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Pii
Practice
Improvement
Initiative

A Guide to Integrating Quality Improvement Into Family Medicine Residency Programs

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1. Background

Why the guide was developed

Quality improvement (QI) is part of everyday practice in family medicine and primary care. The College of Family Physicians of Canada (CFPC) included it as a core competency in the *CanMEDS–Family Medicine 2017* Roles and as a key activity in the *Family Medicine Professional Profile*.[1,2] Subsequently, several family medicine residency programs reached out to the CFPC asking for more direction on what to teach about QI and how to teach it.

Recognizing the need to support family physicians and family medicine residency programs in this area, the CFPC launched the Practice Improvement Initiative (Pii) in early 2017.[3,4] Pii was conceived after the CFPC conducted an extensive environmental scan on practice improvement initiatives in Canada in collaboration with the Canadian Foundation for Healthcare Improvement (now known as Healthcare Excellence Canada). The CFPC aimed to identify the precise needs and gaps related to the practice of QI by family physicians across the country. Two main streams were identified. The first focused on supporting Canadian family medicine residency programs and the second on supporting family physicians and health care teams. Since Pii's inception several initiatives have been undertaken, including the 2018 Invitational Quality Improvement Symposium and the development of the Practice Improvement Essentials (PIE) QI workshops.[5,6]

As part of the environmental scan, significant variation was found across residency programs in terms of how QI teaching and QI practice had been integrated into family medicine training. Some programs had integrated QI extensively into their curricula while others had done so to a lesser extent.[4] The scan also uncovered that many program leaders felt the key and enabling competencies related to QI and research in the CFPC's *CanMEDS-FM 2017* framework were too broad and lacked sufficient clarity to help them design what to teach and how to assess learners for QI competence at the end of residency. The following questions were raised regularly:

1. What competencies related to QI should residents acquire during residency training?

2. What learning approaches or activities can be used to learn about QI?

3. How should the acquisition of QI competencies be assessed?

4. Who teaches or supervises QI with learners?

5. What resources are available to QI leads to support QI learning and teaching?

This guide responds to these questions. While it is not intended to be prescriptive, it provides suggestions and ideas and shares tips on how to integrate QI into family medicine residency training. A companion guide has been drafted on how to integrate research into family medicine residency training and, once finalized, it will be posted on the CFPC website at http://www.cfpc.ca/pii.

The purpose of this guide is to:

• Provide an overview and examples of different ways to integrate the teaching of QI and the practice of QI by learners into a family medicine residency curriculum

• Highlight how to teach and assess QI using competency-based education principles

• Provide insights into what needs to change to support QI teaching and learning

• Share learners' perspectives on teaching and learning about QI

How the guide was developed

This guide was informed by an extensive iterative and participatory process that the CFPC undertook, starting with the multi-pronged needs assessment in 2017 and continuing with significant input received between 2017 and 2019, including:[3,4]

• An environmental scan of all Canadian departments of family medicine

• The Pii retreat

• Follow-up meetings, teleconferences, and emails with representatives of departments of family medicine

• A CFPC ePanel survey[7]

• The 2018 Invitational Quality Improvement Symposium[5]

• The 2018 Guide for Improvement of Family Medicine Training (GIFT) residents' project[8]

This guide was drafted by the principal authors with input and support from CFPC Academic Family Medicine Division staff. It was subsequently reviewed by a specially convened advisory and editorial group.

2. The importance of QI in family practice teaching settings

Family physicians and the teams they work with are committed to providing the highest quality of care to the communities they serve. This goal is not a static end point, as the delivery of high-quality care is dynamic and requires ongoing reflection and action. Armed with resources and tools, family physicians can identify and implement practice improvements both large and small to enhance patient care.

Promoting a culture of curiosity and continuous practice improvement

This guide encourages departments of family medicine, their residency programs, and affiliated teaching sites to adopt three guiding principles when integrating QI teaching into residency curricula and to stimulate faculty to engage in QI work in clinical teaching practices. The three principles are:

- Promoting a culture of curiosity and continuous practice improvement

- Using a systems-based mindset and approach to medical errors and patient safety, including a "no shame, no blame" approach to reviewing adverse outcomes

- Supporting QI participation by building the use of a community of practice

For continuous improvement, family physicians need to serve as role models for learners in their practices and foster a culture of curiosity—a spirit of inquiry—where asking questions for improvement becomes a practice norm. Asking questions should be encouraged rather than discouraged; errors made or areas needing improvement should be seen as opportunities rather than failures. Reframing the use of questions to support quality and patient safety helps cultivate a practice of continuous improvement in a more positive light and reduce shame or even feelings of blame. If embedded in the work culture, this practice would see family physicians and their health care teams regularly asking themselves:

- How well are we doing?

- What are we doing well?

- Where can we improve?

We would see thriving communities of practice created whereby "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise by interacting on an ongoing basis"[9] are seen across departments of family medicine. Research has demonstrated that communities of practice, including virtual communities, can advance innovations and practice change. Large organizations and institutions, such as departments of family medicine, can use QI communities of practice to connect faculty, health care providers, and learners to further increase interest in QI, thus reinforcing its value and encouraging broader engagement.

When a culture of curiosity and continuous practice improvement is established it enables family practice teams to incorporate the six dimensions of quality (safety, effectiveness, patient-centredness, timeliness, efficiency, and equity)[10] when providing care to patients, and it offers opportunities to contribute to the improvement of the overarching health care system using the Quadruple Aim as a framework.[11] The Quadruple Aim highlights goals related to improving both patient and provider experiences, population health outcomes, and health system efficiencies.

Definition of QI

For the purpose of this guide, the definition of QI by the Royal College of General Practitioners (RCGP) in the United Kingdom is used:

> "The term 'quality improvement' describes a commitment to continuously improving the quality of healthcare, focusing on the preferences and needs of the people who use our services. It encompasses a set of values (which include a commitment to self-reflection, shared learning, the use of theory, partnership working, leadership and an understanding of context); and a set of methods (which include measurement, understanding variation, cyclical change, benchmarking and a set of tools and techniques)."[12]

The RCGP's definition of QI suggests a variety of professional roles and activities that are interwoven with, and complementary to, ongoing practice improvement. For example, the references to shared learning and partnership working point to family physicians' roles as health care team members. Similarly, references to measurement, understanding variation, and benchmarking are suggestive of the complementary and supportive relationships that exist between QI and research activities. The CFPC's *Section of Researchers' Blueprint 2* points out that QI and research "both nurture a culture of curiosity and reflective practice. Moreover, both are best conducted by interprofessional teams."[13] For family medicine teachers, research and QI are complementary tools that support practice improvement.[14,15,16] For the purposes of this guide, we describe QI in primary care as the pursuit to identify areas for practice improvement to support family physicians and health care teams in delivering optimal care for the patients and populations they serve. This guide focuses on the initiation and maintenance of QI teaching and learning within family medicine teaching practices as parts of university departments of family medicine.

3. Competency frameworks for family medicine residency

The CFPC recognizes that continuous QI is a core activity and responsibility of family physicians, and it is therefore included in *CanMEDS-FM 2017*, the CFPC's *Family Medicine Professional Profile* (explained in detail by the Core Professional Activities of the *Residency Training Profile*), and the CFPC's *Standards of Accreditation for Residency Programs in Family Medicine* (or Red Book).[1,2,17,14] Through the CFPC's accreditation standards and its assessment policies for the purposes of certification in family medicine, residency programs are provided guidance related to the competency frameworks as well as competency-based approaches to use when designing curricula and teaching and assessing learners.

CanMEDS-FM competency framework

CanMEDS-FM 2017 is a competency framework designed for all family physicians regardless of practice type, location, or populations served.[1] QI appears in the descriptions of five of the seven Roles in the *CanMEDS-FM 2017* framework. Since the CanMEDS-FM Roles overlap,

the knowledge, attitudes, and skills required for participating in and undertaking QI activities in daily practice are not limited to a single Role. For example, QI is clearly related to the Scholar Role; however, the Professional Role also encourages a commitment to self-improvement. The Leader Role reflects the responsibility to help advance both individual and system change, while the Collaborator Role highlights the physician as a member of teams establishing a culture of safety. CanMEDS-FM provides "key" as well as "enabling" competencies. The key competencies related to QI are obligatory and should be incorporated into the curriculum. Their corresponding enabling competencies are useful and their incorporation is encouraged.

Core Professional Activity – Scholarship

Core Professional Activities describe the expected scope of training for family physicians in workplace-based terms.[17] QI is positioned within the scholarship activities of the *Residency Training Profile*, which defines what all graduates are expected to be able to do when they enter independent practice.[17]

The CFPC's Red Book stipulates the requirement that each residency program "includes training in continuous improvement, with emphasis on improving systems of patient care, including patient safety, with opportunities for residents to apply their training in a project or clinical setting."[14] Moreover, it specifies that teachers in residency programs are effective role models. To this end, faculty development is needed to ensure that teachers role model QI in their respective practices and are provided with faculty development on teaching learners how to participate in QI. Programs that integrate QI teaching, learning, and assessment in residency training comply with the CFPC's accreditation standards related to practice improvement and QI.

Competency-based curriculum

As specified in the CFPC's Red Book, competence in family medicine is complex, fluid, and dynamic, and it changes over time because of many factors, including practice context, individual interests, experience, and response to community or practice needs.[14] Core competence in postgraduate family medicine training refers to being competent to enter and adapt to the independent practice of comprehensive family medicine anywhere in Canada.

Upon entering practice, residents must be capable of the responsibilities outlined in the *Family Medicine Professional Profile*. The many competencies required to support this work are outlined in *CanMEDS-FM 2017*, and programs are designed to develop and assess these competencies according to the Triple C Competency-Based Curriculum.[18] The CFPC's Triple C Competency-Based Curriculum "provides the relevant learning contexts and strategies to enable residents to integrate competencies, while acquiring evidence to determine that a resident is ready to enter and adapt to the practice of comprehensive family medicine."[18]

The CFPC developed a Continuous Reflective Assessment for Training (CRAFT) approach for programs to use to monitor the progressive achievement of competence by residents in the workplace.[19] The essential components of CRAFT in **Figure 1** include the cyclical activities of observation of the learner; the documentation of observable behaviours reflecting the knowledge, skills, and attitudes related to QI; and the offer of feedback to the learner to support reflection for ongoing learning. This is followed by periodic reviews of the learner's assessment portfolio to encourage further reflection on what remains to be learned.[19] This model highlights when a resident may need to adjust their learning, if, for instance, a firm understanding of core QI concepts seems to be missing. A further review of the learner's portfolio may include field notes that can help develop the learner's ability to identify key areas for improvement. This would allow their supervisor to attest to the learner's achievement of the expected QI competencies.

Figure 1. The essential components of the CRAFT model[19]
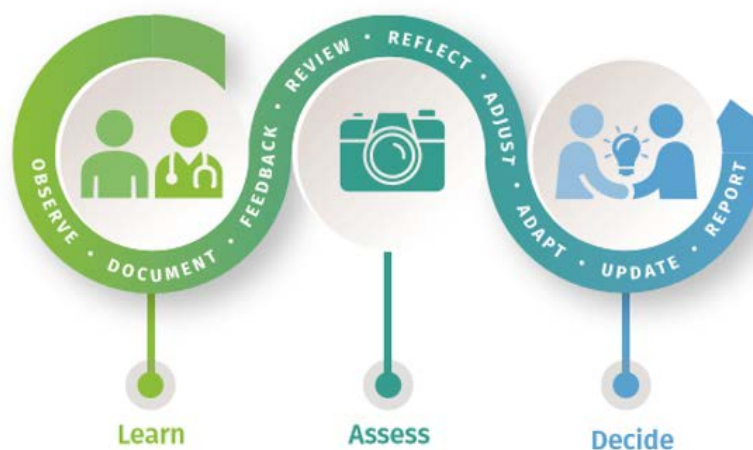
To achieve Certification in the College of Family Physicians of Canada (the CCFP Special Designation), residents must receive attestation from the program that they have successfully completed residency training and must pass the CFPC's Certification Examination in Family Medicine.

Learning contexts

Learning contexts, and how competencies are taught in them, are important considerations when designing and implementing a competency-based medical education curriculum. Learners require exposure to role models who demonstrate how to participate in QI in family practice contexts. They need to be offered learning experiences that enable them to use QI approaches and to practise QI skills. Learners need to be assessed in the workplace for the ongoing acquisition of QI competence during residency training. Intentional teaching of QI requires that equal attention be given to intentional assessment

of competence. Ideally, residents should receive QI training centred in family medicine and their QI activities should also, where possible, be within a primary care context.

This guide proposes the following key guiding principles when integrating QI learning into a competency-based residency training:[20]

- Tailor QI learning methods and instructional approaches to the needs of your learners

- Engage learners: Make it clear to them how QI is relevant to their future practices

- Ensure that faculty members are given resources (e.g., faculty development, protected time, funding) to teach and assess QI competencies successfully

- Get buy-in from both educational leaders (e.g., program directors, division heads) and clinical leaders to support the integration of QI into teaching and practice

4. Learning objectives for QI in family medicine residency

The depth of knowledge, attitudes, skills, and expertise that residents need to achieve by the end of residency, specifically related to QI, can be categorized into two levels, as outlined below. Given the relatively short duration of family medicine residency training and the pressure of addressing many other priorities during this training, the CFPC believes that attaining a fundamental level of competency in QI is the most realistic goal for family medicine residency training. The learning objectives and teaching and assessment methods in this guide therefore provide suggestions for the acquisition of a fundamental or foundational level of QI competence.

- **Fundamental or foundational level:** This is a basic level of competence in QI that allows residents and physicians to embrace QI as part of daily practice and start participating in QI activities, and even to lead some low-complexity improvement initiatives.

- **Advanced or exemplary level:** This level describes very advanced expertise and skills in QI, often undertaken by professionals who include QI as a significant component of their work and who undertake scholarly and leadership roles in this area.

This chapter provides a list of suggested learning objectives to help teach residents the fundamental or foundational level of QI, and it operationalizes the key and enabling QI competencies described in chapter 3 of this guide. The guide does not dissuade residency programs that wish to have QI as a distinct feature of their residency program and that wish to provide opportunities for more advanced training in QI from doing so, nor does it prevent residents with a special interest in QI from pursuing more in-depth training.

QI learning objectives

The learning objectives listed in **Table 1** were developed using a participatory process with extensive input from QI, research, and education experts, users, and stakeholders. These learning objectives, organized into nine domains, are flexible in that they may be adopted exactly as they are, adapted and modified to meet a residency program's specific needs, or disregarded at the program's discretion. Each program is encouraged to consider their unique needs when selecting or expanding on the learning objectives and subsequently selecting the learning methods that best address them.

The learning objectives listed in **Table 1** are divided into two categories: foundational and exemplary. If included in a curriculum, the exemplary learning objectives would provide residents with a more comprehensive understanding of QI. It should also be noted that some foundational learning objectives may have been achieved in medical school, before residency.

Table 1. Suggested learning objectives to support the acquisition of QI competencies

Learning Objective		Foundational	Exemplary
A. Motivation			
A.1	Incorporate QI and measurement as parts of everyday practice	X	
A.2	Demonstrate a commitment to high-quality care	X	
A.3	Describe the role of QI in family medicine	X	
A.4	Describe the six dimensions of quality	X	
A.5	Describe the Quadruple Aim	X	
A.6	Demonstrate reflective practice by continually identifying areas for improvement	X	
B. Define QI in Primary Care			
B.1	Define and describe QI	X	
B.2	Differentiate between QI, quality assurance, and research	X	
B.3	Describe the strengths and limitations of QI	X	
B.4	List different approaches to undertaking QI (e.g., Model for Improvement, Lean, Sigma)		X
B.5	Describe the Model for Improvement approach to QI	X	
C. Plan and Do QI			
C.1	Define a problem and develop an aim statement	X	
C.2	Plan a QI initiative using the Model for Improvement's three questions		X
C.3	Describe tools that can help define the area for improvement (e.g., systems analyses, process mapping, clinical audit, fishbone diagram, the five whys, root cause analysis, driver diagram)		X
C.4	Understand the environment in which the QI activity will take place (e.g., enablers and barriers/challenges)		X
C.5	Prepare a QI project plan, including a feasible intervention and approach		X
C.6	Identify appropriate outcome, process, and balance measures		X
C.7	Identify QI initiatives to improve equitable access to health care (e.g., for marginalized communities*)		X
C.8	Describe strategies to achieve and sustain change		X
C.9	Participate in a QI project	X	
C.10	Participate in a Plan-Do-Study-Act (PDSA) cycle	X	
C.11	Monitor the progress of a QI initiative		X
C.12	Initiate a QI project		X

* When engaging Indigenous groups, initiatives need to be co-created with the community, as outlined in the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans 2* (2018), chapter 9, article 9.2: **https://ethics.gc.ca/eng/tcps2-eptc2_2018_chapter9-chapitre9.html**.

Learning Objective		Foundational	Exemplary
D. Measurement and Data			
D.1	Describe the role of practice-level data in everyday practice, including their quality, strengths, and limitations	X	
D.2	Describe the sources of quantitative and qualitative data that may inform QI (e.g., electronic medical records [EMRs], patient surveys and input, staff surveys, practice-based research networks reports, Canadian Primary Care Sentinel Surveillance Network reports, and significant event analysis)	X	
D.3	Formulate a plan for data collection, analysis, and reporting related to a QI initiative		X
D.4	Describe the variety of methods for monitoring and reporting data related to QI interventions (e.g., run and Pareto charts)		X
D.5	Describe the processes required to ensure quality of data in an EMR or electronic health record (EHR)		X
D.6	Collect and analyze data from sources identified during the Plan and Do QI phase	X	
D.7	Conduct a practice audit		X
E. Teamwork			
E.1	Highlight QI as an interprofessional activity	X	
E.2	Work as part of a team when undertaking QI		X
E.3	Describe the role of patients, families, and the community in QI	X	
F. Change Management			
F.1	Explain why and how change management science is applicable to QI		X
G. Ethics			
G.1	Recognize ethical issues related to QI, including collecting patient data	X	
G.2	Identify QI activities that require research ethics board (REB) approval	X	
H. Patient Safety and Engagement			
H.1	Identify patient safety situations	X	
H.2	Contribute to a supportive, instead of a blame, culture	X	
H.3	Describe the principles of and a supportive approach to analyzing a critical or significant event or serious near-miss event		X
H.4	Participate in a significant event analysis		X
H.5	Describe methods to engage patients in QI activities	X	
I. Resource Stewardship			
I.1	Describe what is meant by resource stewardship	X	
I.2	Practise resource stewardship	X	
I.3	Participate in a resource stewardship activity geared to an area of over- or underuse of resources (e.g., Choosing Wisely Canada initiative, cancer screening, immunization)		X

5. Pedagogical approaches to teaching QI

Due to the realities and contexts of the different programs and teaching sites, there is no one single ideal QI curriculum in family medicine. However, this guide proposes that a well-balanced QI curriculum should contain four essential elements made up of a series of QI-specific learning activities using the learning objectives listed in chapter 4 as a resource to guide learning content.

An overview of the contextual factors that need to be considered—and the challenges of integrating QI into a residency curriculum and suggestions on how to overcome them—is available in our Quality Improvement Symposium report.[5]

Longitudinal versus block curricula

Time is a key ingredient when integrating QI into an already dense two-year family medicine residency program. One of the first steps in building the QI curriculum is selecting the broader curriculum format and deciding whether to teach using a horizontal or block format. **Table 2** summarizes the advantages and disadvantages to both approaches presented in a guide on teaching QI in residency from the Royal College of Physicians and Surgeons of Canada.[20] The use of a horizontal design with a mix of didactic and experiential learning offers a useful middle ground.

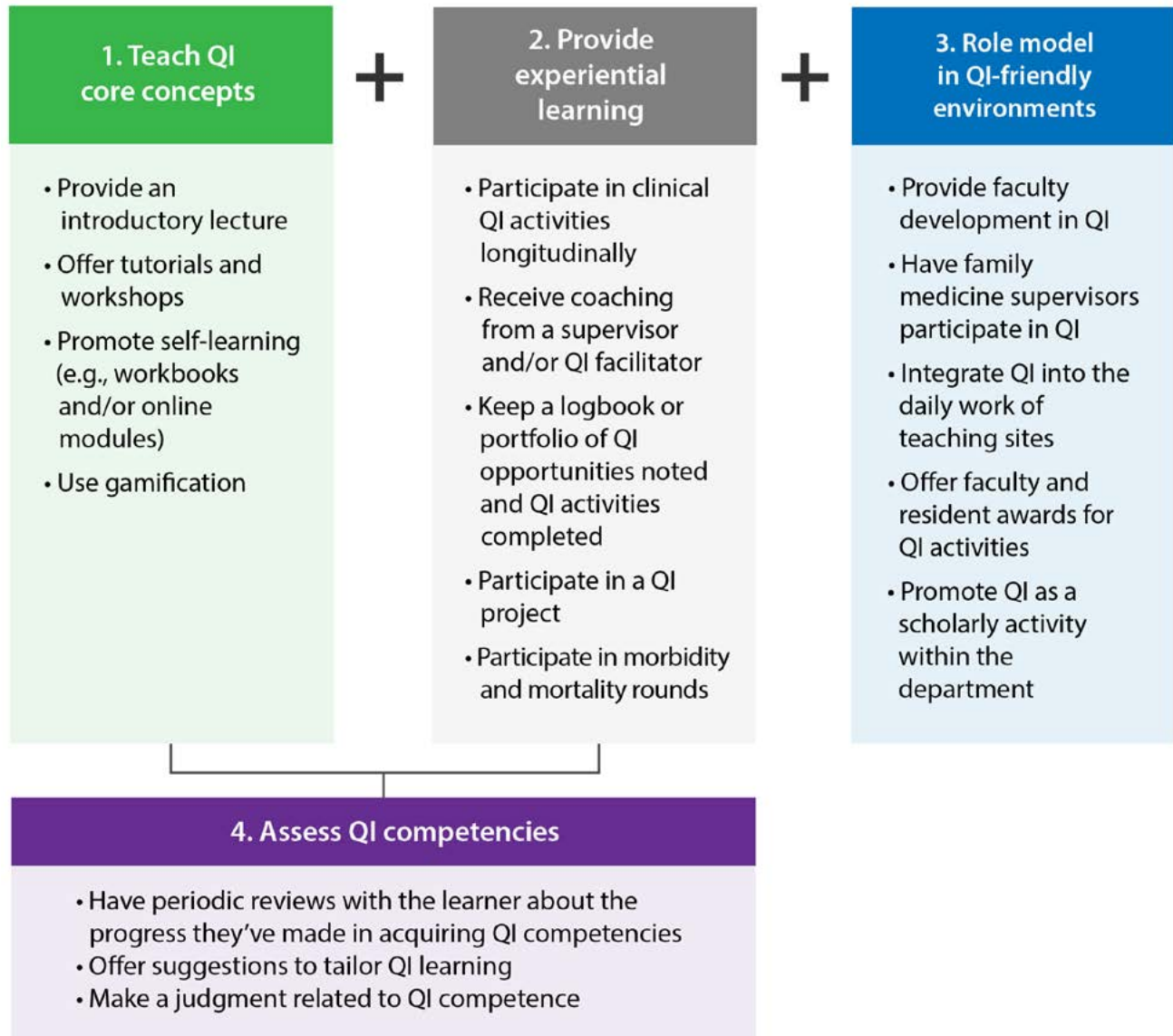**Table 2. Advantages and disadvantages of longitudinal and block curricula**

	Advantages	Disadvantages
Longitudinal curriculum	• Approximates real clinical timelines and allows interprofessional team participation in real-life situations. • Learners can try out and refine over time the 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.	• Learners may be distracted by competing interests. • Potential knowledge decay. • Instructors may have more difficulty in tracking the progress of learners.
Block curriculum	• Focuses efforts. • Much easier to administer than a longitudinal curriculum.	• 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.

Reproduced with the permission of the Royal College of Physicians and Surgeons of Canada.[20]
Wong RYM. *Teaching Quality Improvement in Residency Education*. Royal College of Physicians and Surgeons of Canada; 2015.

Elements of creating a QI curriculum

This guide suggests building a curriculum around four key elements, as summarized in **Figure 2**: 1. Teach QI core concepts; 2. Provide experiential learning; 3. Role model in QI-friendly environments; and 4. Assess QI competencies.

Figure 2. Four elements of a QI curriculum

1. Teach QI core concepts

- Provide an introductory lecture
- Offer tutorials and workshops
- Promote self-learning (e.g., workbooks and/or online modules)
- Use gamification

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2. Provide experiential learning

- Participate in clinical QI activities longitudinally
- Receive coaching from a supervisor and/or QI facilitator
- Keep a logbook or portfolio of QI opportunities noted and QI activities completed
- Participate in a QI project
- Participate in morbidity and mortality rounds

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3. Role model in QI-friendly environments

- Provide faculty development in QI
- Have family medicine supervisors participate in QI
- Integrate QI into the daily work of teaching sites
- Offer faculty and resident awards for QI activities
- Promote QI as a scholarly activity within the department

4. Assess QI competencies

- Have periodic reviews with the learner about the progress they've made in acquiring QI competencies
- Offer suggestions to tailor QI learning
- Make a judgment related to QI competence

For elements 1 and 2 in Figure 2—Teach QI core concepts and Provide experiential learning—the learning objectives could be mapped as outlined in Figure 3.

Figure 3. Example of how to map QI learning objectives for elements 1 and 2

Excerpt of QI Learning Objectives

A.3 Describe the role of QI in family medicine A.4 Describe the six dimensions of quality A.5 Describe the Quadruple Aim B.1 Define QI in primary care	Introduction to basic QI concepts using didactic, online, or workshop teaching approaches
A.1 Incorporate QI and measurement as part of everyday practice A.2 Demonstrate a commitment to high-quality care A.6 Demonstrate reflective practice by continually identifying areas for improvement H.1 Identify patient safety situations	Experiential learning in family medicine–relevant settings using chart/review with preceptors, attending QI meetings, participating in team huddles, and getting a field note
C.1 Define a problem and develop an aim statement C.9 Participate in a QI Project G.2 Identify QI activities that require research ethics board approval	Experiential learning in family medicine–relevant settings Participation in a QI project

Element 3, Role model in QI-friendly environments, encourages a positive attitude toward QI in learners witnessing their supervisors and the teams they work with engaged in QI activities. Seeing QI as a norm of practice in the learning environment in both a clinical and academic setting will help residents recognize that QI is part of the culture of family practice.

Element 4, Assess QI competencies, is broadly described in *CanMEDS-FM*,[1] and programs are expected to design and implement a competency-based curriculum. Detailed information on assessing these competencies is outlined in chapter 6 of this guide.

Element 1: Teach QI core concepts

This guide estimates that at least six to eight hours are needed to introduce residents to QI core concepts and give them practice in key QI approaches and tools. Appendix A provides an overview of the resources available to support didactic teaching.

QI distributed learning approaches

More traditional and effective classroom delivery may be difficult for some programs, particularly if there are scheduling or geographic challenges for residents and/or faculty. Other types of learning approaches might be more appropriate, such as:

1. **Blended learning:** This is a form of education that takes place both online and in a traditional classroom. In blended learning scenarios online course delivery does not replace face time between learners and teachers. Rather, the online component of the learning experience usually consists of exercises or additional content that complement the in-class lesson.

2. **Hybrid classroom:** In hybrid learning a significant portion of the course takes place online. In contrast to blended learning, a hybrid learning scenario replaces much of the learner-teacher face time in a brick-and-mortar location with online interactions.

3. **Flipped classroom:** This is another form of blended learning where a learner is first exposed to new material outside class, usually in the form of an online presentation or self-learning using online modules or other resources. When the student attends class in a traditional classroom setting, the class time is used to apply the material in the form of problem- and case-solving and discussion.

Didactic learning: Lectures, workshops, tutorials, and seminars

When teaching a large group of learners, using a didactic approach can be most efficient. Core QI theory and concepts can be covered by classroom lectures, workshops, or tutorials, either in person or virtually. The advantage of learning about QI through didactic means is that it involves group learning, and group activities can help reinforce the notion that QI is a multi-professional team activity. Didactic learning opportunities can be delivered as full-day workshops, as a series of workshops or tutorials across several weeks, or as academic half days, and they can be delivered at the residents' respective sites. Consider working across sites to collaborate and hosting joint site sessions to ensure you achieve an efficient critical mass and to optimize faculty deployment, particularly in programs with fewer faculty versed in QI and in teaching QI.

Gamification

Gamification is defined as "the use of game design elements in non-game contexts."[21] It has been shown to be an effective method for achieving learning objectives by increasing motivation and engagement in the learning tasks and by increasing enjoyment.[21]

QI Olympics

The Department of Family and Community Medicine at the University of Toronto hosts a QI Olympics for first-year residents to provide an opportunity to apply QI theory and methods in a practical and competitive but fun way.

Designed in 2017, the QI Olympics are a popular activity that includes faculty members, as well. Incorporating gamification with an emphasis on teamwork and leadership, resident teams from respective academic sites select from an array of case scenarios and compete to develop relevant aim statements (Aim Archery), set measures (Measures Marathon), and design tests of change-for-change ideas (Plan-Do-Study-Act Cycling) during a timed activity. Faculty act as coaches and take advantage of teaching moments to support this fun

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Teaching tips for didactic learning

1. Consider integrating a practical component in the didactic section. For instance:
   • Identifying a practice-based area for improvement
   • Developing an aim statement
   • Identifying indicators and measures for use
2. Consider using online formats, which can supplement in-person learning and help ensure that introductory fundamental learning objectives are covered for all teaching sites.

and impactful learning opportunity. Feedback from residents and faculty has been consistently positive since the first QI Olympics.[†]

The Amazing Race: Query Edition – EMRs

The Department of Family Medicine at the University of Manitoba used a game inspired by *The Amazing Race* to teach residents how to pull data from EMRs for use in QI and practice management (e.g., preventive care panel lists, chronic disease management). The Amazing Race: Query Edition had residents from two practices come together and work as partners to produce answers to a series of clues. Most clues required writing queries and pulling data from the EMR while a few involved fun questions such as unscrambling a SMART (specific, measurable, attainable, realistic, and timely) aim statement or obtaining a specific receptionist's birthdate without accessing the EMR. In the spirit of QI, a debriefing with residents was held after the game and the evaluations of the event were quite positive.[‡]

Other ideas

Other gamification methods have been used during academic half days. Residents at the University of Manitoba worked through several games to practise the application of system diagnostic tools and to carry out PDSA cycles. Non-medical examples were used,

and QI practice facilitation was provided throughout the session. Again, residents' evaluations of the session were very positive. Similar games have been developed by the Institute for Healthcare Improvement and involve the use of coins and paper airplanes to learn how to perform PDSA cycles.[22]

These games are examples of programs providing hands-on learning opportunities without the time requirement of a QI project. Development of the games requires planning and creativity to ensure that key QI concepts are thoroughly addressed. However, given the positive feedback from residents, the use of games may well be worth the investment of time if learning objectives can be achieved efficiently without adding to the overall workload of residents and teachers.

The importance of stories

Stories from real life and, especially, from the clinic where the resident works highlight the impact QI can have in daily practice and how it relates to the Quadruple Aim. Stories capture attention, elicit the emotional component of learning, provide real-life case examples to contextualize the learning, and inspire residents. It is also important to provide stories of QI initiatives that were not successful and the lessons that were learned to illustrate how QI needs to be applied judiciously and appropriately.

[†] The QI Olympics were designed and developed by Dr. Brent Elsey, Dr. David Makary, Dr. Melissa Witty, Dr. John Maxted, Dr. Susanna Fung, Dr. Rosemarie Lall, Dr. Phil Ellison, Lorri Zagar, and Patricia O'Brien.
[‡] The Amazing Race: Query Edition was co-created by Dr. Alex Singer and Lorri Zagar.

Teaching tips for gamification

1. Consider having different teaching sites collaborate to organize a half day of games to optimize the delivery and use of residents' and faculty members' time.
2. Consider using non-medical examples for teaching residents, as they may not have sufficient clinical experience to identify areas for improvement.
3. Explore the Institute for Healthcare Improvement's website and video library for more ideas on QI games and how to teach residents about theory, predictions, and PDSA cycles. Its videos include *How Do You Measure the Banana?; Learning about Variation by Counting Candy; Learn How to Use PDSA Cycles by Spinning Coins; and QI Games: The Red Bead Experiment.*[22]

Element 2: Provide QI experiential learning

For residents, gaining experience that is clinically relevant and part of their daily work lives is a particularly powerful way to learn QI. Properly planned, QI work can be carried out efficiently and integrated into regular day-to-day clinical activities, and clinical experiences can be turned into learning moments. Graduates of family medicine need to be able to carry out QI activities that focus on specific parts of their family practices, rather than on those that try to overhaul the entire system. Whether the goal is to improve patient outcomes or professional development, the opportunity for learners to see how QI can be included in day-to-day practice is itself a goal. Experiential learning is important and can be addressed in different ways. However, it is important to stress that experiential learning should not place a burden on practices, residents, or faculty. It should not result in practices experiencing QI fatigue as one after another resident implements a new QI initiative—often more than one at the same time—that is left incomplete when a resident leaves the rotation or completes their training.

At a clinical level, residents can be involved in QI huddles and meetings; taking part in the regular reporting and communications of QI activities and witnessing celebrations of successful QI initiatives help foster a belief that QI is doable, useful, and valuable.

QI projects

Most family medicine residency programs expect their residents to conduct a research project as part of their training requirements. In an upcoming CFPC companion document, new ways of exploring how research is incorporated into residency training will be shared and, once finalized, this document will be posted on the CFPC website at **http://www.cfpc.ca/pii**. If it

is conducted in a scholarly manner for the purposes of practice improvement, a resident's QI project—in which an area of improvement is defined in the first part and followed by a process to address the gap—supports learning for both QI and research. Some programs require the completion of all elements of a practice-based improvement initiative; others require the completion of only some elements. Still others include the completion of a chart audit as a QI project. Regardless of how a QI project is defined, its purpose should be aligned with learning objectives and hence to the competencies the learner is expected to have acquired upon completion of the project. QI projects therefore are an example of experiential learning that can be offered.

The following strategies are suggested for consideration related to the incorporation of QI projects as experiential learning activities:

- Align QI projects with the clinic's and department's priorities and/or ongoing initiatives

- Encourage residents to complete a root cause analysis/fishbone diagram/Ishikawa diagram for a process or outcome they want to approve

- Allow residents to join existing or ready-to-launch QI projects in the clinic

- Provide residents with the clinic's lists of QI projects that have already identified an opportunity and need for improvement

- Use a team-based approach to QI projects during residency; a small team of residents can sequentially take over a project from a previous group and pass it on to the next group of residents

- Provide long-term horizontal opportunities for residents to participate in a QI project

- Encourage short and tangible QI project ideas that can be embedded within the two-year curriculum

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Teaching tips to highlight real-life stories

For an academic day consider inviting a speaker, such as a recent graduate or a resident who has completed or is completing their QI project, to share their experiences and discuss their QI project.

- Ensure projects are undertaken in one's "home clinic" rather than during a rotation or block in an external service

While this guide strongly advises residency programs to use experiential learning for QI, it recognizes that including a QI project in a residency curriculum may be challenging. Careful analysis of the advantages and disadvantages of integrating a QI project as part of the residency curriculum can help program directors decide on the best use of QI projects as an experiential teaching method.

Advantages:

- Provides hands-on learning, allowing residents to experience the full scope of successes, challenges, and barriers in starting and completing a QI project

- Provides an opportunity for residents to work as a team and engage members of the practice

- Promotes a QI culture in a clinic, addresses the Quadruple Aim, and improves practices

- Leverages the use of large-scale, macro-level efforts with residents invited to participate

Disadvantages:

- Clinic fatigue, particularly in clinics with many residents

- Incomplete or unsustained QI initiatives, started by residents simply to complete this aspect of their training but with no plans to sustain the initiative over the long term

- Possibility of residents and staff being taken from other domains of learning and priorities by prolonged QI initiatives

A critical component of learning about QI in the workplace is the coaching and support offered to residents while they are in the clinical workplace.

Continuity of supervision is important, as residents may feel inadequately supported when it is piecemeal, inconsistent, or even absent. Several options are available for providing this support:

- Identify a QI lead or resource person within the clinic or the department of family medicine to support residents

- Organize regular QI team meetings to provide support and advice and to help residents progress with their projects

- Clarify the roles and availability of supervisors and the support team

- Arrange regular interactions with designated QI preceptors/supervisors

- Communicate educational information between supervisors and the programs

- Enable continuity in the QI environment to allow for longitudinal, longer-term work

As a final note, it cannot be overemphasized that QI is a team activity that benefits from faculty collaborating with and supporting their learners to carry out QI together. The co-learning is powerful.

Reviewing, analyzing, and reflecting on successful QI projects

An important part of learning from QI projects is to review, analyze, and reflect on them, particularly as a larger group so that residents can learn from one another. This teaching method could provide elements of experiential learning without the time burden residents associate with conducting a full QI project. Some programs have created a repository of QI projects conducted over time and a plan for learners to analyze

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Teaching tips for experiential learning

1. Provide a list of QI projects from which the resident can choose. Careful consideration of which projects to include can be time-consuming up front but ensures relevancy to the practice and possibly a positive learning experience for the resident.
2. Have a team of residents work on a similar QI project with each team provided block time to engage in the QI project before passing it on to the next team of residents.

and review previous QI projects prior to embarking on their own. By learning from previous QI projects and then participating in their own, residents are more likely to succeed and to choose more feasible QI projects.

Combining Elements 1 and 2: Mixed didactic and experiential learning

Creating a menu of learning activities that offer teaching and learning opportunities for residents to acquire QI competencies can be useful. This guide encourages the use of both didactic and experiential approaches when teaching QI and promotes the use of a horizontal curriculum approach. A suggestion on how this could be designed is outlined in **Table 3**.

Element 3: Role model in QI-friendly environments

A large body of evidence related to the phenomenon of the so-called hidden curriculum in medical education demonstrates that learners emulate the behaviour they observe from their supervisors and teachers more than what they are taught explicitly in a classroom setting. Supervision by clinical teachers and supervisors who demonstrate a positive attitude toward ongoing, everyday practice improvement and who engage in QI initiatives is critical for residents to adopt the necessary QI skills and a positive attitude toward practice improvement. Role modelling applies not only to individual clinician teachers and supervisors, but also to the whole clinic site, the residency program, and the department of family medicine.

Table 3. Horizontal curriculum: Mixed didactic and experiential learning

Fundamental QI Curriculum Overview	
First academic half day	**Second academic half day**
• Pre-test assessment **A didactic session introduces QI concepts** • Difference between QI and quality assurance • PDSA cycle as the model for improvement • Team composition • Choice of an appropriate QI project • Invited speaker (a recent graduate of the QI program discusses their 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** • Establishment of data collection • Interpretation of PDSA cycle • Post-test assessment
Reproduced with the permission of the Royal College of Physicians and Surgeons of Canada.[20] Wong RYM. *Teaching Quality Improvement in Residency Education*. Royal College of Physicians and Surgeons of Canada; 2015.	

However, not all supervisors and clinic team members have the skills needed to participate in QI or to teach it. Residency programs are therefore encouraged to activate a faculty development program in this area with the goal of building faculty capacity. The role modelling of active engagement in QI while teaching residents or facilitating their learning at its highest level should be an explicit expectation of faculty, one included in their job descriptions and contracts.

Faculty development

Faculty development is critical to ensuring that QI is successfully integrated into residency education. QI as a discipline has methodology, skills, and tools, but some faculty members may not have received training in their use. Developing the faculty's capacity and capability through a comprehensive faculty development program is critical to the success of integrating QI into residency training. This is a team effort that, over time, will allow faculty to role model QI in practice and teach residents in a QI-friendly environment. Several options may be available to a residency program depending on how developed or mature the program is with respect to incorporating QI into the curriculum.

Suggestions for preparing faculty to teach QI:

- Identify experienced faculty or teachers (physicians, nurses, or other professionals) who would support the integration of QI into the residency program and who can support and coach residents and their clinical supervisors and teams at teaching sites

- Identify a QI champion or lead for the whole residency program or at teaching sites

- Help all faculty develop basic QI skills so they can participate in QI, serve as role models, and supervise residents in their respective clinics and workplaces

- Leverage existing curriculum resources

Some departments of family medicine in Canada have used innovative methods to bring on board as many of their clinical teachers and teaching sites as possible to participate in QI activities. Some programs have taken a formal approach by designating a dedicated QI lead for the residency program, thereby demonstrating their commitment to QI. Other programs have introduced QI to their faculty informally with a designated

QI champion in the department or at clinical sites who helps promote and advance QI.

In either case, one of the first steps is to identify faculty members (clinicians and/or non-clinicians) who already have QI experience and training. This group would form the initial nucleus around which the program could build a larger pool of QI teachers over time. In large residency programs, or in a program with many distributed sites, the teaching faculty can begin with workshops offered at faculty development days or virtually. As faculty at each distributed site start acquiring skills and experience, they may then provide local tutorials to deliver the theoretical or didactic part of the training.

The Institute for Healthcare Improvement has described a "dosing" approach to building QI capacity and capability. It includes the notion that not all team members need to have the same dose of the science of improvement knowledge and skills, and that education programs can be customized to meet the needs of particular team members. This approach proposes that senior clinicians need a maximum dose in understanding variation and quality as a business strategy and a minimum dose in the history of QI and the construction of control charts. Teaching the related Model for Improvement and PDSA testing would require a moderate dose.[23] The concept of dosing could be considered when developing a QI curriculum to deal with existing time challenges in faculty development.

For teaching sites that have no faculty with QI experience or training, this guide suggests that departments of family medicine identify and reach out to individuals at these sites and support them in acquiring QI skills. This may include the department of family medicine offering virtual seminars delivered by external QI teachers or facilitators. Another approach is to use a co-learning model, in which faculty and clinical staff learn about QI alongside residents as part of the residents' QI curriculum. This co-learning model has worked well in many family medicine programs and has been an efficient capacity-building strategy. Once a nucleus group is formed at a residency program and/or teaching site level, more sites and faculty can be encouraged to participate, gradually expanding a network of QI champions. Faculty-to-faculty training on topics such as QI science, change management, QI mentorship,

and facilitation or supervision of a QI project could then be done on an as-needed basis. Partnering with another department of family medicine or QI training program that has existing resources to teach QI content is another strategy to consider.

Sometimes building a residency-wide QI teaching network starts at a clinical grassroots level instead of emanating from the academic residency program itself. Seeing teachers as clinicians and involving them in practice improvement initiatives, such as practice improvement essentials as part of continuing professional development, is another strategy to use. Once clinicians are comfortable with practising QI, they would naturally role model positive QI behaviours to learners and over time this role modelling would become part of the teaching in clinical settings. This approach would require a deliberate and planned strategy, which may initially take one to two years, followed by ongoing faculty development and support.

A culture supportive of QI is needed within departments of family medicine and their affiliated clinical teaching settings. Without this QI-friendly environment and content supervision, residents may encounter challenges that would hinder their acquisition of the requisite QI competencies and may develop negative attitudes toward, and not fully appreciate the importance of, QI in pursuing practice improvement.

QI at academic departments of family medicine

QI is important in clinical teaching settings as well as at the residency program and department levels. Annual QI days during which residents, faculty, and teaching sites showcase their QI activities and are recognized for the completion of their QI projects would help demonstrate the importance of QI in academic family medicine and contribute to a cohesive, QI-friendly environment for residents. The opportunity to demonstrate formal recognition of QI as scholarship valued by departments of family medicine alongside other research and education activities would signal the departments' support for QI. Identifying and supporting residents or faculty who

want to pursue QI as part of their academic careers—e.g., by pursuing additional training or a master's or PhD degree related to QI—would build QI academic expertise and leadership in a department of family medicine. Moreover, providing support or incentives for publishing QI work in specialized QI journals would also significantly advance QI in family medicine and primary care in an academic forum.

Recognizing the importance of further education in QI and acknowledging QI as scholarly work as part of faculty annual reviews, promotion processes, and annual awards for excellence would further engage current and future family physicians in QI and practice improvement. This could become an important driver of health system change and transformation, as family physicians would be able to share and spread successful practice improvements across the health care system.

QI leadership

To integrate QI in residency training and promote a QI-friendly environment successfully, the designated QI directors or leads in residency programs should collaborate closely with the residency program directors, research directors, and faculty development directors, as there are areas of overlap and opportunities for synergy between these domains. For instance, faculty development related to QI will influence the design of the QI curriculum, including the learning methods used.

Program directors are encouraged to undertake a QI approach to improving their own residency training programs. Curriculum development and implementation become cyclical when a QI approach is adopted. The realities of a residency program may, out of necessity, set a certain direction but perfection is not expected at the start. Flexibility is required to adjust the curriculum along the way as needed. However, it is important to avoid making too many changes too often, as this may cause confusion and educator burnout.

Leveraging existing curriculum resources

Integrating QI in the residency program requires developing resources. Many resources are already available that have been tailored to the Canadian context. Please see Appendix A and the CFPC's Pii website for more information.

Element 4: Assess QI competencies

Assessment of a resident's acquisition of QI competencies is critical to understanding the effectiveness of the teaching offered and the extent of learning obtained. Different assessment approaches are used across departments of family medicine, including formative and summative assessments that align with the standards defined by the CFPC related to the implementation of programmatic assessment in the workplace.

To support the programmatic assessment process recommended by the CFPC in line with the acquisition of the QI competencies outlined in *CanMEDs-FM*[1] and our Core Professional Activities,[17] this guide suggests that:

- Assessment of QI competencies be ongoing and formative

- Residents' progress be monitored on a periodic basis

- Educational planning, including remediation, be individualized

- Promotion criteria and summative decisions be competency-based and made with multiple sources of input and evidence

Following the structure outlined in the curriculum framework in chapter 5, this section provides suggestions on how to assess the teaching of core QI concepts (Element 1) and QI experiential learning in the workplace (Element 2). For several programs, the assessment of QI learning has been less focused

on competence acquisition than on attestation of participation, e.g., attendance in a tutorial. The move toward assessment of QI competence is still evolving at the program level and at the national CFPC level. Using a portfolio that gathers different forms of evidence of a learner's engagement in QI activities along with field notes or other formative assessment tools can help programs assess whether a resident has met the QI competencies and expectations set by the CFPC. The goal of the assessment process is to ensure that all graduates have the ability to participate actively in QI processes at the start of independent practice.

Assessing Element 1: QI core concepts

If didactic, online, or small group tutorials are used to teach residents about QI core concepts, assessment methods could include self-assessment multiple-choice questions or case-based tests. These could be offered to learners on specific QI learning activities and used as formative learning opportunities. Programs could also opt to use the standardized, validated Self-Assessment Program (SAP), a self-reported questionnaire administered to learners that enables them to reflect on their own comfort level and self-reported level of expertise in QI.[24] It is recommended that the SAP is administered at the beginning of a QI curriculum and immediately after the completion of didactic teaching components that introduce core QI concepts.[19] It is recommended that the SAP is not administered more than three times to any given group to avoid assessment fatigue.

The Quality Improvement Knowledge Application Tool Revised (QIKAT-R) is another useful tool that can be administered at an introductory QI first session to establish a baseline of the trainee's knowledge of QI.[23] This tool allows residents to apply their QI knowledge to a clinical case by having them complete a case-based learning exercise, which can be introduced in the workshop/tutorial/seminar component of the curriculum.[25] After the second session is completed, the assessment should be repeated, ideally using a different case study for the QIKAT-R.

As new methods of teaching such as gamification are adopted, flexibility and creativity in assessment methods will no doubt emerge. The QI Olympics and Amazing Race activities, described earlier in chapter 5 and employed respectively by the University of Toronto and the University of Manitoba, have students complete QI-specific tasks during gamification exercises. In the former, residents must identify change ideas or appropriate tools for their root cause analysis, or they describe the plan part of the PDSA cycle for one of their change ideas. In the latter, residents are required to work through a series of clues to extract data from EMRs and correctly solve 20 clues in the least amount of time. In both cases, the assessment is a combination of active participation and the satisfactory completion of the set tasks. The developers of both games highlight the usefulness of having learners reflect on their experiences, which is done through a modified SAP.

The trick with competency-based assessment of QI will be to reinforce the use of innovative approaches wherein residents can assess themselves and receive formative assessments related to QI. This requires a shift in thinking for residents and teachers using CRAFT principles to support an approach for assessing residents' QI knowledge and their overall competence to participate in QI by the end of training.

Assessing Element 2: Experiential learning in the workplace

As described in chapter 4, the suggested learning objectives in this guide can point to what can be best assessed in the workplace; for instance, when learners are involved in the day-to-day management of patient care, involved in clinic operations such as team huddles, or working with other health care professionals and physicians on their own or on clinic- or department-wide QI projects.

When preceptors are coaching and supervising learners as they provide care to patients, learning objectives could be used to create field notes on a specific case review or to offer a specific point of discussion during a periodic review, and these notes can subsequently be added to the learner's assessment portfolio. An example is provided in **Figure 4**.

Figure 4. Example of field notes for a resident's periodic review

Learning Objectives	Preceptor Questions for Learner
A. Motivation	
A.1 Incorporate QI and measurement as part of everyday practice	As you reviewed the need for your patient's annual mammogram screening, did you wonder how many women in your practice currently need mammograms? How might you improve your ways of knowing who needs to be screened and when? How might this question be transformed into a QI problem? How might you create an aim statement to address mammogram screening?
A.2 Demonstrate a commitment to high-quality care	
A.3 Demonstrate reflective practice by continually identifying areas for improvement	
C. Plan and Do QI	
C.1 Define a problem and develop an aim statement	
D. Measurement and Data	
D.1 Describe the role of practice-level data in everyday practice, including their quality, strengths, and limitations	What kind of data would be useful to you and how might you get access to them? Are there limitations to the data you might receive?
E. Teamwork	
E.1 Highlight QI as an interprofessional activity	Who might assist you in getting the data you need? What roles might the other members of the health care team or your patients have in addressing ways to improve mammogram screening?
E.2 Work within a team when undertaking QI	
E.3 Describe the role of patients, families, and the community in QI	
F. Patient Safety and Engagement	
H.1 Identify patient safety situations	What are the risks to your patients if screening is missed?
H.3 Describe methods to engage patients in QI activities	
G. Resource Stewardship	
I.1 Describe what is meant by resource stewardship	
I.2 Practise resource stewardship	

Assessing QI project participation

Learner participation in QI projects serves as an experiential learning opportunity that can be used as an assessment opportunity. However, it can be challenging if the assessment criteria are not specified or if there is confusion as to what level of competence the learner should demonstrate. The suggested QI learning objectives in chapter 4 can be transformed into an assessment template to provide the learner with feedback and an opportunity to reflect on their progress (see **Table 4**).

Table 4. Example of assessment criteria for QI project participation

Learning Domain and Objective	Assessment Criteria
C. Plan and Do QI	
C.1 Define a problem and develop an aim statement	The area for improvement is clearly described in the aim statement 1 2 3 4 5 Unclear Somewhat Very clear description clear description description
C.2 Participate in a QI project	The learner provides evidence of their participation in the QI project 1 2 3 4 5 No evidence Some Active of participation participation participation
C.3 Participate in a PDSA cycle	The learner provides evidence of their participation in a PDSA cycle 1 2 3 4 5 No Some Active participation participation participation
D. Measurement and Data	
D.1 Describe the role of practice-level data in everyday practice, including their quality, strengths, and limitations	The learner is able to justify the use of the methods chosen for the QI project 1 2 3 4 5 No justification Some justification Full of methods of methods justification of methods The learner effectively uses data to support QI recommendations made 1 2 3 4 5 Does not Somewhat uses Fully uses use data data to justify data to justify to justify recommendations recommendations recommendations The learner demonstrates an understanding of the quality, strengths, and limitations of the data used 1 2 3 4 5 No Some Full understanding understanding understanding

Learning Domain and Objective	Assessment Criteria				
E. Teamwork					
E.1 Highlight QI as an interprofessional activity	The learner provides evidence of a team-based approach related to their participation in the QI project				
	1 No team participation	2	3 Some team participation	4	5 Full participation
G. Ethics					
G.1 Identify QI activities that require REB approval	The learner demonstrates an understanding of how REB approval is or is not needed in the QI project				
	1 No REB approval identified	2	3 Somewhat identifies REB approval needed	4	5 Fully identifies REB needs

Other sources of information help the supervisor support the attestation of the learner's acquisition of QI competence at the end of residency training. For instance, the supervisor might:

- Develop and report on the learner's QI project using an assessment grid

- Ask the learner to submit a reflective essay on the QI project experience and what was learned

- Gather feedback from clinic staff, faculty, and/or peers on the learner's oral presentation of their QI project

- Have residents create their own grading rubric to demonstrate what they hoped to learn and what they actually learned from the QI project experience

- Ask residents to submit a self-reflection on critical events and/or decision-making during the project and on how they would improve the QI project if they were to do it again

New assessment approaches are being considered, including whether there should be specific QI content related to core concepts or the practical demonstration of participating in a QI process as part of the Certification Examination in Family Medicine. For now, programs are encouraged to share their assessment innovations for the community at large to develop enough experience to justify specific, more nationally agreed-upon approaches to the competency assessment of QI.

Field note example:

The resident demonstrated a good understanding of how she would go about exploring the mammogram screening rates of her patient population. She knew where to access the data but did not know who else in the clinic could help her get the data in a format that would be helpful. To use this as a reflective learning opportunity, the resident will speak to the clinic manager to determine how she can get the list of who needs mammograms this year from the EMR.

6. Input from family medicine residents

In 2018 the CFPC's Section of Residents Council, which is composed of resident representatives from each of the 17 family medicine residency programs in Canada, surveyed their colleagues about the type of QI learning they had experienced and their perspectives on QI in their training and future practices. This work was subsequently published in a report as a part of the 2018 Guide for Improvement of Family Medicine Training project.[8]

Out of the 489 responses (with approximately 1,300 residents surveyed in total), almost three-quarters of respondents stated that QI is important or very important to their future practices.[8] Residents expressed a strong sense of responsibility for ensuring patient care is optimal and striving continually for best practices and excellence.[8] Residents highlighted that they felt:

- QI is a key area they should be competent in to begin practice upon the successful completion of residency

- There is an increasing expectation by licensing bodies to have family physicians show evidence of engagement in practice improvement activities

- QI has the potential to improve the delivery of health care, improve outcomes, and enhance providers' work experience

However, more than 25 per cent of respondents felt that QI was irrelevant to their future practices.[8] In the open-ended responses as to why QI would not be important to their future practice, the most frequent pointed to a "limited perceived value of QI" and "indifference," followed by "no interest in research or academic work."[8]

Residents suggested that using stories of successful QI initiatives and reviewing or seeing other successful resident QI projects and the projects of their own clinical teams would encourage them to learn and to engage more in QI education during residency. "Stories not only teach us how to act—they inspire us to act. Stories communicate our values through the language of the heart, our emotions. And it is what we *feel*—our hopes, our cares, our obligations—not simply what we know that can inspire us with the courage to act."[8]

The survey also asked residents about the types of QI experiences they were exposed to during their residency programs. The most frequent response from residents was that they participated in scholarly projects (81.7 per cent of respondents), followed by classroom lectures/didactic teaching (55.3 per cent) and online modules (19.0 per cent).[8] Fewer than half of survey respondents (44.4 per cent) reported that the didactic teaching experience was useful for gaining knowledge, whereas 48.6 per cent of respondents stated the scholarly project was useful.[8]

Many residents reported fatigue from having to complete a full QI project. This has been echoed by many teachers, especially in clinics with many residents. While 48.6 per cent of responding residents stated that the scholarly project was useful for gaining knowledge and providing applicable information, only 39.3 per cent of GIFT survey respondents stated that the scholarly project was an efficient use of trainee time:

> "I didn't understand why we had to do a QI project. It was unfamiliar and stressful."

> "I feel that it is a check box we must complete. I personally love my QI project and my topic but I think often times people just try to get it done because they have to."

When residents were asked in the survey whether they felt they had sufficient knowledge or experience to implement QI in their future practices, fewer than half agreed (43.8 per cent), while 32.2 per cent were neutral and 5.6 per cent strongly agreed.[8]

What has emerged since this survey is that there is a need for clearer QI Core Professional Activities that highlight well-defined milestones or expectations regarding graduates being able to participate in ongoing QI processes in their practices and knowing how to obtain and analyze practice data as part of the QI process. Recommendations for improvement in the teaching of QI based on the survey findings were shared with program directors through the GIFT report and a summary infosheet.[8,26] Of the recommendations shared, the following were highlighted in the summary:[26]

1. Appreciate that teaching QI to residents is an expectation of all residency programs.

2. Learn QI: It's more than just conducting a QI project—it is a thought process and a mindset, and it can take many forms.

3. Seek QI learning opportunities and identify how QI is being taught.

4. Recognize that QI in health care is intended for residents to continually do better for patients.

5. Keep it simple: Actively participate in QI projects and select a manageable, small-scale topic to address.

6. Apply QI to daily clinical practice: Review charts and quality reports (available through a provincial health quality adviser) with the preceptor to apply knowledge to real patients.

7. Be curious and ask questions: Identify areas where QI skills can be implemented.

8. Seek mentorship to enhance QI skills: Ask the preceptor to work through QI examples. If a preceptor requires further knowledge about QI, consider involving the preceptor in a QI project or encourage them to seek out faculty development.

9. Use existing tools and resources: Take a course or visit online resources. There are in-person and online courses available (some provincial health quality advisers have courses) in addition to existing online resources such as [those developed by] the Institute for Healthcare Improvement (which also has online courses).

10. Provide site-specific feedback: Review the curriculum and provide feedback to the program to enhance the way QI education is delivered.

7. Conclusion

Engaging family physicians and primary care practices in QI is essential to achieving the Quadruple Aim of improving patient and provider experiences, achieving better health outcomes, and lowering health care costs.[11] Research has demonstrated that exposing residents to QI prepares them to participate in practice improvement upon graduation and subsequently influences lifelong QI behaviours. Critical to this is that they are provided with a foundational set of QI skills and knowledge. Recognizing the importance of QI as a part of everyday practice in family medicine and primary care, the CFPC included it as a core competency in the *CanMEDS-FM 2017* Roles, as a key activity in the Family Medicine Professional Profile, as a Core Professional Activity, and as a critical component in the *Standards of Accreditation for Residency Programs in Family Medicine*.[1,2,16,14]

In 2017 the CFPC's Research Department undertook an extensive, multi-pronged needs assessment to better understand what programs needed to implement the teaching of these competencies. This work was complemented by the Section of Residents' 2018 GIFT project, for which a separate needs assessment was conducted to understand residents' perspectives regarding the teaching of QI in residency.[8] This guide is a response to the needs identified by the family medicine programs and was guided by the recommendations residents provided in their 2018 GIFT project.[26] While this guide is not intended to be prescriptive, it provides an overview and examples of QI learning objectives and pedagogical methods for teaching QI in a family medicine residency curriculum. It also highlights options for assessing the acquisition of QI knowledge using competency-based education principles.

Learning objectives for QI

Developed in collaboration with QI leads and directors at departments of family medicine, specific learning objectives were developed to address the QI competencies that the CFPC established. The learning objectives set out in chapter 4 are suggestions for programs and can be adopted exactly as they are or adapted and modified to meet a residency program's specific needs. Each program is encouraged to consider their unique contexts and to subsequently select the teaching methods that are realistic and feasible to implement.

Pedagogical approaches for teaching QI

This guide has suggested that a well-balanced QI curriculum should contain four essential elements grounded in the suggested learning objectives. These are:

• Element 1: Teach QI core concepts early in residency training

  » Didactic teaching methods, such as lectures, tutorials or workshops, self-learning, and gamification at academic days or as a series of workshops, can be employed

  » Gamification methods can be employed; e.g., the University of Toronto's Department of Community and Family Medicine's QI Olympics, the University of Manitoba's Amazing Race, activities that have been developed by the Institute for Healthcare Improvement, and exercises that use non-medical examples

  » Stories of successful QI projects, challenges, and failures can elicit the emotional component of learning and provide residents with the inspiration to act by engaging them in improvement and demonstrating that QI is not just a "check box" to be ticked as part of training

• Element 2: Provide experiential learning in the workplace

  » For instance, through participation in clinic QI activities, coaching from a supervisor/facilitator, or completion of QI projects

• Element 3: Role model in QI-friendly environments

  » This is critical in inspiring a change of attitude toward QI and creating a QI-positive environment

  » Research suggests that learners emulate the behaviour they observe in practice, often more so than what they are taught explicitly in a classroom setting

» Offering faculty and residency awards for QI activities can provide additional recognition

• Element 4: Assess QI competencies

  » The assessment of QI competencies should be ongoing and formative and should be guided by the CFPC's CRAFT, which maps, facilitates, monitors, and informs decisions about the progressive achievement of competence for residents

  » The CFPC provides further guidance on how to design the assessment processes

Faculty development

To integrate QI into residency training successfully, additional faculty development may be necessary. A core team of experienced faculty or teachers or site-specific QI champions could support the integration of QI into the programs, help supervise residents, and assist their colleagues in developing basic QI skills. This guide suggests the overall goal should be that all faculty eventually have fundamental or foundational QI skills so they can participate in QI, serve as role models in this area, and supervise residents' QI activities in their respective clinics and workplaces.

Input from residents

Results of the 2018 GIFT survey indicate that residents agree that QI is a key area they should be competent in to begin practice, but fewer than half of graduating residents in this survey felt they had sufficient knowledge or experience to implement QI in their future practices.[8] Residents highlighted the need for a shift in the mindset around QI in residency programs to help residents understand how QI contributes to practice improvement. Feedback on the specific learning and assessment methods was provided to programs, and the importance of mentorship and role modelling was emphasized.

8. Appendix: Useful resources for supporting QI in residency training

QI workshops

The CFPC's PIE workshops are available for use by residency programs that do not have access to other resources. The PIE workshops consist of two parts, each 3.5 hours long, delivered separately or jointly as a one-day course. The workshops can be used for teaching residents or as part of faculty development. Please see the CFPC's Pii web page for more details: **http://www.cfpc.ca/pii**.

Other examples of QI education programs available include, but are not limited to, the Centre for Quality Improvement and Patient Safety's C-QuIPS program (**https://cquips.ca/**) and the Institute for Healthcare Improvement's Open School online modules (**http://www.ihi.org/education/IHIOpenSchool/**).

Leveraging existing curriculum resources

Integrating QI in a residency program requires designated resources, which residency programs, other organizations, and provincial governments have been developing over time. Accessing these resources is an effective and efficient way to advance QI within residency programs and wisely use existing material tailored to the Canadian context. Resources can be divided into the following categories, and many are available on the CFPC's Pii web page:

- **In-house resources created by residency programs:** Some residency programs have developed in-house manuals and materials to help faculty and residents learn about and undertake QI. Several are open to sharing these resources and collaborating with other residency programs.

- **University resources:** Most medical schools have faculty-wide QI education programs that residency programs can tap into. Some of these offer more advanced courses for residents and faculty interested in deepening their QI skills.

- **Provincial resources:** Several provinces, such as British Columbia, Alberta, Ontario, and Quebec, have developed resources to support QI, ranging from guides and manuals to courses and online materials. Some of these resources are more generic, while others are more specific to primary care. Some relate to QI in general while others focus on a specific area, such as the use of EMRs to inform and guide QI or tool kits to advance specific provincial-level QI initiatives. Highlighting available materials and promoting provincial resources to residents and faculty offer further support to programs.

- **National resources:** There are pan-Canadian organizations, such as Choosing Wisely Canada and Healthcare Excellence Canada, that have also developed QI-related resources. In the case of Healthcare Excellence Canada, this includes some useful resources on scaling and spreading successful QI initiatives. National colleges such as the Royal College of Physicians and Surgeons of Canada also have useful resources, while the CFPC has developed the PIE workshops and provides opportunities for clinicians to submit their QI activities for Mainpro+® credits.

- **International resources:** One of the most useful repositories of QI-related videos and materials that can be used for teaching and for supporting QI work is that of the Institute for Healthcare Improvement (noted above).

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