, practicing and teaching QI/PS principles in the context of his or her everyday work.
- Some faculty will need to be **expert educators**, skilled in formal teaching of QI/PS principles, in creating and disseminating curricula, and in assessing physician development.
- A few faculty will need to be masters or scholars in QI/PS, whose accomplishments include research and discovery in QI/PS education in addition to their expert status.

Recommendations

To achieve the vision and goal articulated above, the report makes three core recommendations and several subrecommendations:

Recommendation 1
In order to achieve QI/PS goals for education and practice, the medical schools, teaching hospitals, accreditation bodies, examination organizations, and specialty bodies should ensure the integration of QI/PS concepts into meaningful learning experiences across the continuum of physician professional development, and the summative evaluations used for professional certification and licensure.

1.1 It is essential that education and clinical leaders integrate QI/PS concepts and competencies into meaningful educational experiences across the continuum of physician professional development.

1.2 As they create learning experiences and assess QI/PS competencies, medical education leaders should partner with other health professions.

1.3 State, regional, and national accrediting, licensing, and (re)certifying bodies need to align their requirements for QI/PS across the continuum of physician professional development from undergraduate to continuing medical education (CME).

1.4 The application of QI/PS competency assessment that measures across the continuum of physician professional development is necessary for the purposes of formative and summative feedback.

1.5 In order to assess progress toward the achievement of QI/PS competencies, national examination bodies should incorporate QI/PS elements into summative evaluations, and provide feedback to both individual learners and educational programs.

Recommendation 2
In order to improve the processes and outcomes of care, medical schools and teaching hospitals should expect all clinical faculty to be proficient in QI/PS competencies, and be able to identify, develop, and support a critical mass of faculty as expert educators to create, implement, and evaluate training and education in QI/PS for students, residents, and colleagues.

2.1 Given the size and scope of the need to train faculty in QI/PS, the collaboration of national organizations with an interest in this area is essential to the successful achievement of the vision and goal articulated in this report.

2.2 In accordance with the importance of improving health care quality and patient safety, faculty should be recognized for their clinical, educational, and scholarly contributions in QI/PS, in concert with other institutional policies and guidelines regarding promotion and tenure.

Recommendation 3
Academic and clinical leadership should share a common commitment to QI/PS and demonstrate a concrete alignment of the academic and clinical enterprises in a manner that produces excellent health outcomes valued by health care professionals and the public.

3.1 To achieve sustained improvements in care, it is critical to align and coordinate the efforts of senior clinical and educational leaders.

3.2 By ensuring the necessary infrastructure and resources, clinical and academic leaders can create a future in which QI/PS support the clinical education and research missions of medical schools and teaching hospitals.

3.3 In order to develop and assess the effect of appropriate educational interventions, it is necessary for educators to have access to clinical data, moderated by HIPAA concerns and other confidentiality protections.

3.4 To augment current efforts to recognize clinical achievements in QI/PS, national bodies should establish criteria by which individuals and institutions can be recognized for QI/PS efforts in education and research.

Faculty Development in QI/PS

To help achieve implementation of these recommendations, Teaching for Quality:
  o Outlines core competencies in QI/PS—based primarily on the ACGME/ABMS competency framework—to serve as basic curricular and assessment building blocks.
  o Describes the progress of learners from novice to master in acquiring and demonstrating these competencies.
  o Describes and calls for comment on core attributes of faculty members in QI/PS.
  o Provides a set of guiding principles for collaborative national faculty development initiatives to achieve the vision and goal articulated in this report.

The report emphasizes that all clinical faculty need to be proficient in QI/PS competencies, that some faculty members will become expert educators, and that a few will function at the level of mastery, providing scholarship and research to support QI/PS.

Closing the Gap: Implementation, Evaluation, and Next Steps

Finally, Teaching for Quality provides a framework by which a national faculty development strategy can be evaluated and offers an implementation strategy emphasizing:
  o Collaboration among national and local organizations.
  o Building on current platforms for change.
  o Identifying expert and master faculty from the nation's medical schools and teaching hospitals.
  o Identifying and promoting existing and new programs, courses, and other learning opportunities.

Background

The Changing Clinical Environment

In less than a decade, the external environment of QI/PS has changed dramatically, in part as the result of the Institute of Medicine's (IOM) reports on patient safety, "To Err is Human," and on quality, "Crossing the Quality Chasm."[1,2] These landmark papers galvanized the conversation about quality and error in the health care system.[3]

Key National Stakeholders in the QI/PS Process

These reports stimulated a broad engagement of stakeholders in a process of reflection and improvement. Among its many other roles, the Agency for Healthcare Research and Quality (AHRQ) was authorized as the lead federal research agency for QI/PS, resulting in a fundamental rethinking of the subject and the development of patient safety indicators.[4]

Other national organizations have made major contributions to health care quality and safety definitions and expectations. The Joint Commission developed its National Patient Safety Goals in 2002;[5] hospital accreditation now depends in part on compliance with these goals. Similarly, the Centers for Medicare and Medicaid Services (CMS) emphasizes improving quality by defining pay for performance clinical quality measures.[6] New value-based purchasing initiatives based on process and patient experiences will take effect in fiscal year 2013, with payments for discharges occurring on or after October 1, 2012.[7] Further, with passage of the HITECH Act in 2009, CMS was mandated to implement the electronic health record and define meaningful-use criteria with financial incentives and penalties.[8] Many other organizations such as the National Quality Forum and the Veterans Health Administration have also made patient safety and quality a priority.[9,10,11,12]

The clinical world thus presents a markedly different quality and safety environment compared to a decade ago—with attendant expectations for clinical improvement, performance measurement, and clinical competency.

The Changing Academic Environment

The AAMC and most of its member institutions are acting to implement elements of the QI/PS agenda. In 2001, the AAMC issued a Medical School Objectives report on quality improvement teaching,[13] and in 2003, it reported on patient safety and graduate medical education (GME).[14]

Integrating Quality

In 2008, the AAMC launched *'Integrating Quality'* (IQ), founded on the principle that clinical excellence, patient safety, and quality improvement education are essential—and essentially linked—to high-quality health care, and that these principles are best expressed in a seamless continuum of education.[15] Using the AAMC's considerable linkages and resources, including an annual national quality conference, the IQ initiative assists medical schools and teaching hospitals in building coordinated approaches to QI/PS across their organizations. In 2011, the IQ initiative's annual meeting expanded to incorporate meaningful participation from six other health care disciplines, and emphasized that quality of care is a team-based effort that benefits from the efforts of all relevant health disciplines.[16]

Best Practices for Better Care

In May 2011, to accelerate this work, the AAMC and UHC embarked on the Best Practices for Better Care national initiative with the goal of improving the quality and safety of patient care through a unique collaboration of medical education, clinical care, and research. Goals and commitments for Best Practices for Better Care include those shown in the sidebar. This report, Teaching for Quality, is part of that effort.

Other Educational Changes

The broader educational world has also changed. In 2003, the IOM established recommendations for quality and safety in the education of health professionals.[17] National educational and accreditation organizations such as the Accreditation Council for Graduate Medical Education (ACGME) and the specialty Residency Review Committees require quality and safety curricula within residency programs. Relatively new (2005) criteria for CME accreditation require demonstration of physician practice improvement or professional development as a result of the CME program.[18] Systematic reviews of QI/PS training in residency programs have been published;[19,20] quality and safety competencies with improvement of professional performance are now a clear training expectation.

Despite these changes, few educators have defined a quality and safety curriculum, developed instructional methods, or assessed learners and outcomes to meet these goals. For example, in a recent extensive review of more than 16,000 studies of quality improvement curricula for clinicians, only 39 met the dual inclusion criteria of a well-described curriculum and objective evaluation.[21] Further, only two employed outcomes derived from abstracted clinical data. Neither study included clinical data as a curricular element. This relative dearth of educational focus in this area points to a sizable need for the development of educational initiatives to enhance QI/PS—a sizable teaching gap in the training and education of health professional learners across the continuum—linking patient and health care outcomes to educational strategies and interventions.

Despite these limitations, many institutions have begun to embrace programs and curricula of quality and safety. Examples in the U.S. include several master's-level training programs[22,23,24] such as the VA Quality Scholars Program[25] and TeamSTEPPS,[26] and internationally, the WHO Curriculum for Medical Schools[27] and Australia's National Patient Safety Framework.[28]

This report attempts to set out recommendations and next steps to achieve the mission articulated above, namely, ensuring that every medical school and teaching hospital in the U.S. has a critical mass of faculty ready, able, and willing to engage in, role model, and lead education in QI/PS and in the reduction of excess health care costs.

Writing this Report

In late 2011, an AAMC steering committee, under the rubrics of the *Best Practices for Better Care* and Integrating Quality initiatives, selected individuals with expertise in QI/PS, medical education, and faculty development from U.S. and Canadian academic institutions. Convened in late 2011

BEST PRACTICES FOR BETTER CARE

From medical breakthroughs to the latest treatments, America's medical schools and teaching hospitals, and their physicians and scientists, have a legacy of advancing medicine and setting the standard for the best patient care. In response, the AAMC and the University HealthSystem Consortium have created *Best Practices for Better Care*, a multi-year initiative to improve the quality and safety of health care.

The initiative attempts to promote safer surgeries, reduce infections, and cut hospital readmissions. Through a national faculty development initiative, Best Practices for Better Care aims to pass on these best practices to every newly trained doctor to make sure quality and safety are part of medical education from day one. More than 100 medical schools and teaching hospitals and health systems have committed to:
- Teach quality and patient safety to the next generation of doctors
- Ensure safer surgery through use of surgical checklists
- Reduce infections from central lines using proven protocols
- Reduce hospital readmissions for high-risk patients
- Research, evaluate, and share new and improved practices

For more information: **https://www.aamc.org/initiatives/bestpractices/**

and early 2012, this group's discussion, consensus, and subsequent literature review helped shape the recommendations. An additional panel of more than 60 individuals representing other health professions, quality experts, and medical educators were invited to give feedback which contributed to this final report.

Framing Questions

The authors considered a number of questions as they crafted the report's recommendations and supporting arguments: the construct of the learner teacher, the nature of 'teaching' or education itself, the 'work' of the clinician, the content areas of QI/PS, and the place of this initiative in the medical school and teaching hospital.

Who is the learner? This report assumes that all of those involved in health care are learners, especially in relation to QI/PS. This includes the undergraduate medical student, resident, fellow, practicing physician, clinician faculty (its primary focus), and other health professionals including the nurse, pharmacist, dentist, and social worker, among others.

> Teaching is defined here as a broad concept—including curriculum design, competency assessment, experiential learning, and aspects of the 'hidden curriculum' such as role modeling.

What is meant by the term 'teaching'? Although sometimes defined narrowly, the report uses 'teaching' as a broad construct that includes curriculum design, competency assessment, experiential learning, and aspects of the 'hidden curriculum' such as role modeling.

What is the 'work' of the clinician? The report articulates the work of the competent health professional as not only delivering health care (e.g., diagnosing and treating patients individually), but also working to improve it. This current systems-based view of clinical care includes responsibility for identifying problems in care delivery and working with others to improve.

What are the content areas of QI/PS? Another question relates to the content of QI/PS—from both the teacher's and the learner's perspective. Here, in order to avoid creating confusion or developing another rubric for the categorization of QI/PS, the report employs the competencies of the Accreditation Council for Graduate Medical Education (ACGME), and the American Board of Medical Specialties (ABMS) augmented by two other models, the Institute for Health Improvement's eight knowledge domains,[29] and the Pediatrics Milestone Project[30] (See Appendix 1 and Section IV).

What are the linkages between QI/PS and clinical care, education, and scholarship? The report assumes that quality improvement must align scholarship, clinical care, and education with improvement as a foundational science integral for health care and health care education,[31] and that it is possible to do good teaching and role modeling of QI principles only in a well-functioning clinical setting.[32,33] Such a system would support and even lead educational and ongoing professional improvement activities. In this regard, clinical data, information technology (IT) systems, and other infrastructure issues are important to all health care systems and thus to the linkages between education, service, and research.

Language Conventions

Several customs have been adopted in the use of common terms in this report.

First, while it recognizes that QI/PS are 'team sports' in which many health professionals must

participate, the report's *major emphasis is on the training of physician learners across the continuum of medical education*. Wherever possible and appropriate, however, inclusive health professional language is used.

Second, most of the report focuses on the competencies of *clinically active* faculty, termed clinical faculty throughout the document for ease of reading. Despite the emphasis on clinicians, the report indicates that *all* faculty members should be aware of and able to reinforce the principles of QI/PS as appropriate in their teaching roles.

Third, the phrase 'quality improvement and patient safety' is used frequently throughout this document. For ease of reading, it is abbreviated to 'QI/PS.'

Scope, Vision, Goal, and Objectives

Scope

This report addresses the need to increase the capacity of the academic medical centers, teaching hospitals, and medical schools of the U.S. to meet the challenges of health care in the 21st century. These challenges are numerous and include health care redesign, accountable care, cost containment, and the quality of care gap.

In particular, it addresses this need by:

- **Encouraging and supporting faculty competency in QI/PS, with the aim that all clinical faculty be proficient in these domains within a decade.**

- **Promoting the development of a critical mass of expert faculty skilled in teaching, curriculum design, and assessment of QI/PS competencies, thus able to address the QI/PS development needs of other faculty, and to improve the preparation of undergraduate and graduate medical learners.**

In articulating its recommendations, the report bases its rationale on the six domains of health care quality developed by the IOM: safe, timely, efficient, effective, equitable, and patient centered care.[2]

The report focuses on QI/PS, emphasizing educational efforts aimed at assuring effective, patient-centered, timely, and equitable care while avoiding harm to patients. The IOM's emphasis on efficient care (reducing excess expenditures, avoiding waste, and improving the value of health care) is also essential to a comprehensive approach to reforming, rationalizing, and improving health care.

A VISION: QUALITY AND PATIENT SAFETY IN THE ACADEMIC MEDICAL CENTERS OF 2022

It is 2022. U.S. medical schools and teaching hospitals are successfully leading enormous changes in health care, aided by educational programs that embed quality improvement and patient safety across the continuum of physician development. This process depends on alignment of the clinical and educational missions, has been supported by rigorous evaluation and scholarship, and has been fueled by extensive faculty development efforts.

Vision

Report authors were guided by a broad vision of the future in which all medical schools and teaching hospitals embrace QI/PS principles, applying these in curricular assessment and other educational activities across the continuum of physician development, as described in the sidebar.

Achieving this vision by the date selected by the report writers, 2022, would be facilitated through the goal presented below.

Goal

To ensure that every medical school and teaching hospital in the U.S. has access to a critical mass of faculty ready, able, and willing to engage in, role model, and lead education in QI/PS and in the reduction of excess health care costs.

Objectives

In order to achieve the vision and goal articulated above, each institution will need faculty with a range of educational skills in QI/PS.

- All clinical faculty members will need to be **proficient** in the QI/PS competencies by practicing and role modeling QI/PS principles in the context of their everyday work.
- Some faculty will need to be expert educators in QI/PS, skilled in formal teaching of QI/PS principles, in creating and disseminating curricula, and in assessing physician development.
- A few faculty will need to achieve **master** level in the competencies, i.e., scholars in QI/PS whose accomplishments include scholarship, research, and discovery in QI/PS education in addition to their expert educator status.

The specific competencies required to achieve each level are more fully developed in Section IV.

Recommendations

To achieve the vision and goal articulated above, the report makes three core recommendations. Each of these may be viewed as aspirations—components of the vision of this report:

Recommendation 1: Learning and Assessment across the Continuum

In order to achieve QI/PS goals for education and practice, medical schools, teaching hospitals, accreditation bodies, examination organizations, and specialty bodies should ensure the integration of QI/PS concepts into meaningful (i.e., experiential, clinically relevant, and evaluated) learning experiences across the continuum of physician professional development and the summative evaluations used for professional certification and licensure.

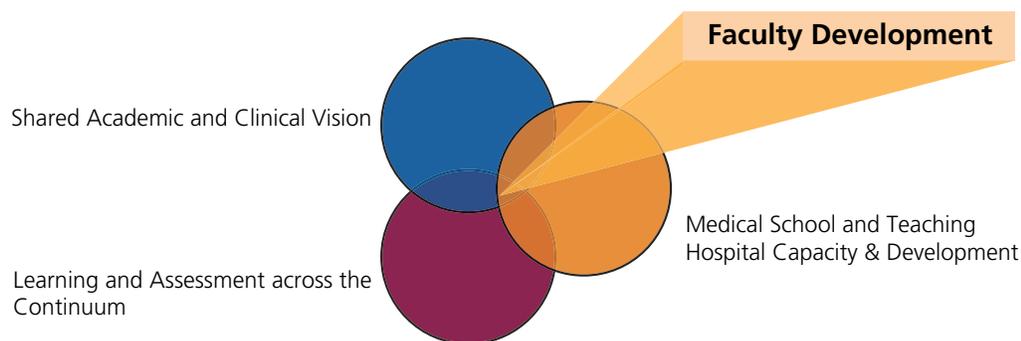## Recommendation 2: Medical School and Teaching Hospital Capacity and Development

In order to improve the processes and outcomes of care, medical schools and teaching hospitals should expect all clinical faculty to be proficient in QI/PS competencies and identify, develop, and support a critical mass of faculty as expert educators to create, implement, and evaluate training and education in QI/PS for students, residents, and colleagues.

Recommendation 3: Shared Academic and Clinical Vision

Academic and clinical leadership should share a common commitment to QI/PS and demonstrate a concrete alignment of the academic and clinical enterprises in a manner that produces excellent health care outcomes valued by health care professionals and the public.

These three constructs are portrayed in Figure 1, "Core Recommendations," in which their intersection highlights the role of faculty development. For ease of reading, each major recommendation is repeated in a sidebar below, followed by subrecommendations.

Figure 1. Core Recommendations

Faculty Development

Shared Academic and Clinical Vision

Medical School and Teaching Hospital Capacity & Development

Learning and Assessment across the Continuum

Core Recommendation 1: Learning and Assessment Across the Continuum

Subrecommendations

1.1 It is essential that education and clinical leaders integrate QI/PS concepts and competencies into meaningful educational experiences across the continuum of physician professional development.

RECOMMENDATION 1.0

In order to achieve QI/PS goals for education and practice, medical schools, teaching hospitals, accreditation bodies, examination organizations, and specialty bodies should ensure the integration of QI/PS concepts into meaningful (i.e., experiential, clinically relevant, and evaluated) learning experiences across the continuum of physician professional development and the summative evaluations used for professional certification and licensure.

The six aims of quality in health care (safe, timely, efficient, effective, equitable, and patient centered)[2] present core concepts to be incorporated by all physicians across the continuum of learning, from the beginning of undergraduate training to the final phase of a career in medicine. For this to occur, QI/PS must be seen as a key component of the scientific foundations of medicine. Learners will optimally encounter the language of quality improvement early in training and subsequently acquire the appropriate behaviors, values, and norms that promote a culture of quality and safety.

To achieve this state, focusing on formal curricula is necessary, but not sufficient. While core concepts and skills can be introduced in the classroom and practiced in a simulation center, the application and feedback needed for competency development must occur in *meaningful experiences in clinical settings that model QI/PS as part of routine care for all patients*.[33] Required and evaluated learning experiences in such settings supports the development of a professional identity that embeds QI/PS as an intrinsic part of the physician role.

1.2 As they create learning experiences and assess QI/PS competencies, medical education leaders should partner with other health professions.

Quality improvement and patient safety are fundamentally interprofessional team endeavors. While physicians serve an important role, they alone cannot improve the quality and safety of the care being delivered to patients. They must collaborate with nurses, pharmacists, and other health professionals who are essential to that care. Parallel efforts are underway in other fields to improve the teaching of QI/PS, such as the Quality and Safety Education in Nursing (QSEN) initiative.[34,35]

The Interprofessional Education Collaborative has established the core competencies for interprofessional work that contributes to the improvement of health care quality and patient safety.[36] These competencies and the process by which they were developed create an opportunity to align movements within and across the health professions, and facilitate a common vision for professional development across the educational continuum.

1.3 State, regional, and national accrediting, licensing, and (re)certifying bodies need to align their requirements for QI/PS across the continuum of physician professional development from undergraduate to continuing medical education (CME).

The current state of medical education lacks coordination and cohesion across the continuum of learning. This is particularly evident in QI/PS.

In this domain, requirements are articulated by the ACGME core competency framework for postgraduate training in its practice-based learning and improvement and systems-based practice competencies,[37,38] but not by the LCME for medical school training.[39] Perhaps, not surprisingly, the majority of published quality improvement curricula in medicine primarily target postgraduate trainees. Aligning the language and intention of LCME and ACGME with respect to QI/PS has several distinct advantages. First, there will be greater integration of QI/PS into the early stages of training. Second, medical students will graduate with a basic vocabulary in QI/PS and, perhaps more importantly, with a set of values and beliefs that will facilitate their ongoing professional development at the postgraduate level. Third, the ACGME's Milestone Project aims to establish a learner-centered, outcomes-oriented approach to foster and measure the learning of residents across the six core competencies—a process which might inform assessment at the undergraduate level.

Further, the Accreditation Council for CME and the specialty certifying boards have also moved significantly in the direction of support for QI/PS.[40] For practicing physicians, future efforts should build on recently established connections between CME and specialty recertification requirements in quality improvement, such as the ABMS initiatives in Part IV, Maintenance of Certification,[41] and current initiatives in maintenance of licensure undertaken by the Federation of State Medical Boards.[42]

1.4 The application of QI/PS competency assessment measures across the continuum of physician professional development is necessary for the purposes of formative and summative feedback.

Like other competencies, successful performance in QI/PS requires the mastery of specific knowledge, skills, and attitudes. Learners must know how to evaluate, synthesize, and incorporate the data, reports, and anecdotes that form the substrate upon which improvement activities occur. Learners must then understand the context in which the medical care is delivered, analyze processes to identify sensitive levers for change, work with appropriate partners to implement change, and assess if their strategies have been successful. Ultimately, they will need to be able to communicate the results of their work to broaden the impact and increase institutional learning.

Assessment tools are necessary to identify key elements of QI/PS performance and to provide accurate global assessments. These assessments are important for formative feedback (to improve performance) and summative feedback (to judge success) to both individual learners and to educational programs. Section IV outlines these tools in greater detail.

1.5 In order to assess progress toward the achievement of QI/PS competencies, national examination bodies should incorporate QI/PS elements into summative evaluations and provide feedback to both individual learners and educational programs.

QI/PS content will compete for the attention of medical students and residents with other content deemed essential for the learners and currently tested in national board and specialty certifying examinations. Unless questions related to QI/PS appear on the examinations, learners will prioritize other areas as more important and more worthy of their time and attention.

The IOM's inclusion of QI/PS as part of the behavioral and social science domains critical to medical education[2] is encouraging, as are recent changes to the MCAT[43] and items related to QI/PS in USMLE exams.[44] However, the format of current USMLE result summary reports limit the impact of these

changes in that schools of medicine receive no or limited information regarding their students' performance in QI/PS.

Organizations such as the AAMC can aid in this process by augmenting current surveys (e.g., the AAMC's survey of graduating medical students) to address learner comfort and self-perceived competence, faculty proficiency, and experience in the QI/PS sphere.[45] An annual survey of medical school graduates would allow for comparisons among schools and would assess progress at a national level. To provide comparative information, other health professional organizations are encouraged to replicate key questions relative to QI/PS.

Further, the ACGME could build on this effort by refining its survey of residents to elicit information about QI/PS education and the achievement of QI/PS competency. Current questions lack specificity regarding particular competencies.[46] Finally, using the Best Practices for Better Care framework, the AAMC already assesses faculty self-perceived competency as both providers and teachers of QI/PS—a process which requires external validation and is outlined in Section V. These efforts will inform plans for the resources needed to develop a cadre of QI/PS educators.

Core Recommendation 2: Medical School and Teaching Hospital Capacity and Development

Subrecommendations
2.1 Given the size and scope of the need to train faculty in QI/PS, the collaboration of national organizations with an interest in this area is essential to the successful achievement of the vision and goal articulated in this report.

This report underscores the need to build capacity for education in QI/PS throughout U.S. medical schools and teaching hospitals and proposes a vision that includes an extensive faculty development effort. The report writers identified several guiding principles for building such an initiative, more fully elaborated on in Section IV:

o Teaching QI/PS will be most successful in settings in which health professionals actually practice its principles.

o Faculty development should equip individuals with the ability to identify educational gaps in QI/PS at their home institutions and to catalyze change.

o Faculty development initiatives represent an opportunity to bring together clinical care, education, and research.

o Determining and documenting desired educational competencies and outcomes (e.g., changes in participants' behavior) are essential to establishing faculty development programs and evaluating their success.

o A single, one-size-fits-all programmatic model for faculty development will be insufficient to meet all goals.

o Faculty development programs should support individual change leaders and intraprofessional or interprofessional teams.

o Faculty development programs should themselves be role models of quality improvement principles.

o Communities of QI/PS expert educators will be important in sustaining the progress of faculty development participants. In particular, regional and small academic medical centers may

benefit from a consortium of expert educators able to help develop and sustain local faculty development initiatives.

2.2 In accordance with the importance of improving health care quality and patient safety, faculty should be recognized for their clinical, educational, and scholarly contributions in QI/PS in concert with other institutional policies and guidelines regarding promotion and tenure.

Despite a growing recognition of the importance of improving health care quality and patient safety, many academic institutions continue to favor traditional forms of scholarship over that related to QI/PS. For these domains to become integrated into education, practice, and research, they need to be valued academically.

Developing the scholarly basis for QI/PS is essential and will require faculty who will focus on QI/PS as a scholarly area of concentration. QI/PS fits well into Boyer's conception of scholarship which includes the study of application and integration.[47] QI/PS draws from the fields of economics, engineering, communications, sociology, public health, epidemiology, information science, and marketing to create a unique area of expertise in QI/PS critical to training and practice.

Policy changes within academic institutions to encourage faculty to pursue scholarship in QI/PS are needed. Suggestions include creating academic career pathways in QI/PS that are supported by mechanisms for academic promotion on the basis of QI/PS work,[48] and re-organizing academic practice plans to provide salary support for scholarly work in QI/PS in academic departments.

RECOMMENDATION 3

Academic and clinical leadership should share a common commitment to quality improvement and patient safety, and demonstrate a concrete alignment of the academic and clinical enterprises in a manner that produces excellent health care outcomes valued by health care professionals and the public.

These incentives may not provide sufficient motivation for every faculty member to integrate quality improvement into day-to-day work. For these individuals, academic departments could insist that they demonstrate appropriate proficiency and participate in institutional quality improvement efforts. This recommendation aligns with existing requirements for practice performance assessments as part of board specialty maintenance of certification.

Core Recommendation 3: Shared Academic and Clinical Vision

Subrecommendations
3.1 To achieve sustained improvements in care, it is critical to align and coordinate the efforts of senior clinical and educational leaders.

Medical schools and teaching hospitals—standing on the pillars of clinical care, research, and education—must strive to integrate quality improvement across these enterprises and align their efforts. From the educational standpoint, it is arguably true (and presents an opportunity for study) that physicians who train in clinical environments that deliver sub-optimal care tend to emulate these practices and are at higher risk of providing lower quality care.[49] From the clinical care standpoint, learners offer a unique, on-the-ground perspective to QI/PS problems that can augment improvement initiatives and promote their success.

The need for alignment of the academic and clinical missions is sizable and will be supported by academic and clinical leaders coming together with QI/PS as core values in both enterprises. Academic leaders can lead policy changes that legitimize QI/PS in academic departments and scholarship to advance the field. In turn, clinical leaders have the power to create clinical environments where QI/PS is woven into the fabric of day-to-day work, providing the necessary context to support teaching and learning about high-quality care. However, even greater strength rests with a unified leadership voice, synergizing academic and clinical resources for the benefit of patients, communities, and the nation.

3.2 By ensuring the necessary infrastructure and resources, clinical and academic leaders can create a future in which QI/PS support the clinical, educational, and research missions of medical schools and teaching hospitals.

Learning about quality improvement must be experiential and situated within the clinical context. This is similar to other areas of clinical medicine where experiences in clinical settings are core to the education of future health professionals.

Features of a supportive environment for QI/PS include (but are not limited to):
- o Robust data systems that are accessible to learners and faculty.
- o Review of errors, complaints, and problems in care that is transparent and open.
- o Faculty who are engaged in scholarship and education in QI/PS.
- o Financial, human, information technology, and other resources available to QI/PS work.
- o An organizational culture of learning and responsibility.

Ideally, an important resource—faculty time, competence, and the resulting opportunities to share improvements to spread learning—needs to be acknowledged and supported by faculty leadership. In addition, given the rapid expansion of medical education sites, regional medical campuses, and other community-based training venues, it is important to identify and support the QI/PS development of community-based faculty.

3.3 In order to develop and assess the effect of appropriate educational interventions, it is necessary for educators to have access to clinical data moderated by HIPAA concerns and other confidentiality protections.

Analysis of clinical outcomes and actions based on those results should be an integral part of clinical practice and therefore should include all learners.

Hospitals invest heavily in information systems, driven in part by CMS requirements for meaningful use of the electronic medical record.[50] Although there is an implied importance of quality improvement in the designation of clinical quality measures as part of meaningful use, there is also a separation of the clinical information system from the educational activities that occur in the medical school. Further, restrictions due to HIPAA concerns and billing issues have limited student access to medical records in many teaching hospitals,[51,52] inhibiting the learning process and reducing the opportunities for students to have a positive role in quality improvement.

In order to train learners to treat both the patient and the system, trainees and educators require access to data that measure patient outcomes and system performance. Unfortunately, such data

are infrequently readily available or may not exist in a form easily lending itself to QI/PS work. For example, it would be helpful for students and residents learning about venous thrombosis embolism (VTE) prevention to have access to system-wide and department-specific VTE rates to compare to national and other benchmarks.

Thus, medical schools, teaching hospitals, and regulators should work together to find ways to make data available for QI/PS activities while ensuring compliance with privacy and other regulatory requirements. Similarly, medical school and teaching hospital leaders should identify regulations that limit or restrict student access to medical records and reviews of clinical performance.[52] Further, medical school faculty require ready access to de-identified data concerning quality of patient care in order to promote true experiential learning and help trainees acquire necessary improvement skills. Finally, clinical leaders should have access to educational outcomes data at levels which inform QI/PS programs.

3.4 To augment current efforts to recognize clinical achievements in QI/PS, national bodies should establish criteria by which individuals and institutions can be recognized for QI/PS efforts in education and research.

Current ACGME oversight of institutional training sites includes a review of the institutional educational environment of care.[53] This process recognizes the critical role played by the clinical setting in nurturing and sustaining learners' interests, commitment, and experiences in QI/PS. Such a setting requires the presence of policies, procedures, practicing health professionals, mentors, and a culture supportive of inquiry into the causes of poor care outcomes, errors, and patient harm.

National bodies can nurture clinical and academic cultures supportive of QI/PS by describing what constitutes a supportive, improvement-focused learning environment, and recognize best performing institutions through awards and recognition.

Faculty Development in Quality and Safety: A Platform for Learning, Teaching, and Change

This section articulates the idea that any successful implementation strategy depends on the creation of a faculty development framework—including goals, content, and process—necessary to assure implementation.

ACGME Competencies[37]

a. Patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health
b. Medical knowledge about established and evolving biomedical, clinical, and cognate (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge to patient care
c. Practice-based Learning and Improvement that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care
d. Interpersonal and communication skills that result in effective information exchange and teaming with patients, their families, and other health professionals
e. Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population
f. Systems-based Practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care, and the ability to effectively call on system resources to provide care that is of optimal value

To help achieve implementation of the recommendations in this report, this section:
o Outlines core competencies in QI/PS to serve as basic curricular and assessment building blocks.
o Describes the progress of learners across a continuum from novice to master in acquiring and demonstrating these competencies.
o Describes core attributes of faculty members, developing a framework for discussion of educational competencies.
o Provides a set of guiding principles for national initiatives to achieve the vision and goal stated in this report.

Core Competencies in QI/PS

The writing group articulated the need to identify the competencies required for proficiency, expertise, and mastery in teaching and actively participating in QI/PS activities. While other competency frameworks exist, such as those of the Canadian Patient Safety Institute,[54] several primary sources were used in this process, including the AAMC MSOP report,[13] the ACGME competencies in Practice-based Learning and Improvement (PBLI) and Systems-based Practice (SBP),[38] and the Institute for Healthcare Improvement (IHI) Knowledge Domains for the Improvement of Health Care.[29]

ACGME/ABMS Competencies
The ACGME/ABMS competencies have been widely adopted in training programs and serve as a useful model on which to frame core content in QI/PS. See sidebar.

While designed for residency assessment, the ACGME competencies have been applied successfully at other levels of medical education.[55] Programs must define the specific knowledge, skills, and attitudes required and provide educational experiences as needed.

While all these competencies are required to achieve improvement in quality and patient safety in health care, those possibly most relevant to QI/PS are practice-based learning and improvement and systems-based practice. Detailed ACGME/ABMS descriptions of these competencies at the level of the graduating resident are described below:

Practice-based Learning and Improvement[56]
Demonstrate the ability to investigate and evaluate the care of patients, appraise and assimilate

scientific evidence, and continuously improve patient care based on constant self-evaluation and life-long learning.

Develop skills and habits to be able to meet the following goals:
1. Identify strengths, deficiencies, and limits in one's knowledge and expertise.
2. Set learning and improvement goals.
3. Identify and perform appropriate learning activities.
4. Systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement.
5. Incorporate formative evaluation feedback into daily practice.
6. Locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems.
7. Use information technology to optimize learning.
8. Participate in the education of patients, families, students, residents, and other health professionals.

IHI Knowledge Domains in QI/PS

1. Health care as process, system
2. Variation and measurement
3. Customer/beneficiary knowledge
4. Leading, following, and making changes in health care
5. Collaboration
6. Social context & accountability
7. Developing new, locally useful knowledge
8. Professional subject matter

Systems-based Practice[57]
Demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.

Achieve the following goals:
1. Work effectively in various health care delivery settings and systems relevant to their clinical specialty.
2. Coordinate patient care within the health care system relevant to their clinical specialty.
3. Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care as appropriate.
4. Advocate for quality patient care and optimal patient care systems.
5. Work in interprofessional teams to enhance patient safety and improve patient care quality.
6. Participate in identifying system errors and implementing potential systems solutions.

Additional Competencies: IHI Knowledge Domains, the Pediatrics Milestone Project, and Interprofessional Education Collaborative Core Competencies for Interprofessional Practice. Developed in 1998 by the IHI, the Knowledge Domains[29] are widely regarded as seminal to the work of QI/PS and augment an understanding of the competencies and learning objectives of QI/PS training. They may further guide curriculum planners and educators less familiar with these constructs. See sidebar and Appendix I.

The Pediatrics Milestone Working Group defined two additional competencies that are required for QI/PS that were not explicitly described in the ACGME framework:[30] role modeling and knowing one's limits to enable engagement in help-seeking behaviors. Finally, a number of the competencies in QI/PS are consistent with the Interprofessional Education Collaborative (IPEC), "Core Competencies for Interprofessional Practice."[36]

The Novice-to-Master Journey in QI/PS

The progression from early training to mastery follows Dreyfus' framework of novice, advanced beginner, competent, proficient, expert, and master. For each competency, this section outlines a developmental progression based on the precepts outlined by Armstrong, et al.,[58,59] using the Dreyfus framework.[60] The behaviors that describe performance at the level of "proficient," "expert," and "master" have been adapted from the publication of the Pediatrics Milestone Project.[61]

> Since quality improvement is core to what it means to be a physician, all clinical faculty will need to be *proficient* in patient safety and the improvement of health care.

In an ideal, steady state, beginning medical students would be at the "novice" stage, graduating medical students at the "advanced beginner" stage, graduating residents at the "competent" stage, and all faculty members at the "proficient" level. Further, reflecting the primary goal of this report, faculty who are leading education in QI/PS would be deemed "experts." Finally, a smaller number of clinical and educational leaders or researchers would be "masters" in this area. See Table 1.

Assessing Competence: Tools and Methods

Formative and summative assessment of progress through the steps of novice to master in QI/PS requires the development of a variety of tools and methods using multiple sources of evidence, such as:
- Tests of knowledge.
- Direct observations of individual and team-based behaviors and performance-based faculty feedback.
- Multi-user or 360 degree evaluations by peers, faculty, other health professionals, and patients.
- Collections of QI/PS work for faculty and peer review in the form of a QI/PS portfolio.
- Performance-based faculty feedback.
- Tests of self-reflection and independent goal development.

Creating the 'Critical Mass': Proficient, Expert, and Master Level Faculty in QI/PS

Focusing on faculty members and their desired skill sets allows the following more granular description of the report's vision of the future. Schools of medicine and teaching hospitals would, in this vision of 2022, have all or almost all of their clinical faculty at the proficient level, a critical mass of faculty at expert level, and at least some faculty members recognized as masters of QI/PS. Brief descriptions of each of these levels of competence are found below and in the sidebar. Appendix 2

Table 1: QI/PS stages of development from novice to master in medical education

Novice	Advanced Beginner	Competent	Proficient	Expert	Master
Beginning medical student	Graduating medical student	Graduating resident	Faculty	Education leaders in QI/PS	QI/PS scholars

outlines competencies in QI/PS at the levels of proficiency, expert educator, and mastery levels; these are formulated as a draft for comment.

Faculty proficient in QI/PS competencies: Because quality improvement is core to what it means to be a physician, all clinical faculty will need to be proficient in patient safety and the improvement of health care. The faculty members who teach and supervise students, residents, other health professions students, and practitioners need to have levels of competence in these domains superior to that of trainees graduating from an ACGME-accredited residency program. The proficient faculty member role models, teaches, and demonstrates QI/PS in the context of his or her everyday work. This sidebar provides examples of behavioral competencies and the day-to-day activities of the proficient clinical faculty member.

Faculty expert in QI/PS competencies: In order to develop robust programs for teaching and learning QI/PS, each medical school and teaching hospital must also have—or have ready access to—a group of faculty who are experts in teaching quality and safety. In addition to achieving proficiency, these faculty are educators in QI/PS, engaged in formal teaching, creating and implementing curricula, and assessing physician development.

Faculty masters in QI/PS competencies: Representing the highest level of achievement, master faculty members are scholars in QI/PS. They add to the achievements of expert faculty through research and discovery in QI/PS, especially in QI/PS education.

An example of the progression from proficient to expert and master level in one of the domains is provided in Table 2, below. A more complete table proposing milestones in all domains—including those referencing explicit QI/PS examples—is included in Appendix 2.

Examples of active behavioral competencies of the proficient clinician faculty member:

- Practices evidence-based medicine, using frameworks that are critical to quality improvement
- Analyzes his or her practice in order to make improvements
- Incorporates feedback into practice
- Uses information technology to improve practice and reduce errors
- Works effectively in an interprofessional team
- Adapts to a variety of systems and settings
- Understands and attempts to improve systems
- Incorporates considerations of cost awareness and risk-benefit analysis in patient and/or population-based care
- Knows his/her limitations

Table 2: Examples of observable behaviors among faculty members in practice-based learning and improvement applied to QI/PS levels of proficient, expert, and master.

Competent	Proficient	Expert	Master
PBLI: Systematically analyze practice using quality improvement methods and demonstrate improvements in practice	• Reflects on and actively considers the health status of both individual patients and populations to gain insight into improvement opportunities • Applies improvement methodologies • Uses that analysis in an iterative process for improvement to populations working in teams where appropriate • Relies on external prompts to inform and prioritize improvement opportunities at the population level	• Shares the analysis of practice data with learners and team members on a continuous basis, without reliance on external forces to prioritize improvement efforts • Teaches and role models leadership of improvement teams and education about improvement • Creates curricula in QI methods • Provides experiential learning to others through improvement work	• Thinks, acts, and leads systemically to benefit one's own and other practices, systems, or populations • Publishes (in report or journal fashion) results of improvement efforts in practice, education, or both

A National Faculty Development initiative in QI/PS

While the authors applaud the innovations of numerous academic medical centers, specialty organizations, and others for educating clinicians in QI/PS, *improving individual faculty capacity in QI/PS teaching (including role modeling, assessing, creating educational experiences) is the primary goal of the national faculty development initiative proposed herein*. This is critical to the report's vision of QI/PS being embedded into curricula across the continuum of physician development. Each medical school and teaching hospital will need to identify, or, in the case of smaller regional academic medical centers, have access to a critical mass of *expert* faculty able to create and lead education in QI/PS. Faculty development should equip faculty already proficient in QI/PS with the ability to diagnose gaps and catalyze change in QI/PS education. Collectively, a national community of "QI expert educators" will be important in sustaining the progress of faculty development participants. See sidebar and recommendation 2.1

Guiding Principles for a Faculty Development Initiative
Given the developmental nature of an expert-level training program, and the existence of many proficiency-level programs nationally, the report recommends the following guiding principles in the creation of expert faculty:

Guiding Principles for a National Faculty Development Initiative

o Clear focus on training expert QI/PS educators
o Strong organizational commitment
o Collaboration across national and local programs
o Creating a community of practice for expert QI/PS educators
o Interprofessional participation where possible
o Pluralistic formats that include experiential learning opportunities
o Educational activities themselves based on QI principles, evaluation, and research

1. *Focus on training expert QI/PS educators:* An effective faculty development initiative should maximize the ability of faculty to develop, implement, and sustain QI/PS curricula at local institutions. Successful participants—those who create and sustain meaningful QI/PS learning—will be prepared to move their faculty colleagues to a "proficient" level of competency in QI/PS. Additionally, they will help other learners, broadly defined across the educational continuum and across professions, attain the next level of competency.

2. *Strong organizational commitment:* Since the goal requires change in medical schools and teaching hospitals, it is important that those organizations explicitly support faculty participation in the faculty development initiative.

3. *Collaboration across national and local programs:* The report writing group supported the concept of a national faculty development initiative—virtually a campaign—implemented to the extent possible with other educational and continuing professional development programs and developed by national bodies, academic institutions, and others where appropriate. Elements in this collaborative framework include:
    o Determining and disseminating information about those programs geared to the creation of proficient clinical faculty.
    o Collaborating with established programs geared to the development of expert or master faculty.

4. *Creating a community of practice for expert QI/PS educators:* Other faculty development initiatives have demonstrated the strength of an ongoing national community to support and sustain participants' work at their home institutions.[62,63] Sharing local experiences on a national or regional level (e.g., through a shared Web site and follow-up conference calls) supports continuous improvement and dissemination of best practices.

5. *Interprofessional participation where possible:* The overall vision developed here targets clinical faculty able to lead education in QI/PS, and would be open to any qualified participant (i.e., an individual already proficient in QI/PS), individuals or teams, to accommodate the diverse needs of faculty members and institutions. Given that interprofessional practice is at the core of QI/PS in health care, a successful faculty development initiative will encourage the participation of small interprofessional teams, ideally with representation from the educational, clinical quality, and QI metrics/research areas from each participating institution.

> **Core curricular elements in a national program to develop expert faculty educators in QI/PS**
> Educational applications of QI/PS competencies
>
> Educational principles of curriculum design, effective methodologies, and leaner assessment
> Interprofessional learning
> Educational leadership and change management

6. *Pluralistic formats that include experiential learning opportunities:* A single, one-size-fits-all venue or model for faculty development will be insufficient to meet the goal set forth in this report. Given the plethora of possible formats, considerations for a national faculty development initiative must provide for a variety of programmatic options for faculty members. These include, but are not limited to:
    o A "train-the-trainer" model,[64] providing participants with the tools and curricula to develop faculty at their local sites. An analogy for this approach lies in the Pediatric Advanced Life Support Program® that has both a "provider" and an "instructor" course.[65]
    o Modularized programs, delivered as a series at regional meetings or in 2-3 day workshops.
    o Blended learning, combining classroom or online learning with essential experiential activities.
    o Learning collaboratives centered on one (or several) central QI issue(s) that support the work of Best Practices for Better Care.[66]

Whatever approach is chosen, experiential learning for both the faculty development participants and the learners they teach in medical schools and teaching hospitals will be essential, aligned with the health system's improvement efforts.

7. *Educational activities themselves based on QI principles, evaluation, and research:* Modeling what would be expected of faculty leaders in QI/PS education, faculty development leaders will continuously improve the initiative in a way that is clearly evident to participants. Similarly, faculty development activities will themselves reflect the learning principles that participants are expected to adopt and use in their own programs, such as using continuous program feedback to improve content, format, and methods.

Core content of an Expert-level Program:

The writing group described several core curricular elements of importance to the development of a faculty "expert" in QI/PS. These are detailed below and summarized in the sidebar:
*   *Educational applications of QI/PS competencies:* Participants in programs designed to create expert faculty in QI/PS should already be proficient in QI/PS and ready to apply improvement methods to education programs. This creates a platform for knowledge exchange, role modeling, and continuous improvement of education programs.
*   *Educational principles:* understanding and applying the following principles to QI/PS topics:
    o curriculum design, needs assessment, adult learning theory
    o effective educational methodologies
    o effective, leaner assessment

- Interprofessional learning, teamwork, and collaborative practice.
- Educational leadership and change management: understanding and expressing the educational principles in leading and developing teams, messaging, leadership, negotiation skills, and change agent skills.
- Electives tailored for individual, program, or site-specific topics: for example, working in primary care vs. tertiary care settings, developing care teams across professions, costs and other economic measures, informatics, educational evaluation, and scholarship, among other topics.
- Advanced training: additional programs to help faculty who wish to focus their scholarly work on QI/PS education at the "master" level of competence.

Improvement, Program Assessment, and Scholarship

Determining and documenting desired educational competencies and outcomes (e.g., changes in participants' behavior and institutional outcomes) are essential to establishing faculty development programs and evaluating their success. This concept is explored in greater detail in Section V, below.

Closing the Gap: Implementation, Evaluation, and Next Steps

Reports and developments in American medicine over the last decade have called—and paved the way for—QI/PS imperatives to be embedded in clinical practice, education, and scholarship. This movement has been hampered by a lack of faculty in medical schools and teaching hospitals prepared to fully engage as educators in QI/PS across the professional development continuum—a phenomenon referred to as the 'teaching gap' earlier in this report.

This report attempts to address that need—and thus to help close a more important gap in QI/PS in clinical care—by portraying a vision in which medical schools and teaching hospitals:

o Along with accreditation bodies, examination organizations, and specialty bodies, ensure the integration of QI/PS concepts into meaningful learning experiences across the continuum of physician professional development and the summative evaluations used for professional certification and licensure.

o Expect all clinical faculty to be proficient in QI/PS competencies and identify, develop, and support a critical mass of expert faculty to create, implement, and assess education in QI/PS for students, residents, and colleagues.

o Are led by groups and individuals who share a common commitment to quality improvement and demonstrate a concrete alignment of the academic and clinical enterprises in a manner that produces excellent health outcomes valued by health care professionals and the public.

While broad, the guiding principles for the content, process, and format of a national faculty development campaign to achieve this vision are proposed here and require two further elements: an implementation strategy and a framework for its evaluation.

Implementation Strategy

A robust implementation strategy for the faculty development envisioned in this report will require the following elements:
   o Collaboration among national and local organizations invested in improving QI/PS training, education, and development.
   o Building on current platforms for change, such as Best Practices for Better Care and the AAMC's Integrating Quality (IQ) initiative, the ACGME's Clinical Learning Environment Review intiative,[33] and IHI's Open School, among many others.
   o Identifying expert and master faculty from the nation's medical schools and teaching hospitals able to develop curricular elements.
   o Identifying and promoting programs, courses, and other learning opportunities for all faculty to achieve a level of proficiency.
   o Developing a network of collaborating programs and initiatives in order to train a cadre of expert faculty in each medical school and teaching hospital setting.
   o With other national and local collaborators, establishing a framework and process to assess the impact of the initiative (explored below).

An Evaluation Framework

The impact of this initiative and others like it may be reflected in multiple domains. These are outlined below with the expectation that identifying and tracking at least some of these measures by medical schools, teaching hospitals, and national organizations will demonstrate the impact of educational and faculty development efforts on a national basis and provide the basis for improvements.

Table 3: An evaluative framework for a national initiative
[Based on Kirkpatrick[67]]

Target	Individual outcomes			Institutional outcomes				
	Perception	Competance	Performance	Participation	HC and professional process and outcomes	Programmatic changes	Institutional outcomes	Health care quality outcomes
Learners (students, residents, others)								
Participants in faculty development activities								
Faculty development trainers								
Academic institutions								

Using this framework permits several observations at the level of individual outcomes. For example, it will be necessary to determine the perception of participating faculty members and others about the effect of training programs on their clinical and educational work or scholarship. In addition, the competence of students and residents and the performance of clinician faculty may serve to assess the impact of expert-level training programs and participation. Standardized measures of learner satisfaction, learner competence, and changes in learner behavior are needed for both the AAMC faculty development initiative and the institution-specific courses.

The framework also permits observations at the institutional level. Here, faculty and learner participation may be tracked, along with programmatic changes (e.g., the creation of new experiential electives and other curricular and assessment innovations) and institutional outcomes, such as ACGME's New Accreditation System Clinical Learning Environment Review, or accreditation findings. Similarly, teaching institutions can identify the number of faculty from each institution who participate in the AAMC faculty development program, and the number of institution-based faculty development programs taught as a result of participation and training. More difficult to link directly to faculty development and other educational interventions—but not impossible—will be measures of health care performance and outcomes.

Many additional measures will be needed to capture the full impact of a faculty development initiative, including measures of individual competence, a more complete assessment of clinical and other learning sites, and assessment of institutional culture. Much of this work is already in progress.

Closing the Care Gap by Closing the Teaching Gap

It is clear that sizable shifts in clinical care, driven by health care reform, cost issues, accountability expectations, and regulatory changes have produced changes in the landscape of American medicine that are readily apparent in the clinical environment and—increasingly, though still slowly—in the academic setting. Thus, the education of students and trainees, and that of their practicing colleagues, lags behind those clinical changes needed to generate lasting improvement in the delivery of quality-driven, safe care. This report references and attempts to address a large teaching gap in which many clinical faculty lack the basic skills and competencies of QI/PS, an important link in the chain of events leading to the closing of the clinical care gap.

If successful, the initiative described here—in concert with the other recommendations in this report—will fuel the successful navigation of medical schools and teaching hospitals and health care practice into the next decade, providing a national platform for faculty development.

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APPENDICES

APPENDIX 1: IHI Knowledge Domains[29]

Knowledge domains for health professional students seeking competency in the continual improvement and innovation of health care:

1. Health care as process, system: The interdependent people (patients, families, eligible populations, caregivers), procedures, activities, and technologies of health caregiving that come together to meet the need(s) of individuals and communities. *(This includes knowledge of powerful design concepts for health care systems such as an appreciation of the value of standardization in reducing errors, and of parallel processing, and externalizing steps in reducing delays.)*

2. Variation and measurement: The use of measurement to understand the variation across and within systems to improve the design and redesign of health care. *(This includes the use of graphical methods and control charts in patient care, and general competency in the use and display of measurements over time, such as the ability to construct and use run charts for a balanced set of measures of performance of a key process, such as patient registration or ongoing management of a diabetic patient.)*

3. Customer/Beneficiary knowledge: Identification of the person, persons, or groups of persons for whom health care is provided or may be provided in the future, an understanding of their needs and preferences, and of the relationship of health care to those needs and preferences. *(This includes forms of patient involvement in care such as self-care, shared decision-making, and "patient-centered care." For example, the ability and willingness to "walk through" a care process in the patient role, or to conduct and learn from a focus group meeting with patients and families).*

4. Leading, following, and making changes in health care: The methods and skills for designing and testing change in complex organizational caregiving arrangements, including the general and strategic management of people and the health care work they do in organizations. *(Such activities include a general understanding of health care financing, information technology, the roles that individuals of different professional preparation play in daily health caregiving, and the development of a supportive internal organizational climate for working, learning, and caring. For example, what is needed to create an environment that welcomes change for the improvement of the quality and value of the work done?)*

5. Collaboration: The knowledge, methods, and skills needed to work effectively in groups, to understand and value the perspectives and responsibilities of others, and the capacity to foster the same in others including an understanding of the implications of such work. *(For example, an understanding of and ability to use the core ideas of principle-centered negotiation in the design of a new clinical care service).*

6. Social context and accountability: An understanding of the social contexts (local, regional, national, global) of health caregiving and the way that expectations arising from them are made explicit. This specifically includes an understanding of the financial impact and costs of health care,

such as the capacity to understand and predict the implications of a specific change on the total cost of care and on the cost and profit profile of a specific health care organization.

7. Developing new locally useful knowledge: The recognition of the need for new knowledge in personal daily health professional practice, and the skill to develop new knowledge through empiric testing. *(For example, the ability to organize and lead a prompt informative trial [PDSA cycles] of a new system for managing asthmatic patients).*

8. Professional subject matter: The health professional knowledge appropriate for a specific discipline and the ability to apply and connect it to all of the above. *(For example, familiarity with the classic authors in the field of health services research, quality assurance, studies of variation in clinical practice, and the relation of those studies to the clinical knowledge related to the daily care for patients).*

APPENDIX 2: PROPOSED COMPETENCIES FOR CLINICAL FACULTY AT THE PROFICIENT, EXPERT, AND MASTER LEVEL

How to use the table: *The table below describes the proficient, expert, and master clinical faculty member in the competencies critical to QI/PS. While these competencies emphasize the work of clinicians, all faculty members should be aware of and able to reinforce the principles of QI/PS as appropriate in their teaching roles.*

In order to achieve the vision and goal articulated in this report, each institution will need clinical faculty with a range of educational skills in QI/PS.

- All clinical faculty members will need to be proficient in the QI/PS competencies, practicing and role modeling QI/PS principles in the context of their everyday work.
- Some faculty will need to be expert educators in QI/PS, skilled in formal teaching of QI principles, in creating and disseminating curricula, and in assessing physician development.
- A few faculty will need to achieve master level in the competencies, i.e., scholars in QI/PS whose accomplishments include scholarship, research, and discovery in QI/PS education in addition to their expert educator status.

Each row represents those behaviors that describe the developmental progression for a single competency, while each column represents the behaviors expected in all of the competencies for a proficient, expert, or master faculty member, respectively. Inherent in these behaviors are two core principles: that all care is delivered in a patient-centered fashion, sensitive to his or her needs, and that care is most often delivered by teams, requiring the learner to understand and adopt principles of interprofessional collaborative care. **This configuration is proposed as a draft template on which to build and refine QI/PS competencies at each level. Readers wishing to offer refinements or comment may visit the AAMC Web site at: www.aamc.org/te4q.**

Competency	Proficient	Expert Proficient plus:	Master Expert plus:
PBLI: Critically evaluate and apply current health care information and scientific evidence for patient care	• Formulates answerable questions • Capable of conducting advanced searches • Critically appraises topics • Incorporates use of clinical evidence in rounds and shares this evidence with patients, families, and other health care team members • Practices patient-centered, evidence-based health care because of the benefit to the patient and the desire to learn rather than in response to external reminders	• Teaches critical appraisal of topics to others • Recognizes and teaches about change at the organizational level as dictated by best current information • Easily and regularly formulates answerable clinical questions for learners • Engages in developing evidence-based practice curricula and evaluating their effectiveness	• Contributes to the evidence, e.g., through systematic reviews, comparative effectiveness research and/or clinical trials, and/or contributes to the body of knowledge about education in evidence-based practice
PBLI: Systematically analyze practice using quality improvement methods and demonstrate improvements in practice	• Reflects on and actively considers the health status of both individual patients and populations to gain insight into improvement opportunities • Uses that analysis in an iterative process for improvement in care, working in teams where appropriate • Relies on external prompts to inform and prioritize improvement opportunities at the population level	• Shares the analysis of practice data with learners and team members on a continuous basis, without reliance on external forces to prioritize improvement efforts • Teaches and role models leadership of improvement teams and education about improvement • Creates curricula in QI methods • Provides experiential learning to others through improvement work	• Thinks, acts, and leads systemically to benefit one's own and other practices, systems, or populations • Publishes (in report or journal fashion) results of improvement efforts in practice, education, or both

Competency	Proficient	Expert Proficient plus:	Master Expert plus:
PBLI: Incorporate formative evaluation feedback into daily practice	• Regularly uses both internal and external sources of feedback for insight and engagement in objectively driven self-assessment and improvement	• Explicitly teaches the skill of reflection and incorporation of internal and external feedback • Coaches others regarding reflective practice leading to continuous improvement as a matter of habit	• Contributes to the body of knowledge about feedback and reflection by studying barriers and facilitators and sharing through studies, reports, or publications
PBLI: Use information technology to optimize learning and care delivery	• Efficiently retrieves information (from EHR, databases, and other resources) • Manages and utilizes biomedical information for solving problems and making patient-centered decisions and for ongoing self-learning • Involves informatics and other data specialists as necessary	• Demonstrates to learners the use of information technology resources to remedy knowledge gaps identified in the course of patient care • Helps others use the EHR platform to improve the care not only for individual patients but populations of patients as well	• Regularly studies, leads and/or contributes to the continuous improvement of current systems and the development and implementation of new information technology innovations for patient care and professional learning
SBP: Work effectively in various health care delivery settings and systems relevant to one's clinical specialty, including identifying systems' issues and improving them	• Adapts learning from one system or setting to another. In this way, can effect or stimulate improvements in a system and does so when the need arises • Views improving systems of care as an integral component of professional identity	• Demonstrates system and team leadership in a manner which creates educational experiences in system improvement for others	• Undertakes and studies curricular and other innovative educational strategies • Conducts and disseminates scholarly work in systems improvement and/or education in systems improvement

Competency	Proficient	Expert Proficient plus:	Master Expert plus:
SBP: Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care	• Critically appraises and applies principles of cost- and risk-benefit analyses into decision-making • Consistently integrates cost analysis into practice while minimizing risk and optimizing benefits for systems or populations	• Creates curriculum in cost-benefit and risk-benefit analysis Creates curriculum in cost-benefit and risk-benefit analysis • Teaches cost- and risk-benefit analysis	• Engages in scholarly activity about value in health care, incorporating cost- and risk-benefit analyses into the work, and education in these areas.
SBP: Participate in identifying system errors and implementing potential system solutions	• Encourages open and safe discussion of error • Actively identifies health system and medical error and near-misses • Accepts personal responsibility for individual or systems error correction, regularly determining the type of error, and beginning to seek system causes of error • Identifies and role models both personal responsibility and systems thinking in understanding error	• Teaches about approaching medical error with a system-solution methodology • Actively and routinely engages with interprofessional teams of clinicians and learners to identify problems and improve system processes • Creates and leads educational experiences in systems thinking and patient safety	• Serves in leadership role(s) in systems thinking and patient safety, and/or engages in scholarly work designed to improve patient safety, and/or patient safety education, and/or other system processes.

Competency	Proficient	Expert Proficient plus:	Master Expert plus:
IPC: Work in interprofessional teams to enhance patient safety and improve patient care quality	• Continually strives to know and appreciate the unique contributions of other health care professionals relative to their knowledge, skills, and attitudes • Seeks their input for appropriate issues • Performs as a highly effective health care and improvement team member in a way that is evident to others • Recognizes that quality patient care only occurs in the context of the interprofessional team	• Understands and can communicate the broader connectivity of the professions and their complementary nature • Actively communicates effective team member or leadership skills in interprofessional work • Engages in the creation of interprofessional learning experiences/ curricula	• Serves in leadership role (e.g., Chief Safety Officer or Chief Quality Officer) overseeing an interprofessional group for a health care institution or system • Engages in and produces scholarly work in interprofessional education or interprofessional collaborative practice
PPD/PBLI: Develop the ability to use self-awareness of knowledge, skills, and emotional limitations to engage in appropriate help-seeking behaviors	• Recognizes own limitations; help-seeking is driven by the patient's needs and supersedes any perceived value of physician autonomy resulting in appropriate requests for help when needed	• Actively and overtly demonstrates help-seeking behaviors, driven by the personal drive to learn and improve resulting in the habit of engaging in help-seeking behaviors	• Studies and produces scholarly work in self-awareness and help-seeking behavior • Develops and tests interventions to improve these behaviors
Educational Competencies	• Role models QI/PS concepts as part of routine clinical work • Participates as a faculty member in experiential learning activities	• Designs and evaluates experiential learning activities for learners • Understands and applies competency assessment measures in QI/PS • Embeds QI/PS concepts into most educationally-relevant clinical work by explicitly teaching or assessing	• Undertakes, studies, and evaluates education innovations across a major portion of the medical education continuum

PBLI= Practice-based Learning and Improvement; SBP= Systems-based Practice; IPC= Interprofessional Collaboration; PPD= Personal and Professional Development; PC=Patient Care