Queen's UNIVERSITY

Evaluating the Implementation of Competency-Based Medical Education at Queen's University

Table of Contents

Executive Summary

In 2015, Queen's University became the first Canadian Medical School to take a systems approach to the implementation of competency-based medical education, beginning the process of transitioning all of its Royal College specialty residency programs to CBME curricula simultaneously. For the implementation to be successful, stakeholders across the School of Medicine had to come together to enact change. Using a just-in-time approach, ownership of CBME implementation transferred from the Executive Committee and subcommittees, to Program Directors, CBME Leads, residents, and faculty.

Throughout the implementation process, we sought to understand how we could best prepare programs for the adoption of CBME, we asked whether we were implementing CBME as intended, what strategies we needed to develop to sustain the adoption of CBME beyond our launch date, and how patterns of behaviour changed with the implementation of CBME. We created a sustainable, collaborative approach to scholarship and invited those interested from the various Postgraduate Medical Education (PGME) programs to write and present a series of abstracts, presentations, and articles. We have presented our findings at academic conferences and have been published in peer reviewed academic journals.

We discovered that 61.4% of stakeholders surveyed agreed that PGME's transition to CBME provided an opportunity to redesign the curriculum and improve the quality of residency education. Buy-in for the transition across stakeholders was at the lowest in year one (2015-2016) because of expressed concerns of Program Directors not having enough curriculum design expertise to lead the CBME transition and insufficient resources (i.e., time, money, and workforce). Furthermore, some stakeholders were not convinced that the costs of implementing a new curriculum would provide valuable benefits, which prevented them from supporting the idea of the transition. The value of CBME was called into question and needed to be addressed by leadership.

As stakeholder buy-in increased from the initial transition announcement, stakeholders grew more confident and committed to a systems-approach to implementation. The benefits of transitioning all Royal College specialty and subspecialty residency programs at once were many, and included opportunities for community building, scholarship, collaboration, and education.

By year three (2017-2018), it became clear that the partnerships formed through adapting a systems-approach for CBME implementation were necessary to ensure CBME sustainability. Many stakeholders told us that CBME implementation encouraged and sometimes compelled colleagues to interact with each other for the first time within and between their respective divisions and departments and across the hospitals and university, paving the way for an increase in peer support, collaboration, and relationship building.

The ongoing implementation of CBME at Queen's is the result of a collaborative, large-scale effort by a village of people coming together to enact change. From the initial vision and strong leadership of the Executive Committee, stakeholders across Queen's have taken ownership of this initiative to change the landscape of PGME within the School of Medicine.

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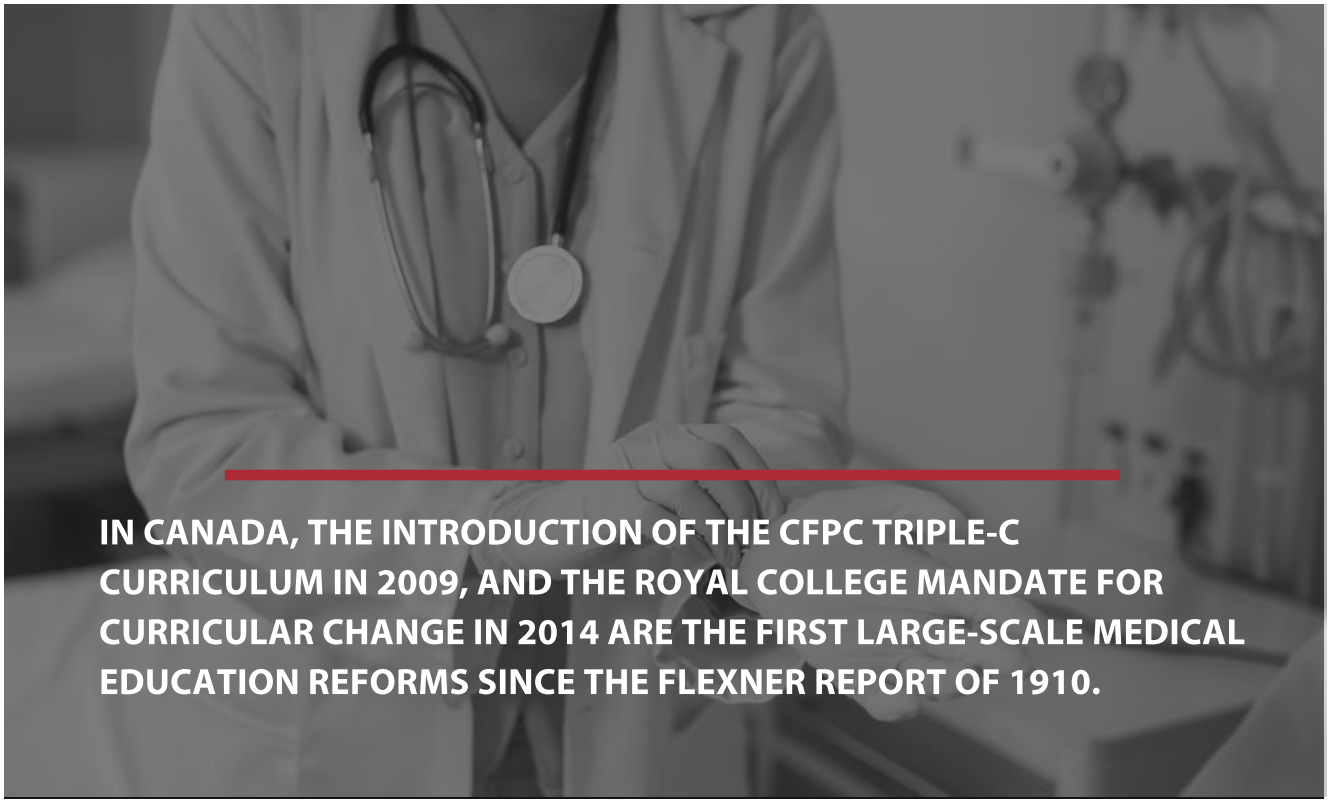
Introduction

In 2015, Queen's University announced its intention to transition all of Queen's University's Royal College of Physician and Surgeons of Canada's (Royal College) specialty residency programs to competency-based curricula. As the Royal College began their iterative Competence-by-Design (CBD) process, Queen's adopted a systems approach to CBME implementation, transitioning all Royal College specialty programs simultaneously. Our aim was to create integrated networks and build synergy by connecting the various programs involved in the implementation of CBME through a community-based approach; one in which residents, Program Directors, and working groups were all actively engaged in curricular innovation, program evaluation, and research/scholarship. The project was guided by an implementation team and facilitated by working groups led by members of the Executive Committee, Resident Leadership, Assessment, Curriculum, Scholarship, and Faculty Development. We also received invaluable insight and benefited from the expertise of our colleagues in Family Medicine who transitioned to the College of Family Physicians of Canada (CFPC) Triple-C curriculum in 2009. As this was a large-scale undertaking, with many different variables, it was important for us to be able to measure and evaluate our progress from the outset of the implementation (2015).

From the initial announcement through the launch, we created an evaluation strategy that also allowed us to harvest any unanticipated, emergent outcomes of our CBME implementation. During this time, we conducted interviews with key stakeholders including Executive Committee Members, Program Directors, CBME Leads, Educational Consultants, and CBME Resident Leads, sent out questionnaires across the faculty, and gathered feedback from Program Leader workshops. Over three years (2015-2018), we created a sustainable, collaborative approach to scholarship and invited those interested from the various PGME programs to write and present a series of abstracts, presentations, and articles. We have presented our findings at academic conferences such as the Society for Teaching and Learning in Higher Education, the Canadian Conference on Medical Education, the International Conference on Residency Education, Association for Medical Education in Europe, and the International Association for Medical Education, and have been published in peer reviewed academic journals such as MedEdPublish, Academic Medicine, and the Canadian Journal of Medical Education. Findings have also been presented at disciplinary conferences and published in discipline specific journals. This allowed us to share our work and our lessons learned with colleagues nationally and internationally whose institutions were also looking at adopting a CBME curriculum. This report shares the highlights of our work.

Throughout this process, we have been guided by a desire to understand the impacts of transitioning to a CBME curriculum across Queen's specialty residency programs. We wanted to be able to identify potential challenges early in the process and identify and celebrate successes. This allowed us to allocate resources where they were needed, while also providing us with opportunities to build forward momentum for institutional change.

A Brief History



IN CANADA, THE INTRODUCTION OF THE CFPC TRIPLE-C CURRICULUM IN 2009, AND THE ROYAL COLLEGE MANDATE FOR CURRICULAR CHANGE IN 2014 ARE THE FIRST LARGE-SCALE MEDICAL EDUCATION REFORMS SINCE THE FLEXNER REPORT OF 1910.

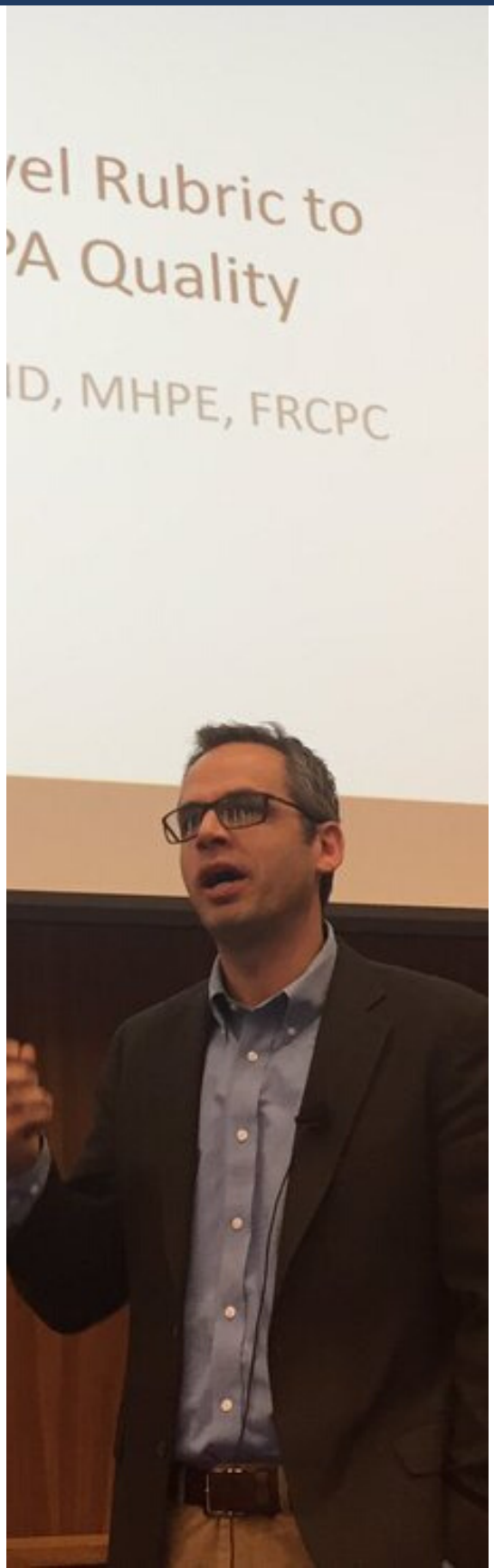
Our current understanding of medical training has been understood as time on task, or what Snell and Frank refer to as the 'tea bag model' [1]. A central assumption of this model is that physicians-in-training would master key skills, knowledge, and attitudes simply through time spent on task. However, it has been widely recognized that this traditional approach is no longer appropriate given the evolution of clinical practice and the complex needs of residents, patients, and other key stakeholders.

Globally, medical educators are seeking new ways to educate learners that can overcome the weaknesses of the time-on-task training model. CBME frameworks such as the Accreditation Council for Graduate Medical Education's (ACGME) 'Milestone Initiative [2], and the Scottish Doctor project in the UK [3] focus on desired outcomes that learners need to achieve to be considered competent in their chosen specialties. Competence is measured by assessing learners' achievement of milestones and competencies in specific areas.

In Canada, the introduction of the CFPC Triple-C [4] curriculum in 2009, and the Royal College mandate for curricular change in 2014 are the first large-scale medical education reforms since the Flexner report of 1910 [5]. With the Royal College's introduction of CBD, Queen's identified an opportunity to build capacity for CBME while building community as programs worked together towards these changes.

[1] Linda S. Snell and Jason R. Frank, "Competencies, the Tea Bag Model, and the End of Time," Medical Teacher 32, no. 8 (2010): 629–30, https://doi.org/10.3109/0142159X.2010.500707.
[2] "Milestones," accessed November 28, 2019, https://www.acgme.org/What-We-Do/Accreditation/Milestones/Overview.
[3] "The Scottish Doctor," accessed February 24, 2017, http://www.scottishdoctor.org/.
[4] "Triple C | Education | The College of Family Physicians Canada," accessed November 28, 2019, https://www.cfpc.ca/Triple_C/.
[5] Abraham Flexner, "Medical Education in the United States and Canada" (New York: Carnegie Foundation, 1910).

Measuring Impact



When the Executive Committee initiated the move towards CBME in 2015, a parallel decision by the Committee was made to document the various processes and outcomes of this movement. The complex nature of documenting innovation and culture shift meant that we could not use a prescribed, one-size fits all approach to measure this impact. All members of the PGME community were encouraged to collect and collate potential data sources at the onset to ensure that we did not miss a valuable opportunity to collect baseline data to help measure our transition.

We wanted to ensure that we were collecting data from diverse sources, and that multiple voices were represented throughout the process. We began by identifying key stakeholders (administrators, faculty, residents, Program Directors, CBME Leads, Educational Consultants) and tools for data collection and analysis. We chose Hall and Hord's "Concerns-based Adoption Model" (CBAM) to provide us with evidence of the extent and quality of CBME implementation across three years (2015-2018) [6]. We were able to use that information to provide timely resources and supports. We also used Wilson-Grau and Britt's "Outcome Harvesting" (OH) framework [7] in year four (2018-2019) to help us understand the intended and unintended outcomes of our implementation. Further, Rapid Evaluation [8] was used to document specialty specific changes in specific programs.

We accomplished a significant number of activities over the initial four-year period which we documented throughout the launch and implementations. In year one (2015-2016), Program Directors were understandably uneasy, especially around scarcity of resources (e.g., time, money, human resources), the amount of work to achieve faculty buy-in. Finally, we recognized the potential that Queen's would be implementing CBME prior to Royal College guidelines, and thereby potentially wasting resources and demoralizing departments.

[6] "Concerns-Based Adoption Model (CBAM)," accessed November 28, 2019, http://www.sedl.org/cbam/.
[7] Ricardo Wilson-Grau, Outcome Harvesting: Principles, Steps, and Evaluation Applications (IAP, 2018).
[8] Andrew K. Hall et al., "It's a Marathon, Not a Sprint: Rapid Evaluation of CBME Program Implementation," Academic Medicine (2020) https://doi.org/10.1097/ACM.0000000000003040.

The changes we saw over four years were remarkable.

Across responses from questionnaires, interviews, and focus groups, in workshop feedback, document analysis, resident assessment data, and data collected within Elentra, we documented increases in:

- **Accountability**
- **Attitudinal perspective**
  (Positive attitudes towards CBME, and feeling personally valued)
- **Collaboration**
- **Communication**
- **Empathy**
- **Knowledge about CBME**
- **Leadership**
  (especially bottom-up and horizontal)
- **Learner empowerment**
- **Confidence in role**
- **Stakeholder engagement**
- **Comfort with feedback**
- **Quality of narrative feedback**

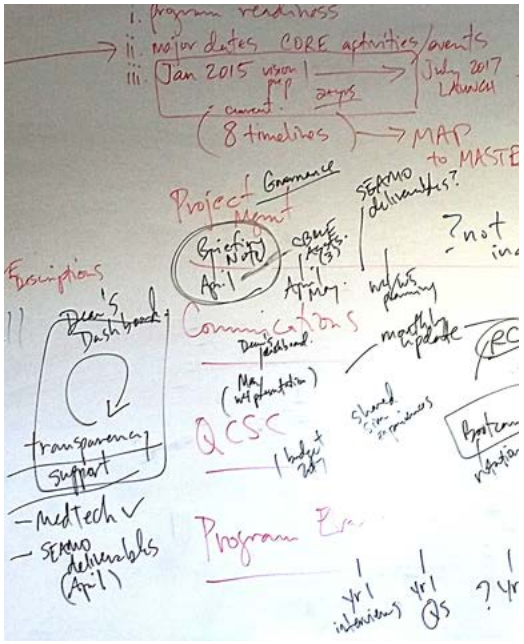
The impact of CBME implementation went beyond the core stakeholder groups of learners, faculty, and administration. Through the OH process, we uncovered several unintended outcomes related to the project's pathway to change that were beyond the scope of CBME implementation. For instance, our CBME Faculty Lead fostered and nurtured relationships with our hospital partners, resulting in the prioritization of wifi infrastructure upgrades for service delivery in under-serviced areas in our teaching hospitals. The implementation of CBME and the requirement for point of care observations enabled through technology was the impetus for infrastructure changes in the hospital, which have benefited a variety of people outside the scope of CBME implementation.

Another unintended outcome documented through the OH process was the need to maintain a form of longitudinal assessment. Traditionally these were captured with In-Training-Evaluation Reports (ITERs) in conjunction with the new CBME point-of-care assessments (e.g., Supervisor & Procedure forms) linked to Entrustable Professional Activities (EPAs). Serious concerns about the potential loss of longitudinal perspectives about resident performance were addressed by the assessment subcommittee through the creation of Periodic Performance Assessment (PPA). These assessment tools leverage the strengthens of ITERs in terms of capturing tacit aspects of trust, consistency, reliability and conscientiousness in daily work, patterns of strengths and weaknesses, intercollegial behavior and communication, sense of responsibility, empathy and patient-centeredness, and the recognition of limitations, all without the high stakes implications commonly associated with ITERs [9].

It has also become clear that with the transition to CBME came new opportunities for Elentra. As Queen's was leading the way in CBME implementation in Canada, Elentra was able to capitalize on their innovative software development to support Queen's initiative to become the educational technology solution for others transitioning to competency-based curricular models both nationally and internationally.

Another positive, yet unintended outcome of CBME implementation is that all trainees are able to reap the benefits of the new Resident Scholarship Certificate program. This program was spearheaded by the CBME resident subcommittee as a way to acknowledge and encourage trainee participation in all scholarship, not just within the field of CBME. The OH was able to link the creation of this new program to CBME implementation.

The OH was able to demonstrate that the cumulative outcome of actions relating to CBME implementation have the capacity to effect change that may be beneficial, yet unrelated to CBME.



[9] Yoon Soo Park, Janet Riddle, and Ara Tekian, "Validity Evidence of Resident Competency Ratings and the Identification of Problem Residents," Medical Education 48, no. 6 (June 2014): 614–22, https://doi.org/10.1111/medu.12408.

Building the Foundation

In the first year of our project (2015-2016), we wanted to identify and understand the key strategies required to build capacity for CBME implementation. Through interviews, workshops and surveys, a subject that came up again and again was resources. Program Directors shared concerns related to a scarcity of resources, such as limited time, money, and workforce available to implement CBME in their departments.

To help us understand the motivating factors for CBME implementation and transition, we distributed a survey to 316 stakeholders including administrators, faculty, staff, clinicians, residents, and Program Directors. We had a response rate of 70.2% with a total of 222 completed surveys. We also asked the CBME Executive Committee (N=11) and Program Directors (N=28) questions from the CBAM Levels of Use (LoU) standardized interview protocol. We added eight Queen's specific questions to the interviews to help us understand the specific strengths and challenges for our institution. The CBAM LoU protocol was designed to measure educational change in all its complexity around the use and non-use of innovations by examining specific behaviours. By identifying individuals' levels of CBME use in year one (2015-2016), we were able to determine strategies required to facilitate the transition as we moved forward.

Implementing the Change

In year two (2016-2017) interviews were conducted with multiple stakeholder groups including: CBME Executive Committee members (N=8), Program Directors (N=25), CBME Leads (N=11), Educational Consultants (N=6), and residents (N=2). In keeping with the CBAM model we expanded our data collection to include new stakeholder groups. These included Educational Consultants hired to support curriculum reform and members of the newly formed CBME resident subcommittee. While resources were still a concern in year two, there was also a sense that strong leadership was helping to guide the transition.

Ensuring Sustainability

The 2017-2018 year saw the official launch of CBME as we welcomed a new cohort of residents into CBME residency programs across Queen's School of Medicine [10]. Our priority was identifying the types of supports needed to ensure the sustainability of the adoption of CBME. This meant that we paid particular attention to the changes in behaviours and perspectives we were seeing in the LoU interview data. During the third year of our institutional evaluation (2017-2018), we collected interview data from CBME Executive Committee members (N=8), Program Directors (N=20), CBME Leads (N=7), Educational Consultants (N=7), and residents (N=2).

To better appreciate the complexity of the innovation that Queen's undertook when it embarked on this journey, in 2019 we initiated our OH. We analyzed patterns, themes, and anomalies through a total of 443 documents and artifacts related to CBME implementation. We identified 38 intended (I) and unintended (UI) outcomes of CBME implementation at Queen's.

Examples of intended outcomes include:

- increased resident leadership in the area of self-directed learning
- the collaborative creation of EPAs for transition to discipline and foundation of disciplines stage of training
- increased proficiency in the use of technology from CBME stakeholders

Examples of unintended outcomes include:

- the development and use of longitudinal assessments congruent with the principles of CBME
- prioritization, support and recognition of the importance of CBME through the Maudsley Scholarship Research Fund and the Maudsley Symposium
- residents as national leaders in co-creating CBME and an increased proficiency in the use of technology from CBME

In year two post launch (2019-continuing), a Rapid Evaluation methodology was initiated at the specialty program level to examine the fidelity and integrity of CBME implementation and inform on-going program adaptations. This initiative builds on early program evaluation work conducted by the department of Emergency Medicine [11], which has led to Dr. Andrew Hall being recognized as a Royal College Clinician Educator with a focus on program evaluation related to CBME [12].

The Rapid Evaluation process allows program leaders to identify whether core components of CBME have been implemented as intended. Not surprisingly, given the nature of educational innovation as an iterative process, preliminary findings suggest some components of CBME may not be fully operating as intended. Going through this process, however, identifies areas that require ongoing support and collaboration as programs move towards stronger fidelity of implementation. Key program stakeholders appreciate the program evaluation process as an opportunity to share their implementation experiences and receive feedback specific to their departments. This work also provides new opportunities for scholarship with some program leaders having already presented this work at conferences and published in peer reviewed journals.

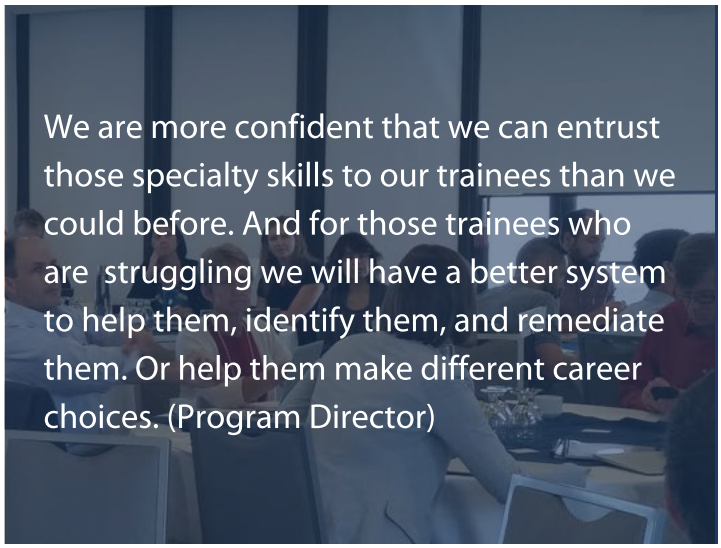
[10] Our colleagues in Family Medicine transitioned to CBME in 2009.
[11] A. K. Hall et al., "P061: Implementing CBME in Emergency Medicine: Lessons Learned from the First 6 Months of Transition at Queens University," Canadian Journal of Emergency Medicine 20, no. S1 (May 2018): S78–S78, https://doi.org/10.1017/cem.2018.259.
[12] "The Royal College of Physicians and Surgeons of Canada: Clinician Educator Bios," accessed December 2, 2019, http://www.royalcollege.ca/rcsite/canmeds/clinician-educators/clinician-educator-bios-e#ahall.

What We Discovered Along the Way

Bringing faculty, residents, and staff together to implement a systems wide transition to CBME was a daunting undertaking for all involved. Along the way we experienced frustration, panic, skepticism, excitement, optimism, and community; we experienced setbacks and successes, and we learned valuable lessons in the process as our Program Directors went from having little to no knowledge of CBME to becoming national experts.

Creating Value

At the start of our implementation journey (2015-2016), we found that stakeholders approached the transition from a very pragmatic perspective: it was something they were being forced to do, but it also provided an opportunity to redesign and update curricula. While we heard many times that Queen's was already graduating competent physicians, Program Directors did suggest that CBME could provide better documentation of residents' progression through their programs and to help with early identification of residents in difficulty within their programs.



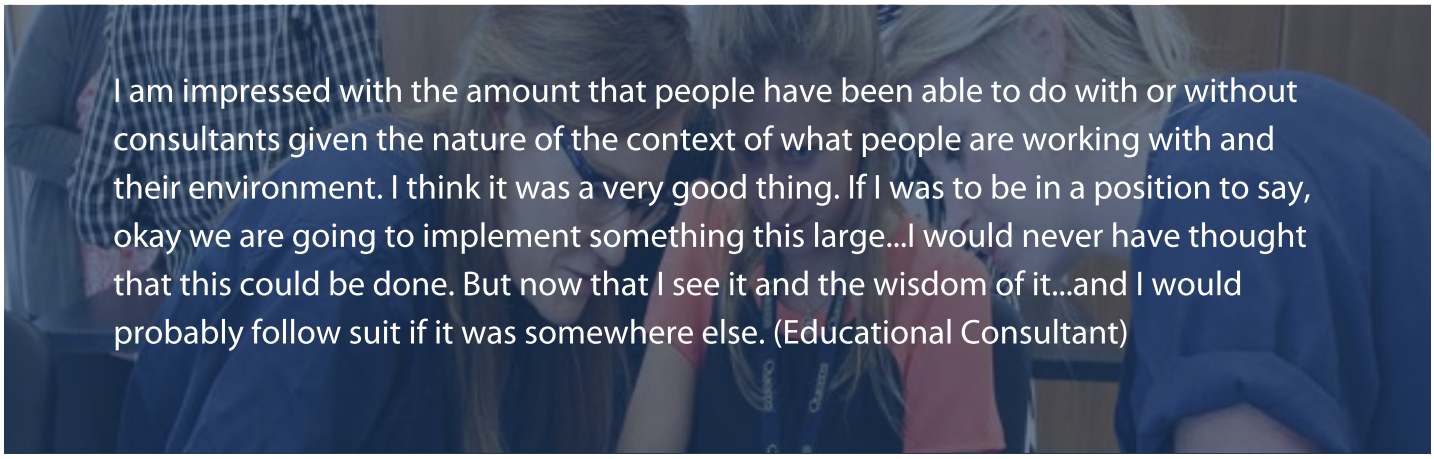
While many stakeholders, especially those in formal leadership positions, viewed the promise of CBME as an improvement to the existing medical education system, buy-in across stakeholders was at the lowest in year one (2015-2016) because there were concerns of Program Directors not having enough curriculum development expertise, and/or resources (i.e., time, workforce, money) to lead the CBME transition. In addition, CBME was still a relatively unknown innovation for many stakeholders who were not yet convinced that the cost of implementation would be worth the potential value of the educational paradigm shift. Open-ended survey responses showed that, compared to residents, faculty indicated that increased effort, time investment, and pressure for timely assessment were perceived costs of CBME implementation, while residents reported fear of change to be a greater cost (compared to faculty).

Buy-in improved in year two (2016-2017) for many reasons, including, for example, the Executive Committee's decision to create the program CBME Lead role to alleviate some CBME responsibilities from Program Directors, and investment in Educational Consultants to assist with the complexity of curricular reform. Survey data indicated that attaining buy-in from all stakeholders requires a variety of supports; for example, faculty development, champions, and a balance of top-down and bottom-up approaches to leadership. Several Program Directors and Executive Committee members mentioned the necessity of buy-in for a successful transition and emphasized how important it is for buy-in to be modelled from the top-down to support trickle down to faculty, residents, and administrators.

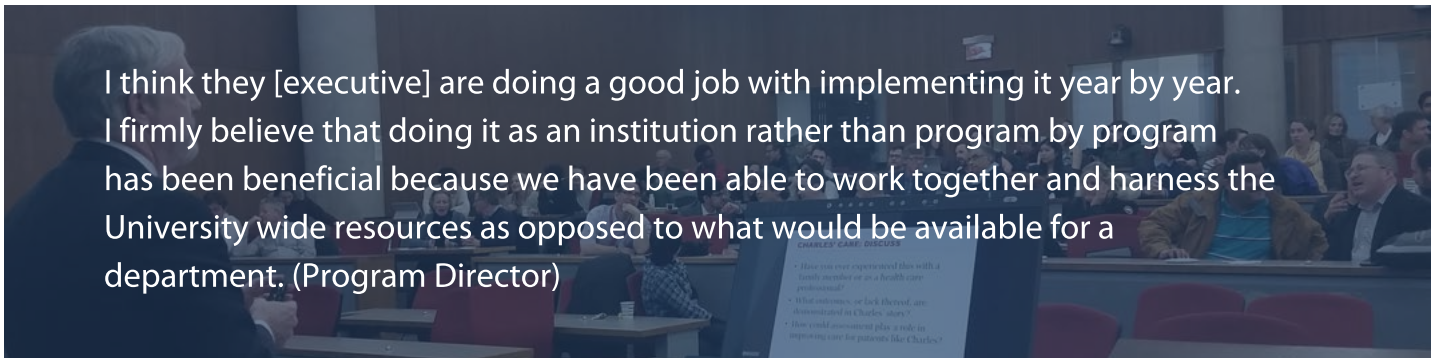
Aligning Systems

As the Royal College began the transition process for the first national specialty and subspecialty cohorts to CBD, there were concerns among some Queen's stakeholders that they would be transitioning their programs before their colleagues nationally. More specifically, the concern was about having to re-do all the newly designed CBME tools to suit Royal College requirements after implementation was completed at Queen's, thereby wasting Queen's efforts and resources. While stakeholder concern about the systems-level approach taken by Queen's was substantial in years one and two (2015-2017) this concern significantly lessened by year three (2017-2018), indicating that the systems-level approach to CBME implementation was a success for stakeholders at various levels of the institution.

Implementing CBME simultaneously across PGME programs, as opposed to implementing it one program at a time, proved rewarding in several ways to the majority of stakeholders, including for Educational Consultants who were assisting with CBME design and for residents who reported the lowest expectancy and value for CBME in year one (2015-2016) survey data. In year two (2016-2017), an Educational Consultant shared how impressive the CBME implementation approach at Queen's has been.



Also, in year two (2016-2017), a Program Director explained the value in the systems-level approach that was taken at Queen's:



University-wide supports proved to be vitally important in the CBME transition at Queen's, but many stakeholders needed to see it to believe it.

Coming Together

One of the key factors for CBME implementation success was having supportive colleagues. In year one (2015-2016) survey data, one of the main resources that the stakeholders found helpful in the transition was support from peers (84%). Survey respondent rated peer support higher than other external resources such as the Royal College CBD framework (10%), or technology (6%). Moreover, many stakeholders who were interviewed over the years attested to how CBME implementation encouraged and sometimes compelled colleagues to interact with each other for the first time within and between their respective divisions and departments and across the hospitals and university, paving the way for an increase in peer support, collaboration, and relationship building.

In year one, (2015-2016) Executive Committee members and Program Directors were aware of how necessary it would be to have a collaborative environment across the School of Medicine for a successful CBME implementation. They knew that such an environment was not typical because of heavy workloads and differences across departments. They knew they had significant work to do, and years two and three interview data (2016-2018) indicated a significant increase in the level of information sharing. Stakeholders came together to support each other and to support this vision of building community. In year three (2017-2018), the interview data revealed how supportive peers made an important difference in building communities, increasing collegiality, and finding empathy as stakeholders were challenged in a variety of ways with the transition to CBME.

Using the OH lens to illuminate our survey and interview findings, we were able to better understand how the communities of practice approach taken by the CBME leadership was foundational for the implementation process. The CBME Executive Committee responsible for governance was at the centre of this transition, as this committee structured and guided the CBME transition while providing insight, expert guidance, and advocating for financial support. Additionally, sub-committees reported any challenges to the Executive Committee, such as funding constraints and policy issues. Furthermore, the Executive Committee established project principles, which meant that the CBME transition was done consistently and followed accreditation standards to uphold the integrity of PGME programs. Governance outputs included budget, implementation plans, project timelines, and financial and human resource allocations.

All sources of data revealed the importance of top-down leadership in this transition and, unsurprisingly, the most common themes post-document analysis in the area of project governance included leadership, collaboration, community of practice, advocacy, support, innovation, systems approach, empowering learners, partnerships, change management, and ownership of both change and outcome of change. The Executive Committee's project governance was flexible over the four-year period to best accommodate the complex transition to CBME. Flexibility in CBME governance, design, and implementation was a theme across all data sets. In year two (2016-2017) interviews, a CBME Executive Committee member who was also the head of a sub-committee elucidated the importance of remaining flexible and open-minded in our implementation:

> I think implementing this in Canada and especially being the first ones to dip our toes in the water requires us to be open minded, evolving, and follow the planned cycle iteratively while keeping our eye to the aim and the key goals and principles of CBME. (Executive)

By year two (2016-2017), it became clear to the Executive Committee that a successful CBME implementation would require commitment and hands-on involvement from faculty and residents. This understanding of shared commitment and involvement removed the sole responsibility of CBME implementation in PGME departments from Program Directors and CBME Leads; it sent a message across PGME that everyone was responsible for CBME implementation. While this meant an increase in training, informational workshops, newsletters, and emails across departments, it also created a stronger sense of community in that stakeholders felt more connected to each other than before.

Year three (2017-2018) interview data and the OH findings revealed that developing a stronger sense of community and re-distributing CBME implementation responsibilities more fairly led to more stakeholder communication and collaborations. Among these collaborations was an increase in CBME scholarship activities across stakeholder groups. Some stakeholders participating in CBME scholarship activities had never participated in education scholarship before and now had the opportunity to do so. Additionally, some stakeholders had only now gotten the opportunity to work across departments or across positions (e.g., Program Director, Executive Committee member, resident) on CBME scholarship activities. The CBME implementation process at Queen's was a valuable lesson in community building.

Sustaining Community

Sustaining a large-scale educational reform such as CBME can present challenges. To ensure CBME sustainability, stakeholders echoed the need to extend the life of the systems that supported the CBME implementation at Queen's; for example, information technology (IT) training, faculty development, Educational Consultants, funding, and administration were all listed numerous times by numerous stakeholders. Additionally, a few stakeholders mentioned that sustainability can be ensured if the faculty who are doing the assessments are provided with additional recognition. One Program Director explained the connection between sustainability and recognition for CBME-related assessments:

> …in order for people to take the time to do these evaluations and do the teaching that is required and the faculty development that is required there has to be some sort of acknowledgment amongst the workforce statistics that this is a recognized valuable activity where there is some sort of credit either in monetary or time recognition, the way that undergrad does. (Program Director)

Some Executive members and a few Program Directors argue that while providing recognition to stakeholders for CBME work during the implementation process was necessary, the transition to CBME should mean that CBME tasks would be included as part of a new status-quo. Related to this notion, one Program Director noted that the CBME transition period, like many other large innovations, will go beyond three years and might be different for each department. In other words, some departments and some individuals will transition faster than others. The varied acceptance among stakeholders revealed by the survey illustrates that the culture change expected by CBME has not occurred uniformly and that specific attention needs to be paid to the preceptors conducting resident assessment to facilitate CBME uptake and successful implementation.

Many Executive Committee members and Program Directors shared that the transition to CBME will/has caused a shift in organizational culture, as not only is the curriculum undergoing changes, but the way we think and do things have also changed and are ever changing because of this transition.

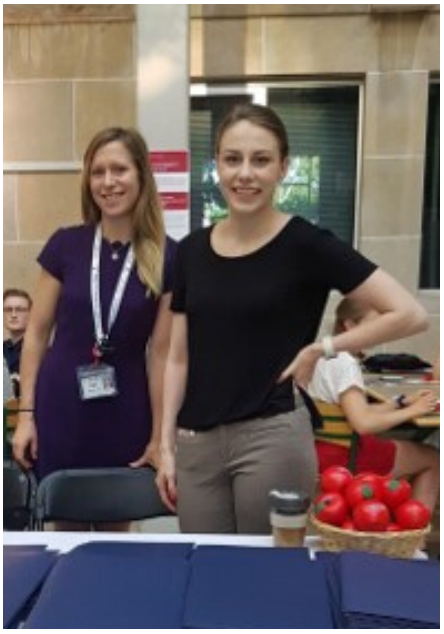
> PGME is experiencing the most collaborative environment it has ever experienced, and it can safely be assumed that CBME sustainability rests on maintaining this collaborative environment.

Interview data revealed a relationship between increased collaboration and increased communication. Following a systems-level approach, the Executive Committee implemented a robust communications strategy to assist with change management. OH findings revealed positive intended outcomes and unintended outcomes. For example, in the year leading up to the launch of CBME programs were supported to develop recruitment resources explaining Queen's CBME initiatives to prospective residents. Important OH findings in the area of communication were the 99% CaRMS match rate for the 2017 launch year, and the 100% match the subsequent year (2018). This demonstrates the importance of communication and resident recruitment practices that alleviate anxieties when involved in curricular reform.

Corroborating findings from the interview data about the importance of communication, the main themes that emerged under the communications area in the OH findings were community of practice, collaboration, change management and project buy-in. Moreover, interview data indicated that having top-down leadership that keeps the lines of communication open will certainly help with sustaining CBME: "So, that iterative and collaborative process is key. So, talking to program leaders, directors, program administrators to make sure everyone is still engaged" (Executive). Related to collaboration, another CBME executive talked about the value of learning from other institutions' ways of sustaining CBME: "I think there are things that we need to learn from other schools and other institutions. And other things that we need to consider from a technology solution to ensure that we can support a more broad CBME audience" (Executive).

A CBME Lead explained some of the intricacies of sustaining CBME and acknowledged the importance of rewarding stakeholders, especially Program Directors, to keep them motivated:

> And then the other part I will say is …for want of a better term human psychology…of applauding all of the hard work that is going on and making sure that every stakeholder …especially the program leaders are validated for all the hard work. And have an ear for them to speak about mistakes and make sure that they feel rewarded. And have internal motivation to build better residency education is probably the most important human factor in sustaining this because it is a lot of work and if program leaders and faculty and residents feel rewarded that it is meaningful that will sustain the ongoing energy and efforts across the project to keep going.



While keeping the stakeholders motivated was on the minds of some CBME Leads, quite a few of the Program Directors shared the notion that more faculty should be hired to increase CBME sustainability:

> …I do think there will be a case to hire more faculty. We have grown very extensively in the last 7 or 8 years, probably by 30% of our faculty we have had growth. And that is to meet the clinical demand but I think we will be able to make a good case that we have ongoing and increasing educational responsibilities. (Program Director)

A few stakeholders acknowledged that there needs to be an understanding that some of them are experiencing post-launch burnout or what one executive referred to as "CBME fatigue"; therefore, measures need to be put in place to accommodate a recovery from the consistently heavy workload for the past four years. Increasing educational responsibility mentioned by many stakeholders in year three (2017-2018), may be alleviated by keeping Educational Consultants indefinitely or for a longer time period than originally planned. Baseline survey data pointed to a sustained need to make the case for CBME support long after implementation is completed.

In year one (2015-2016), baseline survey data and LoU interviews revealed that stakeholders were confident, but still reported high needs for various supports. Across four years, the greatest support was still seen as coming from peers lending support to the feeling that a community makes this transition together. Keeping strong communication, collaboration, and ongoing support systems alive that allow for ongoing feedback and problem-solving at various levels are central to sustaining CBME at Queen's.

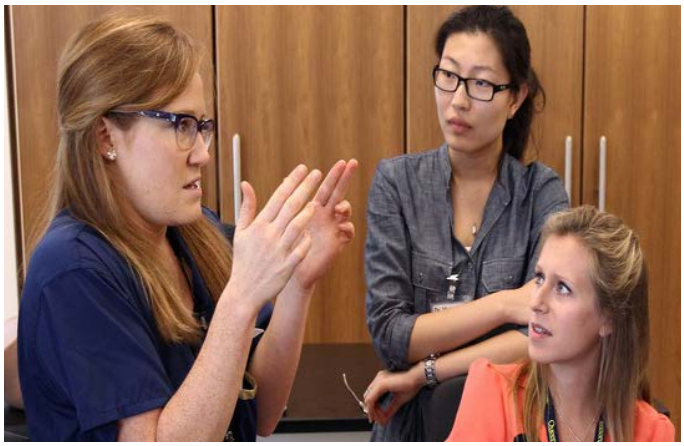
Inspiring Change

To accomplish change at the various levels that it needs to happen in order to transition from the traditional time-based curriculum model to CBME, there needs to be a certain positive momentum stemming from high levels of the organizational structure. Many stakeholders have talked about the Dean's commitment and positive momentum about implementing CBME at Queen's. This positive momentum is also evident in the interviews he has participated in for the LoU portion of this evaluation. Inspiring change can happen at any level of an organization, in this case, it was initiated at the top and trickled down the hierarchy of the organization through purposeful institutional engagement.

As for the resistors of the CBME transition, some of them resisted because of fear of the hefty assessment workload, a few of them did not perceive the time-based model to be in need of replacement, and others simply could not fathom how they were going to find the time, energy, and money to invest in this transition.

One Program Director talked about the assessment workload and faculty members' philosophies about teaching and learning:

> As a Program Director some people are great about providing feedback for their learners and are great about observing their learners. And for those people CBME will not change very much. I think what it will help us to structure people who are less organized in terms of supporting their learners to be more vigilant about that. And for people who are not invested altogether it may give them some impetus to change their philosophy about their learners. So instead of learners doing work for them, it is more about their learners experiencing and making sure that they meet the levels of competencies. (Program Director)



The systems-level approach enabled the Executive Committee to successfully manage the change to CBME curricula across all PGME programs through sub-committees responsible for governance, assessment, curriculum, resident leadership, faculty development, and scholarship. Apart from the logistics that are required to manage these various areas, the Executive Committee has also been cheerleaders and motivators of sorts, as they understand the required momentum to overhaul the traditional time-based curriculum across programs. Changing status-quo requires strong top-down cheerleading and leadership.

In addition to strong top-down leadership, year two (2016-2017) interview data indicated that implementing a shared leadership approach, which created bottom-up leaders and horizontal/middle-out leaders, was the game-changer that re-distributed power and contributed to buy-in among resistors and disengaged stakeholders. Years two and three (2016-2018) interview data revealed that shared leadership has increased the levels of accountability among stakeholders, which will ultimately increase social accountability. Many Program Directors and CBME Leads talked about the increased accountability they feel having transitioned to a CBME curricula, where they are now required to observe, communicate, and assess more. Residents reported feeling more empowered and accountable for their own education under a CBME curriculum.

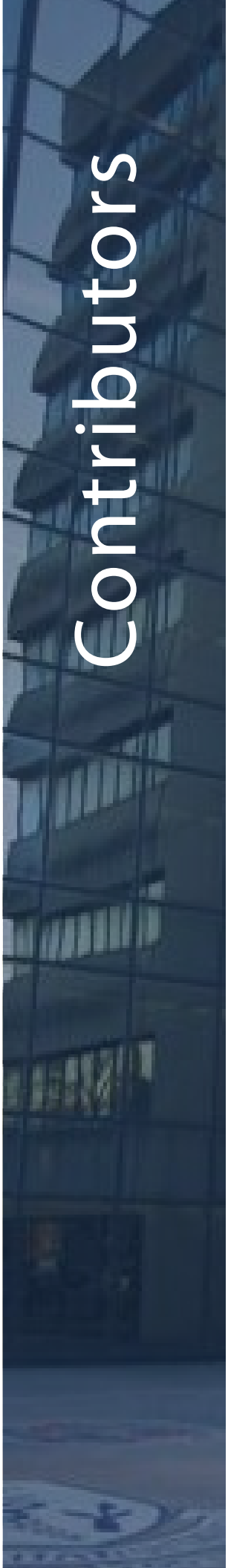
The systems-level approach enabled Queen's to effectively and efficiently manage various changes; for example, residents becoming more proactive in their learning, new positions such as Academic Advisor, self-directed learning through new technology, collaborative scholarship, placing a higher value on educational research, community building that dissolves silos, and Queen's serving as a model nationally and internationally as the first Canadian university to simultaneously implement CBME across all its PGME programs.

Moving Forward

The effort that has gone into making the transition to a CBME curricula successful has been nothing short of extraordinary. Members of the Queen's community have rallied together to enact large-scale change that will impact how physicians are educated for years to come. In the process, the School of Medicine has also become a smaller place as Program Directors, faculty members and residents, some from disparate programs who would not normally interact, have worked together to share ideas, resources, and sometimes to commiserate, as the implementation has unfolded.

Implementation of CBME is an ongoing process, and programs continue to evaluate and refine the way they operate within a CBME curriculum. As the practice of conducting ongoing program evaluation has been instilled as part of the transition process, we anticipate that ongoing monitoring and improvements will continue to shape CBME culture at Queen's.

While the process of transitioning to CBME has not always been easy, Queen's faculty are now nationally and internationally renowned experts in this area, attracting visiting scholars seeking to emulate our successes and learn from our challenges. Queen's is on the map through the hard work, perseverance, and dedication to excellence in education shown by everyone involved in the transition process. In 2019, the CBME Executive Team was recognized with the Queen's University Principal's Curriculum Development Award for their leadership and curricular innovation.



Queen's CBME Leadership

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