# A Descriptive Report of an Innovative Curriculum to Teach Quality Improvement Competencies to Internal Medicine Residents

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There is growing emphasis on the significance of advancing the quality of health care, promoting patient safety, and reducing medical errors.[1,2] Accordingly, training programs on quality improvement (QI) have emerged,[3] although most target fully trained practitioners and few focus on trainees because of limited time available in training programs and suboptimal faculty expertise or interest.[4] While Canadian residency training programs are mandated to teach residents QI under the manager role of the CanMEDS 2005 framework,[5] there is no formal curriculum structure or support. A literature review from 1995 to 2006 revealed 91 studies of QI curricula for residency programs (reference list is available on request), with most focusing on specific diseases rather than general QI principles; none was developed in the context of Canadian health care.[6,7] Recently, a practice-based QI elective rotation was offered to medical residents,[8] which showed better QI knowledge retention in those who completed a QI project than in non-completers.

We are interested in developing a formal QI curriculum that tailors to the needs of Canadian internal medicine residents, with longitudinal content delivery and a team-based project component. We previously reported on the development of a new interactive forum, the Resident Day on QI, which is a product of QI teaching.[9] This report details the facets of the formal Vancouver Curriculum in QI, including target learner identification, needs assessment, creation of specific educational objectives, implementation, and dissemination.

## Methods

### *Setting*

The University of British Columbia (UBC) internal medicine residency program provides 3 years of core internal medicine training, including both inpatient and outpatient experiences. The QI curriculum was mandatory for all first-year medical residents every year (31 in 2005, 33 in 2006, and 44 in 2007). We obtained approval from the university residency training committee to implement the curriculum and disseminate our experience.

### *Development of the Vancouver Curriculum in QI*

We conducted a curriculum needs assessment to define the educational needs of the target learners. Perceived needs were based on input from the UBC Internal Medicine residency program directors. Non-perceived needs were based on a review of the published literature on QI teaching programs and curricula for community physicians and health professionals,[3] resident family medicine residents,[10,11] internal medicine residents,[7,8] and others.[12,13] Importantly, we also included non-perceived needs based on actual QI data from the local hospitals and health regions to capture what was actually happening. From this comprehensive needs assessment, educational objectives in the CanMEDS 2005 format[5] were developed and approved by the residency training committee (Figure 1). These objectives encompass all seven roles in the CanMEDS format and, together with the QI teaching

**At the end of the quality improvement curriculum, the resident will be able to:**

**MEDICAL EXPERT**

- Demonstrate an understanding of the change from quality assurance (QA) to quality improvement (QI), the theory of the plan-do-study-act (PDSA) cycle and how to use measurement for PDSA rapid cycle improvement
- Formulate clear aim statements based on a few key characteristics, and employ strategies that keep the team focused on the aim statements to ensure successful results

**COMMUNICATOR**

- Demonstrate the ability to communicate professionally with colleagues and other health care providers within the context of an interdisciplinary QI team, both at the organizational and health system level

**COLLABORATOR**

- Participate in an interdisciplinary QI team meeting and contribute effectively for the purpose of analyzing and improving a practice or process

**MANAGER**

- Define and implement a clinical QI project in a team-based model, considering available health resources

**HEALTH ADVOCATE**

- Promote the importance of quality improvement in health care, while considering the practical challenges that exist at the operational level

**PROFESSIONAL**

- Understand the potential role of QI in reducing medical errors and improving patient safety

Figure 1. QI-specific CanMEDS[5] educational objectives.

materials, were posted on a secured electronic (Internet-based) platform of learning resources known as e-Res[14] for easy after-hours resident and faculty access.

The Vancouver curriculum in QI consisted of an academic half-day (AHD) curriculum (phase 1) and a longitudinal, team-based, experiential QI project curriculum (phase 2). Phase 1 was a modification of a continuing medical education course,[6] although we lengthened the duration to 7 hours and delivered it during two regularly scheduled AHDs 4 weeks apart. The lesson plans for phase 1 are summarized in Figure 2.

Phase 2 involved completion of a team-based QI project longitudinally over 10 months. All first-year residents formed in teams of four or five and selected their own faculty sponsor from a list of interested faculty with QI experience. While we provided a list of sample QI project topics, all teams were free to select their own topics. One hour of each weekly AHD was protected for independent study, including work on the QI project. Five 1-hour tutorial sessions were facilitated by faculty experienced in QI and provided longitudinal, small group feedback to each team regarding specific operational issues during the QI process (Figure 3). Upon completion of the QI projects, each team produced a QI abstract and presented findings in podium format at the annual Department of Medicine Resident Day on QI. The latter was described in detail previously.[9]

### *Faculty Development*

In addition to recruiting interested faculty members with previous QI experience to provide project topics and be faculty sponsors, we also approached the university and clinical heads of various medical subspecialties, thereby increasing faculty participation. There was, however, no formal faculty development on QI skills available at the local or national level.

## Discussion

The Vancouver Curriculum in QI has several unique features. It is the first formal QI curriculum tailored to the Canadian health system. It has

**First academic half-day:**

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|---|
| Introduction, session agenda, pre-test (30 minutes) |
| **Large-group session 1. Overview of quality improvement: part I** (50 minutes) |
| Topics: quality improvement versus assurance, model of improvement, plan-do-study-act (PDSA) cycles, team formation, aim statement, measurements and indicators, change management, resident perspectives on QI (presented by a senior resident) |
| Break (10 minutes) |
| **Small-group workshop module 1** (50 minutes) |
| Topics: project team formation and organization, topic selection, aim statement |
| Break. (10 minutes) |
| **Small-group workshop module 2** (50 minutes) |
| Topics: flow charting the current process, analysis of clinical context, available staffing, numbers and types and training of staff |
| Session wrap-up (10 minutes) |

**Second academic half-day:**

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|---|
| **Large-group session 2. Overview of QI: part II** (40 minutes) |
| Topics: QI project charter, sampling, types of variation (common versus special causes), QI data formatting (run and control charts) |
| Break (10 minutes) |
| **Small-group workshop module 3** (50 minutes) |
| Topics: data collection, embedding monitoring in workflow, baseline data review, data interpretation, intervention selection, implementation method and timing |
| Break (10 minutes) |
| **Small-group workshop module 4** (50 minutes) |
| Topics: interpreting PDSA cycle data (did change occur? is it an improvement?), sustaining the improvement |
| Break (10 minutes) |
| Session wrap-up, post-test (30 minutes) |

Figure 2. Schedule of educational activities during phase 1 of quality improvement (QI) curriculum. These activities were delivered during 2 academic half-days.

**Tutorial 1: Initial Organization**

1. Fine-tune and produce a final aim statement for the QI project.
2. Brainstorm answers to the three core questions of a QI Charter, that is, (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?
3. Draft a timeline that is realistic and feasible.

**Tutorial 2: Completion of QI Charter**

1. Finalize the answers to the three core questions of the QI Charter for the project.
2. Confirm a timeline (with key milestones) that is realistic and feasible.
3. Establish an appropriate division of labour among team members, including identification of support and resource requirements.

**Tutorial 3: Data Collection**

1. Review the answers to the three core questions of the QI Charter for the project.
2. Begin baseline data collection. Review the division of labour among team members. Identify support and resource requirements.

**Tutorial 4: Ongoing Plan-Do-Study-Act (PDSA) Cycling**

1. Revise the timeline (with key milestones) based on progress to date and ensure it is still realistic and feasible.
2. Review the change(s) made. Identify challenges and barriers, and potential solutions to overcome them.
3. Review progress on data collection. Review challenges and barriers, and potential solutions to overcome them.

**Tutorial 5: Data Analysis**

1. Confirm the team strategy on data analysis. Ensure appropriate use of data for PDSA cycling. Identify support and resource requirements.
2. Prepare the abstract submission for Resident Day on QI.
3. Prepare the podium presentation for Resident Day on QI.

Figure 3. Tutorial objectives during phase 2 of quality improvement (QI) curriculum. These activities were delivered in small-group format over five sessions of 1 hour each.

specific teaching objectives, which encompass all seven roles in the CanMEDS framework. It highlights experiential learning in the real clinical world, with a highly interactive and relatively brief phase 1 that focuses on the basic QI concepts and skills, and a longer phase 2 that allows residents to exercise their maximal autonomy in team formation, project topic, and faculty sponsor selection. We continue to provide guidance by organizing structured tutorials throughout phase 2 to ensure all resident teams achieve milestones necessary for successful completion of the QI projects.

When we implemented our QI curriculum, we resisted the temptation to insert it to any single block rotation to ensure the resident learning would not be tampered by time limitation or work overload. We purposely carved out protected time for residents during AHD to receive the curriculum and complete their projects (1 hour of each weekly AHD was unstructured to allow personal learning endeavours, including QI). We also reorganized the first-year curriculum so that residents remained at one of two teaching hospitals for six consecutive months to complete their clinical rotations before switching over to the other hospital, which made it feasible for residents to identify possible clinical improvement opportunities and make connections with the appropriate stakeholders to carry out the QI activities.

Our QI curriculum received tremendous institutional support at multiple levels, ranging from the university to hospitals to the local health region, which allowed us to identify local champions and opinion leaders to facilitate the implementation of the curriculum as well as place local resources at the residents' disposal. For instance, the hospital health records departments assisted in pulling patient records, and the QI departments provided analytical support in formatting the resident team projects. The same institutions also provided financial support to fund an innovative QI award program, which included cash prizes to winning resident projects at the annual Resident Day on QI.[9]

There were definite barriers in the development and implementation of the Vancouver curriculum. Foremost was a common misperception that QI was for the business world and did not have a role in health care. We tried to dispel this myth by making constant references to QI articles that appear in peer-reviewed medical journals,[15] web resources specific to QI in health care,[3] and the educational requirements on QI as defined by the accreditation bodies in Canada (the manager role in CanMEDS[5]) and United States (practice-based learning and improvement[16]). Another challenge concerned inadequate teaching resources, especially in terms of trained faculty. Although we attempted to identify staff physicians with the experience and interest in teaching QI, we were able to recruit only a small number of teaching faculty and project sponsors. In future, we would need to provide formal QI training to medical staff interested in becoming faculty sponsors, ideally through concerted efforts at the university or national level.

There are limitations to this descriptive report. The curriculum was developed and implemented at a single centre, therefore raising the question of generalizability. We will soon be implementing it in other centres for broader dissemination. All of our residents had minimal (if any) exposure to QI prior to receiving the curriculum. Thus, the applicability of our curriculum to more experienced learners remains unknown. Finally, we did not report on the objective learning outcomes, which are currently being studied. Appropriate end points include resident self-assessment of their QI skills, objective (case-based) assessment of how QI skills are applied in various clinical settings, and performance during the QI project podium presentations. In addition, it is reasonable to assess the feasibility of implementing our curriculum by logging the amount of time required for organization, surveying faculty as to the time and effort needed to prepare for their sessions, and surveying residents about workload for their team projects.

## Conclusion

The emphasis on QI by national residency training accreditation bodies makes it incumbent upon residency programs to teach QI properly. The Vancouver Curriculum in QI offers one formal approach, including a structured AHD curriculum and a team-based longitudinal project. A study of the effectiveness of this curriculum on resident knowledge and skills on QI based on self-assessment and objective assessment has been initiated.

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## References

1. Berwick DM. A primer on leading the improvement of systems. Br Med J 1996;312:619–22.
2. Berwick DM. Continuous improvement as an ideal in health care. N Engl J Med 1989;320:53–6.
3. Institute for Health Care Improvement. A resource from the institute for healthcare improvement. Cambridge, MA: Author; www.ihi.org/ihi. Accessed January 22, 2006.
4. McNeil BJ. Hidden barriers to improvement in the quality of care. N Engl J Med 2001;345:1612–20.
5. Frank JR, ed. The CanMEDS 2005 physicians competency framework. Better standards. Better physicians. Better care. Ottawa: The Royal College of Physicians and Surgeons of Canada; 2005.
6. Society of General Internal Medicine. Getting started in continuous quality improvement. Washington, DC: Author; www.sgim.org/Handouts/am04/Precourses/PW08.pdf. Accessed August 30, 2005.
7. Alliance for Academic Internal Medicine. Curriculum in continuous quality improvement. Washington, DC: Author; www.im.org/AAIM/Meetings/PastMeetings/2004/APDIM/APDIMFall04/HDTDT-Djuricich,Alex-CQIcurriculum.pdf. Accessed July 24, 2005.
8. Ogrinc G, Headrick LA, Morrison LJ, Foster T. Teaching and assessing resident competence in practice-based learning and improvement. J Gen Intern Med 2004;19:496–500.
9. Wong RY, Kassen BO, Hollohan K, et al. A new interactive forum to promote awareness and skills in quality improvement among internal medicine residents: a descriptive report. Can J Gen Intern Med 2007;2(1):35–6.
10. Shortt SED, Hodgetts PG. A curriculum for the times: an experiment in teaching health policy to residents in family medicine. Can Med Assoc J 1997;157:1567–9.
11. O'Connell MT, Rivo ML, Mechaber AJ, Weiss BA. A curriculum in systems-based care: experiential learning changes in student knowledge and attitudes. Fam Med 2004;36:S98–104.

12. Frey K, Edwards F, Altman K, et al. The "collaborative care" curriculum: an educational model addressing key ACGME core competencies in primary care residency training. Med Educ 2003;37:786–9.
13. Welsh CH, Pedot R, Anderson RJ. Use of morning report to enhance adverse event detection. J Gen Intern Med 1996;11:454–60.
14. Al Riyami L, Wong R. Development of a web-based internal medicine residency curriculum (e-Res) using principles of electronic academic detailing. Clin Invest Med 2005;28:173.
15. Boonyasai RT, Windish DM, Chakraborti C, et al. Effectiveness of teaching quality improvement to clinicians: a systematic review. JAMA 2007;298:1023–37.
16. Accreditation Council for Graduate Medical Education. Advancing education in practice-based learning and improvement. Author, 2005; http://www.acgme.org/outcome/implement/complete_PBLI Booklet.pdf. Accessed October 22, 2006.

Perspectives in GIM

# Industry-Initiated Drug Trials Are Far Less Credible to Canadian Internists than Investigator-Initiated Trials

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Many randomized trials of promising drugs are initiated, designed, executed, and analyzed by independent investigators at arm's length from the drug industry. The crucial element of such trials is that all patient data bearing on the efficacy of the drug are sent to the independent investigator, not to the manufacturer (which receives only safety data until the trial's conclusion). In some investigator-initiated trials receiving industry support, the manufacturer might be represented on the steering committee but is kept blind to the emerging results on efficacy. Thus, the manufacturer is excluded from the trial's unblinded trial monitoring committee that examines the emerging efficacy data and decides when to unblind the principal investigators and help them decide whether to continue or conclude the trial. Moreover, the independent investigator retains total academic freedom in interpreting, presenting, and publishing the trial results and conclusions. Finally, this independence can be achieved and maintained when the drug and its corresponding placebo are donated by its manufacturer, and even when partial or complete funding for the trial comes from industry.

Increasingly, however, randomized drug trials are initiated, conducted, executed, and analyzed by the drug's manufacturer. Industry (or its hired contract research organization) recruits the clinical collaborators, usually paying them for each patient they enrol (sometimes with bonuses for achieving a target number). All field data on efficacy as well as safety are sent to the manufacturer, which carries out all the analyses in house. Trial results are interpreted by the manufacturer, sometimes with advice from external paid consultants. Finally, the manufacturer controls the interpretation, presentation, and publication of the trial results, even when they appear under the names of outsiders.

Three recent developments are threatening the credibility of industry-initiated trials. First, in an unprecedented simultaneous move, the editors of 13 leading medical journals declared it was necessary to impose much stricter requirements on authors to disclose their ties to industry and to include "the role of the sponsor" in their trial reports.[1]

Second, the "bounties" paid to clinicians for putting their patients into trials, under increasing attention from the lay media,[2] have led professional organizations to strengthen or re-emphasize their codes of ethics. For example, the code of the Canadian Medical Association declares that the payment for putting one's patients in a clinical trial must not constitute a financial inducement.[3] It restricts the ethical limit to just "replace lost income" for putting a patient into the trial rather than devoting that same time to seeing, and billing for, other patients.