[QI]

Teaching **Quality Improvement** in Residency Education

ROGER Y.M. WONG

ROYAL COLLEGE
OF PHYSICIANS AND SURGEONS OF CANADA

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Foreword: The path to quality care is paved with QI Medical Education

The practice of medicine has fundamentally changed. Long gone is the interaction of a sole practitioner and a single patient in isolation. Health care is now a complex system, a symphony of skilled individuals and those in need of care. We now know that this 21st century enterprise of care does not always produce ideal results. For innumerable reasons, patient outcomes are often not as good as we set out to provide. Sometimes health professionals are not even prepared in their training to provide the best possible care in the settings that they practise in. With so many dynamic and interdependent elements in health care, what can we possibly do to really make care better? How can we prepare the next generation of physicians to survive and even thrive in such a system? Enter the science of health care quality and safety.

Several landmark reports and publications guide us at the intersection of quality science and medical education. *To Err is Human* (2000) and *Crossing the Quality Chasm* (2001) by the Institute of Medicine, and the "Canadian Adverse Events Study" (Baker et al 2004), among so many others, have helped physicians see the extent of the challenge before us. Pioneering authors such as D.M. Berwick, P. B. Batalden, E.S. Holmboe, and others such as G.J. Langley, R. Moen and their colleagues, have introduced physicians to the essential concepts of quality science. Movements such as Choosing Wisely Canada have refocused attention on aspects of practice in need of change. In response, innovations in medical education have arrived to mark a path to professionals trained to continuously improve the system they are immersed in (Wong, Etchells et al 2010; Patow, Karpovich et al 2009).

The time has come to make quality science core content of medical training. Around the world, organizations such as the Royal College of Physicians and Surgeons of Canada and the Accreditation Council for Graduate Medical Education have written new standards for curriculum and assessment that include quality concepts. In fact, this year the Royal College, along with its partner organizations, is releasing the latest version of the CanMEDS competency framework: CanMEDS 2015. CanMEDS 2015 is a framework of physician Roles, competencies, and milestones that describe the scope of abilities required by 21st century medical practitioners and the pathway to achieve them. Quality and patient safety, under the leadership of Brian M. Wong and colleagues, figures prominently in the new content of CanMEDS 2015.

If we, as a profession, have recognized the need to incorporate quality science into medical education, and we have now set the standards for physician competencies in this domain, all we need now is some help to act. Therefore, I am so pleased that the innovative work of Roger Y.M. Wong from the University of British Columbia has been captured in this publication. This book is timely. As educators, we can now turn to *QI: Teaching Quality Improvement in Residency Education* and discover how we can quickly adapt Roger's insights for our own training programs.

Batalden and Davidoff have said that "unceasing efforts of everyone" are needed to improve care. You are a part of these fundamental endeavours. Thank you for selecting this exciting text. May it lead to enhanced training and continuous improvement in the care provided by you and your graduates.

Jason R Frank MD MA(Ed) FRCPC
Director, Specialty Education, Strategy & Standards
Royal College of Physicians and Surgeons of Canada
Vice-Chair, Department of Emergency Medicine, UOttawa
Ottawa, Canada

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Perspective of the clinician

It is with great pleasure that I write a foreword for this book. Dr. Roger Wong should be congratulated for his efforts over the last several years. He has developed an innovative curriculum to teach quality improvement to residents, which is described in detail in this book. He has had a tremendous impact on the educational activities in our residency program and the quality of care of patients. His curriculum has been widely adapted for use in various venues across North America. Ultimately, residency programs that offer this quality improvement curriculum to their trainees will better prepare physicians of the future to identify problems in our health care system and address these problems in a proactive fashion. These efforts will have a major impact on individual patients and on the health care system.

Several components of this curriculum are innovative. First, I like the way that Wong has related the process of identifying quality improvement questions to evidence-based medicine. The prospect of conducting quality improvement is often daunting to residents. By framing these issues in the context of clinical care, Wong has created a curriculum that is much more likely to resonate with trainees. Second, it is interesting how he has woven the CanMEDS competencies into the curriculum. Wong has managed to address all of the CanMEDS Roles, not only the Leader Role, in the curriculum. These efforts are extremely important not only for residency education but also for medical education in general. Many medical schools, including our own, will be revising their curricula on the basis of the CanMEDS framework. The fact that Wong's quality improvement curriculum is enmeshed within the CanMEDS competencies will substantially enhance the likelihood that it can be fully integrated into undergraduate programs.

Finally, most physicians will have to work in health care teams in the future. The quality improvement curriculum that Wong has developed is ideally suited to inter-professional education. Trainees from medicine and other disciplines can be brought together to learn the principles of quality improvement, learn about the unique contributions that professionals in each discipline make to the care of patients, and begin to learn how to work effectively in a health care team.

In summary, Dr. Roger Wong should be congratulated for a tour de force. We are tremendously proud of his accomplishments.

Graydon S. Meneilly, MD, FRCPC, FACP
Professor and Eric W. Hamber Chair
Head, Department of Medicine, University of British Columbia
Physician-in-Chief & Head, Department of Medicine, Vancouver Acute Services
Regional Department Head, Vancouver Coastal Health and Providence Health Care

Preface

This book is intended for educators who are interested in Quality Improvement (QI) and who work with generalist and specialist physicians from all disciplines. My intention is to share practical tips that will help readers to teach QI in a flexible and sustainable way within the CanMEDS educational framework. The information can be adapted to suit different programs. I have no doubt that new evidence and guidelines will emerge concerning how QI can be conducted and taught, and thus I hope that the book will be an evolving document.

QI is difficult to do and probably even more difficult to teach properly to residents. Part of the problem lies in the fact that there is no single, established curriculum to teach QI in medical education, even though QI is a mandatory core competency that all physicians must learn under the CanMEDS Leader Role. Consequently, residency program directors and health educators interested in developing and implementing a QI curriculum face the challenge of doing so on their own.

I understand how daunting this can be, as I have faced the challenge myself at the University of British Columbia (UBC). This book represents the culmination of years of hard work invested in developing and delivering a QI curriculum for medical residents. The goal of this book is to provide a user-friendly approach to developing and implementing a feasible and relevant QI curriculum as well as an assessment method. By sharing this resource, I hope I can help relieve others of the need to reinvent the wheel.

Roger Y.M. Wong, BMSc, MD, FRCPC, FACP
Associate Dean, Postgraduate Medical Education
Clinical Professor of Geriatric Medicine
Faculty of Medicine, University of British Columbia

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Special thanks should also go to the Royal College's fantastic teams, CanMEDS and the Educational Product Development and Dissemination unit. I am indebted to Dr. Jason Frank for his foresight in creating this resource, and to Patti O'Brien for her vision and advice in its development. I would also like to thank Anne Moralejo for her excellent work in editing and Kristopher Tharris for his work on the tools. Finally, thank you to Wendy Jemmet and Cynthia Abbott for their early work on this publication, and to Caroline Clouston and Shelley Murdock for hunting down and securing copyright permissions for the many other resources that add value to this book.

I also thank the University of British Columbia Department of Medicine team, who played a pivotal role in the smooth implementation of the QI curriculum at UBC. I thank all the residents and teaching faculty members who drew on their own experiences with the curriculum to provide me with feedback.

Last but not least, my heartfelt thanks must go to my family (Robert, Juanita, Josephine and Raphael) for their complete support.

About the author

Dr. Roger Wong is Associate Dean, Postgraduate Medical Education, Faculty of Medicine, and Clinical Professor in the Division of Geriatric Medicine, Department of Medicine, University of British Columbia (UBC).

Dr. Wong is a Consultant Physician at Vancouver General Hospital, where he was Head of the Geriatric Consultation Program from 1998 to 2014, and founded the state-of-the-art Acute Care for Elders (ACE) Unit in Vancouver, which has been implemented nationally and internationally. He was President of the Canadian Geriatrics Society from 2011 to 2013. His clinical research focuses on hospital medicine in vulnerable older adults, including quality improvement in acute care geriatrics. Dr. Wong has published and lectured extensively on geriatric medicine and medical education. He has authored in major medical reference books, such as the *Oxford Textbook of Geriatric Medicin*e (2016) and *Acute Care for Elders: A Model for Interdisciplinary Care* (2014). Dr. Wong has been invited as Visiting Professor by national and international centers.

Dr. Wong received his MD degree with Honours in Research (Medicine) from the University of Alberta and completed postgraduate and fellowship training there. He has received numerous teaching awards in recognition of his teaching excellence, including the UBC Killam Teaching Prize in 2007, the Royal College of Physicians and Surgeons of Canada Donald Richards Wilson award in 2007, and the UBC Department of Medicine Master Teacher Award in 2012. He was elected to Fellowship in the Canadian Academy of Health Sciences in 2015, as well as Fellowship in the American College of Physicians in 2005. Dr. Wong has received numerous awards of appreciation from the Alzheimer Society of British Columbia to recognize his advocacy work in the community.

The quality improvement curriculum presented in this book and reported in the peer-reviewed literature has been used at UBC since 2005 to teach hundreds of Internal Medicine residents.

How to use this book

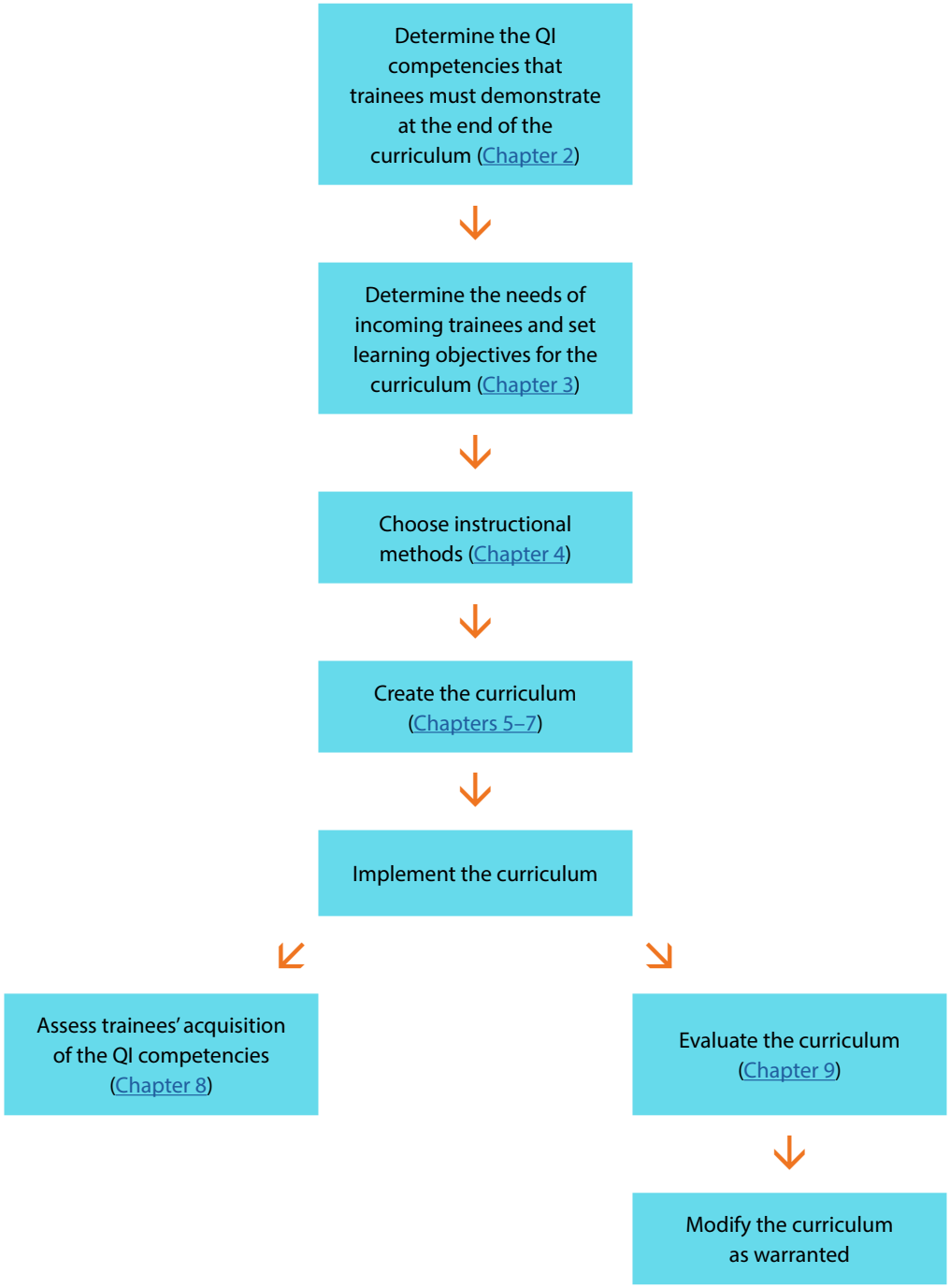
Although the fundamentals of quality improvement (QI) are reviewed briefly, this book is not meant to teach you QI. Rather, it is meant to provide you with some tools that will help you to teach QI to others. The objective of this book is to guide medical educators through the development and implementation of a postgraduate QI curriculum that is grounded in accepted theories of medical education. All of the information provided here can be tailored to any specialty of postgraduate medical education and any local context.

If you are unfamiliar with QI, the website of the Institute for Healthcare Improvement (IHI) is a good starting point for further reading on the different steps of QI, including concepts and techniques. If you are new to curriculum development or could use a refresher on the key concepts, you may wish to refer to the Royal College's publication, *Educational Design: A CanMEDS Guide for the Health Professions* (Sherbino and Frank 2011). *Educational Design* distills the peer-reviewed and grey literature to present the basic theory and essential concepts of curriculum development for medical educators. The chapters of this book parallel the elements discussed in that publication. If you are well into the process of developing a QI curriculum or if you already have a program up and running, you may prefer to turn directly to particular chapters in this book to get help with specific issues.

The first chapter of this book provides an overview of quality improvement (QI) in the health care setting and includes a flow diagram listing the major steps to developing a curriculum. Chapters 2 and 3 cover competencies and learning objectives for QI and how they can be tied to medical education. Chapter 4 outlines some of the curricular methods that can be used, while Chapters 5 to 9 provide information on how to design a QI curriculum to meet the needs of your local learners at a fundamental, intermediate and advanced level, as well as how to implement it and evaluate both the learners and the curriculum itself. Chapter 10 provides advice in the form of a Q & A, drawn from my experience developing and delivering a QI curriculum at my institution, to make your task easier. Suggestions for further reading and additional resources are included at the back of this publication.

Also included with this book are a number of modifiable tools, which can be downloaded (individually or in a package) by clicking on the hyperlinks provided. These hyperlinks connect to the Royal College of Physicians and Surgeons of Canada's website (allowing for updates to the tools when necessary). A static version of each tool is also provided at the end of the book for your reference while reading.

Figure 1 Steps to creating a QI curriculum



Quality improvement (QI) in health care: What is it? Why should you care about it?

- QI in health care
- An overview of QI
- How QI differs from quality assurance (QA)
- Why physicians and health care practitioners should care about QI
- How QI fits into medical education
- How QI can be conducted in a clinical setting

[01]

Quality improvement (QI) in health care: What is it? Why should you care about it?

"[…] health care will not realize its full potential unless change making becomes an intrinsic part of everyone's job, every day, in all parts of the system. Defined in this way, improvement involves a substantial shift in our idea of the work of health care, a challenging task that can benefit from the use of a wide variety of tools and methods." (Batalden and Davidoff 2007)

QI in health care

In health care, the term *quality* refers to the delivery of the right care to the right patient at the right place and time with the right resources. The concept of quality is not new to health care, but it has been attracting increasing attention in the past decade. It is highly relevant to patients, health care providers, health care organizations and funding agencies.

Similarly, the concept of quality improvement (QI) has been receiving more attention in health care. In 2001, the Institute of Medicine identified six aims for quality improvement in health care. The Institute for Healthcare Improvement (2012) sums up these six aims as follows:

1. Health care must be safe;
2. Health care must be effective;
3. Health care should be patient-centered;
4. Care should be timely;
5. The health care system should be efficient;
6. Health care should be equitable.

Batalden and Davidoff (2007) proposed defining quality improvement as "the combined and unceasing efforts of everyone — health care professionals, patients and their families, researchers, payers, planners and educators — to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development (learning)."

An overview of QI

Given the broad scope of QI, it is not surprising that QI means different things to different people. From a practical point of view, QI in health care involves making changes for the better, either to the care of an individual patient or to the running of one or more parts of a clinical system. The commonly accepted model for improvement is the plan-do-study-act (PDSA) cycle, which asks three essential questions (Deming 2000; Langley et al 1996):

1. What are we trying to accomplish?
2. How will we know that a change is an improvement?
3. What changes can we make that will result in an improvement?

This model can be used repeatedly to test a series of consecutive changes.

Projects are usually at the heart of QI, and can involve initiatives aimed at improving flow and/or increasing patient satisfaction, or be built around any initiative that aims to reduce error, examine variation or service, change the work environment, or optimize health care inventory. Conducting a QI project may entail obtaining generalizable scientific evidence from the published literature, applying the evidence to the care of a patient or to a re-engineering process for one or more parts of a clinical system and measuring any performance improvement (Batalden et al 2003).

How QI differs from quality assurance (QA)

Whereas the main aim of quality assurance (QA) is to demonstrate that something meets certain requirements or criteria, quality improvement (QI) is the process by which we achieve desirable results. Also, QA may work in the short term but its results tend not to be sustained, while the results are more sustainable with QI, when QI is done correctly.

Table 1.1 Comparison of Quality Assurance (QA) vs Quality Improvement (QI)

Quality Assurance (QA)	*Quality Improvement (QI)*
In QA, a cut-off point is set that demarcates the border between acceptable and unacceptable quality	In QI the aim is to improve quality overall by reducing unnecessary variation and focusing on what happens most often rather than what happens relatively rarely
Individual outlying points, "outliers", that fall below the cut-off point (and thus are deemed undesirable) are removed	Quality improvement thrives in learning environments that strive to improve the system and its processes rather than trying to eliminate an outlier event
Statistically the remaining points tend to automatically redistribute into a bell-shaped curve over time and thus outlying points reappear below the cut-off point	

Adapted from the Society of General Internal Medicine PW08 Pre-Course (5/12/2004) "Getting Started in Continuous Quality Improvement." Faculty participants: M. Bergen, C. Braddock, S. Dembitzer, E. Holmboe, L. Osterberg, P. Rudd, C. Sharp. No reproduction without permission.

Why physicians and health care practitioners should care about QI

Many institutions already expect that QI will be applied to patient care practices, and regulatory bodies are introducing elements relating to QI into their maintenance of competence frameworks. Given their role in the health care system, physicians are well-positioned to be proactively engaged in QI processes. Since QI is rapidly becoming part of the medical culture, physicians and health care practitioners need to have a solid understanding of what it is and how they can use it:

- *To improve patient safety*. The complexity of our modern health system poses unprecedented challenges with respect to both quality and safety. Patient safety is of such importance that a postgraduate train-the-trainer curriculum on patient safety, Advancing Safety for Patients in Medical Education (ASPIRE), has been developed by the Royal College of Physicians and Surgeons and the Canadian Patient Safety Institute (Royal College of Physicians and Surgeons of Canada 2011). QI is therefore an essential facet of health care delivery, particularly since many QI initiatives are explicitly designed to improve patient safety, such as medication reconciliation, patient safety awareness campaigns, and protocols for preventing wrong-site, wrong-procedure, wrong-person surgery.

- *To improve efficiency and reduce waste.* Some QI initiatives at the clinical system level are designed to improve efficiency as well as enable health care professionals to use scarce resources in such a way as to maximize the benefits to patients. For example,

    - The Alberta AIM program was founded to address the costly effect of wait times on patients, clinics, and the health care system. QI helped identify how multi-disciplinary teams could reduce appointment delays, increase efficiencies during clinical visits and improve clinical care.

    - Following the American model, Choosing Wisely Canada is a campaign to reduce the overuse of health care resources in Canada (for a detailed list of their recommendations, see www.choosingwiselycanada.org/recommendations/). The impact of Choosing Wisely Canada is expanding, with QI work conducted as part of this campaign resulting in scholarly publications, including a 2015 article published in the *Canadian Medical Association Journal* on pre-operative testing before low-risk surgical procedures (Kirkham et al 2015).

- *To translate knowledge*. Engaging in QI encourages the exchange of knowledge — acquiring it, creating it, and sharing it. It also brings the evidence-based practice of medicine to the level of individual patients and populations.

- *To lead change*. Physicians may engage in QI at the patient level, but they also need to participate in system-level QI. This engagement at more than one level of health care is not unique to QI. For instance, one of the key competencies in the CanMEDS Health Advocate Role is that physicians must be able to "respond to the needs of the communities or populations they serve by advocating with them for system-level change in a socially accountable manner" (Frank, Snell, Sherbino 2015).

Example 1: QI in action

Patient level: In the treatment of patients with congestive heart failure (CHF) and left ventricular dysfunction, the physician determines that angiotensin-converting-enzyme (ACE) inhibitors have a strong evidence base to improve CHF outcomes. When the physician decides to review a small number (say 25) charts of his/her CHF patients, only 40% of these patients are found to be taking ACE inhibitors.

Clinical system level: A department head, in consultation with his/her quality improvement committee, determines that evidence from the scientific literature supports the introduction of an electronic clinical decision support system in his/her clinical setting. The department head deploys such a system to routinely identify patients with CHF who may benefit from an ACE inhibitor. The department head chooses appropriate metrics (or indicators) to measure performance improvement (e.g. the percentage of patients with CHF who are identified by the electronic decision support system to potentially benefit from an ACE inhibitor; the percentage of patients with CHF who develop acute exacerbations requiring hospitalization after being started on an ACE inhibitor; and the wait time for patients with CHF to access the clinical service, because time is needed to customize ACE inhibitor therapy for patients). The metrics can drive further improvement cycles.

Table 1.2 Comparison of QI components: patient level vs system level

QI Component	*At the individual patient level*	*At the system level*
Sources for initial data collection	Medical history, physical examination, chart review	Our own experience within the system; discussions with others
Tools used in further work-up	Blood testing, radiology	Flow charts, cause–effect diagrams, run charts and control charts to display the outcome data
Items to be included in suggested plans	Recommendations for medications, surgery or watchful waiting	Model for improvement, plan-do-study-act (PDSA) cycling method

How QI fits into medical education

Interest in incorporating QI training into medical education curricula has been steadily growing. Health care organizations, ranging from national professional bodies to regional health authorities to individual hospitals and clinics, are increasingly offering more training in QI and QI training has become a requirement for the accreditation of many training programs. This includes the CanMEDS framework, where QI is a key learning competency in the Leader Role (Frank, Snell, Sherbino 2015). As well, practice-based learning and improvement is one of the core competencies of the Accreditation Council for Graduate Medical Education (Stewart 2001).

QI training can provide educators with a way to incorporate the teaching of a variety of CanMEDS competencies into a single curriculum by enabling residents to acquire a broad range of competencies beyond those that are specific to QI work. As discussed further in chapters 2 and 4, physicians will need to use knowledge, skills and abilities that are grouped under several different CanMEDS Roles to conduct QI work. For busy residency programs, this feature of QI training can be valuable for program accreditation.

[TIP]

At UBC, QI has become such a fundamental component of the training program that medical students talk about their interest in QI at their interview for a residency position, and some even have an idea for a QI project.

How QI can be conducted in a clinical setting

For residents, gaining experience that is clinically relevant and part of their daily work lives is a particularly powerful way to learn QI. Furthermore, any number of clinical experiences can be turned into learning moments. Properly planned, QI work can also be carried out efficiently and integrated into regular day-to-day clinical activities. In any setting, including clinical practice, QI work needs to focus on addressing specific parts of the system at a time rather than trying to overhaul the entire system at once. Whether the goal is to improve patient outcomes or professional development, quality improvement is influenced by what factors will be measured and these in turn influence where improvements can be made.

For instance, those who conduct a QI project in a clinical system, including any residents undertaking such a study, must take into account the particularities of that system, including its structures, processes, patterns and local culture. Otherwise, the QI initiative is unlikely to meet with success in the context of the system being studied. Table 1.3 itemizes some elements that must be considered at the outset of a variety of types of QI processes.

Table 1.3 Examples of the initial thinking that must take place in QI work

Goal	*Factors to be considered*	*Processes amenable to improvement*
To improve outcomes for individual patients or populations	Health indicators to be measured	Hiring of health care professionals
	Patient knowledge level	Supervision of health care professionals
	Variations that exist currently	Accountability of health care professionals
	Possible causes of the condition that needs improvement	Participation and commitment of health care professionals
		Recognition and reward of health care professionals
To improve professional development outcomes	Competencies of the target learners	Leadership
	Accreditation/certification/ licensure status of target learners	Health organizational development
	Professional training background of target learners	Governance
	Importance of inter-professional collaboration	Financing
	Importance of work-related wellness and creativity	
To improve the performance of the overall health system	Measurement methods	Leadership
	System reliability and instances of failure	Performance review
	Standards of practice	Recognition and reward

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Establishing competencies for a QI curriculum

- QI competencies in medical education
- Using CanMEDS to further frame QI competencies

[02]

Establishing competencies for a QI curriculum

"A competency [is] an observable ability of a health professional, integrating multiple components such as knowledge, skills, values and attitudes. Since competency is observable, it can be measured and assessed to ensure acquisition." (Frank et al 2010)

QI competencies in medical education

In competency-based medical education, as in any competency-based education framework, the term competency refers to a learner's ability to meet performance-based expectations.

- A *key competency* describes the learner's broad ability in an area; key competencies are generally presented in frameworks as global educational statements.
- *Enabling competencies* specify the knowledge, skills and attitudes that are essential to the attainment of a key competency.

The first step in creating a QI curriculum within a competency-based medical education framework, therefore, is to establish the QI competencies that physicians should exhibit at the completion of their training program. For example, a key QI competency might be to describe quality improvement and process/practice review principles and strategies. An enabling competency would be to explain the difference between quality assurance (QA) and QI.

A "design down" approach will help in both planning a QI curriculum and creating QI competencies. This means first determining the key competencies that physicians should exhibit at the end of residency, then establishing which enabling competencies will support each key competency. How you articulate QI competencies will depend on how the curriculum is delivered. Will the competencies be taught in a longitudinal fashion or in a time-based curricular model? For more on curricular methods, refer to Chapter 4.

Some guiding principles:

- The QI competencies need to be measurable, for assessment purposes.
- The QI competencies should conform to external validated criteria, such as national and local accreditation standards for health facilities.
- The QI competencies should reflect best practices, both now and in the future.
- The QI competencies should be amenable to iterative changes.
- Use plain language and avoid jargon to ensure that both the teacher and the learner understand what's required in a competency.

[TIP]

Are you part of an inter-professional practice environment? Invite some QI content experts outside your training program to help you to teach and assess QI competencies — the earlier, the better. These experts may come from other disciplines of medicine or other health professions or they may have a background in a completely different field, such as business, statistics or engineering.

Using CanMEDS to further frame QI competencies

Briefly, the CanMEDS framework organizes the competencies of physicians into seven domains called Roles (Frank 2005). The central integrative domain is the Medical Expert Role. This Role is interconnected with, and enhanced by, six Intrinsic Roles of the Communicator, Collaborator, Leader, Health Advocate, Scholar and Professional.

QI is mentioned explicitly in the 2015 CanMEDS Framework as enabling competency 1.1 in the Leader Role: "Apply the science of quality improvement to contribute to improving systems of patient care." For that reason, and also for ease of curriculum development, QI competencies are often grouped under the Leader Role.

The reality, however, is that all of the CanMEDS Roles overlap, and therefore the knowledge, skills and abilities required for successful completion of QI is not limited to a single Role. When teaching QI within a CanMEDS-based curriculum, it is important to identify for trainees how the QI competencies in the Leader Role complement competencies in the other six Roles. There is no reason this "cross-pollination" cannot be seamless.

For instance, QI work requires competencies in communication and collaboration (grouped under the Communicator and Collaborator Roles) just as much as it requires competencies that are grouped under the Leader Role (e.g., competencies related to participating in the effectiveness of health care organizations and systems, demonstrating leadership, managing change and conducting career development). Table 2.1 shows how key and enabling QI competencies can relate to the different competencies in the CanMEDS framework.

Table 2.1 QI key and enabling competencies that support CanMEDS Roles		
CanMEDS Role	***QI key competency***	***QI enabling competency***
Medical Expert	1. Practise medicine within their defined scope of practice and expertise 5. Actively contribute, as an individual and as a member of a team providing care, to the continuous improvement of health care quality and patient safety	1.1. Demonstrate a commitment to high-quality care of their patients
		1.6. Recognize and respond to the complexity, uncertainty, and ambiguity inherent in medical practice
Leader	1. Contribute to the improvement of health care delivery in teams, organizations, and systems	1.1. Apply the science of quality improvement to contribute to improving systems of patient care
		1.4. Use health informatics to improve the quality of patient care and optimize patient safety
Collaborator	3. Hand over the care of a patient to another health care professional to facilitate continuity of safe patient care	3.1 Determine when care should be transferred to another physician or health care professional
		3.2 Demonstrate safe handover of care, using both verbal and written communication, during a patient transition to a different health care professional, setting or stage of care
Health Advocate	2. Respond to the needs of the communities or populations they serve by advocating with them for system-level change in a socially accountable manner	2.2. Improve clinical practice by applying a process of continuous quality improvement to disease prevention, health promotion, and health surveillance activities
Scholar	3. Integrate best available evidence into practice	3.4. Integrate evidence into decision-making in their practice
Professional	1. Demonstrate a commitment to patients by applying best practices and adhering to high ethical standards	1.2. Demonstrate a commitment to excellence in all aspects of practice

Adapted from Frank JR, L Snell, J Sherbino, editors. CanMEDS 2015 Physician Competency Framework. *Ottawa: Royal College of Physicians and Surgeons of Canada; 2015. Used with permission.*

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Setting learning objectives

- Designing multiple levels of the QI curriculum
- Sample learning objectives

[03]

Setting learning objectives

"A learning objective is a precise statement of specific performance, the achievement of which contributes to the attainment of the goal. A single goal may have many specific, subordinate learning objectives." (Richardson and Flynn 2011)

Learning objectives map out how learners will achieve the desired competencies by the end of the curriculum and guide teachers as they organize the learning material. A "design down" approach can be effective when planning a QI curriculum and typically involves the following steps:

- As covered in Chapter 2, identify the knowledge, skills and abilities (i.e., the competencies) that graduates of the training program will need to have in order to effectively perform QI work during their professional careers. Determine the key competencies first, followed by the enabling competencies.
- Establish educational milestones — the pivotal developmental events in the learning trajectory.
- Create the learning objectives for the curriculum.

[TIP]

Before you can develop your learning objectives, you will need to identify where the trainees are starting in relation to where they must end up. This is usually determined through a needs assessment, which is beyond the scope of this book. For more information on how to conduct a needs assessment, consult Sherbino and Lockyer (2011). The authors also discuss the strengths and weaknesses of a variety of tools, including focus groups, interviews, knowledge tests and direct observation.

Designing multiple levels of the QI curriculum

It may not be practical or desirable to create a one-size-fits-all QI curriculum. Instead, you may wish to target learners at different levels to meet their different learning needs and correlate the increasing complexity of the different QI curricula to the increasing seniority of the residents.

- A fundamental QI curriculum gives residents a simple and basic level of competence in QI. For example, the trainee learns how to write an aim statement for a QI process and how to interpret some performance data.
- An intermediate QI curriculum targets residents who have a special interest in QI by building on skills acquired in a fundamental curriculum. For example, the resident learns how to form a QI team and will carry out a QI project.
- An advanced QI curriculum targets residents who are considering a potential career trajectory in QI or who are interested in more elaborate systemic design. For example, the resident would learn how to write a scholarly article on QI and be expected to present findings.

Sample learning objectives

Table 3.1 compares sample learning objectives for a QI curriculum in medical education at three levels. Each level shows ever increasing complexity for the trainee.

Table 3.1 Sample learning objectives — Quality Improvement (QI) curriculum in medical education

Fundamental Curriculum	*Intermediate Curriculum*	*Advanced Curriculum*
The trainee will be able to:	The trainee will be able to:	The trainee will be able to:
Determine how to organize a QI team for a clinical process	Form a QI team, decide on the accountability of the team members, and establish appropriate division of labour among team members	Lead a QI team
Generate a flow chart for QI of a clinical process	Select a clinical area for a QI project and a venue for data collection, and devise plans for data collection to ensure feasibility and sustainability	Produce and deliver, with team members, an oral presentation of the findings of a QI project in a podium session
Answer the following three questions of the model for improvement: What are we trying to accomplish? How will we know that a change is an improvement? What changes will we make that will result in an improvement?	Develop a QI charter by answering the three core questions of the model for improvement for the self-selected QI project: What are we trying to accomplish? How will we know that a change is an improvement? What changes will we make that will result in an improvement?	Explain the ethical implications of collecting data for QI
Interpret a run chart and/or control chart by identifying common-cause versus special-cause variation of the data	Analyze the data collected, with the aid of QI analysts, in the form of run charts and/or control charts.	Write a scholarly article that meets standard criteria (Ogrinc 2008)

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Curriculum design and instructional methods

- Elective versus mandatory curriculum
- Didactic, interactive and case-based curricular methods
- Longitudinal versus block curricula
- Tutorials
- Addressing CanMEDS competencies by teaching QI

[04]

Curriculum design and instructional methods

"My colleagues and I have found that a dedicated QI curriculum is an ideal way for residents to focus on acquiring the QI knowledge and abilities they will need throughout their medical careers."
(Dr. Mark C. Fok, University of British Columbia)

When you design and develop a QI curriculum for your program, you will need to choose one or more curricular methods to achieve the learning objectives that you have established. What you choose will depend on resource constraints and the amount of time within the residency program that can be allotted to the curriculum as well as the needs of your learners.

Some guiding principles:

- Tailor curricular methods and instructional approaches to the needs of your learners.
- Engage the learners: make it clear to them that gaining QI knowledge will be empowering.
- Ensure that faculty members are given the resources they need to teach QI. Time is the most critical resource, but some financial resources may also be needed.
- Get buy-in from both educational leaders (e.g., program directors, division heads) and clinical leaders (at the level of the hospital and health region).

[TIP]

Concern has been raised that QI work may compete with the research activities that trainees must complete during their residency. This perception of competition is a complex issue and is influenced by factors such as faculty members' opinions of the scope of research as one of the types of scholarship of discovery, the relative importance of QI, and residents' motivation. At UBC, for example, many resident research projects were QI related even before a QI curriculum was implemented. Many residency programs will aspire to have residents participate in both QI and research activities, but this will require careful time allotment and management.

Elective versus mandatory curriculum

Residency programs are busy, and residents tend to learn only what is deemed to be core or mandatory content. With an elective QI curriculum there is a risk of having a lower rate of participation by residents than was hoped for. A mandatory curriculum, on the other hand, not only motivates residents, it becomes especially powerful if it is associated with an assessment system.

As a requirement of accreditation by the Royal College of Physicians and Surgeons of Canada, for example, Canadian residency programs must provide opportunities for residents to learn the practice and application of QA/QI (Royal College of Physicians and Surgeons of Canada 2011). Given the importance of QI for the purposes of both patient care and successful accreditation of the residency program, making your QI curriculum mandatory will optimize its impact.

Didactic, interactive and case-based curricular methods

When we teach QI, especially to a large group of learners, the temptation is to resort to a didactic approach with traditional lectures. Although the lecture format is reasonable for teaching theories and core concepts, its weakness is that learning is passive and therefore suboptimal. Learning QI should be an active process (one might argue that this is true for almost everything in medicine). A mixed approach that includes interactive lecturing, small-group case-based workshops, and experiential learning through projects is an excellent way to deliver a fundamental QI curriculum.

The importance of experiential learning has been underlined by Ogrinc et al (2003) and Wong et al (2010). The experiential learning can also be empowering, providing residents with a systematic way to proactively address problems they encounter in the health system — and giving them an alternative to merely complaining and throwing their hands up in frustration. A project-based approach not only helps trainees absorb the QI principles they are learning by applying them in real life and refining their understanding of them over time. It also makes learning QI practical and fun for residents.

Some guiding principles:

- Modify didactic sessions to include multiple opportunities for interactive learning. Lesson plans should allot ample time for reflection, discussion and sharing during these learning moments. It is also important to recognize that different resident teams may complete tasks at different paces, which is perfectly fine as long as they also have longitudinal learning opportunities either formally or informally.

- Potential material for experiential learning in QI can include any opportunity to reduce error, manage time and resources, eliminate waste, improve services, systems or interactions between people, and change the work environment. The Institute for Healthcare Improvement has many ideas for potential QI projects: visit www.ihi.org.

- Offer case-based learning, which can be effective for QI, especially in a small-group setting. Cases should be selected that allow learners to clearly see the clinical application of QI competencies. Interactive workshops are a form of case-based learning that can facilitate team building and group learning while trainees are learning QI.

- You may also find it helpful to recruit senior residents who have graduated from the curriculum to help teach new resident learners. This increases the credibility of the QI curriculum in the eyes of junior residents.

[TIP]

QI in a real clinical system is complex, and it can be challenging to teach residents about this complexity. One way is to break down the clinical system into smaller units. For instance, learners can be taught that QI in any clinical system attempts to improve three facets: patient (population) outcomes; professional development; and system performance (Batalden and Davidoff 2007; Ogrinc and Batalden 2009).

Longitudinal versus block curricula

Time is a key ingredient in a successful QI learning experience but it can be a challenge to find adequate time in your residency program to allow QI learning to occur. A QI curriculum can be delivered either longitudinally or in blocks of time. Since the practice of QI is a lifelong process, at least during one's career lifetime, learners will benefit if they receive long-term reinforcement of the key concepts. Such reinforcement can be incorporated more naturally into a longitudinal curriculum than into a block curriculum.

Longitudinal curriculum — Advantages

- Approximates real clinical timelines and allows interprofessional team participation in real-life situations;
- Learners have the opportunity to try out and refine over time basic principles learned;
- Allows more time for learners to complete QI projects;
- May be less stressful to learners because of the time advantage;
- A spiral design embedded in a longitudinal curriculum would be ideal, but it is not always feasible to implement such a design.

Longitudinal curriculum — Disadvantages

- Learners may be distracted by competing interests;
- Potential knowledge decay;
- Instructors may have more difficulty in tracking the progress of learners.

Block curriculum — Advantages

- Focuses efforts;
- Much easier to administer than a longitudinal curriculum.

Block curriculum — Disadvantages

- Tight timelines imposed by the block format may result in learners selecting artificial QI projects (i.e., they may select projects that don't address real QI needs);
- The tight timelines of a block curriculum and competing interests of other educational or clinical activities may add to the stress and workload of the learners and others associated with their projects, especially when an inter-professional team is involved;
- It is difficult to introduce a spiral design with layers of complexity into a block curriculum, again because of the tight timelines.

[TIP]

There is an emerging trend in which block and longitudinal designs are combined, perhaps providing a useful middle ground. A team of residents might work on a QI project during a block rotation on QI; at the end of the rotation, they would pass the project on to a team of residents about to begin the rotation. This would enable residents to conduct a longitudinal project within a block curriculum.

Tutorials

Tutorial sessions are well-suited to guide residents in completing the QI project and to help check if the teams are on track with their projects. Tutorials also provide instructors with the opportunity for project coaching and face-to-face interaction, to offer assistance, and to answer any questions that residents may have.

Example 2: Tutorial Session 1 for Intermediate Curriculum

Pre-tutorial preparation: When you arrive for Tutorial Session 1, you will be expected to have

- Selected the members of your QI team;
- Selected a liaison person for your QI team;
- Decided on a clinical area for your QI project, having thought about your team's interests, your experiences when things have gone wrong, etc., and referring to the list of possible topics and sponsors for project ideas;
- Selected a hospital site where data for your QI project will be collected. Your team is responsible for ensuring that it is feasible to collect all of the necessary data at this site;
- Draft one aim statement for your QI project.

Educational objectives: By the end of Tutorial Session 1, your team will be able to

- Produce a final aim statement for your QI project;
- Draft answers for the three core questions of a QI charter (road map): (a) What are we trying to accomplish? (b) How will we know that a change is an improvement? (c) What changes will we make that will result in an improvement?
- Determine a timeline that is realistic and feasible;
- Establish appropriate division of labour among team members, including identification of support and resource requirements.

Additional information to be covered during Tutorial Session 1

- Dates of future QI tutorials;
- Legal implications of QI data;
- Ethical approval requirements (for data presentation and publication only).

Addressing CanMEDS competencies by teaching QI

Chapter 2 touched on the fact that QI competencies, which are usually grouped under the Leader role in the CanMEDS framework, do overlap extensively with other Roles. When teaching QI to residents, it is important to explain how they will need to draw on competencies from a variety of CanMEDS Roles as they conduct QI work. Table 4.1 below shows how QI supports a number of different CanMEDS roles.

Table 4.1 Integrating QI into CanMEDS Roles

Role	*How QI supports this role*	*Integrating role with QI*	*Additional information*
Medical Expert	1. Recognizing and responding to adverse events and near misses 2. Seeking opportunities to provide high-quality care 3. Contributing to a culture that promotes patient safety and quality improvement 4. Awareness of human and system factors 5. Engaging patients and their families in the continuous improvement of health care quality and patient safety 6. Ensuring safety in diagnostic and therapeutic procedures	Active engagement in the continuous improvement of quality and safety is core to what it is to be a physician. This statement is grounded in the belief that physicians require both medical and "health-systems-improvement" knowledge to provide high-quality, safe, and patient-centred care. Thus, quality and patient safety should feature prominently within the Medical Expert Role	It is important to distinguish the competencies listed under the Medical Expert role from those listed under the Leader Role. Although these competencies are related, the PS/QI concepts within the Medical Expert Role focus on improving health care quality and patient safety at the level of the individual patient, whereas those concepts that focus on continuous improvement at the level of the system should reside within the Leader Role
Communicator	1. Patient-centred communication 2. Disclosure of adverse events to patients and families 3. Effective clinical documentation	Teaching resources can be drawn from the literature on standardized communication training frameworks	

Table 4.1 Integrating QI into CanMEDS Roles			
Collaborator	1. Teamwork 2. Working in teams to continuously improve health care quality and patient safety 3. Handover between providers on a health care team 4. Care transitions 5. Consultations and referrals	Teaching resources can be drawn from the literature on models of team building, human resources, organizational behaviour	You may wish to provide residents with contact information for key opinion leaders and stakeholders (e.g., health record departments, QI departments) to facilitate completion of their QI projects
Health Advocate	1. Promoting health equity 2. Advocating for continuous improvement of health care quality and patient safety	Inclusion of a QI component in health promotional activities can improve the credibility and sustainability of these activities, and health advocacy activities can in turn constitute useful tools to bring about improvement. There can be synergies between experiential learning in health advocacy and QI. QI work can also help identify determinants of health for individual patients, communities and populations	See Dharamsi et al 2011 for health advocacy advice

Table 4.1 Integrating QI into CanMEDS Roles			
Leader	1. Quality improvement methodologies 2. System analysis and change in response to adverse events, near misses, and patient safety hazards 3. The role of clinical informatics and health technology 4. Resource stewardship 5. Engaging others in the process of continuous improvement of health care quality and patient safety, including though working in teams		It is important to distinguish the competencies listed under the Medical Expert role from those listed under the Leader Role. Although these competencies are related, the PS/QI concepts within the Medical Expert Role focus on improving health care quality and patient safety at the level of the individual patient, whereas those concepts that focus on continuous improvement at the level of the system should reside within the Leader Role
Professional	1. A commitment to continuously improve health care quality and patient safety 2. Professional accountability to uphold patient safety	When we teach QI, it is important to reiterate the various aspects of professionalism that govern all clinical activities. Several of the key competencies within the Professional Role are well suited to being the focus for QI projects, such as adherence to standards of ethical medical practice and professional regulations	Residents should observe commonly accepted ethical principles as they conduct QI projects, even though consensus has not been reached on whether QI projects require ethics review board clearance (policies vary from institution to institution)

Table 4.1 Integrating QI into CanMEDS Roles			
Scholar	1. Integrating continuous quality improvement with continuous professional development and lifelong learning 2. Using quality outcomes to guide development of personal learning plans 3. Critical appraisal of patient safety and quality improvement literature 4. Knowledge translation 5. Recognizing quality improvement and patient safety as legitimate forms of scholarly activity 6. Ensuring that patient safety is maintained throughout the learning experience, particularly in the context of clinical teaching	Much QI work represents the translation of knowledge generated through scholarly activities, and thus competencies grouped under the Scholar Role partner well with QI competencies. Although QI work is not the same as research, it can nevertheless be conducted in a scholarly fashion and certainly has scholarly potential for innovation and dissemination. For instance, there are standardized criteria for the preparation of peer-reviewed articles on QI activities	Residents undertaking the intermediate and advanced curricula at UBC are required to produce an abstract that conforms with standards for scholarship, as one of the deliverables of their QI project

Adapted from Wong B, S Ackroyd-Stolarz, M Bukowskyj, L Calder, A Ginzburg, S Microys, A Stang, G Wallace. The CanMEDS 2015 Patient Safety and Quality Improvement Expert Working Group Report. *Ottawa: Royal College of Physicians and Surgeons of Canada; 2015. Used with permission.*

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Model curriculum: the fundamentals of QI

- Overview of the curriculum
- Sample learning objectives
- Delivering the curriculum
- Assessment

[05]

Model curriculum: the fundamentals of QI

"Learning the fundamentals of QI as a medical resident provides an important tool to improve aspects of the clinical environment that matter most to our patients and to our profession."
(Dr. Jocelyn Chase, University of British Columbia)

The fundamental-level QI curriculum is designed to introduce learners to the essential elements of QI work and to provide them with a foundational level of QI knowledge. It is analogous to the foundational competencies of the CanMEDS Physician Competency Framework, whereby the physician would be able to meet the following milestones of the Leader Role (Frank et al 2015):

- Describe the relevance of system theories in health care.
- Describe a patient's longitudinal experience through the health care system.
- Describe the domains of health care quality.
- Describe the features of a "just culture" approach to patient safety.
- Describe quality improvement methodologies.
- Compare and contrast the traditional methods of research design with those of improvement science.
- Compare and contrast systems thinking with traditional approaches to quality improvement.
- Seek data to inform practice and engage in an iterative process of improvement.

Overview of the curriculum

The fundamental QI curriculum can be delivered in a number of ways, including having it delivered over two academic half days (seven hours in total) in the beginning months of postgraduate year 1, as is done at UBC. On each of these academic half days, trainees attend a didactic session and participate in two interactive workshops. Whatever format you choose, the curriculum can be adapted to suit your particular program by including specialty-specific content and examples.

Some guiding principles:

- Use a combination of didactic, interactive and case-based curricular methods.
- Include ample clinical examples in the didactic sessions.
- The interactive workshops are best delivered in a small-group format with no more than six participants per group.

Also included with this book are a number of modifiable tools, which can be downloaded (individually or in a package) by clicking on the hyperlinks provided. These hyperlinks connect to the Royal College of Physicians and Surgeons of Canada's website (allowing for updates to the tools when necessary). A static version of each tool is also provided at the end of the book for your reference while reading.

- Tool 1 covers some basic concepts of quality improvement (a more thorough discussion is beyond the scope of this book; please refer to the section on further reading and additional resources). (Acces on-line: canmeds.royalcollege.ca/en/tools)
- Tool 2 provides an example of the QI charter, as well as a modifiable form that can be adapted to your curriculum use. (Acces on-line: canmeds.royalcollege.ca/en/tools)
- Tool 3 provides modifiable forms that can be adapted for the four workshops. (Acces on-line: canmeds.royalcollege.ca/en/tools)

[TIP]

Once your fundamental curriculum is up and running, you may find it useful to appoint residents who previously completed the QI curriculum as leaders for the interactive workshops, as they will help to engage the interest of junior trainees.

Sample learning objectives

The following learning objectives cover the fundamentals of QI curriculum. At the end of this foundational level, the trainee will be able to

- Distinguish between quality assurance (QA) and quality improvement (QI).
- Write an aim statement for a QI process.
- Determine how to organize a QI team for a clinical process.
- Generate a flow chart for QI of a clinical process.

- Answer the following three questions of the model for improvement: What are we trying to accomplish? How will we know that a change is an improvement? What changes will we make that will result in an improvement?
- List at least one outcome measure, one process measure and one balancing measure for data collection.
- Consider how data collection can take place at baseline and after changes have been implemented in the clinical process.
- Summarize how data collection can be embedded in the workflow.
- Interpret a run chart and/or control chart by identifying common-cause versus special-cause variation of the data.
- Discuss whether an intervention appears to work (improvement) or not work (non improvement) on the basis of the data analysis.

Delivering the curriculum

As seen in Table 5.1, the fundamental QI curriculum can be delivered over two academic half days (seven hours in total), with the first session introducing the concepts of QI, and the second session exploring deeper. In the sample plan, each session consists of a didactic session and two interactive workshops. Trainees are also assessed on their knowledge of QI before starting the curriculum and after completion. Having a recent graduate of the QI program discuss his or her QI project in session 1 will also garner interest among the learners.

Table 5.1 Fundamental QI Curriculum Overview

First academic half day	*Second academic half day*
• Pre-test assessment **A didactic session introduces QI concepts** • The difference between QI and QA • Plan-Do-Study-Act (PDSA) cycle as the model for improvement • Team composition • Choosing an appropriate QI project • Invited speaker (a recent graduate of the QI program discusses his or her QI project) **Two workshops provide practical experience** • Selecting a team, choosing a topic, writing an aim statement • Flowcharting the current process to be studied	**A didactic session discusses project management with the QI charter** • Performance improvement goals • Project accountability • Measures and indicators • Conclusions and protocols **Two workshops provide practical experience** • Establishing data collection • Interpreting the PDSA cycle • Post-test assessment

Assessment

For assessment, a number of tools are available, including the Self-Assessment Program (SAP) and the Quality Improvement Knowledge Application Tool (QIKAT) which now includes an updated version, the Quality Improvement Knowledge Application Tool Revised (QIKAT-R). The SAP and the QIKAT/QIKAT-R can be administered at the start of the first session to establish a baseline of the trainee's knowledge of QI. After the second session is completed, the assessment should be repeated, using the SAP and a different version of QIKAT/QIKAT-R. Using a second version of QIKAT/QIKAT-R will minimize any learning effect related to the test. Further information on assessment and these tools can be found in Chapter 8.

[TIP]

The QIKAT is a wonderful example of QI in action. It has evolved into the QIKAT-R with an improved scoring rubric designed to address some of the challenges of the original tool such as "its subjective nature and inconsistent reliability" (Singh et al 2014). After testing the validation of QIKAT-R over three years, Singh et al concluded that QIKAT-R retains the desirable qualities of the original tool while also providing better interrater reliability.

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Model curriculum: intermediate QI

- Overview of the curriculum
- Sample learning objectives
- Identifying what makes a good QI project
- Choosing a manageable project
- Project selection in a clinical setting
- Annual QI Day
- Annual QI Awards
- Assessment

[06]

Model curriculum: intermediate QI

"Experiential learning is a particularly powerful way to learn QI. For residents, the experience should be clinically relevant and part of their daily work lives." (Dr. Richard Sztramko, University of British Columbia)

The intermediate-level QI curriculum in medical education is designed for residents who have a special interest in QI. It introduces learners to the clinical opportunities and risks associated with QI work and gives them an opportunity to conduct a QI project. It is analogous to the core competencies of the *CanMEDS Physician Competency Framework*, whereby the physician would be able to meet the following milestones of the Leader Role (Frank et al 2015):

- Analyze and provide feedback on processes seen in one's own practice, team, organization, or system.
- Participate in a patient safety and/or quality improvement initiative.
- Actively encourage all involved in health care, regardless of their role, to report and respond to unsafe situations.
- Engage patients and their families in the continuing improvement of health care quality.
- Model a just culture to promote openness and increased reporting.

Overview of the curriculum

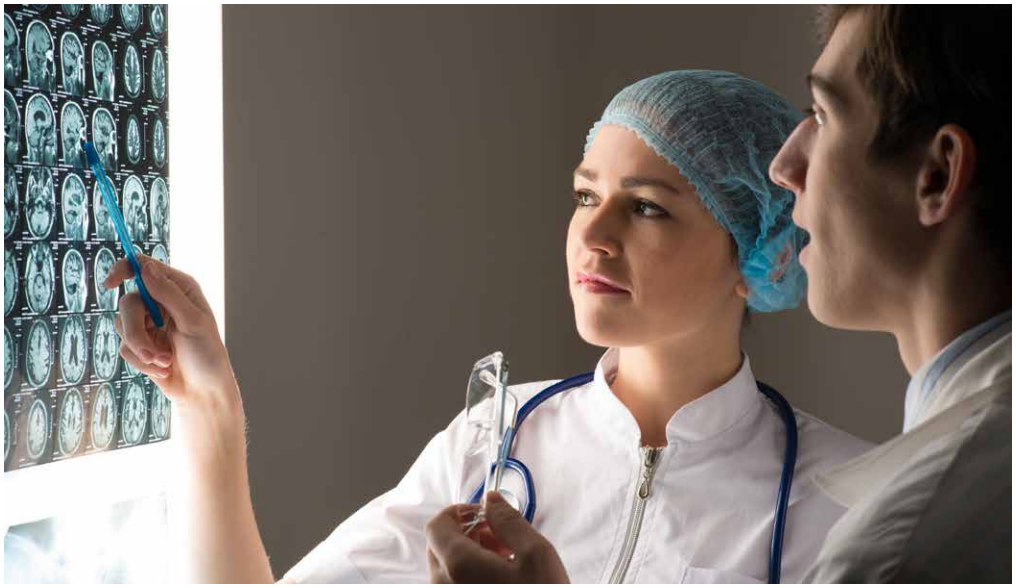
The intermediate curriculum design involves residents forming teams to do a QI project over the span of 11 months, beginning in January of postgraduate year 1 (based on having residents complete the fundamental curriculum in August and September of the previous year). Projects are at the heart of this intermediate curriculum and faculty sponsors oversee the trainees without micromanaging them. To ensure success, residents should be encouraged to select small and focused QI projects that can be completed by teams of four or five people.

Some guiding principles:

- Where possible, choose a longitudinal curriculum with an emphasis on experiential learning.
- Set aside adequate protected time for residents to participate in QI activities, for instance, one hour per week for 11 months. For ease of tracking, this hour can be tagged as part of the same block of time as the academic half day protected time.
- Expect resident project teams to stay in regular contact with their faculty sponsor but leave the timing and frequency of the interactions up to the residents.
- A project may produce unexpected or negative results, but residents should be counselled not to feel discouraged by such findings. Any sort of experiential learning should be embraced.
- Tailor the QI curriculum to meet the needs of any program by including specialty-specific content and examples.
- When you implement your QI curriculum, you may be pleasantly surprised to find out that hospital administrators are very interested in what you are teaching your residents. After all, QI involves process re-engineering, and process re-engineering is a common occurrence in health care organizations.

[TIP]

As you develop your QI curriculum, it is strategically sound to engage QI staff, hospital administrators and community-based health professionals early and completely in what you are doing. Many QI opportunities are present in acute care hospitals and residents tend to select QI projects in the hospital setting because they are most familiar with the setting. As well, hospital staff with theoretical and practical QI knowledge can help to provide didactic sessions and mentor small groups. The infrastructural support is also there for data acquisition and analysis for resident QI projects.



Sample learning objectives

The learning objectives below reflect the increasing complexity of QI training and build on skills learned in the fundamental QI curriculum. For instance, at the end of the intermediate curriculum, the trainee will be able to

- Form a QI team and decide on the accountability of the team members.
- Select a clinical area for a QI project and a venue for data collection.
- Produce at least one aim statement for a self-selected QI project.
- Develop a QI charter by answering the three core questions of the model for improvement for the self-selected QI project: What are we trying to accomplish? How will we know that a change is an improvement? What changes will we make that will result in an improvement?
- Establish a timeline that is realistic and feasible.
- Establish appropriate division of labour among team members.
- Identify needs for QI support and resource requirements.
- Identify indicators for data collection, including at least one outcome measure, process measure and balancing measure.
- Devise plans for data collection to ensure feasibility and sustainability.
- Analyze the data collected, with the aid of QI analysts, in the form of run charts and/or control charts.
- Discuss whether an intervention appears to work (improvement) or not work (non improvement) on the basis of the data analysis.

Identifying what makes a good QI project

Many adult learners prefer to learn through actual experiences, especially when they are dealing with complex theoretical constructs, such as QI in the clinical setting. For residents, gaining experience that is clinically relevant and part of their daily work lives is a particularly powerful way to learn QI. Any number of clinical experiences can be turned into learning moments. For instance, a QI project can be built around any initiative that aims to

- Reduce error;
- Examine variation;
- Examine service, improve the provider–patient interface;
- Change the work environment, improve workflow, manage time, eliminate waste;
- Optimize health care inventory.

Choosing a manageable project

When residents are learning QI, it is important that they complete their tasks (project) from start to finish, so it is perfectly fine for them to take on small but doable projects. Encourage residents in your intermediate and advanced curricula to select small scale and focused QI projects that can be completed by teams of four or five residents. Residents may want to choose their own sponsor and identify their own QI project, but you can also offer a list of possible topics and potential sponsors (see example in Table 6.1). For this reason, you may find it useful to keep a database of all the topics and sponsors of the projects that

have been conducted to date, which can be used to stimulate residents' thinking about topics. The database also provides interesting historical information on changing interests and increasing complexity of projects.

Table 6.1 Sample list of possible topics and faculty sponsors

Program	*Sponsors*	*Suggested topics*
Critical Care Medicine	Drs. A, B and C Dr. D	Protocols to reduce hemodynamic instability during hemodialysis in the intensive care unit (ICU) Improving the process of intubation in the ICU
General Internal Medicine	Dr. G Dr. H	Unplanned trips to the ICU from general medical wards Pain management and polypharmacy

Some guiding principles:

- Have residents reread the material from the fundamental curriculum and remind them that a small change can have a big impact.
- Choose projects where the problems are within the control of the QI team — don't try to solve other people's problems. Select something meaningful to those doing the work. Ensure that what will be studied is not undergoing change from another source.
- Align projects with other QI activities that are known to be occurring in the clinical setting if possible — this will open up support and resources, and promote sustainability.
- Provide guidance through multiple tutorials. As they progress through the curriculum, residents will be able to respond to questions and address objectives in an increasingly sophisticated way and this will be reflected in the tutorials.
- Residents should anticipate complications or hassles and, again, should be reminded not to be discouraged if their project yields unexpected or negative results — any sort of experiential learning is valuable.

[TIP]

As we move our residency learning opportunities into community and ambulatory care settings, it makes sense to encourage residents to select community-based QI projects. Overcoming any barriers — such as a lack of community-based faculty sponsors or a lack of familiarity with QI among health professionals working in the community — will be well worth the effort, as the population base is much larger in the community than in the hospital, and thus community-based QI projects have the potential to have a much broader impact than hospital-based ones.

Project selection in a clinical setting

Residents may be interested in conducting QI in a clinical setting and the same general guiding principles for QI, such as choosing a small project, will apply. At the same time, it should be understood that a QI program that is successful in one jurisdiction will not necessarily be successful should it be implemented in a different jurisdiction.

Specific steps for conducting QI in a clinical system include:

- Write aim statements that are clear, concise and population specific and that have a measurable outcome over a specified time frame.
- Flowchart the steps of the clinical process.
- Sample just enough baseline data to be able to make a sensible judgment.
- Collect baseline data (e.g. complete run and control charts).
- Develop a plan for a change.
- Communicate the plan to stakeholders.
- Implement the plan.
- Collect data to evaluate the plan (PDSA cycling).
- Provide feedback to the team.
- Repeat the relevant steps to implement the next change.
- Disseminate the results of the evaluation.

As in any QI project, residents will be using the commonly accepted model for improvement that asks three essential questions: (a) What are we trying to accomplish? (b) How will we know that a change is an improvement? and (c) What changes can we make that will result in an improvement (Deming 2000; Langley et al 1996). Success can be measured using balanced indicators that look at clinical outcomes, functional outcomes, users' satisfaction and financial costs, to name a few.

[TIP]

It is important to remember that QI work should focus on addressing specific parts of the clinical system at a time rather than trying to overhaul the entire system at once.

Annual QI Day

When you launch your QI curriculum, you may discover that many learners and colleagues are unfamiliar with the concept. Some ways to show learners and teachers the relevance of QI and its impact on clinical practice are through practice audits, personal portfolios and through the self-assessments completed by the trainees on their QI experiences.

Another way is to hold an annual QI Day. This event gives residents a venue for the scholarly dissemination of their QI project findings (Wong et al 2007) while also raising awareness of QI. Activities can include a plenary lecture by an established QI scholar from another institution. This not only adds prestige to the QI Day but also motivates residents to continue to conduct QI work after they finish the curriculum. Cap off the day by concluding with the presentation of awards.

[TIP]

The QI Day should be timed strategically to maximize its educational impact. For instance, if you deliver the fundamental curriculum during two academic half days in August and September of postgraduate year 1, then residents will conduct their QI project from January to November of the following calendar year (i.e., in the final months of postgraduate year 1 and the initial months of postgraduate year 2). By holding the QI Day at the end of November it means that the first-year residents can learn how to present a completed QI project by watching their second-year counterparts.

Annual QI Awards

Everyone likes to be recognized and rewarded for a job well done, and QI learners are no exception. An award structure created specifically for QI will not only recognize resident achievement in QI but may provide extra motivation for residents to develop skills and acquire knowledge outside of the Medical Expert domain.

Different educators may have different opinions about what constitutes appropriate recognition, and thus the details of the award structure may vary from program to program. The idea is to offer something that will matter to your learners and to have a formal presentation of awards, such as at a QI Day. Here are some suggested award categories:

- **Best Overall QI Project by Medical Residents.** Awarded for the QI project that best incorporates the clinical/patient focus, exemplifies the principles of improvement and achieves measurable outcomes.

- **Patient Safety and Best Practice Award for Medical Residents.** Awarded for the QI project that demonstrates the greatest applicability to promoting patient safety and best practice.
- **Quality Award for Effective Teamwork.** Awarded to the team that best demonstrates a balanced contribution of skills and knowledge from all individual team members and that is highly effective in engaging the clinical team that is affected by the process being changed.

Some guiding principles:

- The terms of reference for resident QI awards should reflect goals that are achievable within the span of the QI curriculum.
- Short-term awards may include cash prizes, commemorative certificates and celebration meals. Funds for cash awards can be raised from sources such as university departments and health care organizations.
- Longer term rewards may include documentation of a resident's QI achievements in future reference letters to support subspecialty fellowship and/or job applications, and sponsorship of a resident's presentation of his or her work at national or international QI conferences.
- QI projects should be judged by an adjudication panel chaired by a QI expert (perhaps the keynote speaker at QI day). Other members of the panel can include a senior representative of the local teaching hospital (e.g., the vice-president of medicine), the head of the local QI department, and a representative of the department hosting the QI day.

Assessment

Various frameworks exist for tracking (documenting) the residents' experience, which is helpful for later reflection as well as accreditation purposes. These include the completion of a written report, the compilation of a portfolio (with a reflective essay), and conducting a clinical QI project, where findings and performance can be measured. Assessment tools include the Self-Assessment Program (SAP), the Quality Improvement Knowledge Application Tool /Revised (QIKAT/QIKAT-R) and the balanced score card.

The balanced score card approach simulates what goes on in actual clinical QI work, is commonly employed by health care organizations, and it generates rich information. More information on assessment as well as these tools can be found in Chapter 8.

Reference

Frank JR, Snell LS, Sherbino J, et al. CanMEDS 2015 Milestones Guide. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.

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Model curriculum: advanced QI

- Overview of the curriculum
- Sample learning objectives
- Developing the QI abstract
- Annual QI Day and Awards
- Assessment

[07]

Model curriculum: advanced QI

"The QI departments of the hospitals affiliated with UBC have enthusiastically embraced the QI curriculum and the residents' projects. They have also acted as adjudicators for our Resident QI Day and we have received financial support from hospital administrations for our QI awards." (Barbara Trerise, Providence Health Care, British Columbia)

The advanced level QI curriculum is an extension of the intermediate level curriculum and is designed to provide residents with an advanced level of competency-based QI learning. It targets trainees who are considering a potential career trajectory in QI or who are interested in more elaborate systemic design. It is analogous to the transition to practice competencies of the *CanMEDS Physician Competency Framework*, whereby the physician would be able to meet the following milestones of the Leader Role (Frank et al 2015):

- Apply the science of quality improvement to contribute to improving systems of patient care.
- Contribute to a culture that promotes patient safety and quality improvement.

Overview of the curriculum

At the advanced level, residents further develop their scholarly competencies, including learning how to compose a standardized abstract for their QI project and subsequently present the findings of their project as a team.

Some guiding principles:

- As with the fundamental and intermediate curricula, it is recommended that a longitudinal curriculum be used, with an emphasis on experiential learning.
- Working in conjunction with the intermediate curriculum, promote interest in QI with an awards program and use the annual QI Day event to spotlight the trainees' QI projects.
- You may also wish to engage the heads of your hospital QI departments as adjudicators for a Resident QI Day and seek financial support for the QI awards from hospital administrations.
- The advanced curriculum can be tailored for your residents by including specialty-specific content and examples.
- To help raise awareness of your QI curriculum you can encourage your residents to submit their finished projects to national and international QI conferences.

Sample learning objectives

After having achieved all of the learning objectives for the fundamental and intermediate QI curricula, the trainee working at the advanced level will be able to

- Lead a QI team.
- Align QI with health promotion and disease prevention strategies.
- Explain the ethical implications of collecting data for QI.
- Seek ethical approval when indicated.
- Write a QI abstract that meets standard criteria.
- Produce and deliver, with team members, an oral presentation of the findings of a QI project in a podium session.
- Write a QI scholarly article that meets standard criteria.

Developing the QI abstract

The advanced curriculum is where residents will learn how to compose a standardized abstract for the QI project they had conducted during the intermediate curriculum, write a scholarly paper, and present the findings of their project as a team in a podium setting. Coming into the advanced curriculum, trainees will have completed the data collection for their QI project and started the data analysis. They are introduced to the standard structure of a QI abstract in a tutorial session, and are also provided specific abstract guidelines as well as a sample abstract to follow. Working with their advisor, trainees prepare the team's abstract and prepare their presentation at a specified date.

Example 3 : Sample QI abstract

Effect of an educational program and new data collection method on rates of central line insertion data collection, use of sterile technique strategies, and incidence of catheter-related bloodstream infections in a medical intensive care unit (ICU).

S. Mountain, J. Rodrigo, C. Gray, J. Al Barrak, P. Dodek
Department of Medicine, University of British Columbia, Vancouver, BC

Problems:

Need for improved data collection methods to determine what steps line inserters are taking to ensure sterile technique; and need for improved observation of the tenets of sterile technique to reduce the incidence of catheter-related bloodstream infections.

Aim:

To increase the percentage of lines for which insertion data are collected by 50% within 2 months in a medical ICU; to increase the number of strategies for sterile line insertion employed by inserters by 10% within 2 months in a medical ICU; to decrease the incidence of catheter-related bloodstream infections by 10% within 2 months in a medical ICU.

Key measures for improvement:

Percentage of central line insertions for which data regarding sterile insertion technique are collected; number of strategies for sterile line insertion employed by inserters; incidence of catheter-related bloodstream infections.

Process of gathering information:

Data regarding line placement technique were gathered in two ways; initially line inserters were randomly surveyed after they placed a line by two data collectors stationed in the ICU. After our intervention, data were collected by voluntary completion of an online form that automatically generated a line placement procedure note.

Data on the actual number of line placements in the ICU were collected independently by ICU data collection personnel not affiliated with this study. These data collectors also documented all incidents of catheter-related bloodstream infections as defined by a strict set of predefined criteria.

Analysis and interpretation:

Table 7.1 Results before and after providing an educational session on proper sterile technique in line placement, posting reminder notices and introducing an online standardized procedure form and note.

Table 7.1 Analysis of results — line placement technique

	Prior to intervention	*Post intervention*	*Difference*
Percentage of line placements for which data were collected	19.2	47.2	–27.98 ($p < 0.0001$)
Number of sterile technique strategies employed in line placement	9.67	9.8	0.133 ($p = 0.663$)
Incidence of catheter-related bloodstream infections	0.155/1000 line hours	0.085/1000 line hours	–0.07/1000 line hours ($p = 0.211$)

Strategies for change:

Multiple measures, including an educational presentation, posters and an online data collection form and automated procedure note, were instituted.

Effects of change:

Percentage of line placements for which data were collected was increased significantly, from 19.2% to 47.2%. Our intervention was not associated with an increase in the overall rate of use of sterile techniques. However, in some of the individual strategies, such as use of surgical caps and ultrasound, a significant difference was demonstrated. The low baseline incidence of catheter-related bloodstream infections did not change significantly after our intervention.

Lessons learned:

Current data collection methods limit our ability to effect change, as it is difficult to determine current practices.

Newer data collection methods can be much more effective at allowing us to capture a broader picture of procedural techniques, and they can also serve as an educational reminder for best practices.

Sterile technique is quite well observed in our medical ICU. However, some lapses in observation of full technique were amenable to change associated with our interventions.

The relatively low baseline incidence of catheter-related bloodstream infections was not affected by our interventions as assessed over a relatively short period of time.

Keywords: intensive care unit; catheter-related bloodstream infections.

Annual QI Day and Awards

As with the Intermediate Curriculum, an annual QI Day gives residents a venue for the scholarly dissemination of their QI project findings while also raising awareness of QI. The event also offers the perfect opportunity to recognize QI learners for a job well done with the presentation of annual QI awards.

Assessment

To assess residents in the advanced curriculum it is recommended that the balanced score card be used. More information on assessment as well as this tool can be found in Chapter 8.

References

Frank JR, Snell LS, Sherbino J, et al. CanMEDS 2015 Milestones Guide. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.

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Assessing QI competencies

- Self-Assessment Program (SAP)
- Quality Improvement Knowledge Application Tool / Revised (QIKAT/QIKAT-R)
- Balanced score card
- Portfolio
- Practice audit

[08]

Assessing QI competencies

"Observe, record, tabulate, communicate. Use your five senses. Learn to see, learn to hear, learn to feel, learn to smell, and know that by practice alone you can become expert." (Sir William Osler, 1st Baronet, M.D.)

As in medical education, assessment is an essential component of a QI curriculum: it helps educators to ascertain the effectiveness of their teaching and the extent of the trainees' learning and it helps to meet certain accreditation requirements. As well, the information obtained from content- and context-specific assessment methods can help improve a QI curriculum. It is therefore important to not only build an assessment framework into your QI curriculum but to think about developing the curriculum and assessment frameworks concurrently.

Some of the common assessment tools that can be used with a QI curriculum include

- Self-Assessment Program (SAP);
- Quality Improvement Knowledge Application Tool / Revised (QIKAT/QIKAT-R);
- Balanced score cards;
- Portfolios;
- Practice audits.

ABOUT THE TOOLS: Included with this book are a number of modifiable tools, which can be downloaded (individually or in a package) by clicking on the hyperlinks provided. These hyperlinks connect to the Royal College of Physicians and Surgeons of Canada's website (allowing for updates to the tools when necessary). A static version of each tool is also provided at the end of the book for your reference while reading.

Self-Assessment Program (SAP)

The SAP is a standardized, validated tool for assessing QI competencies (Ogrinc et al 2009). As with any self-report questionnaire, it is easy to use and can be administered to learners at all levels of QI knowledge. The main limitation of the SAP is that improvements in SAP scores may not correlate with improvements in QI knowledge and skills.

Some guiding principles:

- Administering the SAP is a good way to start a QI curriculum as it allows residents to reflect on their own comfort level in conducting QI work.
- You might deploy the SAP at different points such as at baseline, immediately after teaching the fundamental curriculum, and after completion of the advanced curriculum. The tool can be used at any stage, however. For example, if you are not offering an advanced curriculum, you could administer the SAP at the end of the intermediate curriculum.
- Because of the risk of assessment fatigue, it is recommended that the tool not be administered more than three times to a given group.

It is interesting to look at any change in SAP scores over time as the curriculum continues to be rolled out. The information collected through use of the SAP reflects the attitudinal aspects of QI teaching and learning. SAP data can also be used for future needs assessment.

Quality Improvement Knowledge Application Tool / Revised (QIKAT/QIKAT-R)

The QIKAT is a standardized, validated tool that allows residents to apply their QI knowledge to clinical cases by completing a case-based learning exercise (Ogrinc et al 2004). The information collected reflects the knowledge aspects of QI teaching and learning. The main limitation of the QIKAT is that improvement in knowledge scores may not correlate with improvement in clinical performance. A revised version, QIKAT-R, which contains a new scoring rubric, was tested and validated over three years and was found to provide better interrater reliability (Singh, Ogrinc et al 2014).

Some guiding principles:

- As with the SAP, the QIKAT/QIKAT-R can be administered to learners at all levels and is useful for tracking changes in knowledge over time (e.g., at baseline, after completion of the fundamental curriculum and after completion of the intermediate or advanced curriculum).
- If you plan to administer the tool to the same residents pre and post curriculum, it is recommended that different case studies be used in the second QIKAT/QIKAT-R in order to minimize any learning effect related to the test.

Balanced score card

The balanced score card is best used to evaluate learners at the intermediate or advanced levels. Using this tool, QI experts or faculty members rate the learners in a number of areas, such as behaviours, QI skills, and project findings, using a scale of 0 to 5. The approach simulates what goes on in actual clinical QI work and is commonly employed by health care organizations. It also generates rich information. The main limitation of this approach is that the score card must be completed either by QI experts or by faculty members who have received significant training on how to do this task.

Portfolio

Many elements of the QI learning experience and project findings can be conveniently collected within a personal portfolio. The information collected in a portfolio reflects the longitudinal growth in a learner's knowledge, skills and attitudes. In addition to facilitating future reflection by the learner, it provides a convenient means by which others can assess the learner's progress.

Portfolios can be either paper-based or in an electronic format. The portfolio approach, which can be used for learners at all levels, is gaining popularity, and is well-suited for small and medium-sized residency programs. The main limitations are that the learner must reflect on what they have learned, and the portfolio must be reviewed with a faculty member (preferably with expertise in QI) on a regular basis.

Practice audit

A practice audit is a pragmatic way to assess the impact of QI learning on actual clinical practice. However, practice audits may require more resources than the other assessment methods described in this chapter. Future studies are needed to determine whether the benefits of assessing QI trainees via practice audits justify the resources that must be expended to conduct the audits.

References

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Curriculum evaluation

- Evaluating the QI curriculum at UBC

[09]

Curriculum evaluation

"The QI curriculum should be subjected to the same model for improvement similar to any other clinical QI initiatives." (Wong and Roberts 2008)

Is it necessary to improve on an improvement curriculum? The answer is definitely, yes. Any QI curriculum should undergo continuous improvement to maintain its validity and freshness. Iterative changes will help to ensure that the curriculum remains current and continues to provide a good fit for the target learners.

Some guiding principles:

- Implement an appropriate evaluation program for the curriculum, possibly involving tools such as Plan-Do-Study-Act (PDSA) cycling and change management techniques. With PDSA cycling, waves of small improvements in the curriculum can be tested, evaluated and refined if necessary.
- Take a pragmatic approach to curriculum evaluation. As with QI projects for trainees, it is not necessary to embark on a big study. Instead, make changes to your curriculum objectives, to your lesson plans or to the examples you use in your teaching sessions, then evaluate whether these changes improve the curriculum or not.
- Evaluate both outcome and process measures. It is also important to anticipate challenges and to develop strategies that will address challenges proactively.
- Solicit ongoing feedback from residents. Residents who have just completed the curriculum can provide valuable input but also, individuals who completed the program a few years earlier can provide important information.
- Tap into the expertise in curriculum evaluation that may be available elsewhere in your local environment. For example, liaise with the education units in other departments or faculty units. You may also wish to ask physicians who completed the QI curriculum in the first years of your program to come back and teach it and to help improve it.

Evaluating the QI curriculum at UBC

UBC's QI curriculum is a two-phase, competency based curriculum that was developed with didactic workshops and longitudinal, team-based QI projects (Fok and Wong 2014). To evaluate the curriculum, a prospective, cohort study over four years (2007–2011) was carried out, using pre-post curriculum comparison design in an internal medicine residency program in Canada. Overall 175 post-graduate year one internal medicine residents participated. The main outcome measures included self-assessment, objective assessment using the Quality Improvement Knowledge Application Tool (QIKAT) scores to assess QI knowledge, and performance-based assessment via presentation of longitudinal QI projects.

Our study showed that QI knowledge (measured and self-reported) could improve with didactic teaching alone. This is important since many of the barriers and challenges encountered relate to the actual QI project. We also noted that residents' QI knowledge not only improved after didactic curriculum, this improvement was sustained at twelve months post-project curriculum with the completion of the QI projects. This suggests that experiential learning may importantly contribute to such sustainability of QI knowledge.

We have observed that the scope of the QI projects undertaken by the residents broadened over the years. One possible explanation is that there might be some degree of "meta-learning" among the resident classes as the senior residents became more comfortable and/or engaged in QI (that is, this might signify the beginning of an underlying cultural shift in favour of QI, although we did not study this outcome specifically in this study). We have seen this shift in other ways as well. When QI training was first developed for the postgraduate medical education curriculum in the Department of Medicine at UBC, trainees were not interested in learning about QI, perhaps simply because they were not aware of it. Now, QI has become such a fundamental component of the training program at UBC that medical students talk about their interest in QI at their interview for a residency position, and some even have an idea for a QI project.

Table 9.1 lists common challenges as well as mitigation strategies in the evaluation of a QI curriculum.

Table 9.1 Challenges and mitigation strategies in evaluating a QI curriculum

Challenge	*Mitigation Strategy*
Curriculum evaluation is an "after-thought"	Build in curriculum evaluation in the early phase of curriculum development
Lack of evaluation expertise	Engage evaluation expertise from experienced QI teams (e.g. health authority, hospital, etc.)
Lack of funding to support evaluation	Include evaluation costs in curriculum budget
Lack of feedback mechanism after curriculum evaluation	Ensure the model for improvement (e.g. PDSA cycle) is applied to the curriculum
Change management	See Dickson G et al, *Evidence-Informed Change Management in Canadian Healthcare Organizations* for advice on effective change strategies

References

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Some advice to help smooth the way

- How can I prepare myself to teach QI?
- What should I consider as I start to develop my QI curriculum?
- Who are the key stakeholders I need to engage?
- How can I recruit like-minded teachers?
- What can I do to increase a successful implementation of my QI curriculum?
- What information should I provide to someone interested in a QI career?
- How can we encourage others to implement QI training?

[10]

Some advice to help smooth the way

It can seem like a daunting prospect to create and implement a QI curriculum but the results that you can achieve — both in terms of equipping individual residents to conduct QI work and in incorporating QI into your organization's culture — are well worth the effort. The questions and answers that follow are designed to help you as you begin to design your own QI curriculum.

I'm interested in teaching QI, but I'm not sure I'm equipped to lead the implementation of a QI curriculum. How can I prepare myself for the task?

Implementing and leading a QI curriculum is not easy, but you can make your job a bit easier by following the principles of effective curriculum change management (Frank 2007). It may also be helpful to review the four aspects of emotional intelligence, an attribute that has been said to distinguish effective leaders from everyone else (Goleman 2004): self-awareness (self-confidence, accurate self-assessment), self-management (self-control, trustworthiness, conscientiousness, adaptability, achievement orientation, initiative), social awareness (empathy, organizational awareness, service orientation), and social skills (visionary leadership, influence, developing others, communication, change catalyst, building bonds, teamwork and collaboration).

What are the most important things to consider as I start to develop a QI curriculum in my local setting?

There are several key elements that QI curriculum developers should work through early in the process (Wong and Roberts 2008). These include:

- Create a formal curriculum.
- Teach trainees the basic theory of QI and then have them work in teams to conduct a small and focused independent project.
- Use interactive and case-based teaching.
- Ensure that there is adequate protected time for teaching and learning.
- Integrate the teaching of important skills related to QI (e.g., team building, communication) into the curriculum.
- Provide longitudinal and face-to-face mentoring.
- Raise awareness of QI and of your QI curriculum by planning an open forum.
- Create a QI assessment and reward system.
- Seek the assistance of administrative staff members at your hospital who have theoretical and practical knowledge of QI: they can be helpful in teaching, mentoring small groups and providing infrastructural support for data acquisition and analysis.

Who are the key stakeholders I need to engage?

You will need to get buy-in from both educational leaders (e.g., program directors, division heads, department heads, leaders from the postgraduate dean's office and leaders from the educational units of the faculty of medicine) and clinical leaders (leaders responsible for quality and patient safety, clinical department heads, clinical division heads, the vice-president of medicine and the chief executive officer of the hospital or health region).

I am keen to teach QI, but I can't teach an entire QI curriculum by myself. How can I recruit like-minded teachers to share the teaching workload?

You may face a significant challenge in recruiting teachers for your QI curriculum, in part because QI knowledge is still far from optimal among many of today's clinician-educators and in part because many potential teachers have a limited interest in QI. A multi-pronged approach may help to address this challenge:

- In the short term, recruit teachers from other departments (either clinicians or non-clinicians) or look beyond your medical school or hospital (e.g., you could consider recruiting teachers from your university's business school).
- In the longer term, consider offering faculty development to enlarge the pool of teachers. For example, you can organize "train the trainer" courses at the local university (or universities).
- Encourage QI curriculum graduates to take additional training in QI and then return to teach for you. It might be helpful to liaise with the faculty development office or medical education office at your institution and try to synergize your efforts with theirs.
- At the national level, you can establish a QI collaborative model (e.g., using the Institute for Healthcare Improvement's collaborative model) or you can offer training using web-based technology such as webinars or webcasts.

I'm developing a QI curriculum. What can I do to increase the likelihood that the implementation will be successful?

As you develop your curriculum, think carefully about the financial, human and other resources that are available to you and select elements for your curriculum that you can deliver with those resources. For example, if you have a limited pool of potential teachers but you have access to a funding source, you might consider purchasing services from a vendor (e.g., through the Institute for Healthcare Improvement) for the didactic portion of your curriculum. If you have limited financial resources but reasonable human resources at your disposal, it will probably make more sense for you and your colleagues to deliver the didactic component independently. Another option is to arrange to have the didactic component delivered through a central administration (i.e., your university or hospital).

There are three main ingredients that will contribute to the success of your curriculum:

- The provision of dedicated, protected time for residents to learn QI;
- Support from your colleagues, your department and your institution; and
- Partnerships with local experts (your ability to form such partnerships may depend on the local staffing/resource situation).

In general, try to make use of what already exists and be innovative and flexible. Be prepared to face challenges related to heterogeneity in learner progress, bureaucracy and finances. A QI curriculum is not built or implemented overnight, so be patient.

My department's QI curriculum is up and running. One of the learners is looking for more information about QI and is wondering whether to pursue QI as a career pathway. What should I say?

Higher QI training and career trajectories are not easy to identify, but opportunities are slowly growing. Residents (and their teachers) need to understand that with appropriate training and experience, QI can become a viable career path. Residents interested in pursuing a career in QI will first need to obtain advanced training in QI. You can suggest that your resident seek out one of the specialized QI fellowships that are now available in some jurisdictions. You should advise the resident to ensure that the necessary financial and infrastructural support is available at the institution where he or she wishes to undertake advanced QI training. Career trajectories for individuals with advanced training in QI are starting to become available in some jurisdictions. These often entail a combination of academic duties (with scholarly and educational deliverables) and clinical duties.

My colleagues and I are offering a QI curriculum in our department, but we would like to see QI training offered more widely. How can we encourage others to implement QI training?

The best way is to share your QI curriculum whenever possible. To facilitate local dissemination, it is crucial that you establish the processes and infrastructure for your curriculum centrally, such as at the university faculty or departmental level or the health regional or hospital/clinic level. Try to liaise with the QI department at your hospital and clinical departments. You should also connect with the faculties of education and business at your university. You will need to obtain commitment to the curriculum from your institution's leaders if you want to disseminate it beyond your department.

You can increase local awareness of your QI curriculum by organizing a QI Day with an award structure (see Chapter 6). To raise awareness at the national and international levels, you can encourage your residents to submit their finished projects to QI conferences. Also consider organizing workshops and symposia at conferences and sharing success stories from your curriculum in Internet chat rooms.

Support from national accreditation bodies (e.g., the Royal College of Physicians and Surgeons of Canada and the College of Family Physicians of Canada) and/or licensing bodies (e.g., provincial colleges of physicians and surgeons) can also be very helpful as you work to disseminate your curriculum.

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Additional resources

Organizations

Agency for Healthcare Research and Quality
(U.S. Department of Health and Social Services)
Office of Communications and Knowledge Transfer
540 Gaither Road, Suite 2000, Rockville, MD 20850 USA
www.ahrq.gov/

Alberta Access Improvement Measures (AIM)
Webpage accessed June 17, 2015
www.albertaaim.ca

Canadian Patient Safety Institute
Suite 1414, 10235-101 Street
Edmonton Alberta T5J 3G1 Canada
www.patientsafetyinstitute.ca/

Choosing Wisely Canada
Toronto, Ontario, Canada
Webpage accessed June 17, 2015
www.choosingwiselycanada.org

Institute for Healthcare Improvement
20 University Road, 7th Floor
Cambridge, MA 02138 USA
www.ihi.org

University HealthSystem Consortium
155 North Wacker Drive
Chicago, Illinois, 60606 USA
www.uhc.edu

Tools

UCLA Cardiovascular Hospitalization Atherosclerosis Management Program (CHAMP) for secondary prevention of atherosclerotic events www.med.ucla.edu/champ/

Glossary

Advanced QI curriculum	Curriculum that targets residents who are considering a potential career trajectory in Quality improvement (QI) or who are interested in more elaborate systemic design.
Balanced Score Card	The balanced score card is a tool that simulates what goes on in actual clinical QI work to assess a learner.
Baseline value	Measurement that is done at that starting reference point prior to quality improvement activity.
Block curriculum	Curriculum that is usually delivered in semesters.
CanMEDS framework	The CanMEDS Physician Competency Framework describes the knowledge, skills and abilities that specialist physicians need for better patient outcomes. The framework is based on the seven roles that all physicians need to have, to be better doctors: Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar, and Professional. Copyright © 2005 Royal College of Physicians and Surgeons of Canada.
Case-based curricular method	Pedagogical method where learning activities are based on case studies.
Cause and effect diagrams	A graphic design that often resembles a fishbone, it was first popularized by Kaori Ishikawa in the 1960s and is used to list any number of causes that could be contributing to a certain problem or effect.
Common-cause variation	Variation that is internal to a system, random (influenced by chance), repeatable.
Competency	Refers to a learner's ability to meet performance-based expectations.
Competency-based medical education	An outcomes-based approach to the design, implementation, assessment and evaluation of a medical education program using an organizing framework of competencies.
Didactic curricular method	Pedagogical method usually involving a lecture by the instructor and note-taking by the learners.

Enabling competency	Specifies the knowledge, skills and attitudes that are essential to the attainment of a key competency.
Experiential learning	Pedagogical method that encourages students to learn by doing and by reflecting on the experience.
Fundamental QI curriculum	Curriculum that gives residents a simple and basic level of competence in Quality improvement (QI).
Interactive curricular method	Approaches that encourage interactions between teachers and students, or students and students.
Intermediate QI curriculum	Curriculum that targets residents who have a special interest in Quality improvement (QI) by building on skills acquired in a fundamental curriculum.
Key competency	Describes the learner's broad ability in an area; key competencies are generally presented in frameworks as global educational statements.
Key process factors	The main elements of process improvement.
Knowledge translation	The Canadian Institutes of Health Research has defined knowledge translation as "a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system" Canadian Institutes of Health Research, Knowledge Translation Definition, from More about Knowledge Translation at CIHR, webpage accessed May 15, 2015 www.cihr-irsc.gc.ca/e/39033.html#Definition.
Longitudinal curriculum	Curriculum that is offered over several blocks of time.
Outcome data	Measurement that describes the result of how a system performs.
Patient characteristics	As part of baseline outcome data, patient characteristics are the measurements that describe results pertinent to patients.

Plan-do-study-act cycle (PDSA)	A system of steps in a model of improvement that allows changes to a process or product to be continually tested and then improved on.
Portfolio	The information collected in a portfolio reflects the longitudinal growth in a learner's knowledge, skills and attitudes.
Process data	Measurement of how a part or step in a system is performing.
Process improvements	Changes to an existing process that result in an improvement of the status quo.
Quality Assurance (QA)	A study or process to demonstrate that something meets certain requirements or criteria.
QI	Quality Improvement.
QI Charter	A detailed project plan in the form of a spreadsheet.
QI Day	Annual event to give residents a venue for the scholarly dissemination of their Quality improvement (QI) project findings.
QIKAT/QIKAT-R	Quality Improvement Knowledge Application Tool / Revised are tools used to assess a learner's knowledge of Quality Improvement.
Quality Improvement (QI)	A study or process by which we achieve desirable results.
Run charts	A line graph that measures outcomes in a logical progression, usually over time, and which is often used to identify trends or anomalies.
SAP	Self-Assessment Program, a tool that consists of a series of questions that learners answer to self-assess their knowledge.
Special-cause variation	Variation that is unusual and occurs suddenly. It is traceable to a specific circumstance and therefore attributable to a possible cause.

List of figures

TEACHING TOOL 1 — FUNDAMENTALS OF QI

Reproduced from the Society of General Internal Medicine PW08 Pre-Course (5/12/2004) "Getting Started in Continuous Quality Improvement." Faculty participants: M. Bergen, C. Braddock, S. Dembitzer, E. Holmboe, L. Osterberg, P. Rudd, C. Sharp. No reproduction without permission.

Quality assurance versus quality improvement

The process of traditional quality assurance (QA) starts when some event(s) fall(s) outside of the standard, creating an outlier. The immediate questions are "Who did this? Who allowed it to happen?" The immediate response from management is to conclude, "Bad apple! Get rid of him/her!" The immediate response from employees is to generate the cycle of fear and to worry individually if they are good enough to avoid punishment.

In traditional QA, the following assumptions are made:

1. Identifying and eliminating the "perpetrator(s)" will remove the outlier (the tail of the curve).
2. More inspections and eliminations will suffice to eliminate the tail.
3. What remains will somehow be excellent.

In reality, it is statistically impossible to eliminate the tail. Any reassessment is likely to confirm that the bell-shaped curve after intervention contains new events and individuals associated with outlying levels. The process itself is misdirected.

In contrast, quality improvement (QI) focuses on the average performance: what happens most often rather than what happens relatively rarely. The process of quality improvement seeks to reduce unnecessary variation, shifting the mean response in the desired direction and narrowing the distribution of responses. The goal is to improve the average common event rather than eliminate the rare, outlier event. The process of quality improvement thrives in learning environments that strive to improve the system of care and its processes rather than to focus on identifying and punishing individuals responsible for outlier events. Such environments encourage individuals to ask, "Am I the best that I can be?"

Model for improvement: the PDSA cycle

The Plan-Do-Study-Act (PDSA) cycle is the core model for improvement. When applied to a clinical process, the PDSA cycle pre-supposes the following:

- An explicit model of how the clinical process currently works.
- An enumeration and prioritization of potential steps or sites for interventions to improve the clinical process.
- A set of hypotheses about how one might intervene for process improvement.
- A selection of the top hypothesis (the best intervention to try first).

When an improvement process is well planned and executed, the PDSA cycle provides answers to three key questions:

- What are we trying to accomplish?
- What changes can we make that will result in an improvement?
- How will we know that a change is an improvement?

The PDSA cycle is not a one-time event. The cycle is repeated again and again as waves of small improvements are considered, tested, evaluated and incorporated if effective. The cycle may start with ideas, hunches or theories, but these must always be tested for practicality, impact and acceptability. The cycle involves learning as you go rather than insisting that a perfect or comprehensive plan be in place before the process starts. The changes for each improvement cycle may be small, but the cumulative impact may be large because of the repetitive nature of the cycles.

Quality improvement requires a project team

When conducting QI work, it is important to bear in mind that different stakeholders may have various levels of preparedness and therefore different receptivity to the changes that are involved. A good understanding of the change management principles can be helpful to building an effective QI project team. For individuals who are willing and ready to embrace change, engage them at the earliest possibility in the QI process. For individuals who are less inclined to embrace change right away, gradually bring them on board by involving them in early dialogue to address any questions or concerns they might have about QI.

Team size and composition

Team members are chosen for their fundamental knowledge of the clinical process to be improved as well as for their position as stakeholders who will implement any changes selected by the team. The optimal project team size for maximal participation is five to seven individuals. There are also differences in the composition of a project team, as compared to a committee.

Differences between a traditional committee and a project team

Committee	*Project team*
Representative individuals	Individuals who have gained fundamental knowledge from working in the trenches
Productive capacity = capacity of the single most able member	Synergistic efforts Productive capacity > sum of the capacities of the individual team members
Unequal ownership of group's efforts, group's conclusions or implementation	Team reaches consensus, even if not always in full agreement; all members have ownership of group's conclusions and implementation

Features of a good team

The following key characteristics will affect whether a project team functions well or poorly, regardless of team membership: rules, leadership, decision-making, accountability, and results. A good team also has the following features:

- *It is safe*: team members avoid personal attacks.
- *It is inclusive*: Team members remain open to potential contributors and they value diverse views rather than forming a clique.
- *It encourages open exchange*: All ideas are considered fairly, without prejudgment. The team fosters active participation.

- *It seeks consensus*: The team finds a solution acceptable enough that all members can support it. It does not require unanimity or that everyone be totally satisfied.

Additional useful rules for teams

- No complaints can be made unless they are accompanied by suggestions for solutions.
- Input and output are kept within the project team until the team is ready for dissemination.
- Once agreement occurs, the team speaks with one voice.
- Everyone gets his/her say, not his/her way.
- Silence will be judged to mean agreement.
- Meetings start and stop on time and follow a pre-announced agenda.

Discussion techniques

Some groups may benefit from having a formal team facilitator to enforce ground rules and suggest techniques to keep the discussion and process on track. These might include brainstorming, nominal group technique or Delphi methods.

Accountability

Members of effective QI project teams practise three complementary types of accountability:

- Accountability to the team: members follow project team rules and participate in the process.
- Accountability to the team member's constituency: members conduct reality tests of what can and cannot be done and communicate to their peers about the vision of what the team project might accomplish.
- Accountability to senior management: members are responsive to the overall priorities of the institution, resource constraints and the mission of the institution.

Project selection

In project selection, there is a continuum from overly meticulous preparation for action (analysis paralysis) at one extreme to precipitous action (fire, ready, aim) at the other. Two early dangers may also arise — the team may try to do too much (e.g., may try to change the entire system) and/or the team may decide in advance that one particular solution is the only solution that will address the problem.

Optimal results will probably be achieved by selecting a middle position that allows and encourages thoughtful preparation but acknowledges the need to move on to concrete action. At the same time, all potential projects can be classified on the basis of their probable impact (high vs. low) and their ease of implementation (easy vs. difficult).

For your first project, it may be best to select an endeavour that is easy to implement but has a limited impact. Accordingly, one should select a process to improve rather than a system. The process improvement effort then reflects a perceived problem rather than a pre-selected solution.

Some guiding principles:

- Select something meaningful to those doing the work.
- Choose projects where the problems are within the control of the QI team — don't try to solve other people's problems. Ensure that what will be studied is not undergoing change from another source.
- Focus on something that is not undergoing change from another source.
- Ensure the potential project has short-term, measurable parts.
- Aim for incremental change rather than taking on huge projects to achieve "perfection" or projects that have a high cost or high complexity.
- Anticipate complications, hassles, etc.

What to improve (Change management)

There are many possible changes that may lead to improvements (Langley et al 1996). You could choose a goal within one of the six quality domains (safety, effectiveness, patient-centered, timeliness, efficiency, equity). For instance, waste and error can be eliminated by using constraints to guide choices and reminders as alerts or by eliminating repetitions of the same work. Work flow can be improved by minimizing hand-offs among workers or by doing tasks in parallel rather than in series. Inventory can be optimized by standardizing whenever possible.

Health Care Quality Domain	Quality Improvement Opportunity
Health care must be safe	To improve safety of health service
Health care must be effective	To improve workflow, reduce error in handover
Health care should be patient-centered	To improve outcomes for individual patients or populations
Care should be timely	To reduce wait time
The health care system should be efficient	To improve performance of health system
Health care should be equitable	To improve access to health service

Writing an aim statement

Writing an aim statement will help to focus the project team's interest and activities. The aim statement explicitly expresses measurable goals with defined measures, deliverables and timeline. The aim statement should:

- Define the problem to be fixed in clear and concise language.
- Define the project's context, target population and duration.
- Link activities to an outcome (explicit target for success or failure rate).

Examples:

- Within the next 12 months, 80% of our patients with diabetes will have documented hemoglobin A1c levels of 8.0%.
- Within 12 months, we shall reduce hospitalizations for our patients with asthma aged 0–14 years to <1/1000 per year.
- Within nine months, we shall achieve >90% "highly satisfied" rating on routinely monitored satisfaction surveys from our patients in the XYZ Clinic regarding access to care, waiting times and service quality.

The aim statement links to reasonable, worthwhile and important goals, providing an issue around which project team members can rally and sometimes including both target and stretch goals compared with a baseline state.

Flow charting the current process

Any human activity that produces an output is a process. Processes tend to be hierarchical, where one step occurs before the next in sequence: A → B → C, etc. Mapping out the process with a flow diagram allows a comprehensive approach because it breaks the whole process up into more manageable and understandable portions without drowning in detail.

The flow diagram is an explicit model of the process. By making it explicit, the project team can share their understanding of the approach the process entails with one another; integrate criticisms, comparisons and suggestions for improvement; and indicate how and when to measure components.

Some guiding principles:

- Flow chart a clinical process, not the entire medical care system.
- Avoid too much detail at this early stage of planning.
- The flow chart of the process should reflect the project team's mission statement.
- Get all necessary information to ensure that the flow chart contains all the principal steps contained in the existing clinical process.
- Show the process as it actually occurs, not how it should or could be in an ideal state.
- Remember that this is a critical stage of planning: take as much time as needed to get it right.
- Show the flow chart to other front-line people for input and modification as needed.
- Look particularly for areas of error, hand-offs, conflict, confusion, delay, rework loops, hassles and complaints from "customers" about the process.

Measurements

It is important to focus on measurement because what can be measured can be improved. There are three types of measures in quality improvement:

1. Outcome measures
    - How is the system performing?
    - What is the result?

There are four general categories of outcome measures:

- Measures related to finances or use of resources;
- Clinical quality measures;
- Patient satisfaction measures;
- Measures related to the health status of groups and individuals (the following patient characteristics should be considered: demographics; disease-specific severity factors; socioeconomic factors; lifestyle factors).

The following questions should guide the selection of critical outcome measures:

- What outcome is most important to which groups of patients?
- How are health services evaluated by them?
- What is the consequence of variation in an outcome?

2. Process measures
    - Are the steps in the system performing as planned?
    - What information is needed to describe practice (e.g. timing, quantity, equipment)?
3. Balancing measures
    - Are changes designed to improve one part of the system causing new problems in other parts of the system?

To improve process and outcome:

- Present baseline outcome data, e.g.
    - Patient characteristics, or
    - System/process measures, or
    - Severity-adjusted outcomes, or
    - Trend charts, or
    - Statistical control charts, or
    - Common-cause variation and special-cause variation.
- Consider baseline values for key process factors. This includes variation in practice among individual clinicians.

- Develop preliminary conclusions:
    - Do the outcomes of the groups vary?
        1. Cause and effect diagrams
        2. Process improvements
    - Develop protocols to provide for iterative improvement and to provide ongoing support for clinicians in improving processes of care.

The QI charter

A QI charter is the project plan in a spreadsheet. In this QI charter, the program is identified along with the date when the QI charter is drawn up.

The elements of a QI charter include:

- Goal (as identified in the aim statement);
- Tasks — the breakdown of tasks are determined by answering the three questions related to change (What are we trying to accomplish? How will we know that a change is an improvement? What changes will we make that will result in an improvement?)
- Timelines;
- Roles and Responsibilities;
- Support requirements.

References

Langley GJ, R Moen, KM Nolan, TW Nolan, CL Norman, LP Provost. The Improvement Guide: *A Practical Approach to Enhancing Organizational Performance*. San Francisco: Jossey-Bass; 2009.

Rogers EM. *Diffusion of Innovations*, 4th ed. New York: The Free Press; 1995.

TEACHING TOOL 2 — QI CHARTER

Example 4 — Sample QI Charter — What are we trying to accomplish?

Program: XYZ

Date: October 1, 2012

As a team we are committed to achieving the following:

Performance improvement goals:

1. Reduce ALOS/ELOS ≤ 95% for all patients in Program XYZ by June 30, 2013.
2. Ensure that the readmission rate is at or below the target.

No.	What are we trying to accomplish?	How will we know that a change is an improvement?	What changes will we make that will result in an improvement?	Timeline	Leader accountable for achieving outcomes	Support requirements

1.1.0	All patients admitted with disease A will have an expected length of stay of xx days or less	Numerator: no. of patients with disease A who have a length of stay less than or equal to xx days
		Denominator: total no. of cases with disease A
			Develop a clinical algorithm for disease A that will include the following:
			• Expected length of stay time frame of xx days
			• Clinical feature B assessment in the first yy hours
			• Assessment score
			  ◦ Select and standardize the assessment tools on all units
			  ◦ Ensure tools completed on admission and in each round until discharge
			• Complete risk assessment questionnaire in first zz hours
			• Assess support systems in the first xyz hours
					Dr. A
					Dr. B
						• Quality improvement department

1.1.1	All patients with disease A who have clinical feature B will first be assessed within the first yy hours for complication C	Numerator: no. of patients with disease A and clinical feature B assessed for complication C in the first yy hours Denominator: no. of cases with disease A and clinical feature B				
1.1.2	All patients will have an assessment score documented on admission and discharge	Numerator: no. of cases with an assessment score on admission and discharge Denominator: total no. of cases				

No.	What are we trying to accomplish?	How will we know that a change is an improvement?	What changes will we make that will result in an improvement?	Timeline	Leader accountable for achieving outcomes	Support requirements
1.1.3	All patients will have a risk assessment questionnaire documented within zz hours of admission	Numerator: no. of cases with a risk assessment questionnaire completed in the first zz hours				
1.1.4	All patients with disease A will be assessed within the first xyz hours for existing support systems	Denominator: total no. of cases				
1.2.0	Documentation of diagnosis will improve in the following ways: • Clearer documentation • Elimination of inappropriate clinical descriptors • Accurate diagnosis	Audit of xy charts: Numerator: charts with the correct diagnosis (as determined by the auditor) Denominator: total no. of charts audited	• Use discharge template for clinical service • Hold a retreat or training session for the faculty to improve charting • Develop a fact sheet (e.g., diagnosis and expected length of stay) • Discuss at medical staff meetings		Dr. C Dr. D	• Health records • Quality and utilization improvement/ QUIST
1.3.0	Reduce potentially avoidable days owing to discharge plan delays to 0%	Utilization review (InterQual): % adjusted potentially avoidable days for in-patient stay	• Revised discharge sheet has been approved by Forms Committee and is currently in use • Consolidate discharge sheets for all units • Standardize assessment scores applied in rounds for all units		Dr. E Dr. F	
1.4.0	Earlier and accurate identification of alternate level of care patients	Evaluation of transition processes	Workplan to review transition processes will be implemented in the first week of month X		Dr. G Dr. H	

Example 5 — Sample Project Accountability

Role	Responsibility	Name	Signature
Vice president	• Define strategic performance goals, establishing corporate indicators and performance targets • Define improvement priorities • Establish improvement relationships with programs, services and designated groups • Establish mechanisms for the systematic identification of barriers to improvement and the reduction of these barriers • Invest in resources and structures to lead and support improvement and related strategies		

Program leadership	• Assign project leader and accountability
	• Remove barriers
	• Allocate resources, time, authority and any support necessary for project initiatives
	• Communicate to all staff and physicians:
	  ◦ that the program is driving this project
	  ◦ the alignment of the improvement projects with strategic priorities of the program
	• Ensure team membership is appropriate
	• Ensure ongoing review of results
	• Ensure staff and physician participation
	• Review relevant literature
		Program director	

		Physician program director	

Role	Responsibility	Name	Signature
Quality and utilization improvement team	• Establish a system for ongoing tracking and maintenance • Guide the team in applying quality improvement processes: this includes applying tools as needed (e.g., flow chart of the care process, preprinted order sets, data analysis tools) • Assist in the development of a communication and education strategy as needed • Assist in gathering and analyzing evidence as needed (data, literature or other benchmark information) • Provide support for data collection and analysis that will be shared with the team leader(s) and program leaders		

TEACHING TOOL 3 — QI WORKSHOPS

QI Workshop 1

Project team selection, organization, topic selection, aim statement

Reproduced from the Society of General Internal Medicine PW08 Pre-Course (5/12/2004) "Getting Started in Continuous Quality Improvement." Faculty participants: M. Bergen, C. Braddock, S. Dembitzer, E. Holmboe, L. Osterberg, P. Rudd, C. Sharp. No reproduction without permission.

Time		Who
10 min	Orientation to the workshop Select and organize a team, choose a project topic, write an aim statement	

You are a busy General Internal Medicine faculty member. You have been asked by your division chief or department chair to develop a plan, a structure and a program for teaching system-based improvement to your fellow faculty members and Department of Medicine house staff.

You have done some preliminary reading and thinking and have had some discussions with peers and trainees about the subject. You select diabetes mellitus as the initial topic area because it is a high cost, relatively high volume and high variability clinical cluster in your General Medicine Clinic. You are not sure how to learn the QI process and how to teach it to others.

You call a meeting of all the key potential players (those seated in your group).

Time	Task	Who
20 min	Small group breakout: 1. Select a recorder to document the deliberations 2. Select a reporter to summarize your group's conclusions at the end of the workshop 3. Determine how you will organize your project team 4. Write a project aim statement that will serve as an organizer for the group and rally others to support your efforts • focus on reducing diabetic foot complications • use terms that are measurable, time limited, actionable and inspiring for the members of your group 5. Enumerate the things you learned from the exercise	Each breakout group
20 min	Small group reporting Summary of workshop	Selected breakout groups

QI Workshop 2 — Flow chart the current process

Time		Who
10 min	Orientation to the workshop Flow chart the current process Distribute details of clinic layout, available staff, numbers and types and training of providers	

Your group has selected diabetes mellitus foot complications as the initial topic area because it is a high cost, relatively high volume and high variability clinical cluster in your General Medicine Clinic. You call together a follow-up meeting of all the key potential players (those seated in your group).

Time	Task	Who
20 min	Small group breakout: 1. Select a recorder to document the deliberations 2. Select a reporter to summarize your group's conclusions at the end of the workshop 3. Generate a flow chart of 1 current clinical process to monitor and prevent diabetic foot problems 4. List at least one outcome measure, process measure and balancing measure that your team would like to collect at baseline 5. List one change concept that your team would like to test 6. Combining your answers from workshops 1 and 2, answer the following questions in the model for improvement: • What is the aim? • How will we know a change is an improvement (what measures do we collect)? • What change can we make that will result in an improvement? 7. Enumerate the things you learned from the exercise	Each breakout group
20 min.	Small group reporting Summary of workshop	Selected breakout groups

QI Workshop 3 — Establishing data collection and embedding it in the workflow

Time		Who
10 min	Orientation to the workshop Determine the data to be collected; determine how to embed monitoring in the workflow, collect baseline data for review and interpretation, select an intervention and determine the method and timing of implementation	

Your group has flow charted the processes related to diabetes mellitus foot complications in your General Medicine Clinic. Your group has many ideas but remains uncertain about which ideas should be implemented first. Even more concerning is the resistance of physicians and staff to any extra work to collect data. The challenges are to optimize the data set for collection and to embed the data collection process into the workflow as much as possible.

To help with these tasks, you call a follow-up meeting of all the key potential players (those seated in your group).

Time	Task	Who
20 min	1. Select a recorder to document the deliberations 2. Select a reporter to summarize your group's conclusions at the end of the workshop 3. List the essential/irreducible outcome measure(s) and process measure(s) 4. Consider how the data collection can take place at baseline and after changes are implemented in the clinical process 5. Identify the probable sources of opposition and plan manoeuvres to minimize resistance 6. Summarize how the data collection process has been embedded in the workflow 7. Enumerate the things you learned from the exercise.	Each breakout group
20 min	Small group reporting Summary of workshop	Selected breakout groups

QI Workshop 4 — Interpreting the PDSA Cycle

Time		Who
10 min	Orientation to the workshop Interpret the PDSA cycle and determine whether change occurred; if so, whether it is an improvement; and whether the gains have been held	

Your QI project relates to diabetes mellitus foot complications in your General Medicine Clinic. On the basis of input from the residents, the clinic implemented the following interventions over months 3 to 6:

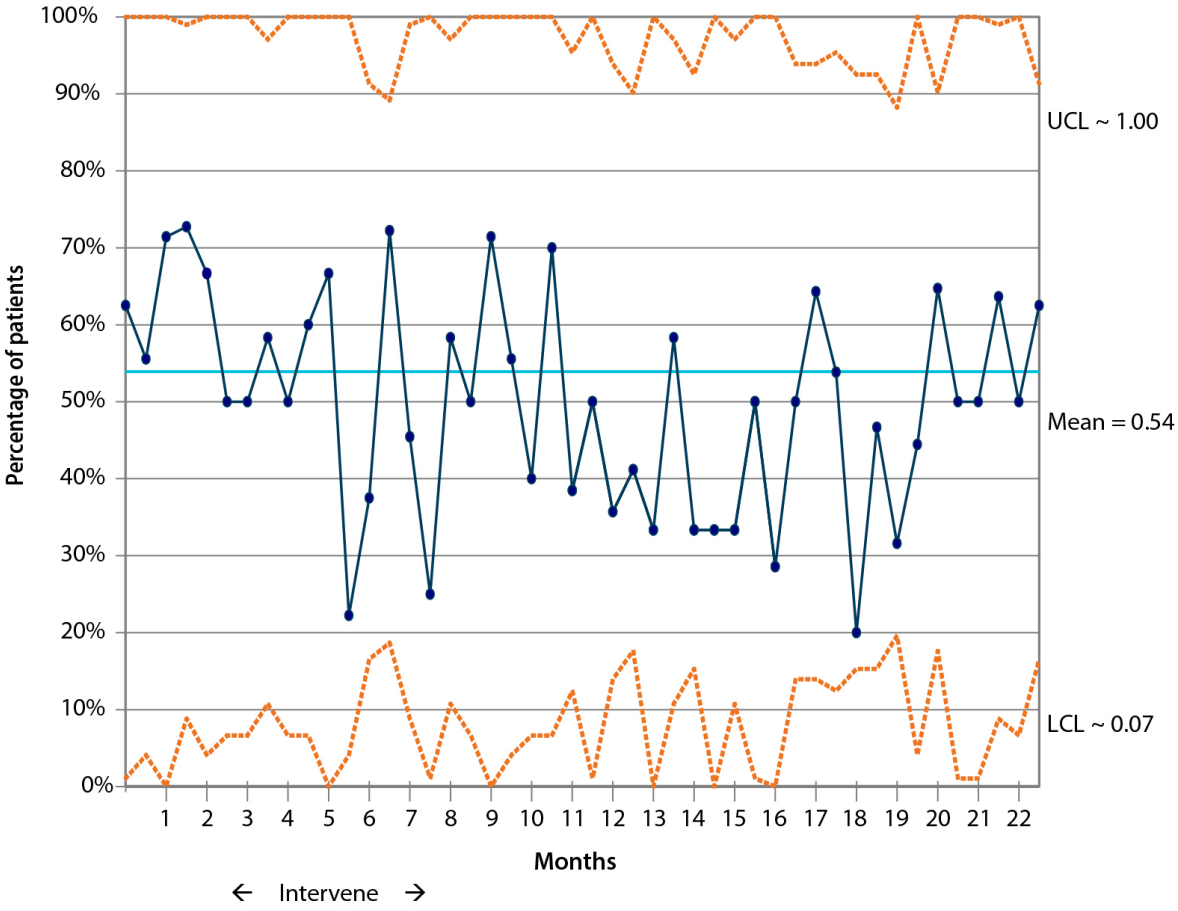
- Special coloured stickers are now used on the chart to identify the patient as having diabetes.
- Posters have been placed in the examination rooms asking patients with diabetes to remove their shoes and socks.

Your QI team has performed a medical record audit. The data are shown on the following page.

Time	Task	Who
20 min	1. Select a recorder to document the deliberations 2. Select a reporter to summarize your group's conclusions at the end of the module 3. Review the data as a group 4. For the control chart (see the following page), identify common-cause versus special-cause variation by counting the number of: • runs (sequences of one or more consecutive observations on the same side of the centre line); • shifts (sequences of eight points on the same side of the centre line); • trends (six or seven points continually increasing or decreasing). 5. Considering the interventions used and the results analyzed above, discuss whether the interventions appeared to work (improvement) or not work (non-improvement) 6. Consider what changes, if any, you wish to consider for the next PDSA cycle 7. Enumerate the things you learned from the exercise	Each breakout group
20 min	Small group reporting Summary of workshop	Selected breakout groups

QI Workshop 4 — Data

Foot examination once during year



ASSESSMENT TOOL 4 — SELF-ASSESSMENT PROGRAM (SAP)

Self-assessment Program (SAP) for QI Competencies

Thank you for taking the time to answer the following questions, which were adapted, with permission, from a tool developed by Dr. Greg Ogrinc (Geisel School of Medicine, Dartmouth College, Hanover, NH) and used by his research team (Ogrinc G, LA Headrick, LJ Morrison, T Foster. Teaching and assessing resident competence in practice-based learning and improvement. *Journal of General Internal Medicine* 2004;19(5 Pt 2):496–500).

Instructions:

How comfortable are you in your current skill with the following aspects of quality improvement? Please circle the most appropriate option (whole numbers only) for each item.

[1] not at all [2] slightly [3] moderately [4] extremely

1. Defining a clear problem statement (goal, aim)	1	2	3	4
2. Applying best professional knowledge	1	2	3	4
3. Developing appropriate measures	1	2	3	4
4. Studying the process of care	1	2	3	4
5. Developing a data collection plan consistent with time and resource limitations	1	2	3	4
6. Analyzing data	1	2	3	4
7. Applying statistical process control	1	2	3	4
8. Describing the roles of different professionals in health care improvement	1	2	3	4
9. Implementing a structured plan to test a change	1	2	3	4
10. Sustaining a change over time	1	2	3	4
This is the end of the questionnaire. Thank you for your input.				

ASSESSMENT TOOL 5 — SAMPLE QIKAT-R OF QI COMPETENCIES

NOTE TO TEACHER: *If you plan to administer the tool to the same residents pre and post curriculum, it is recommended that different case studies be used in the second QIKAT-R. It is also recommended that three (3) scenarios be used in each test.*

Scenario 1 was developed by the author for the QI curriculum he developed at UBC. For other scenarios, you might wish to contact Dr. Mamta K. (Mimi) Singh, co-director, Center of Excellence in Primary Care Education (CoEPCE), Louis Stokes Cleveland VA Medical Center, and Associate Professor of Medicine at Case Western Reserve University.

Quality Improvement Knowledge Application Tool Revised (QIKAT-R)

Instructions: Please read each of the following scenarios and then answer the questions that follow. We recognize that there may be many areas to improve. Be brief and complete in your answers. We request that you attempt each question, even if you are unsure.

Scenario 1

You are a general surgeon who is conducting ward rounds on a Saturday morning. You come across a patient on the surgical ward, who is a 72 year-old female with right-sided pleural effusion of unknown etiology. The patient developed respiratory compromise during the previous night, and the on-call surgical resident performed a bedside thoracentesis for therapeutic and diagnostic reasons. The patient developed a right-sided pneumothorax after the procedure, and as a result, the patient now has a chest tube inserted into the right thorax for drainage.

When you speak with the ward nurses about this patient incident, the nurses tell you that this is the third incident over the past two weeks that involved a complication associated with bedside thoracentesis. The nurses are concerned and so are you.

As you reflect after your ward rounds, you recall that there is literature that shows the patient safety benefit of ultrasound guidance in performing a number of bedside procedures such as thoracentesis. Specifically the risk of thoracentesis-related pneumothorax can be reduced with ultrasound guidance.

Questions for Scenario 1

Please answer each of the following questions as if you were developing a program to investigate and address the problem presented above.

1. What would be the aim?

2. What would you measure to assess the situation?

3. Identify one change that might be worth testing.

Scenario 2

Questions for Scenario 2

Please answer each of the following questions as if you were developing a program to investigate and address the problem presented above.

1. What would be the aim?
2. What would you measure to assess the situation?
3. Identify one change that might be worth testing.

Scenario 3

Questions for Scenario 3

Please answer each of the following questions as if you were developing a program to investigate and address the problem presented above.

1. What would be the aim?
2. What would you measure to assess the situation?
3. Identify one change that might be worth testing.

This is the end of the QIKAT-R. Thank you for your time.

QIKAT-R Scoring Rubric

The scoring rubric is used with permission (Singh MK, G Ogrinc, KR Cox, M Dolansky, J Brandt, LJ Morrison, B Harwood, G Petroski, A West, LA Headrick. The Quality Improvement Knowledge Application Tool Revised (QIKAT-R). Academic Medicine 2014 Oct; 89(10):1386–91.)

When scoring, please consider the following factors:

- Do the answers incorporate improvement fundamentals (customer focus, process knowledge, small tests of change/PDSA cycle)?
- Do the three elements (aim, measure, change) bear some relationship to each other?
- Each item receives one point if the response adequately addresses the item and zero points if it does not. The total possible score is 9 points for each scenario.

3 points for the AIM. The AIM…	
A1	is focused on the system-level of the problem presented.
A2	includes direction of change (increase or decrease).
A3	includes at least one specific characteristic such as magnitude (% change) or time frame.
3 points for the MEASURE. The MEASURE…	
M1	is relevant to the AIM.
M2	is readily available so data can be analyzed over time.
M3	captures a key process or outcome.
3 points for the CHANGE. The CHANGE…	
C1	is linked directly with the AIM.
C2	proposes to use existing resources.
C3	provides sufficient details to initiate a test of change.

ASSESSMENT TOOL 6 — BALANCED SCORE CARD

Balanced Score Card

This tool is to be used after completion of the QI project.

Title of project:

Team members:

Rating system:

0 = no

1 = some attempt was made but does not meet the requirements

2 = met some requirements but substantial improvement is required

3 = good (can use some improvement)

4 = very good (only minimal improvement is required)

5 = excellent (no improvement needed)

Please circle appropriate number for each question						
1. Have the residents worked effectively as a team?	0	1	2	3	4	5
2. Do the project findings indicate a patient focus?	0	1	2	3	4	5
3. Do the project findings indicate knowledge of process?	0	1	2	3	4	5
4. Do the project findings incorporate PDSA/small tests of change?	0	1	2	3	4	5
5. How would you rate the aim statement (including use of appropriate methodology to identify causes of the problem)?	0	1	2	3	4	5
6. How would you rate the measurement/ collection/use of data? (0 = no actual data)	0	1	2	3	4	5
7. Has the team engaged stakeholders in planning, executing and evaluating the change?	0	1	2	3	4	5
8. How would you rate the change suggested/ achieved? (0 = no change suggested)	0	1	2	3	4	5
9. Do the three elements (aim, measure, change) bear some relationship to each other?	0	1	2	3	4	5
Comments:						
Total Score	/45					