Clinical Improvement Career Pathway Guide

Subject	Career Pathways for Clinician Innovators
Prepared By	CMIO with the Universities of Alberta and Calgary
Audience	Clinician participants in quality improvement, decision support, best practice and other areas of clinical improvement. Academic and clinical evaluation and promotion committees.

This guide summarizes the rationale for a clinical improvement career pathway, defines scholarship of improvement, offers approaches to assessing engagement, quality and impact of contributions by clinician innovators, and suggests how improvement work should be presented for promotion consideration .

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Summary

Alberta Health Services (AHS), Alberta Health (AH) and University strategic plans call for capacity-building in quality improvement, quality assurance, patient safety, clinical informatics, health information analytics and other domains collectively referred to as "clinical improvement science." Key recommendations include organizational commitment, supportive governance, enabling information services, alignment with new learning competencies, and faculty development and recognition.

Scholarly clinical innovation is important to the mission of an Academic Medical Center – and its health sector partners – and merits career advancement. Although the scholarship of clinical innovation shares principles of production, performance, and assessment with other scholarly domains, its contributions may not be as well understood as work typically presented by "clinician educators" or "clinician researchers." Accordingly, recognition and support of clinical innovation can be promoted through use of appropriate descriptors, presentation formats, and assessment metrics.

This guide summarizes the rationale for a clinician improvement career pathway, defines the scholarship of improvement, offers approaches for assessing the impact of clinician-innovator contributions, and suggests how improvement work can be presented for career evaluation. Alberta Health Services promotes advancement of clinician innovators by facilitating preparation of contribution reports that align with the principles, frameworks and language described herein.

Background

An emerging realization is that the Alberta healthcare enterprise needs to become more like a "learning healthcare organization". This involves providing learning opportunities to stakeholders. It also involves learning from local experience in order to continually improve education, service, research and administrative outputs.

The Institute of Medicine (IOM Report, 2012) has described a path to continuous organizational learning in its 2012 report, "Best Care at Lower Cost".[1] The authors assert that high-performance organizations demonstrate both an ability to use "external evidence" (arising from the study of populations other than one's own) and an ability to understand and integrate "internal evidence" (about what works best in one's own context). The first capacity requires knowledge access and evidence literacy. The second capacity requires organizational "infostructure" that taps into the "street smarts" of front-line practitioners. Building capacity for evidence-informed improvement requires transformation to a continuously learning organization; one that leverages science and informatics, patient-clinician partnerships and a culture of continuous improvement to produce the best possible outcomes.

Just as the IOM linked the domains of quality improvement, clinical informatics and evidence-informed decision-making, AHS could better leverage Alberta's strengths in evidence-based medicine, health services research, clinical informatics, healthcare training and clinical innovation. Complementing these

[1] *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America.* Institute of Medicine. Sept 6, 2012. (**http://clinicalimprovement.ca/iom**)

with improvement scholarship could increase organizational performance while contributing to more relevant and productive relationships with Academe.

Importance of Scholarly Clinical Innovation to the Healthcare Enterprise

If AHS is to continue to grow organizational capacity for clinical improvement, then it must offer pathways for committed clinicians, affiliates, trainees and faculty to grow their ability, influence and productivity. These "clinician innovators" are as distinct, and important, as clinician researchers and clinician educators. They need career development pathways that fit their unique aptitudes, while aligning with the needs of AHS the Universities.

Academically inclined clinician innovators are disadvantaged when presenting for promotion. Candidates and their sponsors may not appreciate the importance of improvement scholarship, including reference to change management, technology assessment, action research, qualitative inquiry, usability testing, economic analysis and mixed methods. Appropriate mentorship may be hard to find. And promotion committees may lack awareness of pathway-appropriate measures of productivity.

Clinical improvement (CI) science is an exciting, rapidly growing, and eminently fundable form of scholarship. Advancement of its methods can help clinician innovators generate, organize, and share evidence about what makes healthcare better. There is a growing literature that provides guidance for the assessment of the contributions by those who would be involved in the paths and processes described by the IOM.[2,3,4,5]

Academic health institutions that have emerged as leaders in clinical improvement, most notably Harvard University[6] and the University of Toronto, [7,8] have endorsed explicit methods for facilitating the planning, support and evaluation of clinician innovator careers. The clinician innovator phenotype is accorded its own expectations, measures and rewards.

Objective

- *Promote the development of clinicians capable of scholarly inquiry that improves our capacity to improve.*

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[4] Simpson D, Fincher RM, Hafler JP, et al. Advancing educators and education by defining the components and evidence associated with educational scholarship. Med Educ. 2007;41:1002–1009

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[8] Shojania KG, Levinson W. Clinicians in Quality Improvement. A New Career Pathway in Academic Medicine. *JAMA* 2009; 301(7): 766-768.

Principles

The following principles underpin recommendations about evaluation and promotion of clinical improvement (CI) career pathways:

- **CI is inseparable from practice** – the primary motivator for improvement is the clinicians' desire to optimize the health of patients and populations.
- **CI is a team endeavor** – the increasing complexity of healthcare requires that the effective clinician work in inter-professional, multi-sector and multi-disciplinary teams and networks.
- **CI is accountable** – continually improving care in the face of rapidly changing knowledge and societal expectations is part of the accountability of AHS to patients and populations.
- **CI is facilitative** – building CI capacity among interested clinicians could enhance productivity across the continuum of AHS's education, service, research and administrative engagements.
- **CI demands commitment** – AHS is unlikely to achieve its best practice goals without commitment and affirmative action to promote the careers of CI advocates.
- **CI is credible** – there is a body of knowledge, skills, methods and inquiry that informs clinical improvement, change management and patient safety; and this way of knowing is associated with a unique scholarship of improvement.
- **CI is relevant** – visible commitment to CI careers will help AHS showcase productivity that public, foundation, funding and government supporters care about.

Clinical Improvement

Quality Assurance (QA) refers to planned and systematic activities demonstrated to provide confidence that services fulfill pre-determined process and/or outcome requirements. *Quality Improvement (QI)* refers to a formal approach to the analysis of performance and systematic efforts to improve it. *Patient Safety* combines considerations of assurance and improvement to the minimization of unintended harms to patients resulting from healthcare. These terms, concepts and methods are encompassed in *Clinical Improvement*.

Clinical Improvement (CI) is a relatively new term appearing in the healthcare literature. It is favoured by healthcare organizations because it is more inclusive and encompasses clinical management, quality improvement, quality assurance, continuing quality improvement, care optimization, risk management, patient safety, clinical informatics and health information analytics. *Clinical Improvement Science* refers to the theory, methods and ways of knowing associated with clinical improvement.

Clinician Innovators

Clinicians who focus their scholarly efforts on clinical improvement, should be called "clinician innovators" to distinguish them from those identifying as primarily "clinician practitioners", "clinician educators" or "clinician researchers." It is the concept of innovation that is key to their eligibility for unique recognition.

Innovation connotes something new or renewed. It suggests an ability to begin or introduce, integrate or apply something new to a clinical environment, or as for, the first time. This might include clinical products, methods, policies, procedures or processes.

New or novel does not necessarily mean never before discovered. Novelty may relate to something newly integrated or applied in a new context. Attributes of innovation may be expressed on many scales, including radical versus incremental; sustaining versus disruptive; competence enhancing versus competence destroying; product versus process; and technical versus administrative.

Improvement Scholarship

CI is not, in itself, a form of scholarship. To be scholarly, an improvement initiative should result in some kind of enduring element independent of the ongoing presence of the innovator.

This "production" requirement is recognized in the scholarship of education. Teaching is not evidence of scholarship if limited to performance that uses the scholarship of others, even when learner assessments and teacher evaluations are excellent. An element of scholarship is present if the teacher produces a platform, course design, lesson plan, competency assessment or other educational product useable by others; preceded by a best practice review and followed by appropriate testing.

Similarly, a clinical innovator does not express scholarly activity if, for example, the innovator is presented as an exemplar of quality assurance practices. Innovation scholarship can be claimed if, for example, a needed new or optimized quality assurance approach is described in a way that leads to measurable implementation, sustainability, dissemination or external adoption.

To be scholarly, CI activities should contribute to the integration or application of interventions through any combination of the four "Is" of innovation: inquiry, invention, implementation or integration.

Inquiry	Clinical innovators may describe determinants of health processes, outcomes or system performance. Exposing quality, safety, efficiency and other system attributes, and generating pragmatic hypotheses about conditions for improvement, constitutes inquiry. Qualitative methods are often used and scholarly output may be in the form of descriptive study proposals or project designs.
Invention	Some innovators invent entirely new devices, products, processes, software or designs. Their productivity may even be documented in the form of patents or copyrights.
Implementation	Clinical innovators who excel at implementation may iteratively apply, integrate and improve clinical guidance, care-maps, decision-rules, policies, procedures or other operational expressions of improvement principles. They "get things done" while discovering and disseminating how to get more done more efficiently. Scholarly output may be in the form of enduring processes and products.

Integration	Good integrators find, describe and improve strategies for integrating new products or processes within organizations so that incentives are aligned and impediments mitigated. Integration may also involve discovery of conditions for success in new contexts, organizations or jurisdictions. Some innovators excel and discerning what is needed to build organizational capacity for sustained improvement. They may find better ways to develop human resources, or leverage communities of practice in order to promote clinical improvement.

Improvement Methodologies

It is important that evaluators of clinician innovators have some awareness of the range and appropriateness of design, development, implementation and evaluation methodologies appropriate to improvement scholarship.

Where research scholarship emphasizes deductive scientific methods, innovation scholarship relies more on inductive methods. Typical clinical research will declare a hypothesis to test, design a study for testing the hypothesis, closely adhere to pre-declared methods, and determine whether pre-determined outcomes occur in support or defeat of the original hypothesis. Clinical innovation may differ by setting a specific outcome of interest, iterate through multiple variants of methods that may not have been known a-priori, then report on how best to achieve the outcome in a defined organizational context. The designs of meritorious CI projects may be foreign to clinical researchers.

Appropriate methodologies may be specific to particular forms of clinical improvement. For example, patient safety enhancement often draws upon risk management methods. Clinical guidance development draws from knowledge translation and knowledge transfer methods. Systems improvement draws from business optimization, economic analysis and change management methods. Clinical informatics may need user acceptance testing, time-motion mapping and cognitive effects studies. Finally, clinical policy enhancement often draws upon administrative decision-making and health analytics methods.

Improvement Impact

For any of the above approaches to merit formal recognition, creative impact should be demonstrated. Creative work can have impact through publication. However, “high-impact” clinical journals still favour intervention studies. Peer review processes may not be attuned to the attributes of good clinical improvement communications. There remain relatively few journals dedicated to topics like quality improvement.

Creative impact can also be attested by measures of influence. These may include adoption of practice guidelines, endorsement of reports, organizational commitment to health policies, assignment of human resources to a new program, patent registration, technology transfer or commercialization of products or processes. Impact may be demonstrated at the level of a health care organization, health care stakeholders, clinical improvement stakeholders or at the level of a clinical-improvement discipline as a whole. Impact should be demonstrable, if not publishable.

Although the specific channel of influence may differ, the impact of products of clinical innovation can be broadly assessed using Kirkpatrick's levels:

Reaction *Is anyone other than the innovator(s) interested?*
To what degree do participants react favorably to the innovation when introduced or presented?

Learning *Is any one else agreed in principle to use the innovation?*
To what degree do participants acquire the intended knowledge, skills, attitudes, confidence, behaviors or commitment leading to consolidation or change of practices through use of the innovation?

Behavior *Is anyone else actually using the innovation?*
What is the scope of use (locally, nationally, internationally, across disciplines, etc.)?
To what degree do users apply, adopt or use the innovation in typical contexts?

Results *Does the use of the innovation make a difference?*
To what degree do targeted outcomes result of use of the innovation?

The above levels can be applied to standardized CI project summaries included in a Clinical Improvement Portfolio, as described below.

Application for Advancement

Clinicians presenting for advancement as clinical improvement scholars should present a well organized report about the body of their work, its creative contribution and its impact. The report should describe:

- **Need**
  A clearly articulated description of a credible need for change, organizational problem, or improvement opportunity.
- **Method**
  What method(s) of inquiry, invention, implementation, integration or instruction is/are used to address the need in a program of innovation?
- **Capacity-Building**
  How is the applicant's personal capacity for clinical improvement improved through training, professional development or networking?
  How does the applicants program of improvement contribute to organizational capacity-building?
- **Impact**
  What measures of impact are defined in the improvement program?
  What impact has been achieved?
- **Influence**
  How well "connected" is the applicant within the domain of interest, as evidenced by presentations, shadowing, community of practice leadership, integration in organizational governance, etc.?

Clinician innovators should describe a program of innovation and show how it has been developed over time. The need for improvement should be systematically explored, possibly including literature and environmental scans to assess best knowledge and best practices as well as prevailing organizational knowledge and practices.

To frame their work as improvement scholarship, clinical innovators should identify one or more domain-appropriate improvement methodologies that they have learned and applied. This declaration will help evaluators assess the quality of their improvement project designs. As described earlier, a wide range of methods may be referenced:

- Patient safety, risk management
- Quality assurance, quality improvement
- Clinical management, systems management, business optimization, lean processes
- Clinical informatics, clinical decision support, clinical decision-making, usability assessment
- Administrative decision support, clinical analytics
- Clinical engagement and leadership
- Clinical guidance, policy making and governance
- Knowledge translation, knowledge transfer, knowledge management
- Health technology assessment, technology transfer, technology commercialization

Clinical innovation is about change and growth. Clinician innovators should work with mentor(s) to design a program of personal capacity-building. This might involve seeking higher education degrees, training for proficiency in particular improvement methods, taking leadership training, attaining certifications or participating in relevant continuing professional development. Effective clinical innovators are also change agents and promote capacity-building within healthcare organization(s). It is rare that clinical improvement occurs without health organization involvement. Does the clinician innovator participate meaningfully in that organization and grow opportunities for collaborative innovation?

A complete career advancement proposal will include a report of impacts, descriptions of measures of impact and a justification for why the measures are appropriate to the body of work. Artefacts can include conventional publication, unconventional publication (e.g., e-publications, blogs, wikis, newsfeeds, software, etc.), evidence of adoption (e.g., demonstrated endorsement of a clinical practice guideline), use (e.g., metrics quantifying the frequency of reference to the guideline during clinical workflows), behavior change (e.g., ordering patterns changed in an electronic medical record that relate to presentation of guideline-derived decision supports), organizational commitment (e.g., number of order sets and number of institutions referencing or using the guideline), replication (e.g., number of organizations elsewhere adapting the guideline or order set for their own use) or commercialization (e.g. guideline-based mobile application downloaded or purchased).

Clinical improvement is a “team sport”. The final element of a career advancement application should reflect the degree to which the applicant is networked, connected or integrated into local organizations, domain-specific scholarly organizations or pertinent communities of practice. An example might be documentation of the number of times that representatives of other organizations request to do a site visit or to “shadow” the candidate to learn how to emulate innovations.

Clinical Improvement Portfolio

Expectations for advancement are addressed by preparing and submitting a "Clinical Improvement Portfolio". This is modelled after the "Education Dossier" that clinician educators are expected to submit, with many of the same elements.

The the required parts of a CI Portfolio include:

Personal Statement	The personal statement is akin to a teaching philosophy statement. The CI statement provides an overview of the improvement body of work submitted for consideration. It should reference considerations of need, method, capacity-building, impact and influence (as described above). At all career stages the statement will disclose clinical need, a vision for improvement and the approaches or methods that will be used. Early career candidates may add an overview of the types of projects envisioned, a personal capacity-building plan, and a strategy for engaging stakeholders. A mid to late career applicant will add an overview of projects completed, organizational capacity-building achieved and evidence of impact and influences.
Mentorship Report	This lists mentorship or equivalent relationships within the faculty, partner organizations and/or the discipline of choice. Mid to late career applicants may also report clinical innovators who have been mentored.
Project Synopses	One or more project synopses should be included in the dossier, using the standardized structured abstract described below.
Scholarly Products	Up to 5 "best of" artifacts may be included in the dossier, especially if peer reviewed publications have been scant or inappropriate to the field of innovation. Examples include a representative clinical practice guideline, clinical policy, white paper, procedure manual, software description, internet site, patent application or intellectual property description.

Project Synopses

Project synopses should be organized using a standard list of headings, with succinct descriptors under each. This parallels the format that clinical educators use for descriptions of educational interventions; and improves the ability of evaluation committees to compare productivity. Project synopses should be 1-2 pages in length, with all of the following sections clearly labelled:

Need	Summary of clear and explicit goals and objectives that explain what the innovation is intended to accomplish and how the need aligns with faculty needs.
Innovation	Nature of innovation being introduced. Estimated degree of integration and application required for success.
Scope	Scope of dissemination in terms of size of group (practitioners and/or patients) affected and reach of groups involved (local, provincial, national, etc.).

Scholarship	Methods used for innovation, integration and application, appropriate to the goals and need, described in enough detail to be able to compare to the work of others. Description of how existing knowledge and experience was assessed before proceeding with an innovation; including how the intended implementation context differs from what has already been assessed. How reflective critique and peer review was attained.
Impact	Explicit identification of desired outcomes; linked to goals and need. Explicit plan for assessing impact of innovation. Actual impact measures, referencing Kirpatrick's levels. Reference to improvements in satisfaction or outcomes, performance, time, resource use, etc.
Role	Leader/developer; contributor; participant. Include a description of any teams that serve as agents of change and the applicant's role in those teams.

Career Development

As with any career plan, preparation and planning begins years, not days, before promotion opportunities. A clinician contemplating presentation for advancement as a clinical innovator should:

- **Identify a Mentor or become a Mentor**
  starting with organizational Clinical Improvement Leads or other clinicians identified for their interest and capacity in improvement science.
- **Review the Clinical Improvement Career Guide**
  and contemplate a career development plan.
- **Articulate a statement of need**
  and validate its alignment with needs of faculty and health organization stakeholders.
- **Define an appropriate methodological approach**
  and solicit domain expertise to validate the match of the plan to the statement of need.
- **Develop a capacity-building plan**
  for personal and organizational capacity-building to optimize adherence to the methods and their application to improvement projects.
- **Start a Clinical Improvement Portfolio**
  and have this pre-screened by an experienced clinician innovator before submitting for consideration as part of career advancement processes.

Portfolio Entry Example

The following is provided as an example of how an improvement portfolio might be presented when faculty seek academic advancement. Some required elements of a portfolio are illustrated and a specific project synopsis is provided.

Personal Statement

When confronted with the question "What are the main barriers preventing you from delivering efficient, high quality healthcare in the work place?" many clinicians will immediately answer with the statement "The lack of resources." Indeed this was my response 5 years ago as I began my own career journey of clinical improvement. Within developed nations, Canada ranks 5th of 11 nations in terms of healthcare expenditures per capita. Yet according to a report by the Commonwealth Fund published in 2015, we are second to last in quality, access, efficiency and equity. My participation in a LEAN transformation project in the Echocardiography Laboratory at the Mazankowski Alberta Heart Institute in 2012 piqued my interest in a career in clinical improvement. At the encouragement of more senior colleagues such as Ruth Collins-Nakai and Owen Heilser, I completed an executive MBA in healthcare management out of UBC in 2014. During this period I utilized the skills acquired in the program to lead about transformation of our work area in areas of culture and work ethic, operational efficiency, supply and demand mismatch and innovative delivery. I intend to continue this path to play a role in making our healthcare system more sustainable, and improve access to the betterment of the health of Canadians.

Mentorship Report

Over the past 15 years I have been a mentor to over many echocardiography fellows, residents and medical students in areas of clinical research, mainly focusing on quality improvement, appropriate resource utilization and workflow enhancement. In 2011 I was fortunate enough to work with a highly motivated medical student to publish a project as outlined below. As a result of this relationship I was the recipient of a pre-clinical mentorship award from the Medical Students Association.

Project Synopsis

Title

"Feasibility of Sonographer– Administrated Echocontrast in a Large Volume Tertiary Care Echocardiography Laboratory"

Need

Echocontrast agents have been in clinical use since the 1990s for the purposes of endocardial enhancement for wall motion and ventricular function, as well as to rule out left ventricular thrombus. It has been reported that up to 15% of transthoracic echocardiograms have suboptimal image quality and patients would benefit from contrast administration. However the use of this technique has not reached widespread acceptance due to increased amount of time required for establishment of intravenous access and injection of contrast. A flow map process determined that the average delay per study requiring echocontrast was between 10-15 minutes. Given that examinations are normally scheduled for 60 minutes, this significant bottleneck would frequently result in delay and even

cancellation of subsequent studies. Also due to interruption of reporting work flow, there was a reluctance among cardiologists to utilize this technique. Residents were also raising concerns that they were being taken away from their learning opportunities to start IVs and administer contrast. As a result, many patients were receiving suboptimal imaging with reduced diagnostic certainty.

Innovation

Traditionally intravenous access is established by nursing or medical personnel. Similarly contrast agents are administered likewise by the same staff. Sonographers are healthcare providers that receive training in the acquisition and preliminary interpretation of ultrasound images. As opposed to CT/MRI or nuclear technologists, intravenous contrast agents are not commonplace in ultrasound, and the echocardiography laboratory did not have a program for sonographers to administer these agents. After flow-mapping the journey of a patient through the echo lab it was determined that a major bottle-neck in the process was the requirement that a cardiologist first review images, then determine suitability for contrast, followed by establishment of intravenous access and administration. Since the practice of sonography in Alberta is not regulated, it was determined that it would be possible to train sonographers to start IVs and administer contrast where appropriate, thereby bypassing the bottleneck. Since this is traditionally a nursing or physician role, it was initially met with some reservation by the unit manager, who agreed to proceed as a clinical trial and implement into regular practice only if there were no adverse events.

Scope

Over 10,000 echocardiograms are performed at the Mazankowski Alberta Heart Institute annually, with close to 1,500 studies requiring echocontrast. The lab also is staffed with 10 cardiologists, up to 3 echo fellows, 15 rotating cardiology core residents and various elective trainees. The unit is managed by a manager working in a dyad relationship with the echo lab director, reporting to the patient care manager and Divisional Director. As this work had never been done in Canada before, successful implementation of this program has the potential to improve and impact clinical care delivery across the country.

Scholarship

A thorough literature search was conducted and confirmed that similar protocols did not exist in Canada. The clinical trial was conducted in the echo lab at the Mazankowski Alberta Heart Institute. The chief sonographer worked with a clinical nurse educator in the radiology department to establish an intravenous access and drug administration training program which included a written exam with “must-pass” components and observation of 6 IV starts. A summer medical student aided in the design of the data collection sheets, and patients were randomized to standard of care, where a physician or nurse would administer the contrast, compared with a sonographer. Time to injection and completion of the study were recorded as well as adverse events.

Impact

The main goal was to demonstrate in a pilot project that by training and transferring the duties of contrast administration to a sonographer, echocardiograms would be completed more efficiently leading rise to fewer delays, cancellations as well as reduced costs for overtime and hospital stays. In the end the sonographer arm indeed was demonstrated to save an average of 20 minutes per scan

(33% time) where contrast was used. More importantly, fewer scans exceeded the 60 minutes allotted to a study, allowing the lab to maintain efficient work flow. Overall impact of this pilot project was very positive. First of all the sonographers being trained were very enthusiastic about the program, which was key to its eventual successful implementation. Not only did they feel very comfortable with the procedure, they felt empowered and overall efficiency was enhanced. Secondly there was excellent overall agreement between the sonographer and the cardiologist on the need for contrast administration after the training. Thirdly there was a definite increase in the use of contrast where appropriate from <10% to close to 15% of cases after the program successfully launched. This has resulted in fewer call-backs for rescanning, fewer delays or cancellation of cases and overall better patient experience. Residents also had a better educational experience when rotating through the lab. Most importantly, there were no adverse outcomes, and the unit manager agreed to implement the program as standard operating procedure. Furthermore, over the past 5 years I have been an invited speaker for contrast echo to many academic and clinical centres across Canada, as well as national conferences. I have frequently been asked to share our training and administration protocol with these centres, many of whom have now adopted it into their clinical practice.

Role

As the echo lab director I was responsible for developing the training protocol, supervising the clinical trial, analyzing the data and implement the program after the pilot project completed. However all the work would not have been possible if it were not for the support of our unit manager, chief sonographer, nurse clinical educator, medical student and fellows.

Scholarly Products

This study was published in the peer reviewed Canadian Journal of Cardiology (impact factor 3.94) in 2013 (*Can J Cardiol. 2013 Mar;29(3):391-5*).