

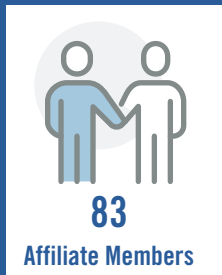
# C-QuIPS

Centre for Quality Improvement  
and Patient Safety



## Self-Study

2012–2017



**National and International Leadership**

The above graphics refer to C-QulPS' current state after 9 years, with the exception of publications and grants, which only include the 4 years since our last external review in 2013.

# CONTENT

<b>EXECUTIVE SUMMARY</b> .....	<b>03</b>
<b>INTRODUCTION</b> .....	<b>09</b>
<b>EDUCATION</b> .....	<b>15</b>
Capacity Building through Education	15
QI/PS Education Beyond our Core Programs	32
Advancing the Field of QI Education	36
<b>RESEARCH</b> .....	<b>38</b>
Research Profiles	43
C-QuIPS Staff	52
C-QuIPS Core Members	60
Summary	65
<b>ORGANIZATIONAL STRUCTURE</b> .....	<b>67</b>
<b>FINANCES</b> .....	<b>69</b>
<b>RESOURCES AND INFRASTRUCTURE</b> .....	<b>71</b>
<b>ALUMNI AND ADVANCEMENT PROGRAMS</b> .....	<b>72</b>
<b>INTERNAL AND EXTERNAL RELATIONSHIPS</b> .....	<b>73</b>
<b>REPORT OF MEMBERS</b> .....	<b>82</b>
<b>REPORT OF LEARNERS</b> .....	<b>85</b>
<b>FUTURE DIRECTIONS</b> .....	<b>87</b>



# EXECUTIVE SUMMARY

Since the inception of the **Centre for Quality Improvement and Patient Safety (C-QulPS)** nearly 10 years ago, we have prioritized capacity building through education. This strategy offered the potential to increase the number of clinicians capable of addressing quality problems in their clinical settings and further the goals of a wide range of clinical services and settings of care. Consequently, we developed a number of successful education programs that equip health care professionals and managers with the knowledge and skills to develop, execute and evaluate successful QI projects and lead patient safety initiatives. Despite this primary focus on education, C-QulPS staff and core members have led a variety of impactful research programs, producing papers and obtaining grants in greater numbers than any comparable Canadian centre and on par with prominent international centres.

Our first external review in October 2013 confirmed the soundness and success of this strategic decision to focus on capacity building through training in QI/PS skills. The University invited as reviewers Professor Charles Vincent, an internationally recognized research leader in patient safety who had also directed the first major Centre for Patient Safety, at Imperial College in the UK, and Dr. Ward Flemons, a respirologist at the University of Calgary with dual expertise in patient safety and medical education. Their review lauded the small but very committed group of C-QulPS leaders, and commented in their summary that the Centre “has

developed high quality and important educational programs...” and “has exceeded its education mandate in the first five years...” Regarding research, they commented that “the academic focus of the Centre’s members has resulted in an impressive list of publications...” and that this number of publications places the Centre “ahead of other universities in Canada and comparable to high functioning centres whose focus is similar to C-QulPS elsewhere”.

Given the initial positive outcomes of our strategic focus on education and capacity building, we have further enhanced existing education programs and developed new ones to increase our national and international reach. Many graduates of our various programs are now themselves emerging researchers, educators and leaders in QI/PS. We also made a decision to expand our strategic priorities to establish a research program that overlays our education activities. This research would not only support our own desire to evaluate the effectiveness of our QI/PS education programs and optimize our educational approaches, but would also advance the broader field of QI/PS education research and attend to the many questions and gaps that exist.

This 2012-2017 report details our progress and successes over the past five years. The summary on the following page provides an overview of notable C-QulPS achievements in research and education.



## 2010

### C-QulPS funded for two major projects from CPSI

C-QulPS receives CPSI grant for Promoting Real-Time Improvements in Safety for the Elderly (PRISE) Study and CPSI contract to evaluate the Economic Burden of Patient Safety.

## 2011

### C-QulPS Director becomes Editor of *BMJ Quality & Safety*

In addition to Dr. Shojania as Editor, four core members have held associate editor roles in the years since, with two holding such roles at present. In 2011, *BMJQS* had an impact factor under 2. It has increased every year since then and now, at 6.186, exceeds all QI/PS journals, as well as all health services research, and medical education journals.

## 2012

### Launch of Masters degree in QI/PS in collaboration with IHPME

The demand for the Masters of Science in QI/PS, a partnership with the Institute for Health Policy, Management, and Evaluation (IHPME), has steadily grown since its inception in 2012. One hundred and four applications were received for the 2017-18 academic year for the 30 spaces available.

### C-QulPS Director and Associate Director help create new Clinician in Quality and Innovation academic position in Medicine

Dr. Shojania and Dr. Wong work with the Department of Medicine to create the Clinician in Quality and Innovation academic stream. It began with six faculty members and is now up to 43 as of 2017.

## 2013

### C-QulPS core members publish 179 peer-reviewed papers and obtain \$10M in grants

External reviewers characterize C-QulPS as “ahead of other universities in Canada and comparable to high functioning centres elsewhere”.

## \$10M+

in grants 2009-2013



## 2014

### C-QulPS Associate Director co-authors *NEJM* publication on I-PASS Study

I-PASS Study shows that a handoff bundle reduces preventable adverse events: SickKids only non-US site in the study.

## 2015

### C-QulPS Director co-leads NPSF report “Free From Harm”

Dr. Shojania co-chairs expert panel process with Dr. Donald Berwick on state of Patient Safety 15 years after *To Err is Human* and produced NPSF report and *JAMA* commentary published in 2016.

## 2016

### Co-Learning Curriculum receives UofT Faculty Development Award

Co-Learning QI Curriculum launched in 2012 is recognized in 2016 with UofT Helen P. Batty Faculty Development award for innovation in program development and design (has now spread not just throughout Faculty of Medicine at UofT, but also training programs at Western and McMaster, and one US site). In 2017, the UofT program has 209 residents and 63 faculty participants.

## 2017

### C-QulPS Associate Director becomes Associate Clinical Director for Children's Hospitals SPS

Dr. Coffey becomes Associate Clinical Director for SPS, a network of over 100 Children's Hospitals in the US and Canada working to improve paediatric patient safety.

### C-QulPS core members publish 276 QI/PS journal articles and participate in grants totaling over \$50M (2012- Aug 2017).

### First C-QulPS team grant: RCPSC Medical Education Research Grant

Second team grant received from Physician Services Incorporated in 2017.

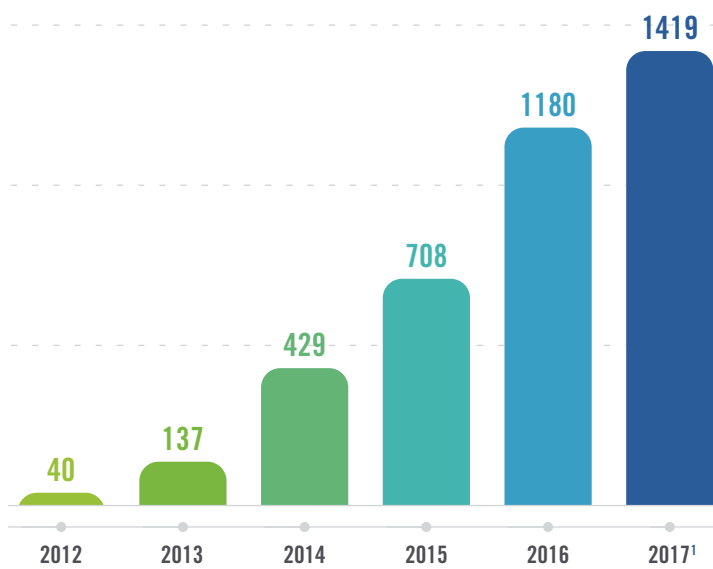
## RESEARCH

Through our capacity building efforts over the past five years, C-QuIPS has grown to 28 staff and core members committed to advancing QI/PS practice and research. As shown on the right, from 2012 to August 2017, 25 C-QuIPS members published 276 peer-reviewed articles related to patient safety or quality improvement. Google Scholar identifies 3,538 citations to these C-QuIPS publications, for a group h-index of 27 (a few individual members have much higher h-indices in the 40–50 range) and an average of 12 citations per publication. Individual C-QuIPS members have also participated as principal or co-investigators on grants totaling over \$50M.

Other research highlights include:

- We obtained our first two C-QuIPS team grants, with multiple C-QuIPS members collaborating on projects central to our activities.
- C-QuIPS Associate Director led the only Canadian site in the I-PASS study, a landmark publication showing a reduction in preventable adverse events from a resident handoff bundle. The study was published in the *New England Journal of Medicine*.
- One of our educational programs generated two peer-review publications including one in *Academic Medicine*, the highest impact medical education journal.
- Under the editorial leadership of the C-QuIPS Director, *BMJ Quality and Safety* has risen in impact so that it now has the highest impact factor in the field of health care quality, as well as the broader fields of health services research and health policy.

### CITATIONS OF PUBLICATIONS BY C-QUIPS STAFF AND CORE MEMBERS (2012-2017)



## 276

Total papers published  
(2012-Aug 2017)



## 3538

Total citations to C-QuIPS  
papers (2012-Aug 2017)

## 27

C-QuIPS h-index

## 76

C-QuIPS i10-index

## 12.8

Avg citations per paper

<sup>1</sup> 2017 citations extrapolated from the number of citations (946) published as of August 2017. These citations reflect the 9 members who have held titles positions within C-QuIPS (e.g. Director or Associate Director) along with 16 core members. We did not include publications solely involving affiliate members.

## EDUCATION

The last five years have seen significant expansion in our educational offerings. These different programs emerged from our commitment to meet the various needs of an expanding group of learners both within and beyond Toronto. For example, we developed a one-day QI workshop for individuals with little or no experience but wanted to gain exposure to QI. At the other end of the spectrum, C-QulPS partnered with the University of Toronto Institute for Health Policy, Management and Evaluation to launch the first Masters of Science (MSc) with a concentration in QI/PS in Canada in response to a growing demand for advanced training that could prepare future leaders and academic clinicians in QI. Some graduates of our programs have themselves played a meaningful role in QI/PS education; for example, a graduate of our MSc went on to lead the process of adapting the Royal College's ASPIRE (Advancing Safety for Patients in Residency Education) train-the-trainer faculty development program to be delivered internationally. Most recently, we created the EQUIP (Excellence in Quality Improvement) academic certificate program to increase our national and international reach.

One of C-QulPS' more innovative programs is the Faculty-Resident Co-Learning Curriculum in QI that began as a pilot program in the Department of Medicine

in 2011-12 with three subspecialty programs, but has since grown to over 35 training programs and over 200 participating residents across the Departments of Medicine, Paediatrics, Surgery and Laboratory Medicine & Pathobiology in 2016-17. The novel approach of bringing faculty and residents together to learn about QI addressed the dual goals of supporting resident QI project efforts while ensuring that faculty develop the necessary skills to supervise and teach QI effectively. This program has garnered national and international interest, and has been the focus of two peer-reviewed manuscripts, one of which was published in *Academic Medicine*. In 2016, the Co-Learning Curriculum received the University of Toronto Helen P. Batty Faculty Development award for innovation in program development and design.

In addition to teaching at our local education programs, C-QulPS core members have played key leadership roles in education, and policy to support QI/PS education, with national and international organizations (e.g., Canadian Patient Safety Institute, Royal College of Physicians and Surgeons of Canada, Choosing Wisely Canada, I-PASS Study Group, Association of American Medical Colleges).



## FUTURE DIRECTIONS

Over the past five years, we have continued to witness the tremendous impact of our investment in education on capacity building. C-QulPS core membership has doubled since our first external review. There are over 40 new faculty in the Clinician in Quality and Innovation (CQI) job description in the Department of Medicine, an academic stream spearheaded by C-QulPS leadership. Many of these faculty have come through C-QulPS educational programs. Other departments have either formally or informally created a job description modelled after the CQI job description in Medicine. Individuals trained through C-QulPS programs have taken on roles with a focus on QI/PS research and practice across a broad range of settings—fully academic and community hospitals, primary care, mental health, and rehabilitation. We also have a growing number of faculty teaching and mentoring QI projects across our education programs, a key factor to our continued growth and sustainability. C-QulPS core members continue to have strong research productivity and we are well on our way to establishing a C-QulPS research program harnessing the diverse content

and methodological expertise amongst C-QulPS core members. We have also generated enough revenue to support more faculty engaged in QI work.

As we strategize for the future, we can choose to further invest in our educational programs, and take them to a more clearly national and international scale. We could also consider investing more heavily in a research program, thinking creatively about research partnerships and opportunities for research growth and impact. Our first ten years position us well to move forward in both directions, strengthening our international reputation in QI/PS education and developing a research and innovation program on a much larger scale. We believe that we are meeting the goal of fostering better health care locally while also making concrete contributions more broadly, especially through our innovative educational programs and our emerging research program advancing knowledge in how best to train clinicians to make robust improvements in care in their practice settings.

## C-QUIPS STAFF<sup>1</sup>

<b>Kaveh G. Shojania, MD</b>	➤ Director, C-QuIPS
<b>Trey Coffey, MD, FAAP, FRCPC</b>	➤ C-QuIPS Associate Director and Site Lead, Hospital for Sick Children
<b>Brian M. Wong, MD FRCPC</b>	➤ C-QuIPS Associate Director and Site Lead, Sunnybrook Health Sciences Centre
<b>G. Ross Baker, PhD</b>	➤ Director of Graduate Studies
<b>Edward Etchells, MD, MSc</b>	➤ Senior Faculty Quality Improvement Advisor <sup>2</sup> (Associate Director from 2009-2013)
<b>Alene Toulany, MD FRCPC</b>	➤ Faculty Quality Improvement Advisor <sup>2</sup> (will take over from Dr. Coffey as Associate Director as of Spring 2018)
<b>Jerome Leis, MD, MSc, FRCPC</b>	➤ Faculty Quality Improvement Advisor
<b>Joanne Goldman, PhD</b>	➤ Research Scientist
<b>Leahora Rotteau, MA</b> (PhD candidate at IHPME)	➤ Program Manager
<b>Lisha Lo, MPH</b>	➤ Research and Education Coordinator
<b>Tanya Agnihotri, BSc</b> (Masters in Health Informatics candidate for 2018)	➤ QI Project Manager <sup>3</sup> (previously Administrative Coordinator, until Fall 2017)
<b>Mohita Moghe, BA (Hons)</b>	➤ Administrative Coordinator (as of October 2017)

<sup>1</sup> Appendix A lists all core members and the C-QuIPS website lists all affiliate members

<sup>2</sup> The QI Advisors provide mentorship/support to UofT faculty who want to conduct QI work. Two of the positions are partly funded by the Department of Medicine.

<sup>3</sup> This is a shared position with Dr. Leis (Director of Infection Prevention and Control at Sunnybrook) supporting QI projects at the interface of QI and Infection Control.

# INTRODUCTION

The Centre for Quality Improvement and Patient Safety (C-QulPS) ([www.cquips.ca](http://www.cquips.ca)) is a joint partnership between the University of Toronto's Faculty of Medicine and two of its major teaching hospitals, Sunnybrook Health Sciences Centre and the Hospital for Sick Children ('SickKids').

The University constituted C-QulPS as an Extra-Departmental Unit (a so-called 'EDU'), defined as a flexible, multidisciplinary entity organized around emerging areas of research and teaching that span traditional disciplines.

C-QulPS began as the Centre for Patient Safety (in January 2009), reflecting the early focus in many countries on patient safety (PS) as a particularly galvanizing aspect of health care quality in the wake of the US Institute of Medicine Report *To Err is Human* (2000). But, from the outset, we engaged in quality improvement (QI) more broadly and finally made this explicit by changing the Centre's name to C-QulPS in 2013.

## MISSION AND STRATEGIC PLAN

**C-QulPS mission: *To create, disseminate, and implement new knowledge in the field of patient safety and health care quality more generally at the University of Toronto and its affiliated hospitals in order to provide the highest quality and safest possible care for our patients.***

As outlined in greater detail later in the report, C-QulPS staff and core members have produced papers and obtained grants in greater numbers than any comparable Canadian centre and on par with prominent international comparators. But, we made a strategic decision from the outset to focus on capacity building. We chose to develop education

and training programs that could only have existed because of C-QulPS. For research, however, we largely let the whole of C-QulPS' research activities equal the sum of its parts. Our staff and core members would publish papers and obtain grants (and have done so at an impressive rate), but we did not make it a priority to develop a research program intrinsic to C-QulPS.

In recent years, we have developed a research program intrinsic to C-QulPS rather than just the collected research of its individual members. We describe this research program later in the report. However, we continue to regard capacity building in QI through our educational programs as the centrepiece of C-QulPS and explain here why we chose education in QI as the strategy for executing the mission of C-QulPS.

For a variety of reasons, we believed that equipping clinicians and health care managers with the skills to carry out successful improvement projects in their own clinical settings would provide greater immediate benefits to local institutions and even longer term benefits to the health care system at large than we could reasonably hope to achieve through a research program by itself.

We arrived at this view on the basis of the following considerations:

- Major grants take time to develop and the chance of success is low to moderate, especially given the limited sources of external funding for work in QI/PS.
- Grants in Canada do not fund investigators' salaries. Thus, grant money would only allow us to hire staff other than investigators, and these staff would have to work primarily on the grant and not on other activities.

- Successful research projects tend to focus on narrow problems. The central line bundle to prevent catheter-associated bloodstream infections illustrates this problem. Famous as this intervention is, it addresses just one specific type of hospital-acquired infection (and not even the most common one). Thus, making a few grants the focus of C-QulPS activity would do little to address the multiple quality and safety problems in the health care system. Moreover, research centres tend to focus on one setting of care (hospitals, ambulatory care, long-term care), so we would be committed to researching several narrow problems in one setting.
- Developing and carrying out a major research project requires many years, during which time the University, Sunnybrook and SickKids would see little return on their investment.
- Moreover, the research would not necessarily generate a success story. Most rigorous evaluations of improvement interventions show small to modest gains—and many show no benefit, just like in clinical research.

In addition to just avoiding the above problems, we also saw positive value in focusing on education and training.

## THE PROS OF EDUCATION AND TRAINING AS A FOCUS FOR C-QUIPS

1. Increasing the number of clinicians able to address quality problems in their clinical settings would

further the goals of a wide range of clinical services and settings (e.g., hospitals, ambulatory clinics, long-term care) in a way not possible with research on specific QI/PS interventions. The nature of the surgical checklist, the central line bundle to prevent catheter-associated bloodstream infections, high-fidelity simulation training to improve teamwork and many others is such that they will not apply to a broad range of settings.

2. Even when researchers want to work on “local problems” (or make a local site part of a multisite trial of a QI intervention), they often need a clinician to help lead the project—championing it to other clinicians, and attending to the daily work of implementing the intervention. A researcher will not have the time to attend weekly meetings to determine why clinicians are not using the new checklist or order set, complying with the new protocol or whatever the case may be. A researcher may also not be well-positioned to respond effectively to implementation barriers related to clinical workflow as they arise. Even if a clinician by background, most researchers will not have the detailed knowledge of the clinical environment to anticipate and address all the possible tensions between the intervention and existing workflow. Finally, unlike in much other research, these tasks associated with leading a project’s implementation cannot be delegated to a (non-clinical) graduate student. Successfully dealing with these problems requires clinical expertise and, ideally, respect from other staff.



Associate Director, Brian Wong, with the graduates of the 2015-16 Certificate Course at Capstone Day.

For many projects, therefore, the natural partners for researchers consist of clinicians who have some training in the methods of QI, rather than graduate students or junior faculty in a scientific job description. In other words, unlike in other areas of biomedical research, attracting (non-clinical) graduate students and more full-time scientists will not necessarily increase productivity or impact in QI.

Thus, we envisioned achieving two goals by training a cadre of clinicians in the methods of QI:

- i. equipping clinical units with staff able to develop, implement and evaluate improvement projects; and,
  - ii. creating potential partners for researchers interested in carrying out interventions in numerous possible clinical settings. The cadre of clinicians with QI skills would thus multiply the impact of the small number of researchers in QI far more than would be achieved by simply hiring one or two more faculty with a research focus in QI.
3. Finally, education and training played to our strengths as practicing clinicians and experienced educators of other clinicians. The leaders at C-QuIPS have substantial experience teaching clinicians on a variety of topics and applying content expertise in patient safety and health care quality to a wide variety of clinical contexts. We anticipated that training clinicians in quality improvement would become increasingly in demand and that clinicians would respond favourably to courses with substantial involvement from active clinicians.

Our first external review (in October 2013) confirmed the soundness of our strategic focus on capacity building through education and training in QI/PS. The University invited as reviewers Professor Charles Vincent, a PhD psychologist researcher by background and internationally recognized research leader in patient safety who had also directed the first major Centre for Patient Safety anywhere (based at Imperial College in the UK) and Dr. Ward Flemons, a respirologist at the University of Calgary with dual expertise in patient safety and medical education.

Their review opened with the following summary:

“ *The Centre has many strengths, chief among them are a small but very committed group of leaders including the Director and two Associate Directors. The education programs they have developed are very strong. The academic focus of the Centre’s members has resulted in an impressive list of publications. Members of the Centre are helping to lead strategic and important education initiatives in the country.* ”

— Dr. Ward Flemons and Professor Charles Vincent  
C-QuIPS external reviewers’ report, 2013

Other comments included:

“ *The number of research publications by members of the Centre clearly place it ahead of other universities in Canada and comparable to high functioning centres whose focus is similar to C-QuIPS elsewhere across the world.* ”

“ *The Centre has developed high quality and important educational programs that make the University of Toronto a clear leader nationally and clearly recognized internationally. It is clear that the Centre has exceeded its education mandate in the first five years of its existence.* ”

Thus, the reviewers acknowledged the successes of the strategy we undertook in the initial years of C-QuIPS, but did offer constructive suggestions for the future evolution of C-QuIPS, chief among them being the development of a research program more intrinsic to C-QuIPS. (Appendix B contains the complete report from the external review in 2013.)

## ACHIEVEMENTS IN OUR SECOND FIVE YEARS

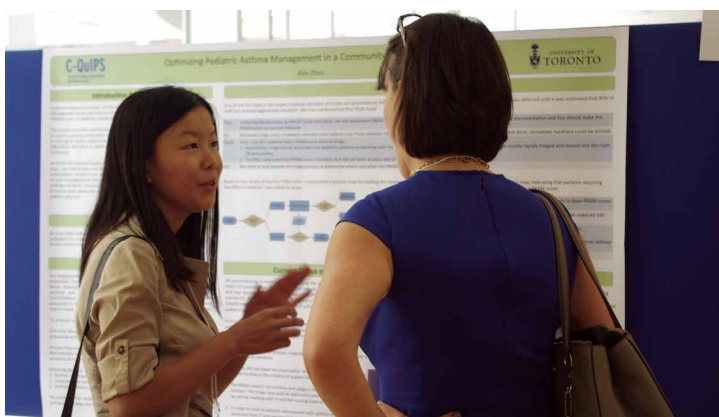
- Many individuals who received training during our first five years went on to jobs with a focus on QI/PS at UoT hospitals. Some of these individuals were senior

trainees who became faculty members, while others were existing physician faculty members or health care professionals whose focus shifted to QI/PS as a result of their training.

- With the aim of growing our internal research program, we hired a new staff member in the role of Education Research Scientist, to focus specifically on the C-QulPS research program. With the addition of this new staff member, the Centre successfully obtained our first two grants involving core activities of C-QulPS and with the research funds solely based in the Centre: one grant through the Royal College of Physicians and Surgeons of Canada to study different forms of QI education programs and one grant from the Physicians Services Incorporated (PSI) Foundation to study the implementation of the institution-wide “Caring Safely” program at SickKids.
- The individual research productivity of our staff and core members remains high, with 276 publications in the past five years (Oct 2012 to Aug 2017). Google Scholar identifies 3,538 citations to these C-QulPS publications, for a group h-index of 27 (a few individual members have much higher h-indices) and an average of 12 citations per paper. Individual C-QulPS members have also participated as principal or co-investigators on grants totaling over \$50M.
- Phenomenal growth of the Faculty-Resident Co-Learning QI Curriculum, which has now spread

beyond the Department of Medicine to Paediatrics, several divisions in Surgery, and even outside of UofT to Western University, McMaster University and Virginia Tech, as well as generating two peer-review publications—one in *Academic Medicine*, the highest impact journal in medical education.

- Continued growth of the Master’s program, which now routinely receives over 100 applications for 30 spots from across Canada.
- Sustained popularity of the Certificate Course in QI/PS, with 96 graduates between 2012 and 2017 and net revenue of approximately \$40,000 per year. Many graduates have remained connected to C-QulPS (e.g., helping mentor the QI projects of new participants in our programs). Others have taken on leadership positions in their home institution. And, some have decided to pursue more advanced training and enrolled in the Masters in QI/PS.
- Growth of our one- and two-day QI workshops (several per year) to include external sites (e.g., the University at Buffalo School of Medicine for three years in a row, St. Joseph’s Hospital in Ann Arbor Michigan), each of which brings in approximately \$15,000 per workshop.
- Launch of a version of our longitudinal certificate program delivered for academic physicians with a mixture of distance learning and in-person workshops. The Excellence in QI Academic Certificate Program (EQUIP) launched in August 2017 and attracted 11 individuals from across Canada and 4 from the US. Participants came for a three-day workshop in August, will receive coaching and webinars from core faculty on a roughly monthly basis to assist them in their QI projects, and will then return for another two-day in person workshop in May 2018. This first year, we restricted the numbers to ensure success for the pilot. Even with this size restriction, this pilot version of the program generated approximately \$60,000 in net revenue (and rave reviews, as detailed in Appendix G). We anticipate roughly doubling the enrollment moving forward.



## MAJOR CHALLENGES / RISKS

### ENGAGEMENT OF PHYSICIANS

C-QulPS has developed a core group of physicians engaged with QI and C-QulPS education and research. Physician engagement in QI/PS has been a challenge at other institutions, making our community of physicians a major strength and success of C-QulPS, one for which hospital CEOs have been grateful and visiting health care leaders have noted. However, this high level of physician involvement has led to more physician-centric programs and probably decreased involvement from other health professionals.

Many clinicians other than physicians have taken part in the Masters and Certificate programs. And, the physicians in our programs typically work on projects involving interprofessional teams. We also have some staff and core members who are nurses or non-clinician researchers and either teach in our educational programs or collaborate on QI/PS projects. Nonetheless, it remains challenging to involve researchers from Nursing, Pharmacy, Physiotherapy, and other health professions in C-QulPS for similar reasons to those that have hindered attracting established physician researchers. While we may occasionally work on projects with these researchers and they may occasionally give guest lectures for us, we just do not have enough to offer in terms of infrastructure or funds.

### OVER-REPRESENTATION OF DEPARTMENT OF MEDICINE AND FOCUS ON HOSPITAL CARE

Many of the physicians involved in the Centre are generalists or subspecialists in either Medicine or Paediatrics. We have added core members in Surgery (adult ENT, Paediatric Urology), Family Medicine, Psychiatry, and Anaesthesia, but only one in each. We anticipate that the continued expansion of educational programs such as the Co-Learning Curriculum in Departments other than Medicine and Paediatrics will gradually increase the number of faculty members from Surgery, Obstetrics, Psychiatry, etc, as this is what happened in Medicine and Paediatrics. We started with

only a few faculty members with expertise in QI, but residents exposed to these faculty and/or our educational programs went on to pursue the Masters in QI/PS and then joined the faculty. Or, existing faculty members who volunteered for the Co-Learning Curriculum transitioned over several years from willing volunteers to more enthusiastic and knowledgeable experts. Moreover, some departments have either formally or informally created a job description modelled after the Clinician in Quality and Innovation (CQI) job description in Medicine (e.g., Psychiatry), which should help further growth in these other departments, as they now have a clearer path to recruiting someone who will make QI their academic focus and a mechanism for rewarding them academically. For instance, we have helped develop criteria for the promotions committee at the University and merit review panels for awards and salary support with hospital practice plans.

### FRAGMENTATION ACROSS NUMEROUS HOSPITALS AND FACULTIES

The University of Toronto has 13 affiliated teaching hospitals (most with their own research institutes) as well as major free-standing research institutes such as the Institute for Health Policy, Management and Evaluation (IHPME) and the Institutes for Clinical and Evaluative Sciences (ICES), established networks of translational research, and so on. As a result, it has been difficult to engage researchers and clinicians in C-QulPS initiatives because they are already embedded in existing (and much larger) structures based in hospital research institutes, their clinical departments or divisions. Compounding this challenge of attracting established researchers in the QI/PS space into meaningful relationships with the Centre is our limited ability to offer funding to the faculty members themselves or to their QI projects.

We have started providing small to modest stipends (e.g, \$15K/year) in recent years to a few faculty members who support our educational programs—through frequent teaching, directing a program, or providing substantial

amounts of coaching and mentorship to the QI/PS projects being developed by participants in our courses or in the UofT Faculty of Medicine at large. And, we have also provided some small funding to help these faculty members start projects and/or increase the chance of success in applying for external funding support.

Modest though these funds have been, they reflect our general strategy for growing the size of the staff and core membership of C-QulPS. Most centres of this type grow out of a large existing grant or productive research group with multiple grants over the years, with the existing relationships between researchers working in the quality/safety space eventually formalized by the creation of a centre. In contrast, C-QulPS was launched with no such existing relationships and with no resources to address the fragmentation of the UofT landscape or mitigate its effects. Thus, there remains little incentive for an established researcher to partner with C-QulPS on a large grant when that researcher's hospital-based research institute (or home clinical department) will expect any external funds to flow through it.

We have dealt with these fragmentation problems partly by growing the C-QulPS community around our educational activities (as opposed to a large grant), expanding from 8 staff and 7 core members in our first 5 years to 12 staff and 16 core members largely on the basis of their involvement in our various C-QulPS training programs. This approach has paid off not only in terms of the greater size of the community working together, but also by creating a subset of these members who have research programs intrinsically tied to C-QulPS. The growth of the faculty able to teach in our programs has also reduced the tremendous teaching and project mentorship burden on the founding faculty members (the “small but very committed group of leaders... ‘working on a shoestring’” referred to by our previous external reviewers), freeing up more of their time for direct QI projects and grant-writing to support this work.

## SALARY SUPPORT FOR PHYSICIANS ENGAGED IN QI

In Canada, grants typically do not cover salary support for physician investigators. As a result, C-QulPS depends primarily on delivering our educational programs to generate revenue. These activities require significant human resources and detract from opportunities to do more research. We run the risk of spending so much time trying to generate revenue through our educational activities that we do not have time for anything else.

To be clear: our educational programs require so much time because they consist of far more than just delivering lectures and workshops. We also need to provide mentorship and coaching to the participants' QI projects. These projects are often complex—they may occur in an institution where the faculty mentor does not work, and often involve topics in which the mentor has little to no clinical expertise. Yet, the project needs to go reasonably well. For educational programs involving trainees, they want to have a decent shot at a publication or at least a conference presentation. And, for non-trainees, hospitals and major departments will stop encouraging people to enroll in our programs if their projects never work and/or the participants feel unsupported.

Running these educational programs requires substantial bandwidth. We have started growing the number of faculty who can be effective QI teachers and mentors. But, this takes time. Even junior faculty members in the CQI job description in the Department of Medicine may have carried out only two or three QI projects to date. There is a limit to how well they can mentor a group doing a QI project for the first time. So, our core of seasoned QI faculty, such as Drs. Shojania, Etchells, Wong, Coffey, Toulany, and Ostrow, as well as some of our mentors from Nursing, such as Marie Pinard, Director of Quality, Safety & Patient Experience at Women's College Hospital, are still required to do a fair amount of either direct mentoring or mentoring 'junior mentors'.



# EDUCATION

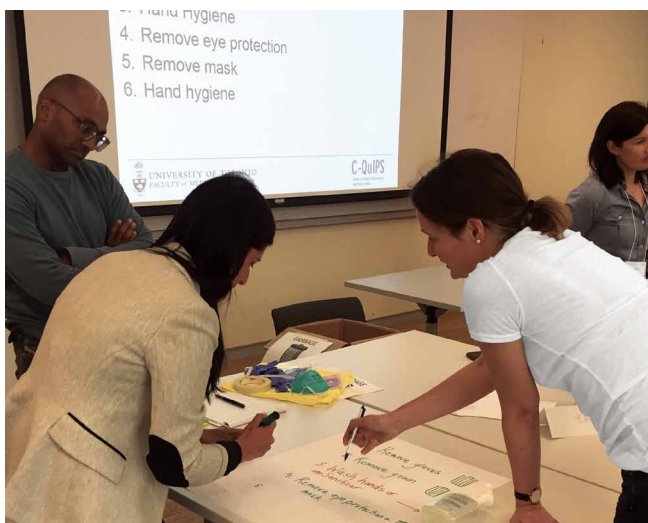
At the outset of the establishment of C-QuIPS in 2009, we made a strategic decision to make education a core priority. This decision aimed to increase the number of clinicians able to study and address quality problems in their clinical settings and to collaborate with researchers on QI/PS studies. Over the past five years, we have continued to build upon this education priority to increase the number of health care stakeholders with the knowledge and skills to engage in QI/PS activities and scholarship in their clinical and organizational settings.

We have used two main strategies to support our education and capacity building goals. The first strategy, ‘capacity building through education’, involves a range of formal education programs for medical and multiprofessional learners. The second strategy, ‘advancing education through leadership’, refers to research, policy and organization-based activities that allow for a systematic implementation of theoretically and empirically informed QI/PS education. In the following section, we describe the details and impacts of these two overarching strategies.

## CAPACITY BUILDING THROUGH EDUCATION

The five education programs developed by C-QuIPS reflect our aim to address the multiple needs of our heterogeneous participants and stakeholders. Our target audience includes physicians in training and in practice; health care professionals (e.g., nurses, occupational therapists, dietitians, etc.) in

clinical and/or managerial roles; and health care administrators. These individuals have a range of QI/PS education needs given their prior exposure to QI/PS, professional roles, career trajectories and organizational contexts. Our stakeholders include our three sponsoring institutions, as well as major clinical Departments (e.g., Medicine, Paediatrics, Surgery, etc.) and cognate academic units within the University, such as Institute of Health Policy, Management and Evaluation (IHPE). Our capacity building activities have contributed to a large number of graduates leading and engaging in QI/PS projects, conducting new research, and developing innovations to our educational programs. Some graduates have, in turn, joined the cadre of facilitators who teach and mentor projects in C-QuIPS programs. This expanding network of QI/PS educators is essential to the sustainability of the C-QuIPS education programs. Each of the education programs are described in further detail in this section.



## C-QUIPS EDUCATION PROGRAMS

### MASTERS OF SCIENCE IN QI/PS

- Partnership between the University of Toronto Institute of Health Policy, Management and Evaluation and C-QulPS
- One-year program geared towards individuals already engaged in QI/PS work or interested in pursuing a professional career in the field
- Launched in 2012, the demand grows each year; 104 applications were received for the 2017-18 academic year for the 30 spaces available
- 139 graduates between 2012 and 2017

### CERTIFICATE COURSE IN QI/PS

- Longest standing C-QulPS education program that grew out of a pilot program in the University of Toronto Department of Medicine
- Ten-month program with 20 half-day sessions geared to individuals from a range of professional backgrounds and at various career stages
- Recipient of University of Toronto Office of Continuing Professional Development Colin R. Woolf Award for Excellence in Course Coordination in 2010-11
- 96 graduates between 2013 and 2017

### CO-LEARNING QI CURRICULUM

- Brings together residents and faculty as co-learners to develop QI skills, teach QI and build faculty capacity
- Consists of two workshops, QI group project work, final day of keynote speaker and project presentations
- Recipient of University of Toronto Helen P. Batty Faculty Development Award for Innovation in Program Development and Design
- A total of 708 residents and 107 faculty members from 39 different training programs have participated in the curriculum between 2011 and 2017



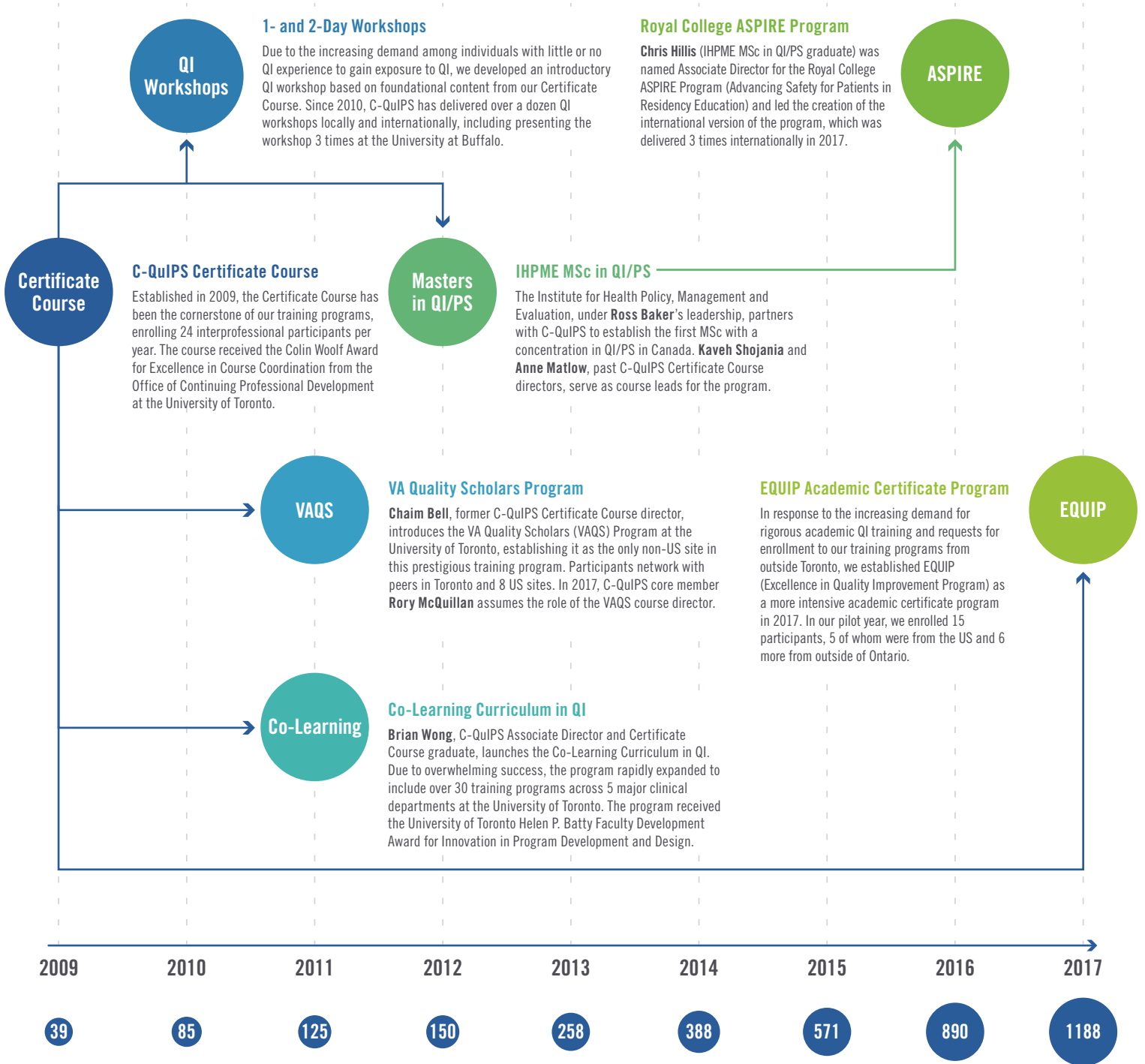
### EQUIP

- Newest program launched in August 2017
- Five days of in-person training over 9 months with mentored project work and webcasts during that time
- Developed primarily for academic physicians in Canada and the US
- 15 participants in the inaugural class

### QI/PS WORKSHOPS

- One- and two-day workshops delivered to 15-25 individuals at a time or to a requesting group of that size
- Aimed at building local capacity
- Participants from within and outside of Toronto

Please see Appendix C for a detailed comparison of education programs.



# Cumulative Number of Graduates from C-QulPS programs

## MASTERS OF SCIENCE IN QUALITY IMPROVEMENT AND PATIENT SAFETY

The **Master of Science in Quality Improvement and Patient Safety**, inaugurated in 2012, is a collaboration between C-QulPS and the Institute of Health Policy, Management and Evaluation (IHPE) at the University of Toronto. Dr. Ross Baker is the Program Lead of the program, and Drs. Shojania, Patricia Trbovich, and Anne Matlow are core faculty. Dr. Wong teaches an elective and Dr. Coffey is a guest lecturer. The Masters aims to graduate individuals with the knowledge and skills to lead, research and teach health care QI/PS. The one-year program is geared to individuals working in the health care system and already engaged in QI/PS work, as well as individuals interested in pursuing a professional career in QI/PS. The curriculum is structured to teach students the theoretical knowledge of quality improvement science, patient safety, and health care leadership, while guiding them through their own QI projects in their workplaces. In addition to the core faculty, local and external guest speakers provide insights to a range of QI/PS topics and initiatives. In 2016-17, a thesis stream was created. (See Appendix D for the description of MSc in Quality Improvement and Patient Safety Courses for the 2016-2017

academic year). The program is one of only two QI/PS graduate programs in Canada and receives applications from individuals across the province and country. Demand for the program has increased each year, with 104 applicants for 30 spaces in the 2017-2018 academic year. Students are selected to ensure professional representation from a range of health care professional groups and contexts (e.g. acute care, rehabilitation, primary care, long-term care facilities). A total of 139 people have graduated from the program over the past five years. Some graduates return as guest lecturers or as tutors who help mentor current students in their project work, thus fostering networking and a continuously expanding QI/PS community.

### MASTER'S PROGRAM OVERVIEW

#### REQUIRED COURSES (2016-2017 ACADEMIC YEAR)

Leading Change

Fundamentals of Improvement Science

Quality Improvement Methods

Leading and Managing Change

Quality Improvement in Health Systems

Concepts and Strategies in Patient Safety Systems

Legal and Regulatory Environment and Risk Management

Project Course

# 104

Applications received for  
30 available spaces for 2017-2018



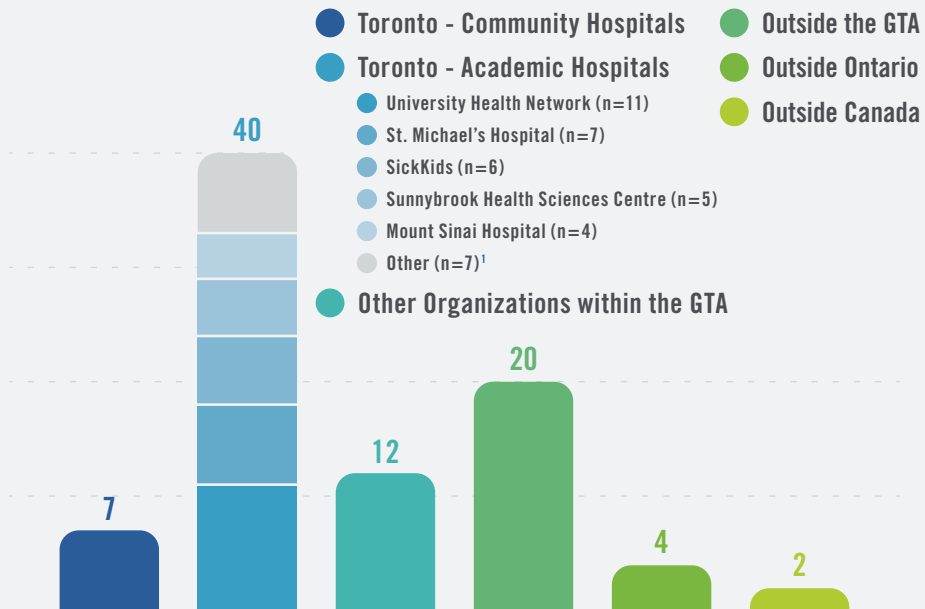
Program Graduate Characteristics



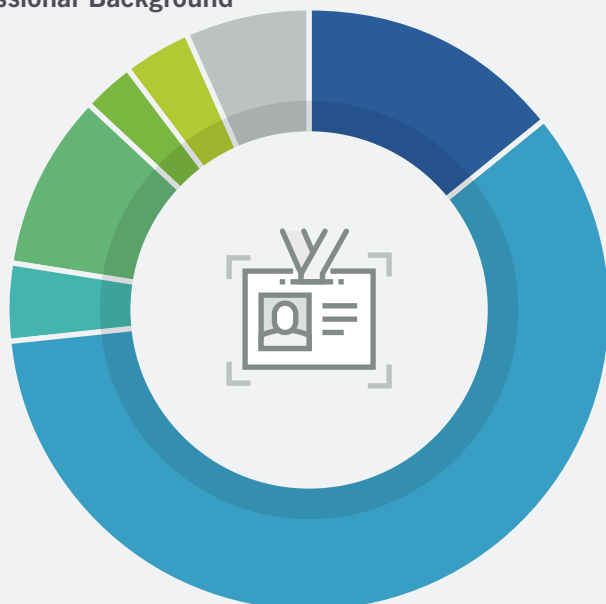
139

GRADUATES

Organizations



Professional Background



- Nursing (n=20)
- Medicine (n=82)<sup>2</sup>
- Pharmacy (n=6)
- Other (n=9)<sup>3</sup>
- Physiotherapy, Occupational Therapy, Respiratory Therapy (n=13)
- Graduate Training (n=4)
- Bachelors (BSc, BHSc, BA) (n=5)

Previous C-QulPS Programs Taken



1 Other includes Baycrest (2), Holland Bloorview Kids (2), Women's College Hospital (2), Centre for Addictions and Mental Health (1)

2 Includes Trainees (53), Professor (2), Assistant Professor (3), Adjunct Professor (1), Lecturer (2). Physician participants have come from the following Departments: Medicine, Surgery, Paediatrics, Anaesthesiology, Family and Community Medicine, Obstetrics and Gynecology, and Psychiatry

3 Other includes Midwifery (2), Dietetics (2), Social Work (1), Paramedic (1), Speech Language Therapist (1), Radiation Therapist (1), Recreation Therapist (1)

## TESTIMONIALS

Graduates of the Master's program have successfully used the knowledge and skills gained from the Master's program to pursue their QI/PS interests and roles in a more rigorous, scholarly way, as evident from the following testimonials:



**Joanne Zee**

Physiotherapist, 2015 graduate

“ As someone with 23 years of health care experience, a physiotherapist by background and currently the Senior Clinical Director of the Brain and Spinal Cord Rehab Program at Toronto Rehab, University Health Network, I can honestly say that my life and approach to health care improvement changed after graduating from the MSc QI/PS 2015 program. Through the Master's program, I initiated and chaired a working group with the purpose of managing challenging behaviours. This initiative led to improvements in teamwork, using visible measurement and transparent accountability and led to an improvement in learning and safety culture. The knowledge and pragmatic skills and experiences gained in the QI/PS Master's Program has opened up new opportunities for me in leadership. After the Masters, I assumed the role of co-chair for Toronto Rehab's Quality and Patient Safety Council, sponsoring staff development in quality improvement methodology training across the organization, and have provided coaching and mentoring of staff who lead improvement initiatives and ensure that a culture of patient partnership and engagement is ingrained in all improvement efforts. This translation is demonstrated particularly in my work leading the introduction of daily huddles from the frontline to executive leadership with the aim of reporting and anticipating potential safety issues in order to implement prevention strategies to reduce potential harm. I would highly recommend this program to novice and seasoned health care providers and leaders—it will give you a foundation of knowledge and skills that will serve you well in improving the lives of patients you serve, the teams you work with, those you mentor and coach and in the end, help you lead improvements for a better health care system. ”

“ I completed the MSc in QI/PS in 2013 while doing a 1-year fellowship in Academic General Pediatrics at the Hospital for Sick Children. It was an honour to be part of the inaugural class, and I have benefitted from both the knowledge gained and the networks established with colleagues and professors. The skills that I developed as part of the course prepared me to take on the role of Assistant Program Head of the Inpatient Unit at the Montreal Children's Hospital/McGill University Health Center. My focus includes patient safety activities and training, as well as QI projects in General Pediatrics, such as creating an in-situ simulation-based program for medical personnel on the inpatient unit based on specific unit-based patient safety incidences. As one of the first faculty at McGill with formal training in QI, I have played key roles in important hospital activities, including successfully and safely moving the hospital to its new location, ongoing training of all hospital staff and personnel in QI methodology, and creating an innovative simulation to promote a culture of safety called the “Crib of Horrors”, which was published in Pediatrics in 2015. ”



**Nadine Korah**

Physician, 2013 graduate



**Christine Soong**

Physician, 2013 graduate

“ While practicing in the United States as an academic hospitalist during the introduction of the Affordable Care Act, I became involved in system-wide quality and safety initiatives. This experience led me to seek advanced training in quality and safety which would provide me with the tools necessary to be a successful clinician in QI. Since the completion of the MSc in QI/PS, I have applied improvement science methodology to local QI projects to improve the care of the hospitalized patient. Our team’s positive results at Sinai Health System have allowed us to scale up projects such as ones involving the reduction of sedative use and integrated hip fracture management to other institutions. As a result, my role within our health system has evolved. I am currently the Medical Lead for the Urgent and Critical Care Programs and oversee the operations and quality targets of these clinical areas. In addition, I maintain my involvement in the MSc and the Certificate in QI/PS programs as a mentor and QI coach. I feel fortunate to have completed the MSc in QI/PS program. The experience has provided much needed foundation in my work in quality and has allowed me to pursue a highly rewarding academic career as a clinician in quality. ”

“ I began my career in obstetrics and gynecology as a traditional academic physician, including subspecializing in Maternal Fetal Medicine. This was complemented by a graduate degree in clinical epidemiology. Over the years, in my roles as head of the Labour and Delivery Unit and site chief of Obstetrics at MSH, I became exposed to risk management strategies such as the MOREOB Program. I felt that I could use a more formal grounding in the broader topic of patient safety and thus chose to apply for admission to the inaugural class of the Masters in QI/PS. As I had hoped, this course provided me with a greater depth of understanding for a range of safety and quality problems, as well as a far larger toolbox to draw from in addressing them. Since completing the Masters, I have taken on new roles as Inaugural Vice Chair Quality in the University-wide Department of Obstetrics and Gynecology and Co-Chair the Maternal Newborn Advisory Committee of PCMCH and become a member of council of the Provincial Council for Maternal Child Health. The skills acquired from the MSc QI/PS and collaboration with other members of the C-QulPS have provided invaluable assistance in carrying out the duties of these roles. In addition, I have enjoyed working in this area to the point that it has been a pleasure to stay involved with the Masters (eg, interviewing applicants almost every year and sometimes serving as project advisor or tutor) and helping support C-QulPS symposia and a recent lecture by a prominent obstetrics safety researcher lecturer from the UK. ”



**Gareth Seaward**

Physician, 2013 graduate

“ After many years in Quality Management, the MSc QI/PS program helped to solidify and expand my knowledge of QI and patient safety science. It also provided me with the opportunity to network with a cadre of like-minded professionals in various health settings and sectors. Completing the Masters has led to my involvement as a C-QulPS certificate mentor and as an instructor in the Masters of Health Sciences, Health Administration program at IHPME. Encouraging and supporting health professionals of all disciplines to pursue formal training in this field is one of the most rewarding aspects of my work. ”



**Marie Pinard**

Nurse, 2014 graduate



**Mahsa Sadeghi**

Nurse, 2015 graduate

“ As a registered nurse in cardiac ICU, I developed an interest in QI by participating in QI projects led by cardiologists. Recognizing that I had a knowledge gap to furthering a career in QI and patient safety, I pursued the MSc in QI/PS at IHPME. After learning from leaders in QI, I advanced my career by moving into a surgical performance improvement role. The knowledge and experience from this program has not only allowed me to lead and complete many successful QI projects but I have been able to present many of these efforts nationally and internationally. The Master’s program has also enabled me to build QI capacity in the surgical department by engaging many surgeons, fellows and residents in improvement projects. Through the graduate program, I have developed strong leadership skills, which has made this a priceless experience. ”

“ After more than a quarter century in academic medicine I was fortunate to be accepted in the Class of 2015 MSc QI/PS at IHPME. This added expertise has allowed me to not only remain on as faculty at IHPME, but to be a leader in the introduction of the C-QulPS program for surgeons. As a division chief, QI/PS has become the central theme of my tenure year which has yielded an increasing number of presented abstracts and publications with many more projects in the works. I am particularly proud that our last two fellows, both Americans, have pursued the C-QulPS Certificate program and the MSc QI/PS at IHPME respectively. ”



**Martin Koyle**

Physician, 2015 graduate



**Kevin Levitt**

Physician, 2014 graduate

“ Having an interest in improving “the system” and developing efficiencies within health care, the Masters in QI/PS was a natural bridge to help achieve this. The skills obtained in the program provided the necessary tools to embark in meaningful research and develop the ability to help supervise the next generation of colleagues in QI. I was fortunate that my masters project was awarded the “Young Investigator Award” at the American College of Cardiology and helped to shape my future work in this area. I have already had the opportunity of supervising three successive cohorts of students in the Masters in QI/PS who have gone on to lead independent, high value QI research. The master’s program has been integral in opening up opportunities in my professional career and the strong leadership within the program is a testament to the importance of QI in academia and their passion for it. ”

“ During my residency in Otolaryngology-Head & Neck Surgery, I developed a strong interest in many issues involving health care quality and patient safety, areas previously unbeknownst to me. I found myself gravitate towards important areas such as the patient experience, patient flow and efficiency, as well as how to measure quality using performance indicators. Upon learning of the MSc QI/PS program I was confident that I had found an academic program that would provide me with a strong foundation for my future. I was very fortunate to be selected into the MSc QI/PS program in the 2013-2014 academic year, and it was an amazing experience. The program has played a major role in my early career, providing me with the expertise that I need as I educate my colleagues through various programs offered at C-QulPS as well as internationally through the Royal College of Physicians and Surgeons of Canada. Most importantly, it has helped me to be an effective mentor to residents and fellows as they pursue their own projects of interest in the field of Quality and Patient Safety. ”



**Eric Monteiro**

Physician, 2014 graduate



## CERTIFICATE IN QUALITY IMPROVEMENT AND PATIENT SAFETY

The **C-QulPS Certificate Course in Quality Improvement and Patient Safety**, our longest standing QI training program, grew out of a pilot program called the Quality Stars program initiated in the University of Toronto Department of Medicine over ten years ago. The Department's Chair at the time, Dr. Wendy Levinson, had the foresight to invest in capacity building as part of her overall strategy to advance QI in her academic department, and enlisted Drs. Chaim Bell, Edward Etchells and Kaveh Shojania to lead the program. With the establishment of C-QulPS (originally known as University of Toronto Centre for Patient Safety) in 2009, Quality Stars became the Certificate Course in Quality Improvement and Patient Safety, and the Course's first directors, Drs. Edward Etchells and Anne Matlow, expanded upon the Quality Stars program and established the Certificate Course as a premier advanced training program that was so highly regarded that it received the University of Toronto Office of Continuing Professional Development (CPD) Colin R. Woolf Award for Excellence in Course Coordination in 2010-11.

After a two-year hiatus during which time the Certificate Course leadership was engaged in establishing the Masters of Science with a Concentration in QI/PS in partnership with IHPME and launching a modified version of the course as a QI fellowship for clinical and managerial staff at St. Michael's Hospital, the Certificate Course was re-booted with new course directors Drs. Brian Wong and Trey Coffey at the helm. In 2016-2017, Dr. Alene Toulany (VAQS graduate) took Trey Coffey's place as co-director, and the program's leadership team expanded to include two associate directors, Drs. Olivia Ostrow (a previous graduate of the Certificate Course) and Eric Monteiro (a graduate of the IHPME MSc in QI/PS).

### CERTIFICATE COURSE OVERVIEW

#### SESSION TOPICS (2016-2017 ACADEMIC YEAR)

Introduction to Quality Improvement, Patient Safety and Resource Stewardship

QI Diagnostic Tools to Better Understanding your Problem

Plan-Do-Study-Act (PDSA) cycles

Run Charts and Control Charts

Leading Change

Measurement I—Quantitative Measurement

High Reliability Organisation and Safety Culture

Process Mapping and LEAN

Introduction to Human Factors (Engineering)

Human Factors Engineering—Usability Testing

Change Management

Measurement II—Qualitative Approaches

Teamwork, Communication and Handoffs

Patient Safety Incident Analysis

Patient Engagement in Quality Improvement & Patient Safety

Informatics in Patient Safety and Quality Improvement

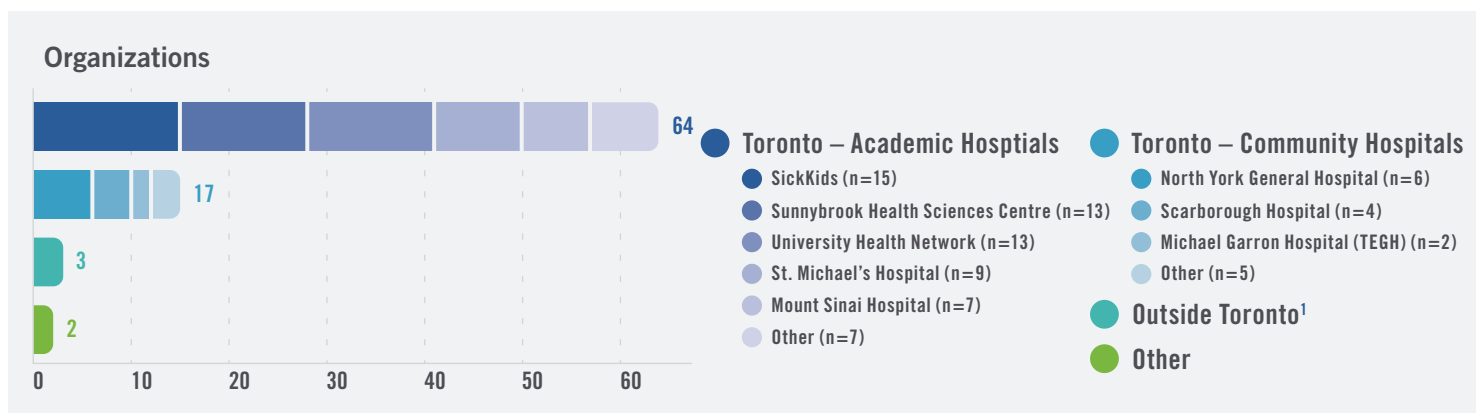
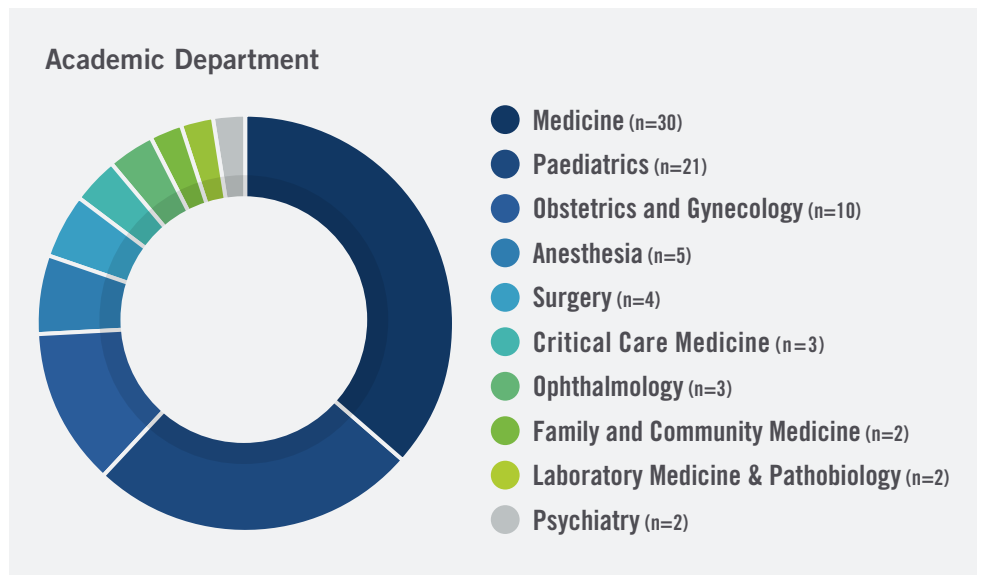
Health Policy and Quality Improvement

Teaching Quality Improvement



The current iteration of the Certificate Course provides participants from a range of professional backgrounds and at various career stages a broad overview of key QI/PS concepts, methods, and theories. Participants are often working or training in health care and interested in developing a more rigorous approach to applying QI/PS methods, or looking for an introduction to QI/PS as a way to explore a possible future career focused in QI/PS. The Course consists of approximately 20 half-day sessions led by the directors and guest lecturers that involve a mixture of didactic lectures, interactive workshop sessions, workplace-based exercises and presentations by class participants (see the table on the previous page for topics and Appendix E for 2016-17 syllabus).

Faculty bring their extensive experience in conducting QI/PS projects and research to the classroom, thus providing participants with relevant and practical examples. The participants undertake a QI project over the course of the program, which provides them an opportunity to be mentored as they apply the knowledge and skills gained to a QI initiative in their own work setting. The interprofessional nature of the program enables participants to gain insights into a wide range of QI/PS activities and perspectives, providing for a more comprehensive understanding of the scope of QI/PS work. Between 2012 and 2017, 96 individuals have graduated from the Certificate program.



<sup>1</sup> Outside Toronto includes St. Joseph's Healthcare Hamilton (1), The Ottawa Hospital (1), University at Buffalo (1)

## PAST PARTICIPANT VIGNETTES:



**Jessica Ng**

Quality Improvement Specialist,  
2015 graduate

Jessica Ng, at the time of her involvement in the Certificate Course, was the Manager for Infection Prevention & Control at Women's College Hospital. The skills that she developed as part of the course prepared her to take on a quality improvement and patient safety role at Trillium Health Partners. She subsequently transitioned to influence change at a provincial level, joining Health Quality Ontario as a Quality Improvement specialist, where she plays a key role liaising with system partners to standardize and improve care across sectors.

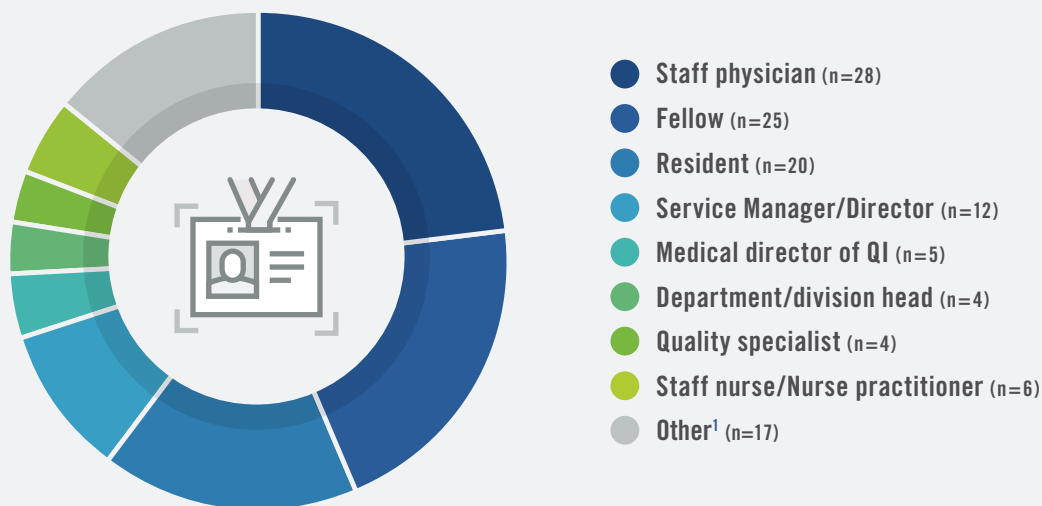
Emily Stairs developed her interest in QI as a frontline occupational therapist at Sunnybrook Health Sciences Centre. Wanting to build upon her experiences working collaboratively with other members of the interprofessional team to implement patient safety and quality improvement initiatives, she enrolled in the Certificate Course and developed enhanced leadership skills that led to new professional opportunities at her organization. Subsequent to completing the Certificate Course, she was hired as a Patient Safety Specialist at Sunnybrook Health Sciences Centre.



**Emily Stairs**

Patient Safety Specialist,  
2016 graduate

## Professional Background



<sup>1</sup> Other includes Analyst (2), IP& C coordinator (2), Lab technologist (2), Professional practice lead (2), Pharmacy (2), Respiratory Therapy (2), Social Work (2), Occupational Therapy (1), Registered Dietician (1), Speech Language Pathology (1)



**Yulia Lin**

Physician, 2015 graduate

Yulia Lin, a faculty member and staff hematologist, was already an accomplished patient safety champion in her field of Transfusion Medicine, but enrolled in the Certificate Course in order to elevate her work and introduce a more academic approach to promoting safe transfusion practices at Sunnybrook Health Sciences Centre. Since graduating from the certificate course, she has led province-wide initiatives to improve appropriate use of blood products, published her QI work in peer-reviewed journals, and advised Health Quality Ontario (HQP) on the development of quality metrics for transfusion medicine. Her work on improving appropriateness of blood transfusion was recently featured in HQO's "Spotlight on Leaders of Change" report. She was also named one of three Choosing Wisely Champions by the American Society of Hematology in 2017 to present on her project on improving appropriate transfusion practices in patients with iron deficiency anemia that she conducted as part of the C-QulPS Certificate Course.

David Borenstein, a practicing emergency medicine physician at Scarborough Hospital, learned QI 'on the job' and successfully standardized processes of care to improve efficiency and patient flow in the emergency department. Recognizing that a deeper understanding of QI would serve him well in his role as the Director of QI in the emergency department, he chose to enroll in the Certificate Course to formalize his skills. After completing the Certificate Course, he has continued to lead locally, and broadened his impact by successfully applying for the role of Clinical Quality Lead for the Central East Local Health Integration Network. He also serves as the new Chair of the Medical Eligibility Committee for the Ministry of Health and Long-Term Care.



**David Borenstein**

Physician, 2014 graduate



**Meiqi Guo**

Physician, 2015 graduate

Meiqi Guo participated in the Certificate Course as a 4th year resident in the Physical Medicine and Rehabilitation training program. Not only did she successfully lead and implement a QI project as part of the course (which garnered her top prize at the Canadian Association of Physical Medicine & Rehabilitation Annual Scientific meeting and a peer-reviewed publication in *BMJ Quality Improvement Reports*), her involvement in the course set her firmly on a path towards an academic career in QI. She recently completed her MSc in QI/PS and has recently accepted a faculty position at the University of Toronto as a Clinician in Quality and Innovation.

Lisa Allen was already a highly accomplished academic physician in the Department of Obstetrics and Gynecology and leader on the local, national and international stages before she enrolled in the Certificate Course. However, her participation in the Course afforded her the opportunity to shift gears at this established stage of her career and make quality improvement and patient safety a more deliberate focus. She successfully completed a QI project and graduated in June 2017, and has already started to bring together academic physicians with an interest in QI to collaborate on city-wide initiatives.



**Lisa Allen**

Physician, 2017 graduate

## CO-LEARNING CURRICULUM IN QUALITY IMPROVEMENT

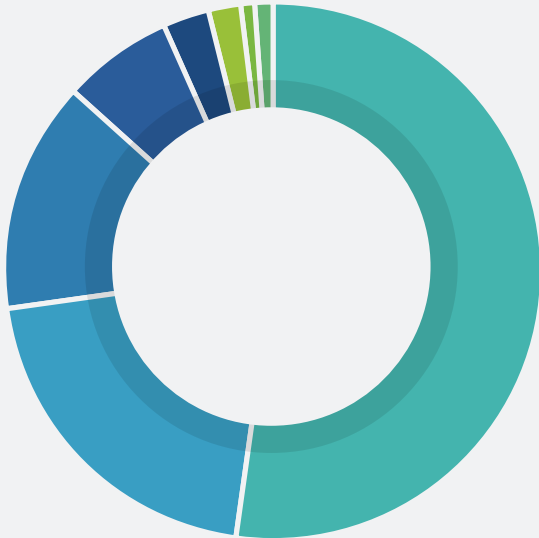
The **Co-Learning Curriculum in Quality Improvement** brings together residents and faculty as co-learners, addressing the dual need to teach QI to residents, while simultaneously building faculty capacity to supervise and teach QI. Based on positive participant feedback, the program saw rapid expansion from the initial three subspecialty pilot programs in the Department of Medicine in 2011-12 to over 35 training programs and over 200 residents across the Departments of Medicine, Paediatrics, Surgery and Laboratory Medicine & Pathobiology in 2016-17 (see figure on top of page 29 and Appendix F). The curriculum consists of two workshops, typically in September and January, and a final session in June that involves a keynote speaker and group project presentations. Each group of residents is expected to conduct a QI project supervised by their Co-Learning faculty. The Co-Learning Model has expanded beyond Toronto, being adopted by Western University, McMaster University and Virginia Tech University. Dr. Wong has also been invited to speak to national (e.g., Royal College of Physicians and Surgeons of Canada) and international audiences (e.g., Association of American Medical Colleges) to present on the Co-Learning faculty development model. In 2016, the Co-Learning program's novel approach to faculty development was recognized by the University of Toronto with a Helen P. Batty Faculty Development Award for Innovation in Program Development and Design.

## CO-LEARNING OUTCOMES

- Over the past six years, the Co-Learning Curriculum produced a cadre of 39 QI mentors and 21 QI teachers who contribute to the long-term sustainability of the curriculum; the teachers maintain an extremely high-level of teaching excellence that we have successfully maintained as the program has expanded (figure on next page).
- Projects arising from this curriculum have been presented as abstracts at provincial (n=6), national (n=19) and international (n=14) meetings.
- Six projects have received conference awards, including the President's Award at the Endocrine Society meeting, top QI award at the Canadian Hematology Society meeting, 1st place in the resident research competition at the Canadian Association of Physical Medicine and Rehabilitation (CAPMR) Annual Scientific meeting, best QI poster award at the Canadian Society of Hospital Medicine, the Garner King award for best QI project at the Canadian Critical Care Forum and best QI poster at the Intensive Care Society scientific meeting.
- Three projects published in peer-reviewed manuscripts (one project publication had an accompanying commentary that explicitly highlighted the fact that a resident-led project carried out as part of a QI curriculum led to an impactful finding that will influence practice change).



### Academic Department



- Obstetrics and Gynecology (n=3)
- Ophthalmology (n=7)
- Surgery (n=15)
- Paediatrics (n=22)
- Medicine (n=56)
- Otolaryngology (n=1)
- Family and Community Medicine (n=1)
- Laboratory Medicine & Pathobiology (n=2)

### Faculty Participant Characteristics

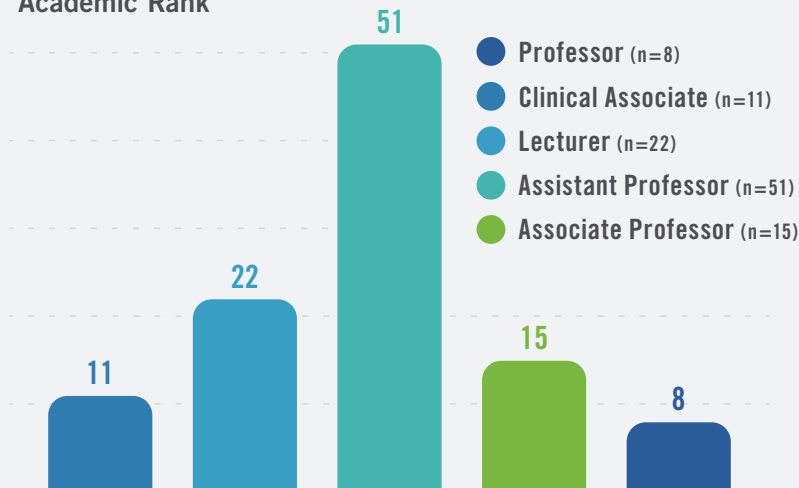


107

FACULTY PARTICIPANTS

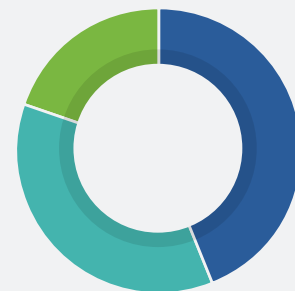


### Academic Rank



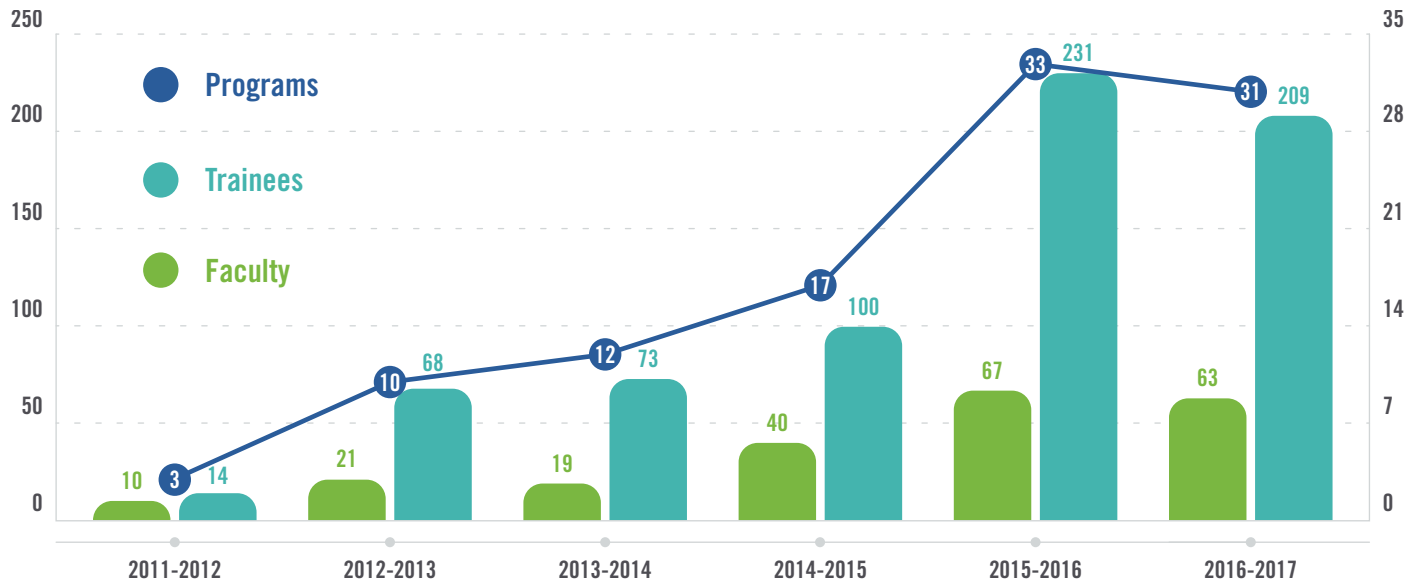
- Professor (n=8)
- Clinical Associate (n=11)
- Lecturer (n=22)
- Assistant Professor (n=51)
- Associate Professor (n=15)

### Curriculum Role

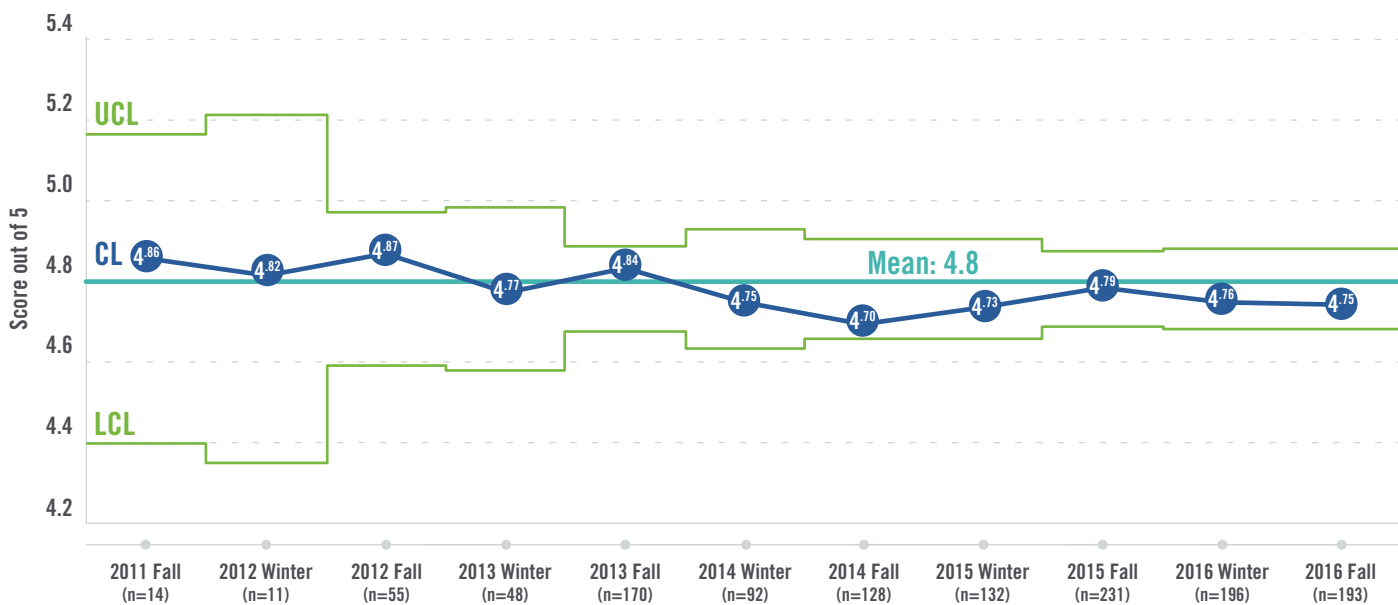


- Participant (n=47)
- Project mentorship (n=39)
- Project mentorship and teaching (n=21)

### GROWTH OF THE CO-LEARNING CURRICULUM IN QI FROM 2011-12 TO 2016-17



### SUSTAINED TEACHING EXCELLENCE OVER 6 YEARS OF THE CO-LEARNING CURRICULUM IN QI



The Co-Learning Curriculum in QI has developed teaching capacity among 16 additional faculty members over the past 6 years. This control chart tracks teacher effectiveness on a scale of 1 to 5 (where 1 = needs improvement, 3 = neutral, 5 = excellent) over the course of our 6 year course expansion. Over 5 years, the mean teaching effectiveness score was 4.8 out of 5 (calculated using over 1200 individual evaluations), and there is no special cause variation over the course of 6 years, which implies that QI teaching effectiveness was sustained as we expanded our teaching pool.

## QUALITY IMPROVEMENT WORKSHOPS

We offer one- and two-day workshops to individuals as well as groups from single department or organization interested in building local capacity in QI. These workshops provide an introduction to QI and aim to set a foundation for participants to engage in further QI activities in their workplaces. Over the past five years, we have provided workshops to groups both within and outside of Toronto.

### LOCAL ORGANIZATIONS:

- St. Michael's Hospital Nursing
- Temmy Latner Centre for Palliative Care, Mount Sinai Hospital
- Mental Health Program, University Health Network
- Perioperative Program and Department of Surgery, Sunnybrook Health Sciences Centre
- Department of Medicine, Trillium Health Partners
- Senior Friendly Hospital Accelerating Change Together In Ontario (SFH ACTION) (C-QulPS delivered the core QI training to nearly 500 participants stemming from 86 organizations across Ontario)

### US INSTITUTIONS:

- University at Buffalo
- St. Joseph Mercy Health System, Ann Arbor, MI

### TESTIMONIALS:

“ There is no doubt that a huge part of the success of our Senior Friendly Hospital ACTION program was due to the QI education delivered in-person by Brian Wong and the outstanding webinars led by members of the C-QulPS group. Throughout the program, we heard participants echoing pearls of wisdom from the QI education. It was the perfect balance of providing new information, facilitating application of the knowledge and coaching through to action. Members of the provincial collaborative keep asking for more! ”

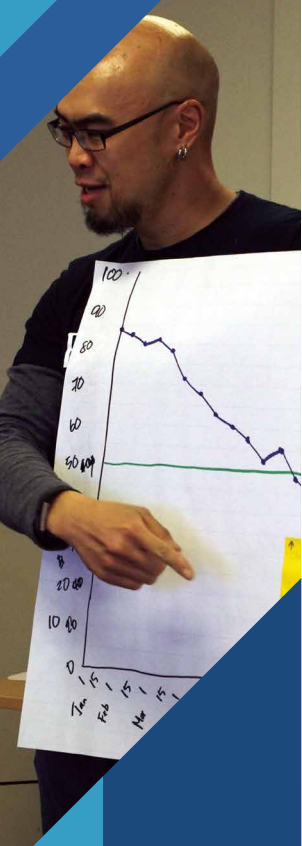
— **Dr. Barbara Liu**

Executive Director,  
Regional Geriatric Program of Toronto

“ We engaged C-QulPS to build skills of faculty for conducting projects with residents but participation transformed everyone into educated consumers of QI. Faculty are interpreting and challenging data on clinical outcomes and performance and making meaningful contributions to QI committees. The C-QulPS faculty's experience with clinical medicine, knowledge of adult learning styles, expertise in publication, and engaging personalities met the needs of a broad range of learners. ”

— **Dr. Roseanne C. Berger**

Sr. Associate Dean, Graduate Medical Education,  
University at Buffalo





## EXCELLENCE IN QUALITY IMPROVEMENT CERTIFICATE PROGRAM

The **Excellence in Quality Improvement Certificate Program (EQUIP)**, launched in August 2017, is our most recent education initiative. We developed this program due to the limited availability of rigorous QI training programs that address the increasing demand amongst Canadian and American academic clinicians seeking to more meaningfully integrate QI into their clinical work or scholarly activities, or faculty with operational roles in QI work wanting advanced skills to optimize their likelihood of success. The EQUIP program consists of five days of in-person training over the course of nine months with mentored project work and webcasts occurring over the course of

this period. Participants travelled to Toronto for three days in August 2017, and will be returning for a final two days in May 2018. Upon completion of the program, participants will be granted an academic certificate from the University of Toronto. The faculty team includes local experts recognized nationally and internationally for their scholarship and experience in QI/PS, as well as visiting faculty from the US. This program therefore provides not only an opportunity to strengthen QI/PS activity and scholarship within academic centres, but also to promote collaboration nationally and internationally. The first EQUIP program included 15 participants from 10 different institutions, including 4 local participants, 6 participants from other parts of Canada, and 5 participants from the United States (see Appendix G for Session Descriptions and Evaluations of the August 2017 Sessions).



## QI/PS EDUCATION BEYOND OUR CORE PROGRAMS

C-QulPS, its members, and graduates of our education programs, are involved in a variety of QI/PS education activities beyond the Centre's core QI/PS education programs. The examples noted below illuminate the interconnections and expanding networks of such activities.

C-QulPS became a **US Veterans Affairs Quality Scholar (VAQS) Program** site in 2011/12, the only Canadian site alongside eight sites across the United States. This Canadian VAQS site was funded initially by a grant held by Dr. Chaim Bell, and is now sustained through a combination of funding from C-QulPS along with tuition paid by participants. The VAQS two-year program provides a fellowship in QI for health care professionals in later stages of training or junior faculty interested in a career in QI. This program offers local participants the opportunity to network with other clinicians interested in QI at other sites in the US. Participants attend weekly meetings that alternate between an interactive videoconference session broadcast across the nine participating sites, and local in-person meetings that involve discussions of individuals' QI projects. Participants are also required to attend the VAQS Summer Institute and to publish their QI work in a peer-reviewed journal. Dr. Chaim Bell has led the program in Toronto, and in 2017, Dr. Rory McQuillan joined in a co-director role. Over the past five years, 24 participants have participated in the VAQS program.

**Members of our Centre and graduates of our training programs are well-recognized QI/PS educators, and through their participation with external organizations, lead or contribute to numerous QI/PS training programs. For example:**

- Dr. Ross Baker is co-lead of the Health Quality Ontario IDEAS program (Improving and Driving Excellence Across Sectors) funded by the Ontario Ministry of Health and Long-Term Care, which provides QI

education to teams of clinicians and managers engaged in improving care and care delivery in Ontario.

- Dr. Chris Hayes (former core member), while he served as the Medical Officer for the Canadian Patient Safety Institute (CPSI), helped to establish the **Patient Safety Education Program (PSEP)**, a two-day train-the-trainer program that has prepared hundreds of patient safety trainers across Canada. He, along with Dr. Amir Ginzburg and C-QulPS Associate Director Dr. Brian Wong, serve as PSEP Master Facilitators.
- Dr. Brian Wong is the course director for **ASPIRE program (Advancing Safety for Patients in Residency Education)** program, a national faculty development program organized by the Royal College of Physicians and Surgeons of Canada. Based on the CPSI PSEP, this four-day intensive program has trained nearly 200 medical educators on how to teach patient safety, quality improvement and resource stewardship in residency education. In 2016, Dr. Chris Hillis (IHPME MSc in QI/PS graduate) assumed the role of ASPIRE associate director, modified the program for an international audience, and delivered the pilot program at the University of Dammam, Saudi Arabia. C-QulPS members Amir Ginzburg, Chris Hayes, Alexander Lo, and Eric Monteiro are also ASPIRE faculty members.
- Dr. Trey Coffey has played a leadership role on the I-PASS Education Executive over the past few years. The mission of the I-PASS Study Group is to improve patient safety by standardizing provider communication, with a specific focus on improving transitions of care. Her education work through I-PASS led to the improvement of team communication practices both locally and internationally. Dr. Coffey has also played a key role in the development and implementation of the SickKids Crew Resource Management-based safety and error prevention curriculum that is being provided across the organization to 6,000 hospital staff.
- Many C-QulPS members and graduates of C-QulPS programs are now highly sought after speakers and

have been invited to deliver keynote presentations and grand rounds as visiting professors in other local, and national and international settings (e.g., Christine Soong was recently invited to deliver grand rounds for the Division of Hospital Medicine at Johns Hopkins University on her Choosing Wisely Canada work, Jerome Leis delivered a plenary presentation at the Association of Medical Microbiology and Infectious Disease (AMMI) Canada national meeting). Other C-QuIPS members organize workshops on QI topics at their National Specialty Society’s annual meetings (e.g., Rory McQuillan has organized a QI workshop at the Canadian Society of Nephrology annual meeting, Alexander Lo presented a concurrent session on QI at the Canadian Association of Physical Medicine & Rehabilitation Annual Meeting).

### SUMMARY: C-QUIPS CORE MEMBERS AND THEIR EDUCATIONAL CONTRIBUTIONS TO THE CENTRE

As is evident from this section, C-QuIPS organizes and supports a range of QI/PS education programs to address the diverse needs of learners from a variety of professional backgrounds. Our staff and core members play key leadership and supportive roles in the planning, implementation and evaluation of these programs; in many instances, individuals have roles in multiple programs. Our staff and core members represent both senior and more junior faculty, the later of whom have been mentored in their teaching roles by the former. In addition, the staff and core members represent a variety of professional and organizational backgrounds that enrich our education programs (e.g., different specialties within medicine, nursing, organizational change, human factors, research).

NAME (IN ALPHABETICAL ORDER)	C-QUIPS-RELATED EDUCATIONAL ACTIVITIES
<b>Ross Baker</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Program Lead</li> <li>➤ IDEAS Program—Program Co-Lead</li> <li>➤ C-QuIPS Annual Symposium/QIPS Forum—Workshop Presenter</li> </ul>
<b>Chaim Bell</b>	<ul style="list-style-type: none"> <li>➤ VAQS Program—Former Course Director (University of Toronto Site)</li> <li>➤ C-QuIPS Certificate Course—Former Course Co-Director</li> </ul>
<b>Trey Coffey</b>	<ul style="list-style-type: none"> <li>➤ C-QuIPS Certificate Course—Former Course Co-Director, now Speaker</li> <li>➤ EQUIP Certificate Course—Core Faculty</li> <li>➤ C-QuIPS Annual Symposium/QIPS Forum—Plenary Speaker and Workshop Presenter</li> <li>➤ QI Workshops—Speaker (Ann Arbor Michigan, University at Buffalo)</li> </ul>
<b>Edward Etchells</b>	<ul style="list-style-type: none"> <li>➤ C-QuIPS Certificate Course—Former Course Co-Director, now Speaker</li> <li>➤ EQUIP Certificate Course—Core Faculty</li> <li>➤ IHPME MSc in QI/PS—Speaker</li> </ul>
<b>Lianne Jeffs</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Speaker</li> <li>➤ C-QuIPS Certificate Course—Speaker</li> <li>➤ C-QuIPS Annual Symposium/QIPS Forum—Workshop Presenter</li> </ul>

NAME (IN ALPHABETICAL ORDER)	C-QUIPS-RELATED EDUCATIONAL ACTIVITIES
<b>Tara Kiran</b>	<ul style="list-style-type: none"> <li>➤ EQUIP Certificate Course—Core Faculty</li> <li>➤ QIPS Forum—Plenary Speaker</li> </ul>
<b>Martin Koyle</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Project Tutor Co-Learning Curriculum in QI—Faculty Lead (Paediatric &amp; Adult Urology)</li> </ul>
<b>Janice Kwan</b>	<ul style="list-style-type: none"> <li>➤ Postgraduate Core Internal Medicine Program—Patient Safety Curriculum Lead</li> </ul>
<b>Jerome Leis</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Speaker (Former Associate Course Director) IHPME Msc in QI/PS—Speaker and Project Tutor Co-Learning Curriculum in QI—Faculty Lead (Infectious Diseases Program) QI Workshops—Speaker (University of Toronto)</li> </ul>
<b>Alexander Lo</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Mentor Co-Learning Curriculum in QI—Faculty Lead (Physiatry) C-QulPS Annual Symposium/QIPS Forum—Workshop Presenter QI Workshops—Speaker (University of Toronto)</li> </ul>
<b>Anne Matlow</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Course Director (Concepts and Strategies in Patient Safety) C-QulPS Certificate Course—Former Co-Director</li> </ul>
<b>Conor McDonnell</b>	<ul style="list-style-type: none"> <li>➤ Hospital for Sick Children—Various Patient Safety Educational Activities</li> </ul>
<b>Rory McQuillan</b>	<ul style="list-style-type: none"> <li>➤ VAQS Program—Course Director C-QulPS Certificate Course—Mentor Co-Learning Curriculum in QI—Faculty Lead (Nephrology) QI Workshops—Speaker (University at Buffalo)</li> </ul>
<b>Eric Monteiro</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Associate Course Director EQUIP Certificate Course—Core Faculty Co-Learning Curriculum in QI—Faculty Lead (Otolaryngology)</li> </ul>
<b>Olivia Ostrow</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Associate Course Director EQUIP Certificate Course—Core Faculty Co-Learning Curriculum in QI—Faculty Lead (Paediatric Emergency Medicine) QIPS Forum—Workshop Presenter</li> </ul>
<b>Marie Pinard</b>	<ul style="list-style-type: none"> <li>➤ EQUIP Certificate Course—Core Faculty C-QulPS Certificate Course—Mentor</li> </ul>
<b>Gareth Seaward</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Project Tutor</li> </ul>

NAME (IN ALPHABETICAL ORDER)	C-QUIPS-RELATED EDUCATIONAL ACTIVITIES
<b>Kaveh Shojanian</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Course Co-Director (Concepts and Strategies in Patient Safety, Project Practicum)</li> <li>C-QulPS Certificate Course—Former Course Co-Director, now Speaker</li> <li>EQUIP Certificate Course—Co-Director</li> <li>QI Workshops—Speaker (Ann Arbor Michigan, University of Buffalo)</li> </ul>
<b>Sanjeev Sockalingam</b>	<ul style="list-style-type: none"> <li>➤ EQUIP Certificate Course—Core Faculty</li> <li>QI Workshops—Sponsor for the UHN Mental Health Program</li> </ul>
<b>Christine Soong</b>	<ul style="list-style-type: none"> <li>➤ EQUIP Certificate Course—Core Faculty</li> <li>Co-Learning Curriculum in QI—Faculty Lead (Internal Medicine)</li> <li>C-QulPS Certificate Course—Mentor</li> <li>IHPME MSc in QI/PS—Project Tutor</li> </ul>
<b>Alene Toulany</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Co-Director</li> <li>Co-Learning Curriculum in QI—Curriculum Lead, Department of Paediatrics</li> </ul>
<b>Patricia Trbovich</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Interim Program Lead</li> <li>C-QulPS Certificate Course—Speaker</li> <li>C-QulPS Annual Symposium/QIPS Forum—Workshop Presenter</li> </ul>
<b>Brian Wong</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Course Co-Director</li> <li>EQUIP Certificate Course—Course Co-Director</li> <li>Co-Learning Curriculum in QI—Program Director</li> <li>IHPME MSc in QI/PS—Course Director (Teaching QI)</li> <li>C-QulPS Annual Symposium/QIPS Forum—Plenary Speaker and Workshop Presenter</li> <li>QI Workshops—Speaker (University at Buffalo, Senior Friendly Hospital ACTION)</li> </ul>
<b>Tanya Agnihotri</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Program Coordinator (Former)</li> <li>EQUIP Certificate Course—Program Coordinator (Former)</li> <li>C-QulPS Annual Symposium/QIPS Forum—Operations Committee Member</li> </ul>
<b>Joanne Goldman</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Speaker (Qualitative Approaches)</li> </ul>
<b>Lisha Lo</b>	<ul style="list-style-type: none"> <li>➤ C-QulPS Certificate Course—Program Coordinator and Speaker</li> <li>QI Workshops—Speaker (Statistical Process Control)</li> <li>C-QulPS Annual Symposium/QIPS Forum—Steering Committee Member</li> </ul>
<b>Leahora Rotteau</b>	<ul style="list-style-type: none"> <li>➤ IHPME MSc in QI/PS—Speaker (Qualitative Approaches)</li> <li>C-QulPS Certificate Course—Speaker (Qualitative Approaches)</li> <li>QI Workshops—Speaker (University of Toronto, University at Buffalo)</li> <li>C-QulPS Annual Symposium/QIPS Forum—Steering Committee Member</li> </ul>

## ADVANCING THE FIELD OF QI EDUCATION

As discussed in more detail in the *Research* section of this report, C-QulPS staff and core members have conducted research that builds knowledge relating to the design and delivery of QI/PS education, positioning them as key contributors to policy and regulatory changes that advance the broader field of QI/PS education.

### BRIEF OVERVIEW OF THE PROGRAMME OF QI/PS EDUCATION RESEARCH AT C-QUIPS

In 2010, Dr. Brian Wong, along with Drs. Edward Etchells, Kaveh Shojania and other colleagues, published a systematic review of QI/PS education that summarized key content areas and typical formats of QI/PS curricula that targeted residents and medical students. Their follow-up qualitative study, which involved interviews of the organizers of the QI/PS curricula included in the systematic review, expanded upon their original review results by identifying key sustainability factors for QI/PS education. These research findings informed the design and delivery of our Centre's education activities, such as the incorporation of experiential projects in all our educational offerings, the strategic use of incentives that faculty members value in academic medicine to encourage their participation, and the eventual development of a 'co-learning' model to build faculty capacity for QI/PS education.

Throughout this work, we began to identify gaps in QI/PS education research, and turned our attention to rigorously evaluating our educational programs and disseminating our findings widely. For example, we have published two studies on the 'co-learning' curriculum. The first examined the pilot experience and described the feasibility and acceptability of a co-learning approach to faculty development in QI education. The second study was a more in-depth exploration of the co-learning model with a

focus on evaluating its effectiveness as a novel approach for building QI faculty capacity for QI project supervision and QI teaching. Core C-QulPS members (including Drs. Wong, Goldman, Shojania, Etchells and Sockalingham) have also published on opportunities for greater intersections across the fields of QI/PS and continuing professional development, underscoring the ways each field can inform and strengthen the other.

In 2016 we received a Royal College of Physicians and Surgeons of Canada Medical Education Research Grant (Dr. Joanne Goldman, the C-QulPS education scientist is the PI) for a study titled 'A case study of advanced QI/PS post-licensure education'. The research team involves core and affiliate C-QulPS members, as well as Faculty from St. Michael's Hospital, IHPME, and the Wilson Centre for Research in Education. This study directly focuses on the study of key QI/PS education programs led by C-QulPS faculty—Masters of Science at IHPME, the QI/PS Certificate course at C-QulPS, and the QI Fellowship program at St. Michael's Hospital—and represents a valuable opportunity to not only bring together C-QulPS faculty and members to collaborate on a research project, but also to continue to build upon C-QulPS' reputation in generating new knowledge about the practice of QI/PS education.

### ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF CANADA

C-QulPS staff and core members have played key roles advancing QI/PS through work at the Royal College, which oversees specialty residency training and maintenance of competence in Canada and defines training standards through its CanMEDS competency framework. Based on expertise demonstrated through the publication of the systematic review on QI/PS education, Dr. Brian Wong was invited to chair the CanMEDS 2015 Patient Safety & Quality Improvement Expert Working Group. The recommendations listed in the Group's report were instrumental in informing the eventual integration of QI/PS competencies throughout all seven CanMEDS roles in the updated CanMEDS 2015 framework.

The release of CanMEDS 2015 framework and broad acceptance of QI/PS as core physician competencies impacts the training of all physicians in Canada. However, there is an increasing recognition that, beyond the basic competencies required for all physicians, QI/PS have a specific scope of practice and distinct body of knowledge that only some experts possess. The comprehensive training required to attain this level of expertise is available in only a few centres across Canada, but national standards are lacking. Again, given C-QulPS' track record and strong reputation as a provider of multiple forms of advanced QI/PS training, Brian Wong was invited to chair the working group that successfully submitted a proposal to the Royal College to have Patient Safety & Quality Improvement recognized officially as an Area of Focused Competence in Canada. This designation, made official in May 2016, opened the door for physicians to pursue advanced QI/PS training and receive a Diploma through the Royal College.

While these regulatory changes have the potential to shift the field of QI/PS education, a number of challenges still exist. Perhaps one of the greatest hurdles is the potential for QI/PS to be handled as an 'add-on' topic that is not fully integrated into the day-to-day work of physicians. An additional challenge relates to the fact that many clinical learning environments do not support QI/PS education and do not invite learners to contribute to addressing important QI/PS concerns. Recognizing that overcoming these challenges would require a coordinated effort, the Royal College invited Brian Wong and Kaveh Shojania to lead the organization of a two-day consensus conference held in advance of the International Conference on Residency Education called "Building the Bridge to Quality: An Urgent call to all Educators". This conference included an international group of 115 educational and health system leaders, educators, frontline clinicians, learners and patients. Its main goal was the creation of a list of key recommendations framed as action statements that individuals and organizations could use to better integrate QI/PS education with clinical care to improve outcomes and experiences for patients and their families.

## CHOOSING WISELY CANADA

In recent years, the emphasis on QI/PS has expanded to include issues related to cost and value, and the stewardship of health care resources. Choosing Wisely Canada, a physician-led campaign established in 2014 modelled after the ABIM Foundation's original Choosing Wisely campaign, aims to help clinicians and patients engage in conversations about unnecessary tests and treatments, and make smart and effective care choices. One of the key campaign strategies is the explicit focus on advancing resource stewardship in medical education.

Brian Wong, serving as the Choosing Wisely Canada Medical Education lead, coordinates the overall medical education strategy, which combines top-down and bottom-up approaches to promoting education on resource stewardship in medical education.

The cornerstone of the bottom-up strategy is the STARS (Students and Trainees Advocating for Resource Stewardship) medical student campaign. Since 2015, students have been nominated from each of Canada's 17 medical schools to participate in Choosing Wisely Canada's leadership training program. Many of these students have gone on to launch or lead local campaigns at their respective medical schools. This initiative has been so successful that spin-off STARS programs are being implemented in the US and the Netherlands in 2017.

Much of the top-down strategy is being spearheaded by Dr. Chris Hillis (IHPME MSc in QI/PS graduate). Under his leadership, the Royal College, in partnership with the College of Family Physicians of Canada, created a series of educational toolkits to support program directors and medical educators to integrate resource stewardship into residency training. The initial phase of this initiative included three toolkits; the leads for the development of each of these toolkits are C-QulPS members, including Chris Hillis himself, Geetha Mukerji, Adina Weinerman and Jerome Leis.

# RESEARCH

Most University research centres and institutes focus on research, not education. And, core members of C-QuIPS have published many papers and obtained grants. For instance, as documented in the Centre's initials five-year review, the eight faculty who held leadership positions within C-QuIPS published 179 peer review articles related to patient safety or quality improvement from 2009 to 2013. Including all members of the Centre, the total number of publications was 405. Both numbers compared very favourably with similar centres in Canada (Ottawa and Calgary—85 and 96 publications, respectively at the time), the US (Northwestern University and Johns Hopkins—205 and 444, respectively), and the UK (Imperial College—405 publications in same period).

Our research productivity has continued in the years since our first five-year review. As shown in the figure in the Executive Summary (page 5), core members published 276 papers (Jan 2012-Aug 2017), and these papers have been cited 3,538 times, for a group h-index of 27 (a few individual members have much higher h-indices), with an average of 12 citations per paper.

The h-index of 27 means that 27 C-QuIPS publications have been cited at least 27 times. The i-10 index of 76 indicates that 76 papers published by C-QuIPS members have received 10 or more citations. The i-10 index will likely increase rapidly in the coming years, since, as the figure shows, many C-QuIPS publications have appeared in the last few years so have had relatively little time to be cited.

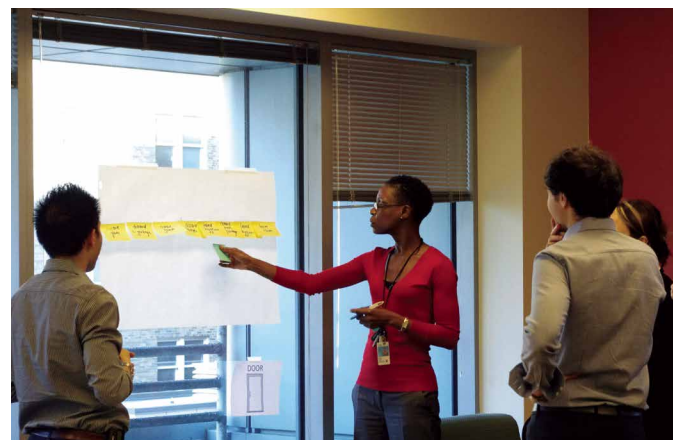
## PUBLICATION OUTPUT FOR C-QUIPS COMPARED WITH OTHER CENTRES

For our previous five-year review, we had compared our number of publications with the outputs of centres at the University of Calgary and the

University of Ottawa, as well Imperial College and Johns Hopkins University. The previous reviewers (Professor Charles Vincent from Imperial College in the US and Dr. Ward Flemons from the University of Calgary) stated:

“*The number of research publications by members of the Centre clearly place it ahead of other universities in Canada and comparable to high functioning centres whose focus is similar to C-QuIPS elsewhere across the world.*”

For this second five-year review, we chose as an extreme comparison the Armstrong Institute at Johns Hopkins, which received a \$10 million donation in 2011. We also chose the program at Northwestern University, which also receives greater financial resources than C-QuIPS, but shares the features of having offered a formal Master's program in QI/PS for several years. We also selected the University of Texas Houston-Memorial Hermann Center for Healthcare Quality and Safety as a comparable centre in terms of the size and structure.







2010

Funded for two major projects from CPSI totaling almost \$400,000

Published widely-cited systematic review of teaching QI in *Academic Medicine*

Wong BM, EtcHELLS EE, Kuper A, Levinson W, Shojania KG. Teaching quality improvement and patient safety to trainees: A systematic review. *Academic Medicine* 85:9;1425-1439.

2011

Editorship of *BMJ Quality & Safety*

In addition to Director as Editor-in-Chief, four core members have held associate editor roles, including with two holding such roles at present. In 2011, *BMJQS* had an impact factor under 2. It has increased every year since then and now, at 6.186 exceeds all QI/PS journals, as well as all health services research, and medical education journals.

*JAMA* publication on unintentional discontinuation of medications for chronic diseases with ICU or hospital admission

Bell CM et al. Association of ICU or hospital admission with unintentional discontinuation of medications for chronic diseases. *JAMA*. 2011

2012

Canadian study led by C-QuIPS members represents first ever national patient safety study in the international literature

Matlow AG, Baker GR, Flintoft V, Cochrane D, Coffey M, et al. Adverse events among children in Canadian hospitals: the Canadian Paediatric Adverse Events Study. *CMAJ*. 2012 Sep 18;184(13):E709-18.

Effectiveness of strategies for improving quality of diabetes care published in *Lancet*

Tricco AC, Ivers NM, Grimshaw JM, Moher D, Turner L, Galipeau J, Halperin I, Vachon B, Ramsay T, Manns B, Tonelli M, Shojania K. Effectiveness of quality improvement strategies on the management of diabetes: a systematic review and meta-analysis. *Lancet*. 2012

2013

Participate in update of *Making Health Care Safer* for US Agency for Healthcare Research and Quality

Shekelle PG, Pronovost PJ, Wachter RM, McDonald KM, Schoelles K, Dy SM, Shojania K, et al. The top patient safety strategies that can be encouraged for adoption now. *Ann Intern Med*. 2013 Mar 5;158(5 Pt 2):365-8.

179

QI/PS peer-reviewed publications in first 5 years



\$50M+

in grants 2012-2017

2014

C-QuIPS leads only Canadian site in I-PASS study and co-authors *NEJM* publication

Resident handoff bundle reduces preventable adverse events in multisite study. Stamer et al. Changes in Medical Errors after Implementation of a Handoff Program. *N Engl J Med* 2014; 371:1803-1812.

2015

NPSF "Free From Harm" report and accompanying commentary in *JAMA* co-led by C-QuIPS Director with Don Berwick

Gandhi TK, Berwick DM, Shojania KG. Patient Safety at the Crossroads. *JAMA*. 2016 May 3;315(17):1829-30

2016

First C-QuIPS team grant from the Royal College of Physicians and Surgeons of Canada

A case study of post-licensure quality improvement and patient safety education. Royal College of Physicians and Surgeons of Canada Medical Education Research Grant. PI: Goldman J. Co-I: Baker R, Bulmer B, Coffey M, Hayes C, Jeffs L, Kuper A, Rotteau L, Shojania K, Whitehead C, Wong B.

2017

*Academic Medicine* publishes evaluation of co-learning as an innovative faculty development model for QI

Wong BM, Goldman J, Goguen JM, Base C, Rotteau L, Van Melle E, Kuper A, Shojania KG. Faculty-resident "Co-learning": A longitudinal exploration of an innovative model for faculty development in quality improvement. *Academic Medicine*. 2017;92:1151-1159.

Second C-QuIPS team grant

High reliability organization in healthcare: Caring Safely at the Hospital for Sick Children. Physicians' Services Incorporated Foundation. PI: Maitreya Coffey, Co-I: Shojania K, Goldman J, Rowland P, Baker GR, et al.

276

QI/PS peer-reviewed publications 2012-2017

## NUMBERS OF MEMBERS AND PUBLICATIONS FOR C-QUIPS AND COMPARATOR CENTRES

CENTRE	MEMBERS	PUBMED PUBLICATIONS	PUBLICATIONS PER MEMBER
C-QulPS (Toronto)	25	276	11
University of Texas	10	179	18
Northwestern University	71	296	4
Johns Hopkins University	73	439	6

As shown in the table above, the total number of publications from the centre at Hopkins (439) far exceeds our total of (276), but we are not much behind the much larger centre at Northwestern (296), and our publications per member (11) exceeds that at either Northwestern (4) or Hopkins (6). (See Appendix H for the method for estimating total publications related to QI/PS for each centre).

### GROWTH OF THE RESEARCH PROGRAM AT C-QUIPS IN ITS SECOND FIVE-YEAR TERM

We regard the increased research productivity of C-QulPS as stemming in part from our strategy to focus on capacity building—equipping a cadre of clinicians with the skills to tackle quality problems and to write up their efforts in peer-reviewed journals for academic credit. We have over 40 new faculty in the explicit QI job description within the Department of Medicine alone (many of whom came through C-QulPS educational programs) and growing numbers in Paediatrics, Surgery, and other major Departments. This success has directly benefited many clinical departments and hospitals by providing clinicians able to lead improvement projects of internal interest as well as often external interest (e.g., to Health Quality Ontario and the Ministry of Health). But, we are also now reaping the benefits of the early investment in capacity building, as some of the recipients of this training now have substantial research programs. Moreover, these research programs have clear ties to C-QulPS.

The other way in which our research has grown involves studying our educational programs. Given our existing emphasis on capacity building in QI/PS through our

education programs in the first five years and continuing to the present, it seemed natural to study the successes of these programs and to investigate ways in which we could further optimize them. This intersection between QI and medical education involves some important research questions of general interest in the field. For instance, how does one evaluate the degree to which learners have acquired the desired skills in developing improvement interventions, implementing and evaluating them?

We do not usually bother asking these questions with clinical research training. There, even if one obtains a graduate degree, the proof is largely in the pudding. Has the person produced any decent papers or obtained a grant during or shortly after their graduate training in, say, clinical epidemiology? But, in QI, many first projects ‘fail’. It is messy work and projects can fail for multiple reasons—including technical issues related to the ideas behind the intervention, but also organizational changes beyond one’s control. These ‘failed improvement projects’ are even harder to publish than negative trials in clinical research. So, assessing the degree to which someone has achieved ‘competence in quality improvement methods and knowledge’ poses some interesting challenges. We cannot base our assessment of their skills acquisition on the success of their project. The fact that most improvement projects involve groups further compounds the evaluative challenge—how does one tell to what extent one person drove the project’s success or failure?

The development of a research program at the intersection of QI/PS and medical education flowed partly from our ongoing educational activities. But, it

also grew out of the dual interests of Dr. Brian Wong, one of the C-QulPS Associate Directors, in QI/PS and medical education. Dr. Wong started at C-QulPS doing a fellowship with Dr. Shojania focused on an externally funded patient safety project, but also with time for training in medical education. Between the Wilson Centre for Medical Education and the Ontario Institute for Studies in Education (OISE), Toronto has a critical mass of internationally renowned researchers in medical education. Given the amount and variety of educational work we carry out at C-QulPS, the interests of some of our core members in medical education, and the background expertise in this field at the UofT, research in QI/PS education naturally emerged as a strategic priority for the Centre. Moreover, the QI/PS education field is in the initial stages of development and there are numerous important research questions concerning learning processes and outcomes in need of exploration.

To further this strategic goal, we hired a full-time PhD researcher, Dr. Joanne Goldman, with a background in qualitative methods applied to medical education research. We initially hired her with the assistance of one of our core members, Dr. Lianne Jeffs (a nursing researcher at St. Michael's Hospital), who had funds for a post-doctoral position, but we now fund Dr. Goldman directly out of C-QulPS revenue from our educational activities. Working with Dr. Wong, Dr. Goldman successfully obtained a Royal College of Physicians and Surgeons of Canada medical education research grant for a study titled 'A case study of advanced QI/PS post-licensure education' (2016). This study serves not only to address some of the evaluative questions about our educational programs, but also fosters research collaborations among core C-QulPS members. This type of collaboration constituted our main goal after our first five years—the development of a research program intrinsic to C-QulPS, rather than just the collective sum of our individual research activities.

We have also decided to collaborate as a Centre around Dr. Trey Coffey's leadership of an organization-wide patient safety program involving high reliability organization principles at SickKids. This hospital initiative provides rich opportunities to build upon the literature on patient

safety and organizational change while also supporting the Centre's partnership with SickKids. In this pursuit, we were successful with our research grant application to Physicians Services Incorporated Foundation to undertake a qualitative study of the implementation of the Caring Safely program at SickKids.

To support our research programs at C-QulPS, we continue to strengthen our research capacity. As mentioned above, in 2015, we hired Dr. Joanne Goldman, with qualitative and social science research expertise in health professions education and practice, to collaborate with C-QulPS staff, especially working with Dr. Wong in advancing the Centre's research in QI/PS education. But, we also supported Leahora Rotteau, our program manager, in pursuing a PhD degree at the University of Toronto's Institute for Health Policy, Management and Evaluation (IHPME) in organizational research. She already played an active role in the Centre's research projects and supports C-QulPS members pursuing projects requiring qualitative research methods. Lisha Lo, our research and education coordinator, partakes in systematic review work (one of Dr. Shojania's longtime areas of research). Tanya Agnihotri, our administrative coordinator, is pursuing a Masters in Health Informatics, and supports data collection and analysis at the Centre. She recently took on a new role as a quality improvement specialist and project manager for Dr. Jerome Leis, one of our core members, in his role as Director of Infection Prevention and Control at Sunnybrook Health Sciences Centre and supports his work on a national project involving antibiotic stewardship supported by Choosing Wisely Canada and the Public Health Agency of Canada.

## GRANT FUNDING

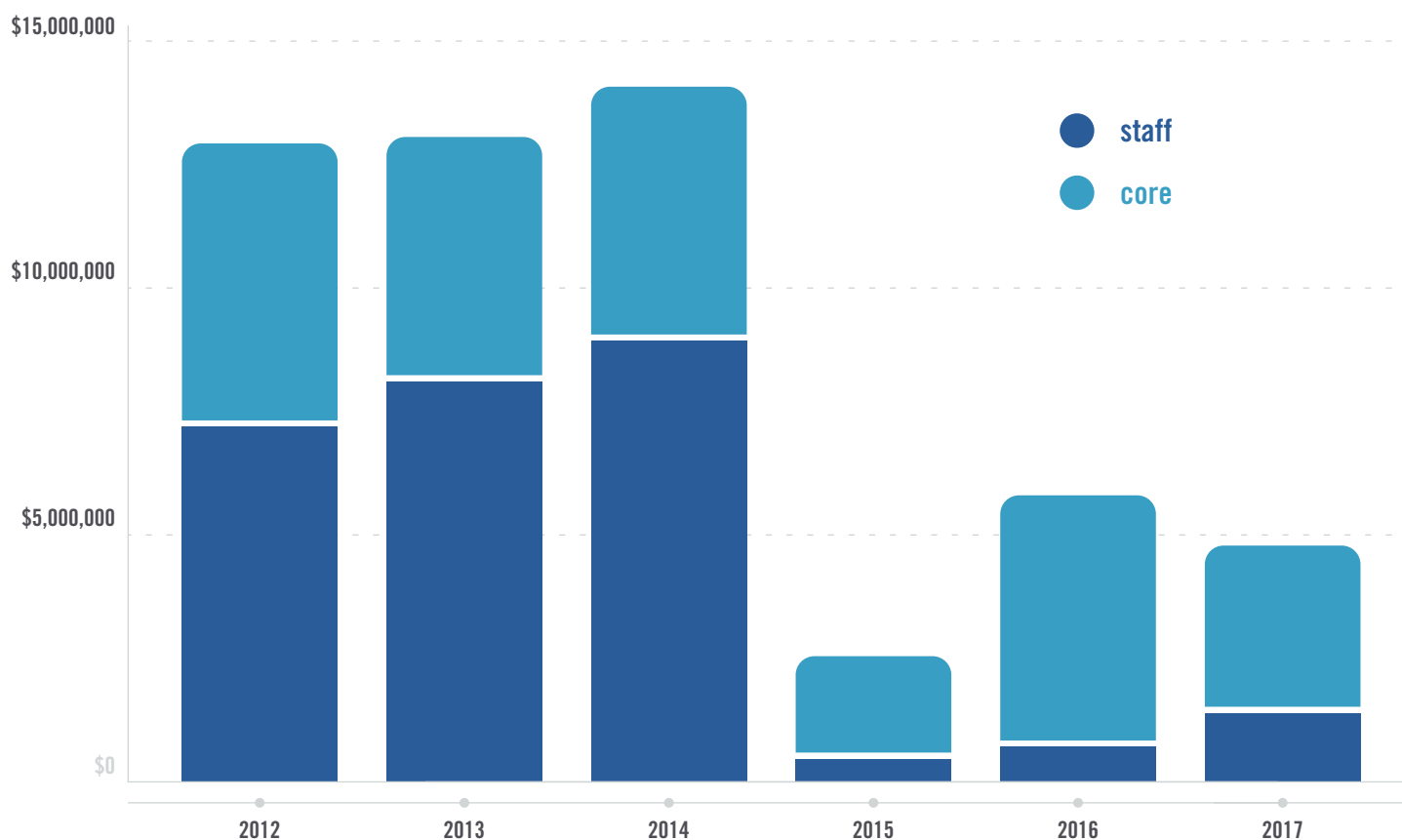
As mentioned previously, C-QulPS staff and core members have published 276 papers from 2012-2017. Over this time same period, C-QulPS staff received \$26.9M in research funding and core members received an additional \$25.9M (see Appendix I for full list of staff and core members grants received during this period).

Amounts of grants awarded to our comparator centres are not publicly available, so we could not compare our funding with other centres. But, the total amount would likely far exceed that of C-QulPS due to differences in the funding structure between Canada and the US. In Canada, funds from research grants do not cover physician salaries nor do they include indirect costs, hence the much lower amounts for most grants in Canada compared with counterparts in the US. The figure below displays research grant dollars each year, broken down by staff versus core members. Except in the case of a few grants to C-QulPS staff, funds were awarded to hospital-based research institutes, not to C-QulPS.

begin with a focus on Drs. Trey Coffey, Brian Wong and Jerome Leis to highlight three individuals whose successful research programs have largely grown out of their affiliations with C-QulPS over the past five years. During our first five years, Dr. Wong was a fellow, Dr. Coffey a junior faculty member with a few publications related to pragmatic improvement projects, and Dr. Leis still a medical resident. All three now have substantial improvement/research programs with national and international profiles. We then provide research profiles of our staff and core members. These individual summaries demonstrate the varied QI/PS research areas to which these individuals have contributed.

In the following sections, we provide details of the research of C-QulPS staff and core members. We

#### RESEARCH GRANTS OBTAINED BY STAFF AND CORE MEMBERS 2012-2017



## RESEARCH PROFILE

# TREY COFFEY, MD, FAAP, FRCPC

Dr. Trey Coffey participated in one of the first cohorts of the Certificate Course and proceeded to become immersed in the QI/PS communities at C-QuIPS and SickKids. After two years as a core faculty at C-QuIPS, she assumed the role of Associate Director (taking over from the inaugural C-QuIPS lead at SickKids, Dr. Anne Matlow), playing a key role in the partnership between SickKids and C-QuIPS.

## RESEARCH PROGRAM

Dr. Coffey's research program has centred around her passion for improving patient safety at the front lines of paediatric health care. Building upon her earlier research in medication reconciliation, over the past five years she has continued to expand her patient safety research program. Employing a variety of methods including qualitative, quantitative and mixed-methods, her research work ranges from single-centre efforts to international patient safety research collaboratives.

Through the Canadian Paediatric Adverse Events Study (CPAES), Dr. Coffey and colleagues demonstrated the utility of a validated trigger tool method for identification of adverse events and classification by degree of harm and level of preventability. This allowed them to publish the first ever national study documenting the burden of hospital-acquired harm in paediatrics (published in the *Canadian Medical Association Journal*). This study has played a significant role in building the case for investment in harm reduction in paediatrics.

Through a systematic review of research and policy initiatives regarding the disclosure of medical errors specific to paediatric patients, Dr. Coffey and colleagues illuminated the limited guidance for disclosing errors in the paediatric context, such as how to determine whether to disclose, who should be present, and when disclosure should



happen. Dr. Coffey and colleagues conducted a study to increase our understanding of parent preferences around disclosures and views on including children.

The findings reflected themes of hesitancy and complexity, where parents have a great need for reassurance and consistency, and wish to act as a buffer between the health care team and their children. These findings informed her collaboration on a study of a multispecialty disclosure curriculum, that aimed to incorporate these findings into education and practice.



**2008–2009** Certificate Course Participant

**2010–2012** Core Faculty Member

**2012–2016** Associate Director

**2012–2016** Certificate Course Co-Director

Further building upon the involvement of patients and families in patient safety research and practice, Dr. Coffey was involved in a prospective cohort study in four American paediatric centres to compare error and adverse event rates obtained from structured interviews with families during hospitalization versus from resident trainees at the end of call shifts versus routinely gathered incident reports. The findings demonstrated that families provide unique information about hospital safety and can play a key role in hospital safety surveillance.

In another instance of international collaboration, Dr. Coffey led the only Canadian site in the I-PASS study (published in the *New England Journal of Medicine*), which evaluated the impact of a resident handoff improvement program in nine hospitals across North America. The I-PASS Study Group received the prestigious 2016 John M. Eisenberg Award for Innovation in Patient Safety and Quality. Dr. Coffey's involvement with the I-PASS study has led to a number of subsequent research studies. She is leading a program of ancillary studies examining success factors and barriers to implementation across sites, end-user and change leader perspectives, and a social theory-guided analysis of uptake of structured communication in health care. Dr. Coffey is site co-principal investigator of a large multicentre study examining the effects of an intervention aimed at applying the principles of I-PASS to inpatient team and family communication; and she mentored four sites with the Society of Hospital Medicine's I-PASS Mentored Implementation Program, which is implementing and evaluating I-PASS in 32 centres across North America. Dr. Coffey has invested tremendous effort into disseminating the findings of the I-PASS study and advocating for practice changes. She recently wrote an editorial in *BMJ Quality and Safety* on a report of the implementation effort at Massachusetts General Hospital implementing I-PASS.

## ADVOCATE FOR RESEARCH INFORMED PRACTICE

In Dr. Coffey's roles of Medical Lead of the ambitious Caring Safely initiative at SickKids, and Associate Clinical Director of Children's Hospitals Solutions for Patient Safety, a network of 130 hospitals in the United States and Canada, she recognizes the importance of bringing a scholarly approach to organizational change initiatives. In a C-QulPS collaboration, Dr. Coffey and colleagues have been funded by the Physician Services Incorporated Foundation for a qualitative study to explore how hospital leaders, health care providers and family advisors, are interpreting and practicing 'Caring Safely'. The findings will identify the social processes and contextual factors that characterize organizational change for improving patient safety. In her Solutions for Patient Safety role, Dr. Coffey oversees 20 improvement streams that involve the testing and evaluation of improvement strategies and dissemination of findings through open access sharing platforms and peer-reviewed publications. In this role, she has tremendous opportunity to inform the research direction and impacts of an international organization dedicated to improving patient safety in paediatrics.

**TREY COFFEY****SIGNIFICANT PUBLICATIONS****CHANGES IN MEDICAL ERRORS AFTER IMPLEMENTATION OF A HANDOFF PROGRAM**

---

The I-PASS Study made an important contribution to the fields of patient safety and medical education, representing the first time a rigorously evaluated handoff program showed improvements in the hard outcome of actual patient safety events. For example, the methodology involved the use of proactive multimodal error surveillance and time-motion study to reduce reporting bias. The intervention was associated with a statistically and clinically significant reduction in errors and preventable harm. The widespread uptake of I-PASS has implications not only in terms of patient safety, but also for its relevance for the transition to competency-based medical education.

Starmer et al. Changes in Medical Errors after Implementation of a Handoff Program. *NEJM* 2014;371: 1803-1812.

**PARENT PREFERENCES FOR MEDICAL DISCLOSURE: A QUALITATIVE STUDY**

---

This innovative study incorporates parent perspectives of disclosure in a paediatric hospital setting. The findings inform both education and practice around disclosure with a paediatric population that is responsive to parent perspectives and experiences.

Coffey M, Espin S, Hahmann T, Clairman H, Lo L, Friedman JN, Matlow A. Parent preferences for medical disclosure: A qualitative study. *Hosp Pediatr*. 2017;7:24-30.

**RESIDENT EXPERIENCES WITH IMPLEMENTATION OF THE I-PASS HANDOFF BUNDLE**

---

This paper reports on a study that occurred simultaneously to the IPASS study reported above by providing important insights to the process of implementation amongst medical residents at eight hospitals. The findings provide valuable insights about the importance of patient type, context, and individual and team factors for the implementation and sustainability of I-PASS.

Coffey M et al. Resident experiences with implementation of the I-PASS Handoff Bundle. *J Grad Med Educ*. 2017;9:313-320.

## RESEARCH PROFILE

# JEROME LEIS, MD, MSC, FRCPC

Dr. Jerome Leis graduated from the Masters of Science in Quality Improvement and Patient Safety in 2013 and shortly afterwards joined the faculty of the Department of Medicine in the new Clinician in Quality and Innovation academic job description in the Division of Infectious Diseases. He works clinically at Sunnybrook Health Sciences Centre, where he also directs the Infection Prevention and Control Program. In the last three years, with mentorship from C-QulPS faculty, he has made immense progress working at the interfaces of clinical research and QI to develop new models of care that promote infection prevention and antimicrobial stewardship while safely using less health care resources. His passion for doing rigorous QI work has not only benefited the field of infection control (he is already a sought-after speaker at conferences nationally in infectious Diseases and in Infection Control), but several of his QI projects have become teaching examples in our various educational activities. A recent article he published on authentic use of Plan-Do-Study-Act (PDSA) cycles (based on a successful project he published in *JAMA Internal Medicine*) will likely become a standard reference for learners in quality improvement.

2. Eliminating unnecessary urine cultures that prompt antimicrobial therapy for asymptomatic bacteriuria;
3. Safely promoting the use of beta-lactam antibiotics among patients with reported allergies; and
4. Improving hand hygiene to prevent transmission of antibiotic resistant organisms.

For each of these topic areas, Dr. Leis has systematically used a combination of rigorous and sequential QI and research methods to understand current practices, implement interventions, and effect practice changes.



As a case in point, in the area of urinary catheter maintenance, Dr. Leis led the following series of QI and research activities: a review of the literature highlighting the need

for better models of care that promote daily reassessment of urinary catheter maintenance; a point prevalence study that confirmed that 50% of catheter-days at his hospital occurred without appropriate indication; a validation of an automated source to measure urinary catheter use; a series of PDSA cycles which

## RESEARCH PROGRAMS

Dr. Leis's QI activities focused on four general areas:

1. Reducing urinary catheter usage to prevent health care associated urinary tract infection;



2012–2013	Masters Participant
2013–Present	Core Faculty Member
2015–2017	Certificate Course Faculty



led to the iterative development of a medical directive for nurses to remove urinary catheters for patients who lack pre-specified indications for catheterization; piloting of the medical directive in a controlled before-after-study; training of nurses on all medical units to use the medical directive; adaptation of the medical directive for surgical patients; and finally participation in a national point prevalence study of urinary catheter use which showed that hospitals that have active systems for removing unnecessary urinary catheters have lower utilization.

### FROM RESEARCH TO PRACTICE

Dr. Leis's research in the four general topic areas has not only informed change at his own organization, but has had national and international impacts through dissemination in high-impact journals and adoption by other health care organizations. For example, the evaluation of new systems for processing and reporting urine cultures to reduce unnecessary treatment of asymptomatic bacteriuria has been studied across multiple patient areas including inpatient wards, ambulatory pre-operative clinics, and the emergency department with many new systems spread across Canada. Following his assessment of the impact of reported beta-lactam allergies in a multicentre observational study, the use of point-of-care beta-lactam allergy skin testing was implemented and resulted in improved antimicrobial utilization in a multicentre evaluation. This intervention also gained recognition with second place for a national Innovation award at the 2016 Association for Medical Microbiology and Infectious Diseases Canada Annual Conference. It has been adopted across at least five hospitals in the Greater Toronto Area with multiple requests received across North America to implement a similar intervention.

### DISSEMINATION ACTIVITIES

Dr. Leis' commitment to advancing research and scholarship in QI is apparent by his peer-reviewed publications related to QI in high-impact journals. In addition, he has published papers aimed at advancing the field of QI/PS. For example, he was a co-author on an

international white paper that elaborated on the Standards for QQuality Improvement Reporting Excellence (SQUIRE) guidelines. He was also the principal author on a narrative review on how to execute PDSA cycles. This article caught the attention of the broader quality improvement community on social media including tweets from Health Quality Ontario (HQO) and the Institute for Healthcare Improvement (IHI), putting it in the top 5% of all research outputs as scored by Altimetric (measurement of online research activity).

Over the past three years, Dr. Leis has rigorously evaluated models of care with dissemination of results, including three international abstracts, nine national abstracts, and 27 peer-reviewed manuscripts (10 principal-author, nine senior-author), including three that were accompanied by editorials and four with media press releases. Three different studies have been featured in *NEJM Journal Watch*, including one that was ranked in the Top 10 manuscripts published in the field of Infectious Diseases in 2016, and six of his publications on quality improvement have appeared in *Clinical Infectious Diseases*, traditionally regarded as the top journal in Infection Disease (impact factor of 8.2). Despite finishing his training and joining the faculty just three years ago, Dr. Leis' work has already been cited over 200 times and has been referred to at multiple international conferences, including the Society of Healthcare Epidemiology (SHEA) conference in May 2016 and the Infectious Diseases Society of America (IDWeek) in October 2016.

Dr. Leis' impactful QI and research activities have resulted in numerous awards, amongst them the IHPME 2016 Innovation Award given for "demonstrated creativity or ground-breaking new thought with the potential to impact the health care system".

**JEROME LEIS****SIGNIFICANT PUBLICATIONS****ELIMINATION OF SCREENING URINE CULTURES PRIOR TO ELECTIVE JOINT ARTHROPLASTY**

---

This time series analysis of a system-change regarding the ordering of screening urine cultures prior to elective joint arthroplasty surgeries resulted in a 99% reduction in urine cultures processed and a measured decrease in antibiotic prescriptions for asymptomatic bacteriuria without any significant increase in prosthetic joint infections. Its publication in *Clinical Infectious Diseases* was reported on by the *NEJM Journal Watch* who commented that “elimination of this practice might well result in considerable cost savings and decreases in antimicrobial resistance and acquisition of *Clostridium difficile* infection.”

Lamb MJ, Baillie L, Pajak D, Flynn J, Bansal V, Simor A, Vearncombe M, Walker SA, Clark S, Gollish J, **Leis JA**. Elimination of screening urine cultures prior to elective joint arthroplasty. *Clin Infect Dis*. 2017;64:806-809.

**IMPACT OF REPORTED BETA-LACTAM ALLERGY ON INPATIENT OUTCOMES: A MULTICENTER PROSPECTIVE COHORT STUDY**

---

This prospective, multicentre cohort study described the burden and clinical impact of reported beta-lactam allergy and showed that patients with conditions for which a beta-lactam constituted first-line therapy who received alternate therapy due to the reported allergy had a threefold increased odds of adverse events compared with those who received the preferred beta-lactam therapy despite their allergy. This study was accompanied by a laudatory editorial and featured in *NEJM Journal Watch*, which

ranked it in the top 10 studies published in Infectious Diseases (ID) in 2016. Of note, this study involved the faculty and trainees from ID in the Faculty-Resident Co-Learning Curriculum.

MacFadden DR, LaDelfa A, Leen J, Gold WL, Daneman N, Weber E, Al-Busaidi I, Petrescu D, Saltzman I, Devlin M, Andany N, **Leis JA**. Impact of Reported Beta-Lactam Allergy on Inpatient Outcomes: A Multicenter Prospective Cohort Study. *Clin Infect Dis*. 2016 63:904-010.

**DO PHYSICIANS CLEAN THEIR HANDS? INSIGHTS FROM A COVERT OBSERVATIONAL STUDY**

---

Although there have been other covert observational studies on hand hygiene, this is the first study to demonstrate that the change in behavior that occurs when health care providers know they are being audited (known as the Hawthorne effect) is not uniform and may vary between clinical services and provider types. This study highlighted the inherent flaws in the way we measure hand hygiene in hospitals across the world, and points to the need for better monitoring systems. Its publication was associated with significant media attention including an article published in the *National Post* and has raised the interest of Health Quality Ontario in developing new and more reliable measures for this important reported hospital patient safety indicator.

Kovacs-Litman A, Wong K, **Shojania KG**, Callery S, Vearncombe M, **Leis JA**. Do physicians clean their hands? Insights from a covert observational study. *J Hosp Med*. 2016;11:862-864.

## RESEARCH PROFILE

**BRIAN M. WONG, MD, FRCPC**

Brian Wong established his research expertise as the first research fellow at C-QulPS in 2008 under the supervision of Drs. Kaveh Shojania and Edward Etchells. During this fellowship, he developed skills in both quantitative and qualitative methodologies, and has applied these to the following three programs of research:

1. Research on quality improvement and patient safety (QIPS) education;
2. Research on the intersection between QIPS education and practice; and
3. Research on QI/PS in the hospital setting.

Through his research collaborations locally, nationally and internationally, he has quickly become a productive QI/PS researcher at C-QulPS. He has 60 peer-reviewed publications (h-index = 14 as of June 2017) in high-impact journals such as *BMJ Quality and Safety*, *JAMA Internal Medicine*, and *Academic Medicine*. He has held nearly one million dollars in peer-reviewed grants from funding agencies that include the Canadian Institutes of Health Research (CIHR), the Canadian Patient Safety Institute (CPSI), the Royal College of Physicians and Surgeons of Canada (RCPSC), the American Board of Internal Medicine Foundation (ABIM-F) and the Josiah Macy, Jr. Foundation. He is a member of the *Academic Medicine* editorial board and recently stepped down as associate editor for the *Journal of Graduate Medical Education*. In recognition

of his accomplishments in QI/PS education research, he received the New Investigator Award from the Canadian Society of Internal Medicine, and the Young Educators Award from the Association of Faculties of Medicine in Canada.

## RESEARCH PROGRAM

## RESEARCH ON QI/PS EDUCATION



As Dr. Wong set out to implement a QI/PS curriculum in the Department of Medicine, he recognized the limited evidence to inform this education

planning. Consequently, he led a series of studies to expand the existing evidence base surrounding QI/PS education. These include a systematic review of QI/PS curricula involving residents and students, a qualitative study exploring factors that affect the sustainability of QI/PS training in graduate medical



<b>2008–2010</b>	Research Fellow
<b>2010–2013</b>	Core Faculty Member
<b>2012–Present</b>	Certificate Course Co-Director
<b>2013–Present</b>	Associate Director

education, an evaluation of Co-Learning as an innovative faculty development model for QI education, and most recently, a case study of three models of advanced QI/PS education. This program of research has informed national training standards in Canada, with the explicit integration of QI/PS as core competencies within the Royal College CanMEDS 2015 framework.

### **RESEARCH ON THE INTERSECTION OF QI/PS AND EDUCATION**

His dual interests in QI/PS and medical education contributed to establishing Dr. Wong's research on issues and topics that lie at intersection of these overlapping fields. Examples include research on error disclosure, resident duty hours, the impact of computerized physician order entry on medical education, and patient handover.

### **RESEARCH ON QIPS IN THE HOSPITAL SETTING**

Over the past five years, Dr. Wong has also continued to build upon his earlier work on QI/PS in the hospital setting that centred on improving hospital-based communication systems to reduce paging errors. As principal investigator on a CPSI-funded study, he led a study to evaluate the utility of a near-real time trigger tool to identify targets for patient safety improvement activities, and was lauded by prominent patient safety researcher Dr. Eric Thomas in an accompanying editorial that called for others to build on this research to “expand, evaluate and improve prospective clinical surveillance to measure patient safety”. Other research collaborations have centred on studying the quality of code status documentation in the hospital setting, reducing unnecessary urinary catheter use in hospital, and a multisite randomized trial of an interdisciplinary transition care model (i.e., Virtual Ward) to prevent hospital readmissions.

### **RESEARCH SUPERVISION ACTIVITIES**

Over the past five years, Dr. Wong has directly supervised nearly 20 resident and medical student patient safety and quality improvement projects at the undergraduate, postgraduate, and graduate levels. A number of these former trainees have themselves gone on to make QI/PS their primary academic focus. Their projects have been presented at national and international meetings as oral and poster presentations, with several winning conference awards for best presentation or poster. More recently, three of these trainee studies have been published in peer-reviewed journals, with an additional four case reports published in *JAMA Internal Medicine*.

**BRIAN M. WONG****SIGNIFICANT PUBLICATIONS****TEACHING QUALITY OF CARE AND PATIENT SAFETY TO TRAINEES: A SYSTEMATIC REVIEW**

This systematic review of 41 quality improvement and patient safety curricula that targeted residents and/or medical students informed an emerging need to teach future physicians quality improvement and patient safety concepts and skills, as demonstrated by it having been cited nearly 237 times as of Sept 2017.

**Wong BM, Etmells EE, Kuper A, Levinson W, Shojania KG.** Teaching quality of care and patient safety to trainees: A systematic review. *Acad Med.* 2010;85:1425-39.

**FACULTY-RESIDENT “CO-LEARNING”: A LONGITUDINAL EXPLORATION OF AN INNOVATIVE MODEL FOR FACULTY DEVELOPMENT IN QUALITY IMPROVEMENT**

This paper reports on co-learning as a novel approach for building QI faculty capacity, an important area of investigation given that the limited availability of faculty with expertise in QI/PS is a widespread challenge in QI education. The findings of this study demonstrate that co-learning was effective in improving faculty QI knowledge and skills and increased faculty capacity to teach and mentor QI. However, a combination of curriculum and contextual factors were critical to realizing the curriculum’s full potential. This publication is timely given the interest of other medical schools in adopting the co-learning model.

**Wong BM, Goldman J, Goguen J, Base C, Rotteau L, van Melle E, Kuper A, Shojania KG.** Faculty-resident “co-learning”: a longitudinal exploration of an innovative model for faculty development in quality improvement. *Acad Med* 2017;92:1151-1159.

**MORNING HANDOVER OF ON-CALL ISSUES: OPPORTUNITIES FOR IMPROVEMENT**

This study was one of the first to study the handover that occurs when the on-call resident is communicating overnight issues back to the daytime team. The findings demonstrated that approximately 40% of overnight issues were not verbally discussed in the morning, and nearly 85% of on-call issues were not documented by the on-call resident in the medical record. The paper had an accompanying commentary written by one of the associate editors and the results generated interest for the general public and were featured in a *Reuters Health* news article in July 2014.

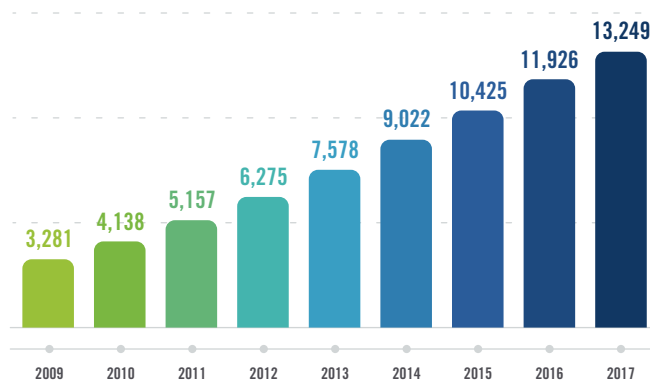
Devlin MK, Kozij NK, Kiss A, Richardson L, **Wong BM.** Morning handover of on-call issues: opportunities for improvement. *JAMA Intern Med.* 2014;174:1479-1485.

## STAFF AND CORE MEMBERS RESEARCH SUMMARIES

## C-QUIPS STAFF

**KAVEH SHOJANIA, MD****DIRECTOR**

Dr. Kaveh Shojania's research focuses on identifying evidence-based patient safety interventions and effective strategies for translating evidence into practice. He has more than 150 publications indexed in Medline, including papers in leading journals such as *The New England Journal of Medicine (NEJM)*, *The Lancet* and *the Journal of the American Medical Association (JAMA)*.

**CUMULATIVE CITATIONS TO DR. KAVEH SHOJANIA'S PUBLISHED WORK BY YEAR**

On returning to Canada in 2004, Dr. Shojania held a Canada Research Chair in Patient Safety and Quality Improvement from 2004 to 2013. In 2015, the US National Patient Safety Foundation (NPSF) convened an expert panel, including members of the original Institute of Medicine panel which wrote *To Err is*

*Human*, to summarize the state of the field after 15 years of activity and develop recommendations for further advancing patient safety. Dr. Shojania co-chaired the expert panel and writing of the resulting report with Dr. Donald Berwick, founder of the Institute for Healthcare Improvement and widely regarded as one of the most influential figures in the field of quality improvement. A commentary they wrote (with Dr. Tejal Gandhi, head of the NPSF) in *JAMA* summarized the main recommendations from the full NPSF report.

In 2001, while at the University of California, Dr. Shojania led a team from 10 academic institutions across the US to produce *Making Health Care Safer*, a comprehensive report for the US Agency for Healthcare Research (AHRQ) and Quality that synthesizes the evidence supporting more than 75 practices to patient safety. Highlights of the report appeared in *JAMA*, and more than 140,000 copies of the report have been obtained since its release. An update of this work was produced in 2013 with many of the associated articles published in a special supplement issue of *Annals of Internal Medicine*.

Following that major early work on evidence synthesis in patient safety for the US AHRQ, Dr. Shojania's research has continued to include systematic reviews and meta-analyses on a wide variety of topics. These include diagnostic errors

detected at autopsy (published in *JAMA*), the impacts of quality improvement strategies for diabetes (published in *JAMA* and *The Lancet*) and the effectiveness of medication reconciliation (published in *Annals of Internal Medicine*).

Dr. Shojania has also led educational initiatives in patient safety. He helped edit a series of 13 case-based articles on health care quality in *Annals of Internal Medicine* and produced a website ([www.PSNet.ahrq.gov](http://www.PSNet.ahrq.gov)) for the US AHRQ, which highlights new research and educational materials related to patient safety each week. The site receives about 100,000 visits per month. In addition, he has authored a book on patient safety *“Internal Bleeding: the Truth Behind America’s Terrifying Epidemic of Medical Mistakes”* (co-authored with Dr. Robert Wachter), which received excellent reviews in the *New York Times*, *San Francisco Chronicle*, *Baltimore Sun*, *British Medical Journal* and *JAMA*. For this and other work, Drs. Shojania and Wachter received one of the John M. Eisenberg Patient Safety Awards in 2004 from the US Joint Commission and the National Quality Forum.

Dr. Shojania began his career focused primarily on assessing the degree to which “off the shelf” QI interventions produce their intended results—e.g., does case management really improve glycemic control in patients with diabetes? Do rapid response teams really reduce in-hospital mortality? What are the typical effect sizes achieved by computerized reminders and decision support? However, when he became Director of C-QuIPS in 2009, he became more interested in the modification of “off the shelf” strategies and the development of de novo interventions to achieve optimal impact given local contextual factors. He realized that, for hospitals and clinics to develop and test such interventions, they needed not just QI scientists, but also clinicians with some knowledge of the methods of QI. Clinicians with such training could either develop their own QI interventions in their practice settings (sometimes

obtaining input from improvement scientists) or help improvement scientists refine larger, more traditional research initiatives.

Around this time, Dr. Shojania noticed the emergence of a few faculty members at different institutions who had found themselves in this very position. They were not “Big R” researchers in QI, but led projects that required scholarly application of results from the literature to their local settings. He wrote a commentary on this new academic pathway in the *Journal of the American Medical Association* with the then-Chair of the Department of Medicine, Dr. Wendy Levinson [Shojania KG, Levinson W. Clinicians in quality improvement: A new career pathway in academic medicine. *JAMA*. 2009]. Locally, he then led the development of a new job description in the Department of Medicine (Clinicians in Quality and Innovation), beginning with six such faculty members in 2012 and now having over 40.

To help develop these sorts of faculty members—clinicians with some training in the methods of developing and evaluating QI interventions—Dr. Shojania worked with other C-QuIPS members (Drs. Ed Etchells, Anne Matlow and Chaim Bell) to create the University of Toronto Certificate Course in Quality Improvement and Patient Safety, various one- and two-day workshops, and a new Master’s degree in Quality Improvement and Patient Safety at the University of Toronto Institute for Health Policy, Management and Evaluation. Thus, while Dr. Shojania continues to do some research (including in evidence synthesis, as before, but more recently in quality improvement related to infection control, with Dr. Jerome Leis, one of his former mentees), much of his academic work now focuses on optimal ways to develop and mentor academic physicians working in quality improvement. Dr. Shojania’s other academic focus in recent years has involved advancing the standards for research in QI. In the years following the influential US Institute of Medicine Report, *To Err is Human*, many leaders

in the field initially resisted applying the same evidence standards to promising patient safety and quality improvement interventions as to traditional clinical therapies. Dr. Shojania previously made important contributions to changing this attitude through his research itself, including many of the evidence syntheses outlined above, as well as commentaries published in influential journals [e.g., Shojania KG et al. Safe but sound: patient safety meets evidence-based medicine *JAMA* 2002 and Auerbach AD, Landefeld C, Shojania KG. The tension between needing to improve care and knowing how to do it. *N Engl J Med* 2007]. But, more recently, Dr. Shojania's interest in advancing the science of

QI has focused on his work as editor-in-chief of *BMJ Quality and Safety*. When he started as Editor (in 2011), the journal had an impact factor under 2. It has increased every year since then and now, with an impact factor of 6.186, *BMJ Quality and Safety* is the highest impact journal in the field of health care quality, as well as the broader fields of health services research and health policy. (This impact factor now exceeds all 50 of the journals Thomson Reuters Indexes as health services research, health policy, medical education—this constitutes almost all the journals that are not clinically based or basic science related.)



## ROSS BAKER, PHD

### DIRECTOR OF GRADUATE STUDIES

Dr. Baker is an organizational sociologist and professor at the University of Toronto Institute for Health Policy, Management and Evaluation (IHPME). His distinguished research career has been recognized through many awards and membership in the Canadian Academy of Health Sciences (Canada's equivalent to the National Academy of Sciences in the US). Briefly, his research in quality improvement and patient safety includes leading the Canadian Adverse Event Study with Dr. Peter Norton, for which they jointly received the Canadian Health Services Research Advancement Award from the Canadian Health Services Research Foundation. Modelled on the Harvard Medical Practice Study, the methods of the Canadian study have been referenced in national adverse event studies carried out in various countries in the wake of the widespread interest in patient safety beginning in the early 2000s.

Dr. Baker maintains an active research program focused on organizational and system strategies to improve performance, governance and leadership in patient safety and quality improvement more generally. His book, *High Performing Healthcare Organizations: Delivering Quality by Design*, and reports based on the book's case studies have been cited by leaders and researchers in England, the US, Sweden and Canada and noted as a key influence in the development of the Ontario Excellent Care for All legislation. Several years later, Dr. Baker co-led with Dr. Anne Matlow a CIHR funded national study of adverse events in the paediatric hospitals and then several studies in home care settings. More recently, working with colleagues from Montreal, London (England) and Toronto, he has carried out case studies of patient engagement strategies in organizations in four countries. Dr. Baker's research also examines the development of effective



integrated systems of care for patients with chronic disease and multi-morbidity, and, in particular the leadership and organizational issues in developing such systems.

Dr. Baker has been an award-winning teacher in graduate studies at the IHPME for many years. But, more recently, he has developed and led major educational initiatives in QI/PS. He is the Program Lead of the Masters of Science in QI/PS at IHPME. And, he co-leads the IDEAS program (Improving and Driving Excellence Across Sectors) funded by the Ontario Ministry of Health and Long-Term Care. IDEAS provides state of the art quality improvement education to teams of clinicians and managers engaged in improving care and care delivery in Ontario and is modelled on the Intermountain Healthcare Advanced Training Program (ATP).

Dr. Baker is frequently consulted by the Ministry of Health in Ontario, and he has served as a board member of the Health Quality Council of Saskatchewan since 2005. He was recently appointed as Chair of the Safety and Quality Committee and a board member of the University Health Network, one of the largest teaching hospital groups in Canada. In addition to these research and educational activities, Dr. Baker is Editor of *Healthcare Quarterly*. Dr. Baker published a key report in 2015, *Beyond the quick fix: Strategies for improving patient safety*, that provided an overview of the progress on patient safety and the challenges that remain. The report aimed to facilitate informed, strategic, long-term decision making in health care in Canada. Dr. Baker has a total of 9123 citations on Google Scholar, including 5062 since 2012, an h-index of 45 and an i10 index of 104.



**TREY COFFEY, MD**

(Highlighted in previous section)

**C-QUIPS ASSOCIATE DIRECTOR AND SITE LEAD, HOSPITAL FOR SICK CHILDREN**



**EDWARD ETHELLES, MD, MSc**

**SENIOR FACULTY QUALITY IMPROVEMENT ADVISOR**

Dr. Edward Etchells is a general internist, Medical Director Information Services at Sunnybrook Health Sciences Centre and Professor of Medicine at the University of Toronto. His scholarly activity on improving patient safety is focused in three areas: medication reconciliation; evaluating health care technologies for improving patient safety; and

patient safety education. Since 2002, Dr. Etchells has 40 journal articles or research letters (21 as first or senior author), and 13 book chapters, commentaries or editorials. He has an h-index of 35 in Google Scholar, an i10-index of 65 and overall 7903 citations.

When Dr. Etchells arrived at Sunnybrook in 2002, his first activity as leader of the nascent patient safety program consisted of a one-month prospective local audit of medication errors on his medical ward. He found that the most common potentially serious medication errors occurred at the time of hospital admission. His studies of medication errors at the time of hospital admission (2003-2006) had international impact. Dr. Etchells and colleagues developed a novel method for classifying medication errors at the time of admission, which was adopted by other researchers in the area. One paper is cited as a Patient Safety Classic by the US AHRQ Patient Safety Network ([www.PSNet.ahrq.gov](http://www.PSNet.ahrq.gov)) and was cited as an influential paper in the 2006 Update in Hospital Medicine by the *Annals of Internal Medicine*. From 2004 to 2007 he was an active faculty member for the Canadian *Safer Health Care Now!* National Medication Reconciliation project. He advised the project specifically on their measurement approach. The World Health Organization (WHO) adopted this measurement approach as part of their High 5s Medication Reconciliation initiative. He was also principal author of a systematic review of economic analyses of patient safety improvement strategies, including medication reconciliation, funded by the Canadian Patient Safety Institute. This publication in *BMJ Quality and Safety* had an accompanying editorial, and is also cited as a Patient Safety Classic on the US AHRQ website PSNet. A US-wide Institute for Healthcare Management Webinar in 2012 also featured this work in 2012.

Dr. Etchells' interest in medication errors led to an exploration of Sunnybrook's electronic health record, and its potential role in reducing these medication errors. In 2008, he became Medical Director of Information Services at Sunnybrook. In general, the major challenges in implementing new

technology are poor usability of clinical software and poor integration with clinical workflow. Therefore, he forged a relationship with clinical engineering colleagues and students in the Master's Program in Biomedical Engineering at the University of Toronto. The conceptual innovation was to apply engineering principles of User-Centered Design to health care information technology. Dr. Etchell's senior authored electronic order sets study was cited as one of the top 2% publications in biology and medicine by the Faculty of 1000 (<http://f1000.com>) on January 13th 2012. His first authored study of sending electronic alerts to physicians with abnormal or life threatening lab values was featured at the AHRQ innovations website. He subsequently was senior author on a related editorial in *BMJ Quality and Safety*. Dr. Etchells and colleagues also identified usability and workflow problems related to pagers. This research letter (co-authored with Dr. Brian Wong) garnered international attention including the *Wall Street Journal* health blog and the *U.S. News & World Report*.

Dr. Etchells developed and implemented several safety education programs locally, including topics such as adverse event detection, diagnostic safety, morbidity and mortality rounds, and single patient rooms. Materials created for these educational programs led to 12 journal articles (four first or senior author), one book chapter, and commentaries for the *Canadian Medical Association Journal (CMAJ)*, *Journal of the American Medical Association* and the AHRQ Web Morbidity and Mortality site. Dr. Etchells led the training for reviewers in the Canadian Adverse Events Study ("the Baker-Norton Report"), which he then shared with Japanese researchers undertaking their own national adverse events study. These educational programs also led to six international invited presentations.



## JOANNE GOLDMAN, PHD

### RESEARCH SCIENTIST

Dr. Joanne Goldman joined C-QulPS in 2015 as its first postdoctoral fellow. This postdoctoral position was a partnership between C-QulPS, The Wilson Centre, and Li Ka Shing Knowledge Institute, St. Michael's Hospital. Dr. Goldman's research at C-QulPS focuses on the use of sociologically informed theoretical and methodological perspectives to study quality improvement and patient safety, with a particular focus on the intersections between education and practice. Her prior work was largely focused on the areas of interprofessional education and practice and continuing education, and the intersections of these fields with quality improvement and patient safety.

In 2016, Dr. Goldman was successful in receiving a Royal College of Physicians and Surgeons of Canada medical education research grant for her postdoctoral study titled 'A case study of advanced QI/PS post-licensure education'. The research team involves representation from C-QulPS, St. Michael's Hospital, IHPME, and Wilson Centre. The study is exploring three advanced post-licensure quality improvement and patient safety (QI/PS) education programs that C-QulPS faculty are involved with—the Masters at IHPME, the Certificate at C-QulPS, and the Fellowship program at St. Michael's Hospital—and seeks to enable a deeper understanding of participants' experiences of these education programs and the intersections between QI/PS education and practice. The findings of this study will inform education practices locally and contribute to the emerging field of QI/PS education. Dr. Goldman has also collaborated with Dr. Wong and

C-QulPS investigators on other education research studies, including a qualitative study of faculty development in the Co-Learning QI Curriculum.

Dr. Goldman is a co-investigator with C-QulPS colleagues on the successful application to Physician Services Incorporated Foundation for a qualitative study of the innovative, large-scale, 'Caring Safely' program at SickKids. The study will examine how its aim to implement high reliability organizing is influencing patient safety culture and preventable harms. Using interviews, observations and documents, this study will explore how hospital leaders, health care providers, and family advisors are interpreting and practicing 'Caring Safely'. The findings will provide in-depth insights underscoring the social processes and contextual factors that characterize organizational change for improving patient safety.

Dr. Goldman continues her research in the area of interprofessional education and practice, such as a recently updated Cochrane review on the impact of practice-based interventions designed to improve interprofessional collaboration on professional practice and health care outcomes and a publication on the implementation of collaborative competencies in a critical care setting.

Dr. Goldman will be transitioning to a scientist position at C-QulPS to continue to support and build a sociologically informed research program in QI/PS education and practice.



## JEROME LEIS, MD, MSC

(Highlighted in previous section)

FACULTY QUALITY IMPROVEMENT ADVISOR



## LEAHORA ROTTEAU, PHD (C)

PROGRAM MANAGER

Leahora Rotteau is the program manager at C-QulPS and is also undertaking a PhD degree at the University of Toronto IHPME in organizational research. Leahora's thesis study is an exploration of the development, implementation and spread of innovative health delivery programs aimed at integrating care for patients with complex needs. In this study, she is applying social theory to develop a better understanding of the social and organizational factors influencing the uptake and spread of such programs.

Leahora has been involved in a number of C-QulPS research projects over the past five years. She is currently a collaborator on the Physician Services Incorporated Foundation grant for studying the high reliability Caring Safely program at SickKids, bringing to the study her expertise in organizational change and qualitative research methods. She also published a paper in *BMJ Quality and Safety*, with Dr. Shojania as one of the co-authors, of a study of the views and experiences of Patient Safety

Walkarounds, a widely recommended strategy for identifying patient safety problems and improving safety culture.

In her position at C-QulPS, Leahora teaches and mentors C-QulPS learners and members in qualitative research methods. For example, she has worked with Dr. Coffey on the analysis of data from interviews with residents about their experiences with the I-PASS handoff bundle. She has also consulted with C-QulPS affiliate, Dr. Lucas Chartier, and his colleagues, Drs. Andrew Remfrey and Travis Carpenter, on their study through Health Quality Ontario examining how clinical case audits in emergency departments in Ontario are promoting a culture of quality improvement and patient safety.

Leahora is working towards completing her PhD and aims to continue to develop her research program on quality and safety and organizational change informed by social and organizational theory.



## **ALENE TOULANY, MD, FRCPC**

### **FACULTY QUALITY IMPROVEMENT ADVISOR**

Dr. Alene Toulany's clinical and research activity overlap significantly. Her main research interests focus on the transition from paediatric to adult care, primary care, and eating disorders and obesity. Dr. Toulany has contributed significantly to multiple projects on transition to adult care for youth with complex chronic illness, sleep disorders, eating disorders and kidney transplant recipients. Her most significant contribution in transition, however, is currently being completed as part of a Health Services Master's degree at the IHPME at the University of Toronto. The objective of her work is to describe health service utilization for youth with severe mental illness before, during, and after transition to adult care and analyze the association between primary care continuity and acute mental health service use following transition. Her findings indicate that youth with no primary care provider during transition have a 50% increase in risk of a mental health admission following transition. Therefore, ensuring adequate access to primary care may improve mental health outcomes in young adulthood. This research has important implications for clinical care, policy and service planning, and the development of best practices for health systems integration, collaborative care, and quality indicators for mental health services across the continuum between paediatric and adult care.

Dr. Toulany also conducts research in the area of eating disorders and obesity. She recently conducted the first economic analysis in Canada examining the direct and indirect costs of inpatient treatment for adolescents with anorexia nervosa from hospital and caregiver perspectives and assessed predictors of hospitalization costs. In addition, Dr. Toulany has collaborated with researchers at University Hospital Network to better understand the challenges young adults face with accepting family support and their experiences transferring to adult care. She is also leading a collaboration with researchers at McMaster University to systematically review the optimal management of eating disorders in primary care.

As the only Adolescent Medicine Specialist in Canada working in an obesity management program, Dr. Toulany is uniquely positioned to improve the quality of developmentally appropriate and adolescent friendly care for youth with obesity. She has helped lead the implementation and evaluation of a day hospital program at SickKids to address co-morbid obesity and mental health in adolescents. In addition, she is a co-investigator on a CIHR team grant in bariatric care and is leading a qualitative study on the factors that influence risky sexual health behaviours in youth with obesity.



## **BRIAN WONG, MD**

### **C-QUIPS ASSOCIATE DIRECTOR AND SITE LEAD, SUNNYBROOK HEALTH SCIENCES CENTRE**

*(Highlighted in previous section)*

## C-QUIPS CORE MEMBERS

This section reports on the research activity of C-QulPS core members whose research programs have grown out of their education and mentorship at C-QulPS as well as senior scientists who have had relationships with C-QulPS since its inception and continue to have research collaborations. The core members not included in this section are those whose membership is largely due to their contributions to and involvement with the Centre's education programs (and are therefore highlighted in that section).



**CHAIM BELL, MD, PHD**

---

Dr. Chaim Bell is Physician-in-Chief of Sinai Health System, a hospital-based general internist and Professor of Medicine and Health Policy, Management and Evaluation at the University of Toronto. Since his earlier widely cited work on care and outcome differences in hospitalized patients depending on the day of the week, and his Canadian Institutes of Health Research—Canadian Patient Safety Institute Chair (CIHR-CPSI) in Patient Safety and Continuity in 2009, he has been awarded millions of dollars in research grants. Dr. Bell's work can be organized into two general areas of research inquiry: 1) Quality of care: continuing of care between the hospital and community and 2) Value and health policy investigations. His success in these areas have stemmed from the productive collaborations that he has forged with other researchers and his extensive mentorship in both the quality improvement and research realms.

Continuity of patient care between hospitals and the community has become a major focus of patient safety and quality improvement efforts. Dr. Bell's study identified hospitalization as a risk factor for medication discontinuation and ICU admission as an exposure that increases that risk. This was based on earlier studies outlining medication continuity

issues for surgical patients and an audit in the ICU. His group was also able to document initiation of potentially inappropriate medications in hospitalized patients including benzodiazepines and opiates as well as discharged ICU patients. Moreover, his group helped establish quality measures to assess this issue and evaluated the initiation of accreditation requirements for medication reconciliation in nursing homes. Other studies by Dr. Bell documented that elderly patients were at risk for not filling their new medication prescription at all. As well, they documented that prescriptions at discharge may improve medication adherence after stroke. An earlier paper designed and tested an electronic tool for hospital patients discharged to the community to improve communication and patient outcomes. Subsequent papers have examined this issue in critical care and nephrology patients. Other projects have examined hospital discharge and readmission from both quantitative and qualitative perspectives including developing quality measures. These experiences helped Dr. Bell and colleagues develop a checklist for hospital discharge to prevent readmissions that arose through an Ontario government initiative. Dr. Bell was also involved in intervention trials to prevent hospital readmissions. Finally, a few projects have identified a lack of patient follow-up after radiology procedures.

Dr. Bell has authored several papers on the use of economic tools for health policy. This has built on his prior experience in evaluating the quality of cost-effectiveness analyses. A few articles were based on oncologists in the US and Canada who were surveyed about their attitudes and knowledge for the funding of new and expensive cancer therapies. Another paper identified the differences in private spending for brand-name and generic drugs. Other work proposed a new policy direction for Canada to funding drugs for rare diseases which also had widespread media attention. Dr. Bell has examined real-world costs for lymphoma treatment, public and private bariatric surgery funding, and conducted an economic comparison of drug treatments for breast cancer. Another article identified potential savings for government by harmonizing hospital and community drug formularies. Further, he has provided editorials on biases of cost-effectiveness analyses. In addition, he has examined how policy decisions for cancer drug funding in Canada incorporate data from non-peer reviewed sources. Finally, he has published ophthalmology-specific policy papers

including identifying adverse events with medications for macular degeneration and policy issues related to funding of those drug treatments –most relevant because the drug in question is one of the largest expenditures on public formularies. As well, he has described variation in prices for specialty lenses after cataract. Together these papers have been widely cited in the economic evaluation and health policy communities as well as some in the broader clinical literature and mass media.

Dr. Bell has occupied many leadership roles supporting QI/PS research, such as being an associate editor of *BMJ Quality and Safety*, chair and member of Canadian Institutes of Health Research grant committees, and supervisor and committee member to graduate and medical students. He has published over 225 peer-reviewed articles, almost entirely in international journals. He was lead author on three papers and senior author on 52 papers. Overall, his work has garnered 10333 citations, with an h-index of 52, and i10-index of 146.



## LIANNE JEFFS, RN, PHD

---

As a leading nurse health services researcher in the areas of quality improvement, patient safety, and professional practice, Dr. Lianne Jeffs has secured several grants (\$4 million as principal investigator) from peer-reviewed funding agencies nationally and provincially, including two early research awards. Further demonstrating the impact of her research expertise, she was awarded the inaugural St. Michael's Hospital Volunteer Association Chair in Nursing Research (2013-18).

Dr. Jeffs' interest and expertise is in improving patient experience and the health of populations by optimizing care transitions and health system performance and building research capacity for nursing. Through her policy-relevant and productive research program and leadership roles, she continues to generate and disseminate nursing and health care knowledge that informs practice and policy, and mentor students and colleagues with a focus on: 1) Leveraging nurses' key role

in care coordination and service delivery and patient/caregiver engagement to ensure quality care transitions outcomes and experiences and 2) Generating and translating evidence to enhance quality care, organizational learning, and health system performance that inform and have an impact at local, provincial, national, and global levels.

In recognition of her research expertise, she serves as the lead editor for a new quality improvement studies column in the *Canadian Journal of Nursing Research*, associate editor of the *Journal of Nursing Care Quality*, and editorial advisory board member of *The Joint Commission Journal on Quality and Patient Safety*. She has published extensively, presented

globally and has received several awards for leading research, education and administrative initiatives.

Dr. Jeffs was inducted as a fellow into the American Academy of Nursing (AAN) in October 2015. In recognition for her expertise and leadership, Dr. Jeffs has received numerous honours and awards such as the Sigma Theta Tau International Lambda Pi Chapter Dorothy M. Pringle Award for Excellence in Research (2015) and the Council of Ontario University Programs in Nursing Award for Strategic Contribution to Nursing Education (Nursing Health Services Research Unit) (2015) and early Research Award, Ontario Ministry of Research and Innovation (2014–2019).



## JANICE L. KWAN, MD MPH

Dr. Janice Kwan practices general internal medicine at Mount Sinai Hospital and is an assistant professor in the Department of Medicine at the University of Toronto. She completed her undergraduate, medical, and residency training all at the University of Toronto. She was Chief Medical Resident and a fellow with the Veterans Affairs Quality Scholars program in her final year of postgraduate medical training. She went on to earn a Master of Public Health in health policy and management at Harvard University. She was awarded a research fellowship in diagnostic medicine with the Society to Improve Diagnosis in Medicine.

Dr. Kwan's research focuses broadly on diagnostic error, a relatively neglected topic in patient safety and quality improvement until recent years. In addition, her areas of interest include the study

of missed test results, quality of care in general internal medicine, medication reconciliation, and evidence synthesis.

Dr. Kwan is the principal investigator on a study evaluating the follow-up of pulmonary nodules noted incidentally on computed tomography imaging. Furthermore, she led the investigation of an innovative quality improvement initiative at Mount Sinai Hospital involving patient navigators on the general internal medicine ward. This work was featured in the American College of Physicians (ACP) Hospitalist report. Dr. Kwan is the Mount Sinai Hospital site lead for the General Medicine Inpatient Initiative (GEMINI), a multisite research and quality improvement collaborative across seven hospitals affiliated with the University of Toronto. She was co-lead author for the chapter



on medication reconciliation supported by clinical pharmacists in the Agency for Healthcare Research and Quality (AHRQ) report, *Making Health Care Safer II: An Updated Critical Analysis of the Evidence for Patient Safety Practices*, as well as the systematic review on this topic, published in *Annals of Internal Medicine*. Moreover, Dr. Kwan authored a spotlight

commentary on medication reconciliation for AHRQ WebM&M. She is currently working on the update to the Cochrane review on the effects of on-screen, point of care computer reminders on processes and outcomes of care. Her work has appeared in *British Medical Journal*, *BMJ Quality and Safety*, *JAMA Internal Medicine*, and *Journal of Hospital Medicine*.



## CHRISTINE SOONG, MD, MSC

---

Dr. Christine Soong's academic focus is in continuous hospital-level improvements through the development, implementation, and dissemination of best practices. Two examples are the development and implementation of a hip fracture co-management care model and improving transitions of care for patients leaving hospital. In the first example, she led the creation and development of a model of care where a hospitalist physician and an orthopaedic surgeon actively co-manage complex frail patients with hip fractures. Using improvement methods and a collaborative teamwork framework, they embedded a hospitalist physician within the orthopaedic interprofessional team and found significant improvements in timely access to surgery, length of stay, costs, mortality and perioperative complications. Their findings were published in the *Journal of Orthopaedic Trauma*. In the second example, she was the principal author of a paper describing an evidence-based checklist of discharge items recommended to ensure a safe discharge from hospital. This paper has been highlighted in the US AHRQ Patient Safety Network. As a recognized leader in the area of care transitions, she was invited to lead and chair a research synthesis project organized

by the Newfoundland Centre for Applied Health Research. The project, on models of discharge planning for patients in acute care units, is part of a program in Contextualized Health Research Synthesis Program (CHRSP). Internationally, she provided expert consultation to colleagues at Harvard Medical School's Boston's Children Hospital in their development of a national safe discharge checklist for paediatric inpatients. She is also the site principal investigator on the Patient-Oriented Discharge Summary (PODS) randomized control trial that seeks to evaluate a patient tool to improve information exchange at the time of discharge.

As an early adopter and an Ontario Choosing Wisely Canada Leader, Dr. Soong has been closely involved in the campaign since its inception when she led the creation of Choosing Wisely lists for two professional societies: Canadian Society of Internal Medicine (CSIM) and the Canadian Society of Hospital Medicine (CSHM). Locally, she is leading several projects to reduce unnecessary blood testing, sedative prescriptions, and antimicrobial use both within her own institution and those of other UofT-affiliated academic medical centres. This year, in recognition of the success of their pilot study on

sedative reduction at Sinai Health System (SHS), Dr. Soong was the awardee of three independent AFP grants to evaluate a sleep bundle intervention that aims to reduce sedative use among hospitalized patients across five hospitals. Nationally, she leads two professional societies (CSIM and CSHM) in the advancement of the Choosing Wisely agenda through dissemination of implementation strategies at annual meetings. Through this work, she was the principal author of two key papers published in the *CMAJ* and the *Journal of Hospital Medicine* that increase awareness of their societies' recommendations and highlight areas of improvement. Dr. Soong's and colleagues' publication in the *CMAJ* on reducing unnecessary testing in patients presenting with syncope has achieved an Altmetric score of 14, ranking it in the top 10% of all research outputs tracked by Altmetric.

Internationally, Dr. Soong is an active member of the Quality and Safety Committee at the Society of Hospital Medicine as well as a Faculty Member of the newly formed High Value Practice Academic Alliance, a group of 75+ academic medical centers (AMC) in the United States and Canada, focused on advancing high value care through education, research and implementation science. As part of this work, she is leading the development of two implementation guidelines to reduce inappropriate daily blood tests and treatment of asymptomatic bacteriuria. These guidelines will be submitted for publication and disseminated to the 75+ international AMC members with a goal to broaden the reach within both the United States, Canada and beyond.



## PATRICIA TRBOVICH, PHD

---

Dr. Patricia Trbovich holds the Badeau Family Research Chair in Patient Safety and Quality Improvement at North York General Hospital and is Associate Professor of Quality Improvement and Patient Safety in the Institute of Health Policy, Management and Evaluation. She leads the HumanEra Team and holds cross appointments at the Institute of Biomaterials and Biomedical Engineering (IBBME) at the University of Toronto and the University Health Network.

Dr. Trbovich's research program aims to create resiliency in health care systems, by concentrating on conditions under which health care providers

work and by proactively building defences to avert errors or mitigate their negative effects. Her studies cover a range of clinical areas and contexts. For example, Dr. Trbovich and her team are currently engaged in a study aimed at developing a comprehensive understanding of information exchange in the critical care unit at SickKids so as to inform the development of safety enhancing interventions. In the operating room context, she is partnering with St. Michael's Hospital and North York General Hospital to conduct a pilot study using the Black Box. The Operating Room (OR) Black Box is a multi-channel data recorder that synchronizes multiple intraoperative video- and audio-feeds to

facilitate the detailed and comprehensive observation of surgery for research and learning. This pilot study, part of a larger multisite study, will assess technical skills and surgical performance, errors, non-technical skills, and environmental factors in the operating room for the purpose of correlating these metrics with postoperative outcomes and complication rates.

Dr. Trbovich is also engaged in research addressing the opioids crisis. Her team is collaborating with the Institute for Safe Medication Processes Canada (ISMP Canada) on the Safer Decisions Saves Lives (SDSL) project, which aims to improve prescriber education by enhancing existing guidelines, training and tools. In addition, her team is undertaking a human factors study to proactively identify factors that contribute to opioid diversion (clinicians taking/selling opioids) in hospitals so that better safeguards can be implemented to prevent/detect diversion. Another area of study for Dr. Trbovich and her team is triaging, given that the current process

of triaging patients varies within and between hospitals significantly. Accuracy and consistency in the Canadian Triage and Acuity Scale (CTAS) tool score assignment is critical to patient safety, health system decision-making and performance improvement. Their study aims to evaluate the impact the electronic Canadian Triage and Acuity Scale tool (eCTAS) has on nursing triage practice.

Dr. Trbovich's research team was recognized with the 2015 Patient Safety Award from the Association for the Advancement of Medical Instrumentation and Becton Dickinson. Dr. Trbovich collaborated with Brazilian colleagues on a research grant, funded by the São Paulo Research Foundation, to introduce human factors engineering in Brazil. She also collaborated with the University Marques de Valdecilla, a public hospital, located in Santander, Cantabria, Spain on a joint human factors research and training program. She is Associate Editor for the *BMJ Quality and Safety* journal.

## SUMMARY

The Centre's staff and core members are distributed across a range of hospital and university settings with multiple institutional affiliations. This distribution is advantageous as it enables QI/PS research conducted to be informed by expertise and resources from a range of institutes (e.g., large database health services research, health policy, medical education, etc.) and clinical and organizational contexts (e.g., paediatrics and general internal medicine, academic hospitals and primary care, etc.). Furthermore, as evident by the above

descriptions, staff and core members provide diverse opportunities for medical trainees and graduate students given the varied academic and health care contexts in which they are embedded. While the distribution of people can be challenging to a unified approach to QI/PS research, our staff and core members collaborate extensively across and within organizational settings. The research activities described above for each individual together constitute the following 15 cross-cutting research themes.



## RESEARCH THEMES AND ASSOCIATED C-QUIPS RESEARCHERS

### DIABETES

- Geetha Mukerji, Kaveh Shojania, Lianne Jeffs, Chaim Bell

### INFECTION CONTROL

- Jerome Leis, Kaveh Shojania, Chaim Bell, Lianne Jeffs, Ross Baker

### INFORMATION TECHNOLOGY

- Patricia Trbovich, Edward Etchells, Brian Wong, Kaveh Shojania, Lianne Jeffs, Janice Kwan

### ERROR DISCLOSURE

- Trey Coffey, Anne Matlow, Brian Wong

### MEDICATION SAFETY

- Edward Etchells, Patricia Trbovich, Conor McDonnell, Jerome Leis, Kaveh Shojania, Chaim Bell

### SYSTEMATIC REVIEWS

- Kaveh Shojania, Janice Kwan, Edward Etchells, Ross Baker, Lisha Lo

### COMMUNICATION

- Patricia Trbovich, Joanne Goldman, Brian Wong

### ORGANIZATIONAL CHANGE

- Ross Baker, Trey Coffey, Joanne Goldman, Leahora Rotteau, Kaveh Shojania

### PATIENT AND FAMILY ENGAGEMENT

- Trey Coffey, Ross Baker, Lianne Jeffs, Patricia Trbovich

### DISCHARGE AND CARE TRANSITIONS

- Brian Wong, Christine Soong, Lianne Jeffs, Chaim Bell, Janice Kwan, Alene Toulany

### RESOURCE STEWARDSHIP

- Christine Soong, Geetha Mukerji, Jerome Leis, Brian Wong

### METHODS IN QI/PS RESEARCH

- Kaveh Shojania, Chaim Bell, Jerome Leis, Brian Wong, Edward Etchells

### QI/PS MEASUREMENT, TOOLS AND INTERVENTIONS

- Kaveh Shojania, Ross Baker, Edward Etchells, Brian Wong, Patricia Trbovich, Chaim Bell, Lianne Jeffs, Leahora Rotteau

### QI/PS EDUCATION

- Brian Wong, Joanne Goldman, Kaveh Shojania, Trey Coffey, Edward Etchells, Lianne Jeffs, Leahora Rotteau, Ross Baker

# ORGANIZATIONAL STRUCTURE

C-QuIPS is an Extra-Departmental Unit (EDU), defined by the University as a flexible, multidisciplinary entity organized around emerging research and teaching areas that cut across traditional disciplines and departments. For instance, two long-standing EDUs at the UofT include the Wilson Centre for Medical Education (<http://thewilsoncentre.ca/>) and the Joint Centre for Bioethics (<http://jcb.utoronto.ca/>). The University constituted C-QuIPS as an EDU:C, meaning that we do not appoint faculty members or admit students ([http://www.vpacademic.utoronto.ca/Extra-Departmental\\_Units.htm](http://www.vpacademic.utoronto.ca/Extra-Departmental_Units.htm)). In other words, one cannot become a faculty member or student at the UofT solely based on an appointment or admission to C-QuIPS; one must have an existing appointment within a Department. EDU:Cs also cannot grant degrees, which was one of the incentives for running the Master's program through the Institute for Health

Policy, Management and Evaluation (IHPME), which is an EDU:A. Consistent with the model for other multi-departmental academic units at the University of Toronto, the Governance of the C-QuIPS consists of an Executive Committee and an Advisory Council (see organizational chart below).

Following the very favourable external review at five years (and the coincident transition to new jobs of several Deans and CEOs who sat on the Executive Committee), the full Executive Committee meetings were put on hold. The C-QuIPS Director continued to meet with the Chair of the Executive Committee and the two hospital CEOs to update them on the Centre's activities and identify any concerns. It was decided that the Executive Committee would reestablish annual meetings when the new C-QuIPS Director is chosen sometime in late 2018.

## U OF T CENTRE FOR QUALITY IMPROVEMENT AND PATIENT SAFETY GOVERNANCE AND ADVISORY OVERSIGHT



## CURRENT EXECUTIVE BOARD MEMBERS

- Dr. Adalsteinn D. Brown, Director, Institute of Health Policy, Management, and Evaluation
- Dr. Michael Apkon, President and CEO, Hospital for Sick Children
- Dr. Barry McLellan, President and CEO, Sunnybrook Health Sciences Centre (succeeded by Dr. Andrew J. Smith, the new CEO as of July 2017)

## ADDITIONAL EXECUTIVE BOARD MEMBERS UNTIL 2015<sup>1</sup>

- Dr. Catherine Whiteside, formerly Dean of Medicine<sup>2</sup>
- Dr. Cheryl Regehr, Vice-Provost, Academic Programs, University of Toronto (originally on Board in capacity as Dean of Social Work)
- Dr. Sioban Nelson, Vice-Provost University of Toronto (formerly Dean of Nursing)
- Dr. Robert Howard, President and CEO, St. Michael's Hospital
- Dr. Mark Rochon, then President and CEO, Toronto Rehabilitation Institute (prior to its merger with UHN)
- Dr. David Mock, Dean of Dentistry (2009-12)
- Dr. Henry Mann, Dean of Pharmacy (2012)

## SUNNYBROOK HEALTH SCIENCES CENTRE ADVISORY COMMITTEE

- Dr. Andrew J. Smith, Executive Vice President and the Chief Medical Executive (CEO as of July 2017, so will move to overall Executive Committee)

- Ru Taggar, Executive Vice President, Quality Improvement and Patient Safety, Executive Vice-President, Health Professions & Chief, Nursing
- Dr. Brian Cuthbertson, Chief, Department of Critical Care Medicine
- Dr. Ari Zaretsky, Chief, Department of Psychiatry
- Dr. Barbara Liu, Executive Director, Regional Geriatric Program of Toronto
- Board Member/Patient Representative—previously Marcia Visser, Sunnybrook Health Sciences Executive Board Member and Chair of the Board's Quality SubCommittee; replacement to be determined in Fall 2017

## THE HOSPITAL FOR SICK CHILDREN ADVISORY COMMITTEE MEMBER

- Jeff Mainland, Executive Vice President, Strategy, Quality, Performance and Communications
- Marilyn Monk, Executive Vice President, Clinical Programs & Services
- Peter Laussen, Co-chair M&M Committee
- Karim Jessa, Chief Medical Informatics Officer
- Rick Wray, Director, Quality Management and Infection Prevention and Control
- Pam Hubley, Chief, Professional Practice and Nursing
- Dr. Ron Laxer, Staff Rheumatologist (formerly VP Medical Affairs)
- Rita Damignani, Quality Analyst / Patient Safety Coordinator

<sup>1</sup> Around 2015, due to a coincidental confluence of factors, the broader executive committee dissolved and the overall leadership fell to the two CEOs of the partner hospitals (Sunnybrook and SickKids), as Dr. Steini Brown (in his capacity as Director of the Institute for Health Policy, Management and Evaluation and acting as the Dean's delegate). The reason for the rest of the Executive Committee more or less falling by the wayside was largely that many of them had sat on the Committee by virtue of their jobs as Deans or CEOs but they left these roles. The founding documents for the governance of C-QuIPS specified a mix of CEOs and Deans for the Executive Committee. A number of these Executive Committee members happened to transition to new jobs within a year or so of each other. Two of them, Drs. Sioban Nelson, Vice-Provost University of Toronto (formerly Dean of Nursing) and Cheryl Regehr, Vice-Provost, Academic Programs, University of Toronto (formerly Dean of Social Work) kindly stayed on for a time. But, with the loss of other members of the committee and the fact of the five year review going so well, the CEOs of the two partner hospitals and the Chair of the Executive committee felt that it was fine to have a smaller executive for a few years (e.g., until the next review and the subsequent appointment of a new Director).

<sup>2</sup> When Dr. Whiteside's tenure as Dean ended, she asked Dr. Adalsteinn Brown (now the interim Dean of the School of Public health, but at the time the Director of the of the IHPME) to represent the Dean as Chair of the Executive Committee. Dr. Whiteside took this approach as Dr. Brown was already familiar with C-QuIPS (since C-QuIPS collaborates with IHPME on the Masters in QI/PS and because he has expertise in this area as well), rather than leaving the new Dean, Dr. Trevor Young, to Chair the Advisory Committee. This decision also occurred in the context of the very favourable five-year review we had just received.

# FINANCES

The Centre receives \$300,000 per year in support—\$100,000 from each of the three partner institutions. Sunnybrook and SickKids also donate space for offices at each site. The other revenue streams include education programs (Certificate Course, QI workshops, EQUIP, the Master's program), and grants. The average total revenue, including the annual support, over the past four years is approximately \$405,000 annually. Staff salaries are the largest Centre expense, accounting for approximately \$415,000 annually. Other expenses include C-QulPS promotions, research and education costs and general supplies and services. Over the past few years, C-QulPS has maintained surpluses of between \$16,000 to \$70,000 annually. This annual surplus has allowed C-QulPS to maintain a reserve fund equivalent to one and a half year's operating costs.

In our first five years (2008-2013), the Centre aimed to build local capacity and grow our revenue generating educational programs. During that time, we also grew our reserve fund to ensure that the Centre could be maintained through any financial changes.

We have saved our money to prepare for a worst case scenario (in which funding goes away) so that we would then have about year and a bit of funds to run the Centre. But we have also been led to believe that the funding will be renewed (by the two CEOs), so we have started to invest more in growing the Centre using our revenue generated through our educational activities.

- Hiring a full-time PhD Scientist (Joanne Goldman) to develop and grow the C-QulPS research program, especially as relates to our educational programs

- Enhancing the positions of our existing staff members through greater salary support to retain these talented, hardworking individuals and/or providing them career development opportunities. For instance, we have paid for workshops on administrative skills, such as project management, but also for specific research skills, such as meta-analysis and qualitative research, as well as accommodating enrollment in graduate programs (a Masters in Health Informatics for Tanya Agnihotri and a PhD for Leahora Rotteau)
- Hiring an education coordinator (Mohita Moghe) with substantial experience organizing and coordinating large programs given the number and size of concurrent educational programs we run. We need experienced administrative support people who are used to overseeing multiple substantial activities.

The impact of these additional costs will be more apparent beginning in 2019/20 fiscal year due to timing of staff returning from maternity leave.

## CHALLENGES AND OPPORTUNITIES OVER THE NEXT 5 YEARS

As we progress through the next five years, our projected budget reveals that our current spending may exhaust our reserves after fiscal year 2021/2022. Obviously we do not plan to let that happen.

For years already we have spent each year more than the \$300,000 we receive annually from the two partner hospitals and the Faculty of Medicine. We have been able to do this while also creating a substantial surplus because of revenue from our educational programs and from a few key grants and

contracts in our first five years that allowed us to recoup salaries for some C-QulPS staff. We wanted to hold on to this surplus, maintaining a cushion equal to about 18 months of operating expenses in case we lost our funding entirely at some point. Based on conversations with the CEOs of the two hospitals in recent years, that has seemed less of a risk—i.e., they have explicitly said that they do not plan to eliminate their support. Of course, that could still change, but we felt comfortable enough to start spending some of our retained earnings, investing first in a new administrative support person a few years ago, so that all of the work of coordinating our programs would not fall on the shoulders of Lisha Lo and Leahora Rotteau, especially as they were also contributing to some of our research projects given their masters-level research training (and now Leahora Rotteau is a doctoral student part-time). We then hired a full-time scientist and started to give small amounts of salary support to core members playing major roles in our educational programs.

In the projections over five years, we have made the very conservative assumption that we will bring in only about \$50,000/year in grants. We also did not project that much growth in our educational programs even though it seems clear that we could do so. Or, rather, it seems clear that we could do at least one of those activities (bring in far more than \$50,000/year in grants or much more substantially grow revenue from EQUIP or other educational programs in the coming years). In the unfortunate and unlikely event we are wrong, we have ample time (four years) to make a course correction in our spending.

## THE FINANCIAL PLAN MOVING FORWARD

Through the increase of revenue from the development of the EQUIP Certificate program, we forecast an additional

\$120,000 revenue to the Centre's operating budget, which will allow the Centre to use these funds in a variety of ways to enhance C-QulPS education faculty bandwidth and support local improvement efforts at our partnering hospitals and the wider University of Toronto community. Potential avenues for the additional revenue include:

- ▶ Developing C-QulPS grants to support local QI and Patient Safety work or research. Grants would be matching with hospitals or departments.
- ▶ Provide salary support to clinicians or researchers conducting research aligned with C-QulPS priorities (this salary support could help support the work of a pharmacist or a nurse working within the field of quality improvement and patient safety).
- ▶ Funding 0.5FTE position at our partner hospitals to support specific QI work aligned with the hospital priorities (for example, Infection Control practices at Sunnybrook).



# RESOURCES AND INFRASTRUCTURE

C-QulPS has dedicated office space at both sites—Sunnybrook and SickKids. The space at Sunnybrook accommodates the offices of the Centre Director, the Sunnybrook Associate Director, the Program Manager, and the Administrative Coordinator. We are also able to provide office space to two physicians who support quality and safety at Sunnybrook and work closely with the Centre. The space also contains an office space for students and research assistants and a meeting room. The meeting room is also used for some weekly meetings of the hospital-based department of Quality and Patient Safety, as well as team meetings for specific QI projects at Sunnybrook.

The SickKids site holds three offices and a large multi-purpose meeting space. The Sickkids site has office space for the SickKids Associate Director, Education Research Scientist and the Research and Education Coordinator as well as swing space for students, researchers and core members. Because the SickKids site is located downtown, near the other UofT hospitals, we designed the main open space to allow us to accommodate many of the Centre's programs such as rounds, research and education meetings, workshops as well as the Certificate Course, Co-Learning Program, and VAQS. The multi-purpose space is equipped with

videoconferencing equipment which allows for greater flexibility in meetings and interactions with national and international collaborators. E.g., the VA Quality Scholars group meets there for its weekly videoconference meetings with the seven US sites.

We have enjoyed excellent support from the two partner hospitals with the space they have provided us. It is possible that we will exceed our current space needs in a few years and not be able to have all our key staff have an office. But, it is not a looming crisis of any kind. For the downtown space provided to C-QulPS, there is a plan to move us into a building (along with other groups occupying space rented by the hospital). There has been some talk of all the spaces there consisting predominantly of cubicles. We do benefit greatly from the more open concept type of space we have at the SickKids site because we use it for most of our educational programs. We hope to work with our SickKids advisory committee and other leaders at SickKids to see if there can be any flexibility in the space set aside for C-QulPS in the planned move to the McMaster building once it has been renovated (estimated around two years from now).

# ALUMNI AND ADVANCEMENT PROGRAMS

Some alumni of our programs go on to further training in one of our other programs. For example, an attendee of a one-day workshop might decide to enroll in our Certificate program. Some graduates of the Certificate program decide they want more intensive training and enroll in the Masters. Some alumni become (or already were) faculty members and/or staff at a teaching hospital and stay connected through specific projects or informal mentorship about projects on which they are working. Furthermore, we have an email list we use to announce rounds, our annual symposium, and other special events.

In terms of advancement programs, we do have access to the advancement programs in the Faculty of Medicine, Sunnybrook, and SickKids. Offers of access to these programs (by the CEOs and the Dean) have been sincere (and made more than once). But, realistically, hospital foundations have priority areas and capital for buildings understandably receives much of their attention, followed by famous diseases and cutting edge technology. For most of the past nine years, though, the experience we have

had with the advancement offices has amounted to: if we have a donor who seems interested in health care quality or patient safety, we will send them your way. And, we have had a couple of small donations (on the order of \$10,000) of this type. We also had a few ad hoc donations—one from a lawyer who came across C-QulPS when she was looking for a suitable recipient of \$50,000 from a class action lawsuit related to patient-centredness.

In recent years, SickKids has achieved success with donors for Chairs related to some of its strategic goals, one of which includes patient safety. The CEO of SickKids, Dr. Michael Apkon, has offered to coordinate this sort of fundraising with C-QulPS (e.g., try to find a donor for a Chair in QI or PS which could fund the SickKids Associate Director position, freeing up salary support funds). And, the Chair of Medicine is exploring a Chair in QI, which could free up the salary support for any one of the several faculty members in the Department currently receiving money from C-QulPS. Clearly, though, the next Director could build on these sorts of opportunities or explore other options for fundraising.

# INTERNAL AND EXTERNAL RELATIONSHIPS

## INTERNAL RELATIONSHIPS

### **WILSON CENTRE FOR RESEARCH IN EDUCATION**

C-QulPS has collaborated with Wilson Centre Scientists on a number of QI/PS education projects. Dr. Joanne Goldman, C-QulPS research scientist, completed her post-doctoral training under the joint supervision of Dr. Brian Wong from C-QulPS, Drs. Ayelet Kuper and Cynthia Whitehead from the Wilson Centre (the latter of whom is the Wilson Centre director), and Dr. Lianne Jeffs from the Li Ka Shing Knowledge Institute at St. Michael's Hospital. As part of this post-doctoral work, Dr. Goldman received peer-reviewed funding from the Royal College to lead a research collaboration between C-QulPS, IHPME, the Wilson Centre and Li Ka Shing Knowledge Institute.

### **INSTITUTE FOR HEALTH POLICY, MANAGEMENT AND EVALUATION (IHPME)**

C-QulPS continues to work with Dr. Ross Baker to support the IHPME Masters of Science in Quality Improvement and Patient Safety program. Several C-QulPS staff (Drs. Kaveh Shojania and Brian Wong) and core members (Drs. Anne Matlow and Patricia Trbovich) are course directors, with numerous other core and affiliate members acting as guest speakers and project tutors for the program. C-QulPS also co-sponsored several joint rounds with IHPME involving high profile local, national and international invited speakers.

### **CENTRE FOR INTERPROFESSIONAL EDUCATION**

Despite having similar mandates and organizational structures, C-QulPS and the Centre for Interprofessional Education (IPE) at the University of Toronto had not formally collaborated on any initiatives until recently. The leadership teams have recently held several very productive meetings, and have started to seek opportunities to work together. Given that both C-QulPS and Centre for IPE have a major focus on capacity building, there are exciting opportunities to serve as guest faculty for each other's educational offerings.

### **MAJOR CLINICAL DEPARTMENTS**

#### **MEDICINE AND PAEDIATRICS**

We have extensive interactions with the Departments of Medicine and Paediatrics, since so many of our staff and core members come from these two departments. C-QulPS members lead many QI activities for these departments, including mentoring other faculty members working on QI projects.

Our various partnerships with Department of Medicine have been critical to the development of C-QulPS, but have also added tremendous value to the Department. To give just a few examples, Dr. Shojania helped establish the Clinicians in Quality and Innovation job description, beginning with six

faculty appointees in 2012 and now, as Vice Chair for Quality and Innovation in the Department (since 2015), oversees the 43 faculty members now appointed to this job description, as well as developing and supporting other departmental activities synergistic with the activities of C-QulPS. Likewise, Dr. Brian Wong, holds the position of Director, Continuing Education and Quality Improvement in the Department, in addition to his role at C-QulPS. Dr. Wong's incredibly successful Faculty-Resident Co-Learning Program in QI began as a Department of Medicine activity, but clearly supported by C-QulPS, and its spread to other Departments (e.g., Paediatrics, Surgery) and other universities (e.g., McMaster, Western University, Virginia Tech) has happened more under the auspices of C-QulPS than the Department of Medicine.

Other staff and core members in C-QulPS, such as Drs. Ed Etchells, Alene Toulany, and Jerome Leis receive salary support to mentor and support members of the Department carrying out QI projects. Dr. Etchells also runs a monthly series of mentorship workshops for the CQI faculty on topics related to QI, but also on general faculty development for junior faculty, such as time management, learning how and when to say No, a writing workshop, how to review a manuscript, and so on. Dr. Etchells leads some of these sessions himself, but often invites guest faculty members.

## **SURGERY**

The Department of Surgery includes some faculty members with major research programs in the QI/PS space. Dr. David Urbach, the Surgeon-in-Chief at Women's College Hospital is an accomplished health services researcher who has published extensively on topics in health care quality, including the widely cited study in the *New England Journal of Medicine* (2014) showing the lack of impact on morbidity or mortality from the famous WHO surgical safety checklist in Ontario. Dr. Robin McLeod, a distinguished clinical researcher and medical educator has had a long standing interest in the translation of evidence-based practices into routine surgical practice—to the point that she now holds the position of Vice-President, Clinical Programs and Quality Initiatives, for Cancer Care Ontario. Dr. Theodor

Grantcharov at St Michael's Hospital has a growing international reputation for his pioneering the use of a surgical 'black box'. Analogous to the black box referred to in aviation investigations, this device records events during surgeries to detect and analyze errors and adverse outcomes. And, Dr. Avery Nathens, the Surgeon-in-Chief, at Sunnybrook is a senior health services researcher and Director of the Trauma Quality Improvement Program for the American College of Surgeons.

As mentioned elsewhere in the report, these sorts of established researchers already have strong ties to hospital-based research institutes. And, we have far too limited resources to create new research opportunities with them. These senior, well-established faculty members in Surgery have still generously supported C-QulPS. For instance, several of the above mentioned researchers have delivered keynote addresses at our annual symposium, and some have sent surgical trainees pursuing graduate degrees and junior colleagues to our educational programs. In the case of Dr. Nathens, we put on a half-day workshop for faculty from a variety of surgical specialties, and the QI specialist who works full time for Dr. Nathens (Mahsa Sadeghi, RN) went through the Masters in QI/PS program.

In terms of interactions with the Department of Surgery more generally, the whole Department now participates in the Co-Learning Curriculum. Several junior faculty members in Surgery have come through the Masters and one is a core member of C-QulPS (Dr. Eric Monteiro from Otolaryngology).

## **PSYCHIATRY**

The Department of Psychiatry at the University of Toronto has been investing in a quality improvement strategy over the past several years and engaged C-QulPS members in their capacity-building activities. Examples include presentations delivered by C-QulPS members at Continuing Professional and Practice Development strategic planning meetings, and delivery of a QI workshop to approximately 30 interprofessional members of the University Health Network Mental Health program. More

recently, several senior residents and faculty members are participants in our C-QulPS Certificate Course, and Dr. Sanjeev Sockalingam has joined as a core faculty member of our EQUIP Academic Certificate Program.

### **OBSTETRICS & GYNECOLOGY**

Dr. Shojania worked with the Chair, Dr. John Kingdom, to help establish a Vice-Chair for Quality, which was then filled by Dr. Gareth Seaward, a graduate of the Masters. Since then, six members of the Ob-Gyn Department have come through the Certificate Course or Masters.

### **FAMILY & COMMUNITY MEDICINE (DFCM)**

The Departments of Medicine and Family & Community Medicine partnered to obtain a \$5M program (over five years) funded by the Ministry of Health to evaluate new models of care (especially for chronic illnesses) in the outpatient setting. Dr. Shojania acted as the Scientific Director on this project. And, Dr. Wong has worked and taught with some faculty members in DFCM. Some of these connections made have led to other collaborations. But, our interactions with the DFCM through C-QulPS itself have been limited. We do now have one core member (Dr. Tara Kiran from St. Michael's Hospital) and hope to grow our interactions with DFCM faculty members via some work we have started with the Institute for Health System Solutions and Virtual Care (WIHV) at Women's College Hospital, given that this collaboration focuses on the ambulatory care setting.

### **PARTNER HOSPITALS (SUNNYBROOK HEALTH SCIENCES CENTRE AND SICKKIDS)**

The mandate of a unit such as C-QulPS tends to focus on academic work, not the operational activities of the hospitals. Nonetheless, we have tried from the outset to produce some tangible benefits for Sunnybrook and SickKids. We have helped support some specific QI initiatives at the two hospitals—assisting either with the development of the project or its evaluation, especially in our first five years. Examples at Sunnybrook have included the protocol for handling patients sent from the emergency department to hallway beds on the admitting

service's ward, executive walkrounds (also known as patient safety walkrounds), and a project for which we obtained grant funding (from the Canadian Patient Safety Institute) to identify and mitigate adverse events among elderly general medical patients. This project led to our assisting with some operational projects, such as an early mobilization initiative for seniors admitted to hospital. C-QulPS has also collaborated with Dr. Barbara Liu, Director of Regional Geriatric Program, housed at Sunnybrook, to provide ongoing quality improvement education and support to the province-wide improvement collaborative for frail elders.

At SickKids, numerous projects have involved C-QulPS staff because the Associate Director based at SickKids (Trey Coffey and Anne Matlow before her) have also held positions within SickKids focused on patient safety. Since then, we have added other staff and core members who hold positions within SickKids (as quality/safety officers or director of the M&M committee) whose activities at SickKids and C-QulPS reinforce each other. More recently, we have also obtained a grant to evaluate the hospital-wide 'high reliability organization' initiative underway at SickKids for the past few years.

More generally, though, we have helped SickKids and Sunnybrook through our strategy of training physicians, nurses, pharmacists, therapists, and others and having them go on to take key positions related to QI/PS in the two hospitals.

### **OTHER UNIVERSITY OF HOSPITALS AFFILIATED WITH THE UNIVERSITY OF TORONTO**

Our connections to the other teaching hospitals in Toronto have also primarily involved training individuals to go back to their institutions and participate in or lead QI/PS projects. Michael Garron Hospital (formerly Toronto East General Hospital), is an important community teaching hospital which has sent a steady stream of individuals to us ever since the chief of staff, Dr. Ian Fraser, took our Certificate Course in its first year. Not only has Dr. Fraser sent multiple staff to the Certificate Course or Masters, he occasionally obtains advice from us around specific

projects and also donates some of his time in return at conferences and other events we hold. A concrete example of a project at Michael Garron Hospital with both operational and academic credit is a novel and very successful approach to reducing unnecessary urine cultures and unnecessary prescriptions for asymptomatic bacteriuria in the emergency department. The journal article reporting this project had as its first author a graduate of the Masters who is also an infectious diseases specialist (Dr. Jerome Leis).

Dr. Chaim Bell, one of our core members and the Physician-in-Chief at Mount Sinai Hospital, and we have collaborated on a number of education programs. We have also shared a fellow funded by a donation of \$50,000 to support work on the patient experience (Dr. Jessica Liu), who is now on faculty in the Clinician in Quality and Innovation job description. Similarly, Dr. Janice Kwan, now a core member of C-QulPS based at Mount Sinai, was a trainee supervised by Dr. Shojania and has collaborated with him and Lisha Lo on two major systematic reviews—one on medication reconciliation published in *Annals of Internal Medicine* (2013) and a forthcoming Cochrane review on computerized decision support. Drs. Kwan and Shojania also work on a research project defining the frequency with which important test results from the inpatient setting, such as suspicious pulmonary nodules identified incidentally while pursuing the acute diagnosis, are lost to follow-up after discharge. At least 10 staff from Mount Sinai Hospital have taken our educational courses (Certificate Course, Masters, or VAQS), and the hospital's senior leaders also agreed to participate in a multisite research project.

For University Health Network (UHN), 13 individuals have taken the Certificate Course and others have taken the Masters. We also held a workshop specifically for the renowned advanced heart failure centre at UHN, with a multi-professional group of attendees, including the centre's director, Dr. Heather Ross. Dr. Ross has since sent several of her heart failure fellows through the Master's program, one of whom, Dr. Stephanie Poon, is now a member of the Department of Medicine in the CQI

job description. Most recently, Dr. Sanjeev Sockalingam in the Department of Psychiatry (based at UHN) has joined C-QulPS as a core faculty member and teaches in our EQUIP Academic Certificate Program. Finally, the nature of our research on optimal strategies for teaching and assessing QI/PS skills has led to collaborations with members of the internationally-renowned Wilson Centre for medical education housed at UHN.

St. Michael's Hospital has sent a comparable number of its staff, including physicians, nurses, and physiotherapists, through our educational programs. However, we also have had connections with St Michael's through the fellowship in QI run there. We partnered in its launch as a parallel to our Certificate Course (led by Dr. Chris Hayes, a former core member who has since moved to McMaster to take a leadership position at one of its core hospitals). Though we do not participate in running that fellowship any more, we do occasionally give guest lectures in it, and it is part of the evaluation we are conducting of QI/PS training programs funded by a grant from the Royal College (described in the *Research* section). More generally, we have had some research collaborations with St. Michael's Hospital because one of our core members (Lianne Jeffs, RN PhD) is based there and supported a post-doctoral fellowship for our Education Scientist, Dr. Joanne Goldman, during her first year at C-QulPS.

Finally, C-QulPS has partnered with the Quality Improvement and Patient Safety Operational departments at a number of the academic hospitals to deliver City Wide Quality Improvement and Patient Safety Rounds, with rotating host sites and broadcasts to the other participating hospitals using the Ontario Telemedicine Network.

## EXTERNAL RELATIONSHIPS

### HEALTH QUALITY ONTARIO (HQO)

While the most obvious partnership with HQO revolves around the planning and coordination of the Annual

Quality Improvement and Patient Safety Forum (QIPSF), which attracted over 500 attendees (which is roughly double the number of attendees that used to attend our annual symposium which the forum replaced) in its first year and was a huge success, C-QuIPS members have been called upon as expert advisors and committee members to advance HQO strategic priorities and activities. Examples include supporting the IDEAS program as well as several expert advisory committees (Dr. Kaveh Shojania) and involvement in the P4R Emergency Department Return Visit Quality Initiative (Dr. Olivia Ostrow). Dr. Tara Kiran (one of our core members) is also a CIHR Embedded Clinician Researcher with Health Quality Ontario.

### CANADIAN PATIENT SAFETY INSTITUTE (CPSI)

---

Numerous C-QuIPS members have played key leadership roles within the CPSI. Dr. Chris Hayes was the CPSI medical officer between 2008 and 2015, and chaired the Canadian Safe Surgery Lives program. He also played a critical role in establishing the CPSI Patient Safety Education Program, which has now trained hundreds of patient safety trainers for organizations across Canada. Emily Musing (Executive Director of Pharmacy, Clinical Risk at the University Health Network and one of our affiliate members) currently serves as a CPSI board member. Dr. Anne Matlow was also a CPSI board member during her tenure as an Associate Director of C-QuIPS. And, various staff and core members are frequently asked to provide expert advice, serve on various committees to support key CPSI initiatives (e.g., Dr. Ross Baker was a project team lead for the Pan-Canadian Home Care Safety study), or speak at their annual symposium.

### US AGENCY FOR HEALTHCARE RESEARCH AND QUALITY (AHRQ)

---

Dr. Kaveh Shojania has made meaningful contributions to AHRQ research and educational initiatives, including two websites PSNet and WebM&M, which receive approximately three million visits a year. C-QuIPS members Drs. Edward Etchells and Janice Kwan have

both contributed educational content to these online resources. Dr. Shojania was also on the editorial-board of the AHRQ-funded *Making Health Care Safer* (MHCS) initiative; the University of Toronto, through Dr. Shojania's involvement, was the only non-US institution that contributed to this report (the others being University of California, San Francisco/Stanford, UCLA-RAND corporation, and Johns Hopkins University).

### SOLUTIONS FOR PATIENT SAFETY (SPS)

---

The Hospital for Sick Children, led by Dr. Trey Coffey (former C-QuIPS Associate Director), became the first Canadian hospital to join SPS, a network of 100+ children's hospitals whose joint mission is to work together to eliminate serious harm across all children's hospitals. Recognizing Dr. Trey Coffey's exceptional leadership, SPS named her the Associate Clinical Director in 2017, a role which positions her on the core leadership team of this preeminent international patient safety collaborative.

### NATIONAL PATIENT SAFETY FOUNDATION (NPSF)

---

Dr. Kaveh Shojania co-chaired, along with Dr. Donald Berwick, an international expert panel convened by the NPSF to produce a report called *Free from Harm: Accelerating Patient Safety Improvement Fifteen Years after To Err Is Human*. This work also led to a *JAMA* publication involving Drs. Shojania and Berwick along with Dr. Tejal Gandhi, the CEO of NPSF. Dr. Shojania has also been an invited keynote speaker at the NPSF annual symposium (which draws about 2,000 attendees a year) in 2013, 2014, and 2015.

### CHOOSING WISELY CANADA (CWC)

---

Dr. Sacha Bhatia (C-QuIPS affiliate) and Dr. Brian Wong are the Evaluation and Medical Education Leads respectively for Choosing Wisely Canada. Many C-QuIPS members have played a lead role in chairing the creation of CWC lists for their respective national specialty societies. Furthermore, a number of C-QuIPS members have also led strategic initiatives on behalf of

Choosing Wisely Canada. For example, Drs. Jerome Leis and Christine Soong coordinated the creation of DIY (Do-It-Yourself) Implementation Toolkits.

### **ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF CANADA (RCPSC)**

---

C-QulPS members have played a critical role in supporting strategic priorities and activities relating to QI/PS, including providing expert advice on the integration of QI/PS into CanMEDS 2015. Dr. Brian Wong serves as a CanMEDS Clinician Educator, and leads a number of strategic initiatives that advance QI/PS education, including chairing the ASPIRE (Advancing Safety for Patients in Residency Education) Faculty Development program, chairing the International Building the Bridge to Quality Consensus Conference, and leading the successful creation of a national diploma program for QIPS (i.e., an Area of Focused Competence in QIPS). Dr. Anne Matlow also co-led a 2-day patient safety symposium in 2014, called Transitioning to Safe Care: Culture meets Competence, which resulted in the creation of a patient safety roadmap for the Royal College. Several C-QulPS members play an active role in supporting a number of these initiatives (e.g., ASPIRE—Drs. Hayes, Ginzburg, and Monteiro are core faculty; QI/PS Diploma—Dr. Hayes was a member of the working group).

### **ASSOCIATION OF AMERICAN MEDICAL COLLEGES (AAMC)**

---

Dr. Brian Wong has served on several AAMC committees related to QI education. He was the only Canadian representative on the Teaching for Quality (Te4Q) expert panel, and collaborated with colleagues from leading institutions across the United States to design and deliver the Te4Q faculty development program. He has also served as a member of the Integrating Quality (IQ) Steering Committee, and was recently invited to act as

the committee's vice-chair/chair-elect in 2017-2018. Drs. Brian Wong and Sanjeev Sockalingam have also collaborated with the AAMC as organizational members of the Aligning and Educating for Quality (ae4Q) initiative.

### **THE HEALTH FOUNDATION (HF)**

---

The Health Foundation (<http://www.health.org.uk/>) is one the largest endowed foundations in the UK focusing on health, spending approximately £30 million a year on projects, research, and training related to improving health and health care. Dr. Shojania has a relationship with the HF originally through his role as Editor of *BMJ Quality and Safety*, because the Foundation co-owns the journal with the BMJ Publishing Group (as part of the Foundation's mission to support QI). But, he has subsequently been an advisor on their Improvement Science Fellowship program and a frequent speaker at the scientific symposium funded by the HF the day preceding the annual International Forum for Healthcare held by the BMJ and the Institute for Healthcare Improvement.

### **MCMASTER UNIVERSITY AND UNIVERSITY OF WESTERN ONTARIO**

---

Both McMaster and Western incorporated the Co-Learning curriculum, developed at C-QulPS, as part of their Quality Improvement Strategy. Both of these universities have also sent junior faculty members through the Master's program, some of whom have become tutors in the Masters (e.g., Dr. Chris Hillis from Hematology and Dr. Shawn Mondoux from Emergency Medicine) or run the Co-Learning programs there (e.g., Dr. Hillis at McMaster and Dr. Alan Gob at Western).



## ANNUAL SYMPOSIUM

From 2013 to 2015, we continued to organize an annual patient safety and quality improvement symposium. Each year, the symposium attracted approximately 200 researchers, educators, clinicians, patient safety officers, and hospital executives from the Greater Toronto Area and around the province. The symposium offered high profile, prominent international keynote speakers, local presentations of innovative quality improvement and patient safety work, interactive breakout sessions, a poster and abstract competition and opportunities for networking. Keynote speakers included:

- ▶ **Dr. Christopher Landrigan**, Associate Professor of Medicine and Paediatrics, Harvard Medical School, Research and Fellowship Director, Inpatient Paediatrics

Service, Children’s Hospital Boston, delivered a presentation on the just recently published (at the time) I-PASS study (*New England Journal of Medicine*, 2014) he had led on a handoff intervention that reduced preventable adverse events, as well as other notable work he has published in high-impact journals on provider fatigue and temporal trends in adverse events over time.

- ▶ **Mary Dixon-Woods**, Professor of Medical Sociology and Director of the SAPHIRE group, Department of Health Sciences, University of Leicester, UK (now the RAND Professor of Health Services Research, Wellcome Trust Investigator and Co-Director, Cambridge Centre for Health Services Research, Cambridge University) delivered an exceptional overview of the various challenges that arise in evaluating major improvement efforts undertaken by hospitals and health systems.



- ◀ Drs. Christine Soong and Adina Weirnerman, Poster Award Winners at the 2012 C-QuIPS Symposium.

Drs. Ian Fraser, Chief of Staff at Michael Garron Hospital, and Conor McDonnell viewing posters at the Inaugural Quality Improvement and Patient Safety Forum in 2016. ▶



## EVOLUTION OF C-QUIPS SYMPOSIUM INTO LARGER QUALITY IMPROVEMENT AND PATIENT SAFETY FORUM (QIPSF)

In 2016, we partnered with Health Quality Ontario (the provincial health quality council) to deliver a larger annual event called the Quality Improvement and Patient Safety Forum (QIPSF) in place of our annual symposium. This partnership had many benefits for the Centre, the local and provincial QI/PS community.

- For C-QulPS, the partnership with HQO eliminated the cost of delivering the annual event (which had been in the order of \$30,000) and helped us reach a much larger audience than we had previously, when the 200 or so attendees each year mostly consisted of staff at the core teaching hospitals and a handful of people from outside Toronto who knew about C-QulPS.
- HQO found the partnership attractive because C-QulPS elevated the academic tenor of the meeting, identified speakers who tended to be prominent leaders in QI/PS, and delivered engaging and interactive workshop sessions.

The inaugural QIPSF event attracted over 500 attendees from across Ontario (a little more than double what we had in past years on our own) extending the reach and impact of our annual event.

Helen Bevan, the Director of Service Transformation at the NHS Institute for Innovation and Improvement, delivered a keynote address that examined some of the latest evidence and methods for spread and sustainability of change. Dr. Trey Coffey closed the day with a presentation illustrating key personal and organizational learning from SickKids' first two years of Caring Safely, its transformative safety journey. In addition to the engaging keynote addresses, 20 breakout sessions provided participants with opportunities to learn about various topics in health care quality, including larger didactic sessions, but also more hands-on workshops, including a very popular one for run charts and statistical process control targeting a non-beginner audience. A number

of alumni from our QI/PS courses as well the provincial IDEAS program found this a very useful session.

Based on the success of the Forum, in 2017, we partnered again with HQO to deliver a joint QIPSF. The event attracted an attendance of approximately 600. Dr. Bryan Sexton (Duke University), an internationally known researcher on teamwork, organizational culture, as well as burnout and resilience among health care workers, delivered a meaningful and important keynote address on building resilience. Drs. Tara Kiran (St. Michael's Hospital) and Kaveh Shojania gave the afternoon keynote on the Hot Topics in Patient Safety and Quality Improvement, selecting for the most influential and interesting papers in the literature in the primary care and acute care settings.

## C-QUIPS INVITED SPEAKER AND RESEARCH IN PROGRESS ROUNDS

Since 2013, C-QulPS has continued to deliver Invited Speaker Rounds and Research in Progress Rounds. The Invited Speaker Rounds have included a number of prominent visiting and local speakers discussing a range of quality improvement and patient safety topics.

Select speakers at our Invited Speaker Rounds included: Dr. Tobias Everett, Paediatric Anesthesiologist at SickKids; Dr. Aidan Halligan, visiting professor from UK and National Health Service's first Director of Clinical Governance and Deputy Chief Medical Officer for England; Dr. Yoel Donchin, Director of the Patient Safety Unit at Hadassah-Hebrew University Medical Center, Jerusalem, Israel; Dr. Martin Marshall, Professor of Healthcare Improvement at University College London; Dr. Sacha Bhatia, F.M. Hill Chair in Health System Solutions; Dr. Chris Hayes, Chief Medical Information Officer, St. Joseph's Healthcare Hamilton.

C-QulPS has also continued hosting Research in Progress Rounds to give the members of the Centre (especially junior faculty) the chance to present work at an early stage and receive feedback. Selected speakers for these rounds included Dr. Christine Soong, Dr. Lisa Hicks, Dr. Lianne Jeffs, Dr. Geetha Mukerji, Dr. Ilana Halperin,

Dr. Carol Fancott and Dr. Andrea Bishop. Many of the topics presented at these rounds in their initial phases developed into successful projects leading to hospital-wide implementations at TAHSN hospitals.

## CITY WIDE QUALITY AND SAFETY ROUNDS

In 2016, in an effort to improve synergy and decrease overlap, C-QuIPS partnered with Sunnybrook Health Sciences Centre, the Hospital for Sick Children, St. Michael's Hospital and the University Health Network

to design and deliver the City Wide Quality and Safety Rounds. In 2017, Mount Sinai Hospital joined the partnership as well. The rounds are delivered on a rotating basis at each of the partnering institutions and broadcast to the other institutions through the Ontario Telemedicine Network. Attendance for the rounds has consistently grown and the average ratings for the events have been consistently high.

Below is a list of events held through the collaboration of C-QuIPS with the hospital partners:

DATE	EVENT	HOSPITAL PARTNERS
May 11, 2017	<b>Fixing it for good:</b> How human factors informed design can create a safer, more resilient health system	➤ Joseph A. Cafazzo, PhD PEng and Anjum Chagpar, MHSc PEng
Feb. 9, 2017	<b>Discharge Before 1100:</b> Advancing a quality culture through team based discharge planning	➤ Lina Gagliardi MSW, RSW & Tracey DasGupta, RN, MN
Feb. 9, 2017	<b>Bridging the Divide between Health Professions Education and Quality Improvement</b>	➤ Brian Wong, MD, FRCPC
Jan. 12, 2017	<b>Choosing Wisely SMH:</b> Developing a grassroots approach to tackle overutilization in the hospital setting	➤ Lisa Hicks, MD, FRCPC, MSc
Dec. 8, 2016	<b>Beyond the Checklist:</b> Working to advance a culture of safety in the OR	➤ Carol-Anne Moulton, MBBS, PhD, FRACS
Nov. 10, 2016	<b>Improving Care for Patients with Dementia</b>	<ul style="list-style-type: none"> <li>➤ Mary-Lynn Peters, Nurse Practitioner</li> <li>➤ Deborah Brown, Nurse Practitioner, Senior Friendly Strategy</li> <li>➤ Florence Wong, Advanced Practice Nurse</li> <li>➤ Sarah Evans, Registered Nurse</li> <li>➤ Tanya Abji, Occupational Therapist</li> <li>➤ Tina Sahota, Physiotherapist</li> </ul>
Sept. 8, 2016	<b>Implementing Patient-Oriented Discharge Summaries (PODS)</b>	➤ Shoshana Hahn-Goldberg, Karen Okrainec, Jennifer Goodwin, Jullian Chen, Patrick O'Brien

# REPORT OF MEMBERS

We invited a mix of 26 core and affiliate members to provide input on the activities of C-QulPS through an anonymous online survey. We asked them to reflect on the successes and challenges of the Centre over the past five years and to provide suggestions for future directions (see below for survey questions). We selected participants to represent a range of professional backgrounds, nature of involvement with C-QulPS, and QI/PS roles and activities.

## MEMBER SURVEY QUESTIONS

- 1 Over the past 5 years what have been the successes and strengths of C-QulPS?
- 2 Over the past 5 years what have been the challenges and weaknesses of C-QulPS?
- 3 Moving into the next 5 years (during which time there will be a new director), do you have any suggestions for major new directions for C-QulPS or modifications to existing activities?

## SURVEY RESPONSES

### SUCCESSSES AND STRENGTHS OF C-QUIPS

As shown in the quotations below, in response to the question “Over the past 5 years what have been the successes and strengths of C-QulPS?”, respondents reported on the excellent education opportunities provided by C-QulPS. They referred specifically to the Certificate Course, our annual symposium, Co-Learning QI Curriculum, Master’s program, QI Workshops and EQUIP. These education programs were perceived to successfully engage people, in particular clinicians, interested in doing QI work. Though brief, the comments below clearly echo the

solicited testimonials of C-QulPS alumni quoted in the section on Education (Pages 20–22 and 25–26).

Respondents noted that the education programs support learning amongst participants as well as collaboration within and across divisions and departments. The education programs were seen to have been instrumental in the launching of academic faculty and interprofessional staff’s QI careers. Other perceived successes of C-QulPS were its creation of a network of professionals and experts in QI/PS and its strategic partnerships with Health Quality Ontario and IDEAS.

- “ Excellent education opportunities for those who are engaged in patient safety and who are involved with quality improvement work. ”
- “ The annual conference has been a huge success. Many people refer to this as their favourite conference. The C-QulPS certificate program is another success. ”
- “ Excellent educational content/format successful launch of QI careers for academic faculty and interprofessional staff ”
- “ -building collaboration with colleagues within and across divisions, departments through the educational programs -fostering an environment where we learn from each other (through educational programs) ”
- “ Teaching workshops and certificate courses and masters courses ”
- “ Engaging people ”

“ organized some robust educational programs for clinicians interested in doing QI work ”

“ stellar educational offerings, network of professionals/experts in QI and patient safety ”

## CHALLENGES AND WEAKNESSES OF C-QUIPS

All responses to “Over the past 5 years what have been the challenges and weaknesses of C-QulPS?” appear below verbatim. Respondents identified the challenge of accessibility to C-QulPS education programs due to factors such as geography (dispersion of the various clinical sites across the city) and resources. They also noted concerns about the ability of C-QulPS to keep up with the demand of learners and to provide support to members, given the limited bandwidth of leaders and core faculty. On the other hand, some members expressed the concern that they could not discern C-QulPS’ priorities beyond its educational activities of Co-Learning Curriculum and Certificate Course. This is an understandable impression in so far as we have historically focused more on educational activities. But, as the *Research* section outlines, we have a substantial research footprint. The issue has been that most research projects involve only one or two C-QulPS members working with non-C-QulPS colleagues. Although we have recently developed two major research projects involving multiple C-QulPS members, we clearly could do a better job disseminating this research to the C-QulPS community and, even more importantly, communicating opportunities for new research collaborations for core members.

A perceived weakness of C-QulPS was that it has been too physician- and hospital-focused, and that it should further focus on interprofessional learning and improvement science beyond physicians. This is a problem to which we have been attuned for years. In many places, physicians rarely participate in QI/PS activities—or, when they do, they are often the last ones to the table, with nurses, pharmacists and other health professionals showing much greater engagement with QI/PS. We set out to solve that problem—to interest more physicians in QI

and provide them with the skills to participate in or lead QI projects. As shown in the *Education* section, over 50% of the participants in the Certificate Course and Masters have been physicians (see page 19 and 25). And, in some departments, such as medicine and paediatrics, we have large numbers of faculty members with academic jobs explicitly focused on QI. Health care leaders from other cities and organizations such as Health Quality Ontario have routinely expressed their amazement over how many physicians we have at our events and in our programs. In the actual QI work these physicians do in their hospitals, the work remains multidisciplinary. But, for sure, our approach can give rise to the impression that C-QulPS is too physician-centric. Now that we have succeeded in addressing the tremendous disinterest in QI among most physicians, we will have to do a better job of balancing our membership and activities in terms of involvement from non-physicians. For instance, only three of our 13 core members are non-physicians (one PhD researcher in human factors engineering, one RN PhD nurse researcher, and one RN-QI specialist).

“ Not always accessible to everyone due to resource limitations, geography. ”

“ limited bandwidth of leaders and core faculty ”

“ -keeping up with the growing QI community and how to stay connected -unsure as to our priorities for actives besides Co-learning curriculum and certificate programs ”

“ Academic promotions pathway outside of Department of Medicine Common Understanding of Creative Professional Activity beyond grants and publications ”

“ Keeping up with the demand? ”

“ Supporting members better. ”

“ hospital-focused ”

“ Too physician-centric. A fundamental principle of QI is interdisciplinary approach/teamwork. Scholarly approach to improvement science need not be solely a physician pursuit. If we could find innovative and satisfying ways to learn together, it would advance system capacity. ”

## FUTURE DIRECTIONS

The verbatim responses to “Moving into the next 5 years (during which time there will be a new director), do you have any suggestions for major new directions for C-QulPS or modifications to existing activities?” appear below. In addition to continuing with its education programs, respondents identified opportunities for C-QulPS to strengthen its leadership and advocacy activities. Respondents suggested that C-QulPS further foster collaboration, QI research and improvement collaboratives amongst its members. For example, C-QulPS could provide QI research infrastructure to junior faculty, such as methodological and statistical support and advice, and facilitate QI project work connections between trainees and faculty. Others were interested in C-QulPS providing resources or funding for QI work, such as member and graduate competitions for QI projects (e.g., provide funding to a successful project to spread to other organizations). These understandable suggestions mostly occur in the context of not realizing how little money C-QulPS receives—\$300,000 a year, from which we have to pay salaries for staff and support a number of partial physician salaries. As it is, we have to earn revenue to deliver the services we already offer.

Respondents also recognized an opportunity for C-QulPS to play more of an advocate role. Suggestions included supporting a formal CQI track beyond the Department of Medicine (i.e., replicating the formal job description created in the Department of Medicine in other major Departments); increasing collaboration with the Ontario Ministry of Health and Long-Term Care (MOHLTC) and Health Quality Ontario to influence Quality Improvement Plans, improvement priorities, reporting etc.; and promoting system process changes to facilitate QI (e.g., joint agreement on ethical standards, data handling among university-affiliated organizations). In fact, we

do work with HQO and some of our members work with the MOHLTC, but it is also difficult for a provincial organization (or the provincial government) to be seen to have too explicit a relationship with just one university.

“ I have no suggestions for major new directions but it would be nice to look into creating new opportunities for C-QulPS members to collaborate. ”

“ consider advocating for/supporting formal CQI track beyond Dept of Med ”

“ perhaps providing access to junior faculty to do QI work (resources, stats support, IT, students, etc)—consider a similar infrastructure like research institutes but for QI research (again, access to consultants who can provide methodological and statistical support/advice)—a way to pair trainees and faculty in projects (beyond co-learning curriculum). e.g, IM R2s have to do a research or QI block, is there a way to better connect the residents with faculty besides through the DOM catalogue ”

“ No. ” [i.e., no suggestion for major new directions or modifications]

“ More external dissemination and recognition. ”

“ how about increasing collaboration with MoHLTC and HQO to influence QIPs, improvement priorities, reporting, etc ”

“ What has been accomplished is phenomenal. I think the integration with IHPME, HQO and IDEAS has been especially successful. I would like to see new and innovative funding competitions for QI projects for former graduates or members. Perhaps even other ways to encourage partnerships and improvement collaboratives. Wouldn't it be great if a successful certificate project (that meets certain criteria) could be selected for a grant to facilitate spread to other organizations? Funds and faculty expertise could allotted—might also be a great QI research opportunity. Also how can C-QulPS advocate on system processes to facilitate QI? e.g. joint agreement on ethical standards, data handling among university affiliated organizations ”

# REPORT OF LEARNERS

We invited 22 individuals to provide input on their experiences as learners of C-QulPS through an anonymous online survey (questions below). We selected participants to represent a range of professional backgrounds, involvement with C-QulPS education programs, and QI/PS roles and activities.

## LEARNERS' SURVEY QUESTIONS

- 1 How has C-QulPS supported you as a learner (education programs, mentorship, coaching, continuing education...)?
- 2 What are your overall impressions of C-QulPS in terms of any of the following: education programs, research opportunities, faculty development, capacity building, advice or consultation supporting local improvement efforts, networking?
- 3 How has being involved with C-QulPS as a learner impacted you in your career?
- 4 Looking to the future, what recommendations do you have for how C-QulPS could further advance education in quality improvement and/or support learners in this area?

## C-QUIPS SUPPORT FOR LEARNERS

Respondents reported on their positive experiences as learners in the education and mentorship programs supported by C-QulPS. A Certificate Course learner commented that the course “gave me the skills to conduct quality improvement projects

and apply what I learned to the QI projects in my work”. A Master’s learner reported that the program “has provided me with a solid foundation in QIPS”. A rounds participant noted “the rounds offered via OTN webcast are an excellent way to stay connected to the CQI experts and a mainstay for me”. This learner further noted: “the annual conference is also an excellent way to facilitate face-to-face collaboration”. Learners also commented on the benefits of their participation in the VAQS program, continuing education for their organizations, and the monthly CQI sessions. A few of the learners highlighted the valuable mentorship that they have received from C-QulPS faculty. For example, one learner reported: “C-QulPS directors are subject matter experts and provide advice and consultation”.

## OVERALL IMPRESSIONS OF C-QUIPS

Respondents valued C-QulPS for its outstanding education and capacity building activities, staff, and networking opportunities. A respondent noted that “C-QulPS does a wonderful job of offering a variety of courses with different time commitments, allowing most interested candidates to find something that works for their schedule. Its capacity building is also second to none.” Similarly, another respondent wrote that “C-QulPS provides the highest calibre of QI education available in Ontario and likely beyond”. Respondents viewed C-QulPS as being instrumental in advancing QI projects through its support and “expert leadership and academic connections.” Respondents also valued the quality and commitment of the Centre and its staff, using the words organized, available, accessible, supportive, excellent, collaborative, and dedicated,

to describe them. Finally, respondents identified the valuable networking opportunities provided through C-QulPS, such as the following comment that: “The faculty and networking opportunities are remarkable. Particularly, I now have contacts in several Canadian hospitals that I created with my fellow classmates.” One respondent’s overall impression of C-QulPS is “lots accomplished and lots more is possible.”

### IMPACT OF C-QUIPS ON CAREER

In response to the question about how C-QulPS has impacted learners’ careers, respondents’ comments reflected the impacts at different career stages and on QI scholarly and practice activity, and the importance of a professional network.

Respondents noted that the education programs were important first steps and provided a foundation to build upon. A respondent also commented that the education brought a new focus to that individual’s academic career. These comments illuminate the opportunities for both early and advanced career clinicians. Respondents recognized the impact that C-QulPS education programs have had on their profiles in their organizations and in their academic promotions.

The following comments are examples of the ways in which involvement with C-QulPS as a learner has impacted on varied types of QI/PS activities:

- “Has given me a framework and practical experience making me more confident to initiate improvement initiatives. My involvement also provided me with a common language and expertise that will improve my capacity and efficiency as an actor in certain administrative roles (both in hospital and on national/provincial committees).”
- “Increases the expertise that I have in scholarly inquiry and I am applying this knowledge and experience to influence the quality of the improvement projects at my organization. In this year’s operational plan we will be

developing our advanced practice health professionals so that they can better support and mentor point of care staff to conduct feasible and relevant projects.”

- “Definitely helped me speak the language of QI. Conduct projects in a rigorous way to be able to show how our projects impact on patient care. Connected with Choosing Wisely through C-QulPS and developed a toolkit for CWC.”

Respondents recognized the critical role that networking through C-QulPS has had on their career activities and developments. As one respondent noted, C-QulPS “has positively impacted my career by connecting me with likeminded colleagues involved with QI and mentors who can guide me through my career.”

### FUTURE RECOMMENDATIONS

Future recommendations focused on C-QulPS education programs and strengthening opportunities for continued involvement in C-QulPS.

Respondents recommended continuing and expanding upon the education programs provided while maintaining a commitment to a “local feel”. Amongst the specific suggestions were to continue to market C-QulPS education programs broadly (e.g., surgical groups) and to offer the programs to interdisciplinary health professionals. It was also suggested that C-QulPS should consider tailoring its education programs to particular needs (e.g. individuals in clinical administration require systems level knowledge versus frontline project focused courses). One respondent reinforced the importance of the partnership with Health Quality Ontario to increasing sustainability. In addition, respondents wanted to see continued opportunities for alumni to be involved in educational opportunities, including speaking at rounds and teaching.

One respondent noted “More of what you are doing. C-quips is a high performing team of highly talented individuals. We need more of them.”



# FUTURE DIRECTIONS

The initial five-year review by Professor Charles Vincent (then from Imperial College, now at Oxford) and Dr. Ward Flemons (Calgary) included the following noteworthy passage:

“ The major risk to C-QulPS is the relatively small number of faculty that currently exists to carry the extensive education load that the Centre has taken on and the limited number of researchers currently involved with the centre. A number of those interviewees external to the Centre commented that it was clear that the Centre was ‘working on a shoestring’. The present model relies heavily on the commitment and dedication of a small number of staff with a very high workload; we do not regard this as sustainable in the next phase of the Centre’s evolution. The latter issue could be addressed through recruitment; however, the Centre can also capitalize on the reputation that it has developed to promote and foster collaboration among existing faculty members who may be affiliated with other important Faculty Centres or Institutes. We believe that some of these issues can be addressed by the Centre leaders themselves, but wider discussion is needed within the university and health care providers. There is clearly the potential to create a major international centre which will be of benefit to both the citizens and patients of Toronto and to the wider international community working in this area. However, this will require more stable funding, a dedicated infrastructure and an increase in senior leadership and administrative capacity within the Centre. Both university and health care providers need to consider whether this is a direction they wish to pursue and support. ”

Obtaining greater funding from either the University or two partner hospitals seemed impossible in the fiscal climate of recent years. And, involving more hospitals as financial contributors has not seemed like a promising strategy given the ongoing fiscal constraints (crises in some cases) facing most hospitals. Moreover, adding another partner hospital diminishes the branding for the two original partner hospitals.

While we have not made any great breakthroughs financially (our “shoestring budget” remains unchanged), we have mitigated the serious threat to burnout of our staff and core faculty through the following modest changes:

- We have grown our educational revenue sufficiently to bring on new staff.
- We have mentored some of the past participants who came through our educational programs and then joined the faculty so they could become

teachers in our programs and thus distribute the large educational workload among a larger group.

- Using the revenue from our educational programs, we hired a full-time education scientist which led to our bringing in our first grants directly to C-QulPS (rather than having them held by individual members in hospital-based research institutes).

Between having a full-time scientist with minimal teaching responsibilities and the slightly relaxed educational workload of Drs. Shojania, Wong, and other staff and core members, we plan to bring in more and larger grants in coming years. While we cannot use grants for salary support for the physicians in C-QulPS, we can aim for recouping the salaries of our full-time scientist and portions of other non-physician C-QulPS staff who support our research programs (e.g., Leahora Rotteau, PhD candidate and Lisha Lo, MPH both play active roles in research projects at C-QulPS).

While we are unlikely to ever receive direct financial support from any clinical departments, we have achieved some indirect forms of support, such as salary support for some of our core members to act as mentors or faculty advisors in the Department of Medicine, thus buying them out of some of their clinical time. The substantial salary support Drs. Shojania and Wong receive from the Department of Medicine also amounts to a form of support for C-QulPS, since the Department Chair, Dr. Gillian Hawker, accepts a substantial amount of blurring of the lines between work we do for the Department and the work we do for C-QulPS. The Department of Paediatrics has similarly partnered with us to provide joint financial support for some of its faculty members who are staff or core members of C-QulPS.

## CROSSROADS

At this point, we have achieved many successes. Our educational programs remain very popular and are regarded as assets by hospitals and departments at the UofT. We have also started to overlay a research program on our educational programs and our staff and core members continue to have productive research careers. But, we are at a crossroads.

One road would consist of taking our educational programs to a more clearly national and international scale. Not many places (possibly none) have the critical mass of clinicians with expertise in developing and executing successful QI projects as we do here in Toronto. Participants in our programs quickly see the difference between more superficial programs (“Quality improvement is important. Here’s what a PDSA cycle is, now go out and change the world.”) The fact that we are all active clinicians and have academic track records (i.e., publishing papers and obtaining grants) especially appeals to academic physicians. Thus, it seems possible to have a goal consisting of making UofT a place to which academic physicians from elsewhere come for training—much like McMaster trained a generation of physicians coming to its early EBM and clinical epidemiology courses in the 1980s and 90s. Eventually other prominent universities in the US caught up and became competitors. But, we could probably enjoy considerable success for some years with this sort of model.

We piloted the Excellence in QI Certificate Program (EQUIP) this year with this idea in mind. We charged \$6,500 per person for individuals to come for an intensive three-day workshop in August 2017, followed by distance learning and project coaching on a roughly monthly basis until a second two-day workshop in May 2018. We engaged nine members of C-QulPS as faculty in EQUIP so that the first cohort of 15 participants from across Canada and the US would have close attention but also in anticipation of accepting 25 participants next year.

The feedback from the participants has been universally positive and we have already received inquiries from colleagues of these participants about enrolling next year—even before we have sent out any advertisement. It does seem possible that we could bring in more revenue and gain an international reputation as a destination for clinicians who want to acquire skills in QI/PS.

The main downside to this road is that it would mean that we would probably all become more or less full-time educators/mentors in QI/PS. This would leave little time for any other sorts of activities. The hospitals and departments in Toronto would not suffer—we already provide them with clinicians equipped to tackle QI/PS project successfully and hold leadership positions related to QI/PS. But, the C-QulPS faculty would have little time for anything else. One of the reasons it is hard to do anything other than the teaching and mentorship once one goes down this road is that, unlike in other areas of academia, learners come with their own projects. They do not take on projects of the mentor/teacher. When someone comes here for the Master’s program, Certificate Course or EQUIP, they work on a project for their home institution, not a project in which the faculty member here has any vested interest. In other words, these learners do not serve as extenders for the faculty members at C-QulPS. Sure, it can be enjoyable to mentor people through these projects, but other than that and the modest remuneration from the course fees, there is not much else to show for it. And, there is no time for anything else once the numbers of participants and course offerings become so high.

The other road would probably consist of a pivot back to a more traditional research unit. We would use the

modest retained earnings we have saved up to invest more heavily in acquiring grants for specific research projects, thus growing the number of research assistants and full-time researchers at C-QulPS. This road need not be a completely traditional one. For instance, with some support from the Dean of the Faculty of Medicine, Dr. Trevor Young, Dr. Shojania and the Chair of the Department of Medicine have worked with the Department of Computer Science at the UofT (regarded as one of the top departments in the world) to recruit a computer scientist from MIT (currently finishing a post-doc at Google—she will arrive here in July 2018). We are splitting her salary with the Department of Computer Science and she will work with members of the Department of Medicine based at the Institute for Health System Solutions and Virtual Care (WIHV) at Women's College Hospital. This joint hire is part of a larger effort to foster collaboration between Computer Science and Medicine on work aimed at harnessing the rapid growth in consumer mobile technologies and 'big data' to improve health care quality and outcomes, especially for patients with chronic conditions. The intersection of health care with the contemporary consumer realities of "apps", wearables, and internet-enabled smart devices and advances in artificial intelligence promises to not only radically reframe our notions of the personalization of health, but also the research and entrepreneurial environments surrounding health care.

Successful existing models for centres of excellence in this space include the Center for Digital Health Innovation at UCSF or Health Innovation Manchester. Some senior academic leaders at the UofT believe there is still room to position UofT as a leader in this space, given its world class medical centres, one of the top departments of Computer Science in the world, and a rapidly developing local innovation ecosystem.

We have positioned C-QulPS so that we are not too committed down either road at this point, given that C-QulPS will need a new Director as of January 2019. The Dean of Medicine, the CEOs of the two partner hospitals, and other leaders in the UofT community involved with C-QulPS will want to consider which road is more promising when they select the next Director.

I (the Director) will just add this one personal note. As an expert first in patient safety and later in quality improvement, I have spent years giving talks and writing papers in which I emphasize that education is a weak 'change strategy.' The whole point of most QI is to come up with system changes that "make the right way to do something the easy way to do it". We will never achieve meaningful improvements in care if we rely on educating. It almost never works that well to begin with and is difficult to sustain since one needs to continually deliver the education over and over again to new crops of physicians.

On top of this evidence-based skepticism about the weakness of education as a vehicle for anything than transmitting knowledge, as opposed to changing behavior or achieving other quality goals, there is the simple fact that most educational innovations do not pan out (just like most clinical innovations do not). Yet, here we have seen several very successful educational programs not just continue, but really grow. I am not suggesting that this is because of any special educational talent on my part. Our programs have worked partly on the basis of a lucky confluence of factors: I was recruited more as a researcher to develop a Centre for Patient Safety and later QI more broadly and realized that research was unlikely to get us where the hospitals would want us to be (especially with the limited resources we had). And, I had the good fortune to have as colleagues several clinicians with expertise and experience doing QI projects who are gifted teachers and have backgrounds in medical education.

Whatever the exact reason for the successes we have had in education around QI, we do have them. It would seem a shame to lose these programs or let them stagnate through neglect by chasing after a more traditional form of research success (especially one currently being chased by so many people, namely 'big data', wearable apps, virtual care, and other forms of digital innovation).

All that said, maybe the right person or vision could allow us to have our cake and eat it, too—to take C-QulPS to a new level in which, possibly through a partnership with another existing UofT institute or just by growing C-QulPS—maintain a robust set of educational programs while also developing a research and innovation program on a much larger scale.



[www.cquips.ca](http://www.cquips.ca)

# Appendix A

## Core members of the Centre for Quality Improvement and Patient Safety

Core members with C-QuIPS are members of one of the University of Toronto Faculties with research, teaching, administrative, or other professional activities interests align with C-QuIPS' mission, and who are actively involved in research or educational activities with C-QuIPS. While their primary affiliation typically still lies with another Department or academic unit of some kind, core members participate in Centre educational and research activities in a consistent and robust manner. They typically have led sessions at symposia, frequently teach in educational offerings from the Centre, or frequently collaborate in research projects with other members of the Centre. They may also be asked to supervise or mentor trainees associated with C-QuIPS education programs.

Chaim Bell, MD, PhD  
Lianne Jeffs, RN, PhD, FAAN  
Tara Kiran, MD, MSc  
Martin A. Koyle, M.D., MSc, FAAP, FACS, FRCS (Eng.), FRCSC  
Janice L. Kwan, MD MPH  
Alexander Lo, MD, MSc, FRCPC  
Anne Matlow, MD, FRCPC  
Conor McDonnell, MB, MD, FFARCSI  
Rory McQuillan, MD  
Eric Monteiro, MD, MSc  
Marie Pinard, BscN, MSc  
Olivia Ostrow, MD, FAAP  
Gareth R. Seaward, MBBCh, MMed, MSc  
Sanjeev Sockalingam, MD, MHPE  
Christine Soong, MD, MSc, CCFP  
Patricia Trbovich, PhD

# Appendix B

## External Review 2013 (Reviewers: Charles Vincent and Ward Flemons)

### EXTERNAL REVIEW SUMMARY

The Centre has many strengths, chief among them are a small but very committed group of leaders including the Director and two Associate Directors. The education programs they have developed are very strong. The academic focus of the Centre's members has resulted in an impressive list of publications. Members of the Centre are helping to lead strategic and important education initiatives in the country. The Centre's reputation is enhanced by its Director being the Editor of a leading patient safety / quality journal. The strong support that the Centre receives from the Faculty of Medicine and, in particular, the Department of Medicine has clearly helped it to fulfill its mandate. The Centre enjoys excellent support from many of the academic teaching hospitals, in particular the two partnering hospitals, Sunnybrook Health Sciences Centre and the Hospital for Sick Children.

The reviewers did not have any substantial concerns with C-QuIPS based on the documentation that was provided and the interviews that were conducted. By design, the Centre has focused much of its time and energy on developing quality improvement / patient safety education courses and increasing its teaching capacity. This has been an effective strategy. There have been several important research grants obtained by members of the Centre; however, the Centre has not yet evolved to the point of developing interprofessional research themes or having enough administrative support to offer its members dedicated assistance in identifying grant opportunities or applying for research grants. The Centre will want to evaluate opportunities for developing programmatic research themes, to recruit faculty members, and to invest in research associates to support these themes.

The major risk to C-QuIPS is the relatively small number of faculty that currently exists to carry the extensive education load that the Centre has taken on and the limited number of researchers currently involved with the centre. A number of those interviewees external to the Centre commented that it was clear that the Centre was 'working on a shoestring'. The present model relies heavily on the commitment and dedication of a small number of staff with a very high workload; we do not regard this as sustainable in the next phase of the Centre's evolution. The latter issue could be addressed through recruitment; however, the Centre can also capitalize on the reputation that it has developed to promote and foster collaboration among existing faculty members who may be affiliated with other important Faculty Centres or Institutes. We believe that some of these issues can be addressed by the Centre leaders themselves, but wider discussion is needed within the university and healthcare providers. There is clearly the potential to create a major international centre which will be of benefit to both the citizens and patients of Toronto and to the wider international community working in this area. However, this will require more stable funding, a dedicated infrastructure and an increase in senior leadership and administrative capacity within the Centre. Both university and healthcare providers need to consider whether this is a direction they wish to pursue and support.

### 1. RELATIONSHIPS

The Centre is formally based in the Faculty of Medicine and has very strong support from senior Faculty who were unanimous in their praise for the achievements of the last five years, the personal energy and

commitment of the Centre team and the leadership of Dr. Shojanian. Chief Executives from associated hospitals were equally supportive and admiring of the progress that had been made by Centre's small team in providing training to large numbers of clinical staff. They recognized that the presence of the Centre available to all participating hospitals provides economies of scale and a level of expertise and high level training which would be difficult to provide within a single hospital. It is also clear that the Centre provides a focus for safety and quality improvement which, with its increasing international recognition, has helped to give safety and quality improvement a higher focus in both the university and the participating hospitals. It is fair to say that all the senior leaders who attended the review spoke with evident pride of the achievements of the Centre.

As is the case in many international centres, hospitals have been the major focus of attention. This was surely a correct judgment in the early years of the Centre. In the next phase, with appropriate support, it will be possible to consider a wider reach in family medicine and community care. There are also a number of other groups within the Toronto area (such as simulation centres) which share some of the objectives of the Centre. In the coming years, there is the potential for the Centre to more actively reach out to other groups and perhaps act as the focus of a wider coordination of safety and quality activities in the Toronto health system.

## **2. RESEARCH**

The Centre, by design, has not invested much time yet in developing a Centre-specific research agenda. Notwithstanding that, the individual members of the Centre have been very productive individually. The number of research publications by members of the Centre clearly place it ahead of other universities in Canada and comparable to high functioning centres whose focus is similar to C-QulPS elsewhere across the world. During its next five-year mandate, the Centre has the opportunity to develop a greater focus on coordinating and facilitating patient safety / quality improvement research at the University of Toronto by developing defined research themes and programs. This will be enhanced by the development of a PhD (and a research-based Masters) program.

The development of a stronger research agenda is of course consistent with the vision of the Faculty of medicine. However it also has strong support from the healthcare providers who see it as a desirable and natural evolution from the Centre being a provider of the training to an organization that provides leadership, research, focused high value training and international links.

## **3. EDUCATION**

By all accounts, the Centre has developed high quality and important educational programs that make the University of Toronto a clear leader nationally and clearly recognized internationally. It is clear that the Centre has exceeded its education mandate in the first five years of its existence. Future expansion plans are feasible now that its Master's degree program is able to train potential faculty members that can help share the teaching load over the next several years. The expanding number of graduates will also mean that local healthcare providers will increasingly be able to provide core training in safety and quality within their own organisations leaving the Centre to concentrate on training those who will themselves become leaders, trainers and researchers in the field.

As the Royal College incorporates patient safety and quality improvement competencies into its CanMeds framework, the Centre will play an important role in helping to define and coordinate the Faculty of Medicine's plan to meet the College's accreditation requirements for its post-graduate training program. Presumably, the Royal College's CanMeds initiative will also influence accreditation requirements for undergraduate medical training; the presence of the Centre will position the Faculty to effectively meet these requirements. Students who had attended the courses reported excellent educational experiences which

gave them a much broader view of their clinical roles, expanding their vision from the care of individual patients to also embrace the wider improvement of the healthcare system. Furthermore, they had also received mentoring from the Centre staff both during and after the courses. All however commented that it was clear that the staff were 'extremely stretched'.

#### **4. ORGANIZATIONAL AND FINANCIAL STRUCTURE**

The Centre has a small number of faculty and support staff who currently use a small amount of space and can function within a simple organizational structure. Current financial support originates from the Faculty of Medicine and the two academic teaching hospitals. Additional revenue has come from some of the education courses that the Centre has created. However, the Centre does not receive revenue from the Master's degree program that it helped create in partnership with the IHPME. There have been some small donations received. Research grants that have been obtained by faculty members who are part of the Centre are used to support the individual projects but do not flow into the Centre and are not used to support the centre in any way. As the Centre grows and expands its educational and research agendas and takes on additional functions of coordinating, communicating and facilitating relationships between faculty members, current students and prospective students, it will require additional faculty members and administrative staff and therefore some more formal organizational structures plus additional revenue streams. Some possible places to look for additional revenue would include:

- a) academic health centres that benefit from the quality and patient safety education offered by the Centre
- b) Faculty partners (e.g. Nursing, Pharmacy)
- c) additional revenue from the courses offered by the Centre (including the current Master's degree program)
- d) philanthropy
- e) contracts / grants from the Ontario government, the Ontario Hospital Association, Canadian Patient Safety Institute
- f) research program grants

#### **5. LONG RANG PLANNING CHALLENGES**

C-QuIPS developed a clear and logical strategic plan as it started up. The plan is definitely consistent with the University's and Faculty's academic plan and has been followed with effective results. Going forward the leadership of this Centre recognize the need to renew its academic vision and develop a new five-year strategic plan that now will place more emphasis on creating a defined research agenda. Part of this renewed strategic plan will need to include updated thinking for garnering additional funding for the Centre to allow it to continue to meet its expanding education mandate and to develop a formal research agenda.

Although the Centre currently has space available within the academic hospitals that partner with the Faculty of Medicine to support it, additional space will be required that facilitates the development of additional, research-focused graduate programs (Masters and PhD) and a more dedicated research agenda.

Centre leaders and staff can, with partners, address some of the longer term challenges. However, a wider question also needs to be addressed by both university and by participating hospitals and other organisations. There is clearly the potential to create a major international centre which will be of benefit to both the citizens and patients of Toronto and to the wider international community working in this area. However, this will require more stable funding, a dedicated infrastructure and an increase in senior leadership and administrative capacity within the Centre. Both university and healthcare providers need to consider whether this is a direction they wish to pursue and support. Relatively small sums from a wider network of university and provider organisations could provide the more stable core funding for staff and infrastructure that the Centre needs to evolve to the next level.



## 6. INTERNATIONAL COMPARATORS

The Centre has developed effective education programs featuring a certificate program and a master's degree (in partnership with the Institute for Health Policy Management and Evaluation). Members of the Centre also participate in undergraduate and post-graduate teaching. The master's degree program in patient safety and quality improvement is one of only two available in Canada. Now in its second year, the program is admitting high quality candidates (the majority being physicians). The demand for the program is high and graduates who become members of the Centre will be able to increase the capacity for teaching. The education programs that the Centre is now able to offer clearly places the University of Toronto first among Faculties of Medicine in Canada as a leader in patient safety / quality improvement education.

In terms of research, the individual members of the Centre have a very good publication record and some already have an international reputation individually. However, the Centre has not as yet developed an overall research strategy (for understandable reasons) with a coherent set of research themes. Members of the Centre have participated in some important projects. However, the Centre does not yet seem to have evolved to the point of initiating or leading major programmes of research. This should not be seen as a criticism at this point in its evolution but should be an objective for the coming years.

## 7. CONCLUSION

### *Strengths*

The Centre has many strengths, chief among them are a small but very committed group of leaders including the Director and two Associate Directors. The education programs they have developed are very strong. The academic focus of the Centre's members has resulted in an impressive list of publications. Members of the Centre are helping to lead strategic and important education initiatives in the country. The Centre's reputation is enhanced by its Director being the Editor of a leading patient safety / quality journal. The strong support that the Centre receives from the Faculty of Medicine and, in particular, the Department of Medicine has clearly helped it to fulfill its mandate. The Centre enjoys excellent support from many of the academic teaching hospitals, in particular the two partnering hospitals, Sunnybrook Health Sciences Centre and the Hospital for Sick Children.

### *Concerns*

The reviewers did not have any substantial concerns with C-QuIPS based on the documentation that was provided and the interviews that were conducted. By design, the Centre has focused much of its time and energy on developing quality improvement / patient safety education courses and increasing its teaching capacity. This has been an effective strategy. There have been several important research grants obtained by members of the Centre; however, the Centre has not yet evolved to the point of developing interprofessional research themes or having enough administrative support to offer its members dedicated assistance in identifying grant opportunities or applying for research grants. The Centre will want to evaluate opportunities for developing programmatic research themes, to recruit faculty members, and to invest in research associates to support these themes.

The major risk to C-QuIPS is the relatively small number of faculty that currently exists to carry the extensive education load that the Centre has taken on and the limited number of researchers currently involved with the centre. A number of those interviewees external to the Centre commented that it was clear that the Centre was 'working on a shoestring'. The present model relies heavily on the commitment and dedication of a small number of staff with a very high workload; we do not regard this as sustainable in the next phase of the Centre's evolution. The latter issue could be addressed through recruitment; however, the Centre can also capitalize on the reputation that it has developed to promote and foster collaboration among existing

faculty members who may be affiliated with other important Faculty Centres or Institutes.

### *Recommendations*

1. The Centre should evolve its mission by further developing its research mandate. There are several approaches that could be pursued – first and foremost, the Centre should work towards creating opportunities for coordinating a graduate training program for PhD and thesis-based Master degree candidates.
2. The Centre should evolve its organizational structure to support its ongoing educational mandate and support an enhanced research mandate (see Recommendation 1). The Centre requires a Director to lead education and a Director to lead research with an Executive Director to provide overall leadership.
3. The Centre would benefit if the Faculty of Medicine promoted the approach adopted by the Department of Medicine to create academic positions whose focus was quality improvement / patient safety among all of its academic departments – this could diversify the membership of the centre leading to improved intraprofessional collaboration.
4. The Centre should take steps to strengthen its relationships with healthcare faculties (e.g. Nursing, Pharmacy) by creating some formal leadership / membership positions for interested and qualified faculty members; opportunities to strengthen relationships with other University centres / institutes.
5. The Centre should explore with leaders of physician practice plans, their willingness to contribute some time of a key physician who is able and willing to play a key leadership role in the education / research mandate of the Centre.
6. The Centre could benefit from an enhanced profile and needs to enhance its coordination and communication with its members, students, potential students and stakeholders. To accomplish this, the Centre should consider employing a communications specialist.
7. The Centre should explore options to offer quality improvement and patient safety education to healthcare managers, executives and board members.
8. The Centre should explore options to include one or more patients in its activities.
9. The Centre's Executive Committee should consider creating a task force to investigate options for increasing revenue for the centre – some suggestions to consider include:
  - contributions from each academic health centre (rather than just two) since all academic health centres benefit from the quality and patient safety education offered by the Centre
  - contributions from some key Faculty partners (e.g. Nursing, Pharmacy)
  - increased revenue from the courses that are offered by the Centre (including the current Master's degree program)
  - donations from philanthropists
10. There is clearly the potential to create a major international centre which will be of benefit to both the citizens and patients of Toronto and to the wider international community working in this area. However, this will require more stable funding, a dedicated infrastructure and an increase in senior leadership and administrative capacity within the Centre. Both university and healthcare providers need to consider whether this is a direction they wish to pursue and support.

### **Reviewers**

Charles Vincent PhD  
Professor of Clinical Safety Research  
Imperial College, London

W. Ward Flemons MD, FRCPC  
Professor of Medicine  
University of Calgary

# Appendix C

## Detailed comparison of C-QulPS education programs

<b>QI Workshop</b> C-QulPS Workshop in Quality Improvement	<b>QI Certificate</b> C-QulPS Certificate Course in QI & Patient Safety	<b>EQUIP</b> Excellence in QI Academic Certificate Program	<b>VAQS</b> Veterans Affairs Quality Scholars Program	<b>MSc in QIPS</b> IHPME Masters Concentration in QIPS
<b>Intended Audience</b>				
<ul style="list-style-type: none"> <li>Individuals with little/no background in QI wanting to acquire basic tools and principles for developing effective QI projects</li> <li>Participants can register individually, but workshops sometimes organized for groups of 25 from a single institution or department</li> </ul>	<ul style="list-style-type: none"> <li>Clinicians (physicians, nurses, therapists) or administrators (managers, quality leads) in either academic or community-based settings whose work relates to QIPS</li> <li>Trainees considering a QIPS focus in their future careers</li> </ul>	<ul style="list-style-type: none"> <li>Faculty members identified as the 'go-to' or lead person for QI working in academic departments or institutions</li> <li>Senior trainees wanting to make QI an academic career focus</li> <li>Directed primarily at participants outside of Toronto</li> </ul>	<ul style="list-style-type: none"> <li>Clinicians working in academic departments or institutions seeking a training program that offers opportunities to network with peers working in Toronto and the United States</li> <li>Senior trainees or junior faculty who have already completed an advanced degree in related fields (i.e., Informatics, Clin Epi, Med Ed, MBA) who want to supplement their training with formal QI</li> </ul>	<ul style="list-style-type: none"> <li>Similar to Certificate Course – physicians, nurses, therapists, managers and quality leads in a broad range of academic and community settings, but:</li> <li>Have a job with QIPS activities as a major focus and/or plan for an academic job focused on QIPS</li> <li>Participants come from across Canada</li> </ul>
<b>Program Format and Content</b>				
<ul style="list-style-type: none"> <li>1 full-day or 2 half-day workshops (typically offered between January and March)</li> <li>In-person sessions</li> <li>QI project planning and design (participants not expected to conduct a project)</li> </ul>	<ul style="list-style-type: none"> <li>20 half-day sessions delivered over 10 months (September to June)</li> <li>In-person sessions</li> <li>Longitudinal QI project with 1-on-1 faculty mentorship</li> <li>Upon completion, participants receive a certificate from the University of Toronto</li> </ul>	<ul style="list-style-type: none"> <li>5 full-day in-person sessions (3 days in July/Aug and 2 days in May/June)</li> <li>Webinars every 2 months in-between in-person sessions</li> <li>Longitudinal QI project with 1-on-1 faculty mentorship</li> <li>Upon completion, participants receive a certificate from the University of Toronto</li> </ul>	<ul style="list-style-type: none"> <li>Weekly 2-hour sessions delivered over two years</li> <li>Video-conferenced content from distance VA sites</li> <li>VAQS Summer Institute – participants from 8 VAQS hubs meet in-person for 1 week per year</li> <li>Participants conduct either a QI project or more traditional research project focused on a quality or safety topic</li> </ul>	<ul style="list-style-type: none"> <li>Year-long program with two 1-week intensive courses and monthly 3-day in-person courses / electives so participants do not need to interrupt their careers or training</li> <li>Longitudinal QI project with 1-on-1 project tutors</li> <li>Thesis stream allows deeper focus on a specific research project</li> </ul>
<b>Program Eligibility</b>				
<ul style="list-style-type: none"> <li>No eligibility requirements, but dates depend on interest</li> </ul>	<ul style="list-style-type: none"> <li>Applicants must submit a brief CV and 2 letters of reference (including one from an institutional sponsor or training program director)</li> </ul>	<ul style="list-style-type: none"> <li>Applicants must submit documentation attesting to the fact that they currently hold an academic appointment or are senior trainees on a clear track towards an academic position</li> </ul>	<ul style="list-style-type: none"> <li>Applicants must submit a CV as well as 2 letters of reference</li> </ul>	<ul style="list-style-type: none"> <li>Applicants should ideally have familiarity with QIPS or prior experience participating in QIPS initiatives</li> <li>Meet eligibility criteria for School of Graduate Studies (SGS) at the University of Toronto</li> </ul>
<b>Primary Organizer</b>				
<ul style="list-style-type: none"> <li>C-QulPS</li> </ul>	<ul style="list-style-type: none"> <li>C-QulPS</li> </ul>	<ul style="list-style-type: none"> <li>C-QulPS</li> </ul>	<ul style="list-style-type: none"> <li>VA Quality Scholars Fellowship Program (coordinated through Baylor College of Medicine)</li> </ul>	<ul style="list-style-type: none"> <li>Institute of Health Policy, Management &amp; Evaluation</li> </ul>
<b>Registration Fee / Tuition (CAD) – 2017-18 Rates (subject to change)</b>				
<b>\$800</b> Individual Registrations <b>\$15,000</b> Group Rate	<b>\$4500</b> Faculty/Staff <b>\$1750</b> Trainees <b>\$2750</b> Health Professionals	<b>\$6500</b> Individual Registrations	<b>\$1500</b> Individual Registrations (per year)	<b>\$7000</b> Canadian Residents

# Appendix D

## Description of MSc in QI/PS courses for 2016-2017 academic year

Course Name (code)	Description	Instructor(s)
Fundamentals of Improvement Science (HAD3010H)	The course introduces the Quality Improvement (QI) and Patient Safety program and the courses offered and a framework for successful projects. It provides an overview of the core concepts and methods of quality improvement science, using diagnostic tools to understand the root causes of quality gaps, building a theory for change, and an introduction to quantitative analyses for quality improvement projects. Successful quality improvement is also covered in the context of project management, project charters, stakeholder engagement and managing teams.	Ross Baker
Quality Improvement Methods (HAD3020H)	The course covers the basics of quality improvement methods including identifying and exploring quality improvement opportunities, testing, learning and implementing change, appraising the development and use of different approaches to the measurement, quality monitoring mechanisms and 'big dot' indicators; scalability and sustainability. Students learn how to apply experience based design and health literacy concepts. They also gain skills in applying statistical process controls to quality improvement data for the purposes of identifying true quality gaps and monitoring the impact of change.	Paula Blackstien-Hirsch
Concepts and Strategies in Patient Safety Systems (HAD3030H)	This course covers the nature and scale of harm in health care, reporting and learning systems, fundamental issues in human error and systems thinking, reliability science and its use in patient safety improvement and attributes of organizations that support safer care such as principles of a fair and just culture related to safety, health human resources and healthy work environments, engaged leadership, teamwork and communication within teams and across transitions points. Relevant applications of patient safety theory include discussions of the effectiveness of clinical interventions and system changes to improve safety, human factors design principles and healthcare simulation teams.	Kaveh Shojania & Anne Matlow
Project Practicum (HAD3040Y)	A key knowledge component and area for inquiry is the bridge between theoretical knowledge and the application of theory to practice. In the project course students exercise essential creative and critical thinking, break down and apply theoretical information, rigorously study the impact and sustainability of a change concept, and lead and communicate a quality improvement plan. Students also examine the critical issues and epistemology of relevant research methods, including qualitative and quantitative analyses required for quality improvement project.	Ross Baker & Kaveh Shojania
Leading and Managing Change (HAD3050H)	The program is designed to enhance individual leadership capacities and provide leadership tools for influencing organizational effectiveness. The course covers a self-assessment of personal leadership skills, change management theories and application; overcoming resistance to change and modeling the environment for change; leadership strategies using cases and role playing exercises; how to embed improvement and safety into practice at all levels; negotiation and conflict management, strategy alignment of quality from the top and from the bottom; innovation and design; definition of knowledge translation and its application to quality improvement and safety.	Tina Smith & Surjeet Rai-Lewis

Course Name (code)	Description	Instructor(s)
Quality Improvement in Health Systems (HAD3060H)	This course examines how systems thinking and organizational theory influence complex adaptive change and the strategies needed for spread and sustainability in the context of the Canadian health system and policy framework. The course covers broader systems issues related to healthcare funding and improvement; the strategic alignment of funding, concept of cost and quality; building a business case for quality initiatives, how to negotiate and advocate for quality in a multi-stakeholder environment, physician engagement and governance. The concepts of a systems perspective include the evolution of health regions, evolution of transparency in healthcare, review international developments in healthcare quality management and service improvement; Critically assess the development of policy on quality management and service improvement (Excellent Care for All Act).	Ross Baker & Chris Hayes
Legal and Regulatory Environment and Risk Management (HAD3070H)	The course covers the relationship between patient safety, quality improvement and risk management, legal and regulatory environment related to quality and safety, system failure and medical errors and methods and strategies for identifying and preventing adverse events. It includes an understanding of healthcare claims management, litigation process in the context of health care safety improvement culture and transparency, post incident investigations, root cause analysis, disclosure of critical incidents. This course builds on measurement principles and statistical process controls with examples of analyzing incident reports, identifying areas for improvement and using data to monitor patient safety and outcomes of care.	Polly Stevens & Kathleen Millar
LEAN Application in Healthcare (HAD3090H)	This course covers lean based concepts and methods used for quality improvement in healthcare and will build on the basics of quality improvement covered in the Fundamentals of Improvement Science and Quality Improvement Methods courses, including the application of basic Lean concepts and principles. This includes methods and tools required to design, implement, and sustain Lean process improvements from start to finish, beginning with an overview of the fundamentals and the roots of Lean improvement. It then delves into the A3 form and A3 thinking as well as approaches for sustaining change using visual management techniques at team and leadership levels.	Paula Blackstien-Hirsch & Ron Bercaw

# Appendix E

## Certificate Course syllabus for 2016-2017 academic year

Session	Title	Session Description	Speakers
1	Course Introduction, Core Concepts in Quality, Introduction to the Model for Improvement	This session provides a high-level overview of the course and provides participants with a current-day view of the field of quality improvement and patient safety (QIPS) and a look into how the field is evolving. It also provides an introduction to a quality improvement framework (Model for Improvement) that participants use to carry out their QI project as part of the certificate course.	<b>Kaveh Shojania, MD</b> <i>Director, C-QulPS</i>  <b>Brian Wong, MD</b> <i>Director, Certificate Course and Associate Director, C-QulPS</i>
2	Introduction to Safety and Introduction to Stewardship	This session introduces key definitions related to patient safety and helps participants to reflect on the challenges associated with adverse event reporting and addressing systems problems to address patient safety concerns. It also presents resource stewardship as a potential QI project target by highlighting successful interventions.	<b>Alene Toulany, MD</b> <i>Director, Certificate Course and Faculty Quality Improvement Advisor, C-QulPS</i>  <b>Brian Wong, MD</b> <i>Director, Certificate Course and Associate Director, C-QulPS</i>
3	Understanding your Problem	Participants learn about and apply QI tools (e.g., Fishbone diagram, process map, Pareto diagram) to diagnose quality gaps and further characterize them to inform future improvement activities. Participants also apply the ADKAR (Awareness-Desire-Knowledge-Ability-Reinforcement) framework to explore organizational readiness for change.	<b>Trey Coffey, MD</b> <i>Associate Director, C-QulPS and Medical Officer for Patient Safety, Hospital for Sick Children</i>  <b>Alene Toulany, MD</b> <i>Director, Certificate Course and Faculty Quality Improvement Advisor, C-QulPS</i>
Optional	Quality Improvement and Patient Safety Forum	This is an optional session where participants are strongly encouraged to attend the Forum co-developed by C-QulPS as well as the IDEAS program, support by Health Quality Ontario. In addition to attending sessions to learn about the latest in QIPS, the forum provided networking opportunities with others working in QIPS in Toronto and surrounding areas.	
4	Authentic use of Plan-Do-Study-Act (PDSA) cycles (Pt 1)  Introduction to Run Charts and Control Charts (Pt 2)	This session highlights the importance of authentically using PDSA cycles to iteratively refine an intervention and carry out small tests of change through the use of case examples of real-world QI projects. In part 2, participants learn about data variation, and develop s in data over time using run charts and SPC charts to understand whether an implemented improvement actually resulted in change.	<b>Jerome Leis, MD, MSc</b> <i>Medical Director, Infection Prevention and Control at Sunnybrook Health Sciences Centre and Faculty Quality Improvement Advisor, C-QulPS</i>
5	Leading Change	This session prepares participants to lead change by introducing them to Kotter's 8-Step Change model and encourages them to apply this model to a change relevant to their QI project. Participants also use a variety of tools to support strategies for change.	<b>Susan Lieff, MD, MEd, MMan</b> <i>Professor and Vice-Chair, Education, UofT Dept of Psychiatry and Director, New and Emerging Academic Leaders Program and Academic Leadership Development, Centre for Faculty Development, UofT Faculty of Medicine</i>

Session	Title	Session Description	Speakers
6	Measurement I – Quantitative Measures	Participants learn about the value and validity of small sample sizes as a sampling strategy in QI and how to avoid common measurement errors/pitfalls. They apply their learnings by developing a measurement plan for their QI project and receive peer and faculty feedback during the session.	<b>Edward Etchells, MD, MSc</b> <i>Medical Director, Information Services, Sunnybrook Health Sciences Centre and Senior Faculty Quality Improvement Advisor, C-Q-QulPS</i>
7	<i>Project Progress Updates and Feedback (Aim Statement, Rationale)</i>	This is the first of three project progress update sessions where course faculty and mentors provide participants with feedback on their QI projects (typically each group of 5-6 participants will have 1 course director and 3-4 course mentors). This session focuses on helping participants refine their project aim statements.	<b>Course Faculty and Mentors</b>
8	High Reliability Organisation and Safety Culture	Interspersed throughout the course, there are sessions focused on core patient safety topics. This session provides a general overview of safety culture and high-reliability organization principles. Participants apply the Just Culture model to a case example to distinguish between human error, at-risk behaviour and recklessness and the differential response required for each type of scenario.	<b>Trey Coffey, MD</b> <i>Associate Director, C-QulPS and Medical Officer for Patient Safety, Hospital for Sick Children</i>  <b>Alene Toulany, MD</b> <i>Director, Certificate Course and Faculty Quality Improvement Advisor, C-QulPS</i>
9	Process Mapping and LEAN	Participants develop an understanding of the LEAN process improvement methodology by working through real-life cases from various healthcare settings. They then reflect on their own project work and discuss different ways to apply LEAN concepts to their QI project work.	<b>Sam Sabbah, MD, MSc</b> <i>Assistant Medical Director, Emergency Department, University Health Network</i>
10	Introduction to Human Factors (Engineering)	This introductory session introduces participants to the field of human factors and how its tools and methods are used to identify patient safety hazards and address patient safety concerns. The session provides a high-level overview of a number of key concepts, and then focuses specifically on the Heuristic Evaluation method to evaluate interface designs.	<b>Patricia Trbovich, PhD</b> <i>Badeau Family Research Chair in Patient Safety and Quality Improvement, North York General Hospital and Academic Research Lead, Healthcare Human Factors Group, University Health Network</i>
11	Human Factors Engineering – Usability Testing	This session, a continuation of the previous, gives participants a chance to apply human factors concepts and methods to inform the design of reminders and order sets, two commonly used interventions in QI. Participants learn how to conduct usability testing by simulating ‘think-aloud’ testing on order sets currently in use at their organizations.	<b>Edward Etchells, MD</b> <i>Medical Director, Information Services, Sunnybrook Health Sciences Centre and Senior Faculty Quality Improvement Advisor, C-Q-QulPS</i>
12	<i>Project Progress Updates (Measures)</i>	This is the second of three project progress update sessions where course faculty and mentors provide participants with feedback on their QI projects (typically each group of 5-6 participants will have 1 course director and 3-4 course mentors). This session focuses on providing feedback on the measurement strategy and problem characterization activities currently underway.	<b>Course Faculty and Mentors</b>
13	Change Management – Lakeview Simulation	This full day session builds on the earlier Leading Change session and includes a simulation to help participants identify, understand and balance stakeholder interests. Kotter’s 8-Step Change model is re-visited as participants learn how to capitalize on change leverage points and testing out different strategies as part of the simulation.	<b>Tina Smith, MHSc</b> <i>Program Director, Masters in Health Administration UofT Institute of Health Policy, Management and Evaluation</i>

Session	Title	Session Description	Speakers
14	Measurement II - Qualitative Approaches	This session introduces key theoretical concepts relevant to qualitative research, and demonstrates their concrete application to the planning, implementation and evaluation of QI interventions. Participants explore how a qualitative lens can inform problem characterization and PDSA activities as they relate to their QI projects.	<b>Leahora Rotteau, PhD(c)</b> <i>Program Manager, C-QulPS</i>  <b>Joanne Goldman</b> <i>Research Education Lead, C-QulPS</i>
15	Teamwork, Communication and Handoffs	This session discusses the role of communication failures as the prime contributor to preventable harm and examines factors that impact effective communication in healthcare. Participants learn about different strategies to improve communication and resolve conflict and, in particular, the elements of high quality patient handoff.	<b>Trey Coffey, MD</b> <i>Associate Director, C-QulPS and Medical Officer for Patient Safety, Hospital for Sick Children</i>  <b>Alene Toulany, MD</b> <i>Director, Certificate Course and Faculty Quality Improvement Advisor, C-QulPS</i>
16	Patient Safety Incident Analysis	This session provides an overview of a patient safety incident management framework and engages participants in conducting an incident analysis using a case study. Issues related to adverse event disclosure are discussed in greater detail.	<b>Amir Ginzburg, MD</b> <i>Chief of Quality and Medical Director of Medical Administration, Trillium Health Partners</i>
17	<i>Project Progress Updates</i>	This is the last of the three project progress update sessions where course faculty and mentors provide participants with feedback on their QI projects (typically each group of 5-6 participants will have 1 course director and 3-4 course mentors). This session focuses on providing feedback on PDSA cycles and any barriers encountered as part of their QI projects.	<b>Course Faculty and Mentors</b>
18	Patient Engagement in Quality Improvement & Patient Safety	This session introduces participants to the key concepts & tools for engaging patients to design healthcare improvements. Using the Experience-Based Design framework, participants identify opportunities to redesign care processes based on the perspectives of patients and families.	<b>Paula Blackstien-Hirsch, MSc, MHSc</b> <i>Principal, Quality thru Improvement and Core Faculty, Masters Concentration in Quality Improvement and Patient Safety, UofT Institute of Health Policy, Management and Evaluation</i>
19	Informatics in Patient Safety and Quality Improvement  Better has no limit – towards a learning health care system	The first half of the session introduces participants to high-level health informatics (IT) principles, and provides a number of practical suggestions for how to successfully utilize IT to improve quality and patient safety.  The second half of the session describes the role of the Ontario Ministry of Health and Long Term Care in setting the provincial quality agenda, the key features of the Excellent Care For All Act (ECFAA), and enlists participants to compare and contrast the pros and cons of top-down versus bottom-up approaches to QI.	<b>Trevor Jamieson, MD, MBI</b> <i>Physician Lead for Virtual Care, Women's College Hospital Institute for Health System Solutions and Virtual Care (WIHV)</i>  <b>Irfan Dhalla, MD, MSc</b> <i>Vice-President, Health Quality Ontario</i>
20	QI Teaching and Academic Opportunities— Making QI scholarly	This session helps participants to reflect on the intersection between QI and health professions education and takes them through the design of a workshop focused on teaching QI (e.g. conducting a needs assessment, writing learning objectives and integrating interactive teaching techniques)	<b>Brian Wong</b> <i>Director, Certificate Course and Associate Director, C-QulPS</i>



Session	Title	Session Description	Speakers
21	Certificate Course Capstone <i>Final Project Presentations</i>	The course culminates in a Capstone Day, a celebration of all that has been accomplished over course of the year. Past participants serve as keynote speakers, who provide insights into how they used what was learned in the course to advance their careers and QI goals. Participants deliver 'fun' 1-minute elevator pitches to promote interest in their QI projects, and then present their posters to their peers, mentors, sponsors and course faculty.	<b>Keynote Speakers:</b> <b>Deborah Schonfeld, MD</b> <i>Assistant Professor, Department of Pediatrics, UofT, Staff Physician, Division of Emergency Medicine, Sickkids</i>  <b>Meiqi Guo, MD, MSc</b> <i>Physiatrist, UHN - Toronto Rehab, Lecturer, Division of Physical Medicine and Rehabilitation, UofT</i>  <b>Jessica Ng, MSc</b> <i>Quality Improvement Specialist, HQO</i>



Department	Training Program	2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017	
		Faculty	Trainees	Faculty	Trainees	Faculty	Trainees	Faculty	Trainees	Faculty	Trainees	Faculty	Trainees
Surgery	29 Orthopaedic Surgery	0	0	0	0	0	0	1	0	2	9	2	9
	30 General Surgery	0	0	0	0	0	0	2	0	3	17	3	13
	31 Vascular Surgery	0	0	0	0	0	0	1	0	2	2	1	3
	32 Neurosurgery	0	0	0	0	0	0	1	0	1	5	1	4
	33 Cardiovascular Surgery	0	0	0	0	0	0	1	0	0	3	0	1
	34 Plastic Surgery	0	0	0	0	0	0	0	0	0	4	1	6
	35 Urology	0	0	0	0	0	0	0	0	1	4	1	5
	36 Ophthalmology	0	0	0	0	0	0	0	0	10	27	0	0
	37 Obstetrics & Gynecology	0	0	0	0	0	0	0	0	0	0	3	13
38 Otolaryngology	0	0	0	0	0	0	0	0	0	0	1	5	
LM&P	39 Medical & Clinical Microbiology	0	0	0	0	0	0	0	0	2	7	2	6
<b>TOTAL</b>		<b>10</b>	<b>14</b>	<b>21</b> <b>13</b> <b>(new)</b>	<b>68</b>	<b>19</b> <b>2</b> <b>(new)</b>	<b>73</b>	<b>40</b> <b>25</b> <b>(new)</b>	<b>100</b>	<b>67</b> <b>27</b> <b>(new)</b>	<b>231</b>	<b>63</b> <b>30</b> <b>(new)</b>	<b>209</b>

# Appendix G

## EQUIP session descriptions and evaluations – August 2017

### Day 1

Session Name	Session Description	Evaluation Score (out of 10)
<b>Why many projects fail and what to do about it</b>	The opening session walks participants through a completed QI project, and highlights 11 common pitfalls that participants should avoid when leading QI projects	9.8
<b>Advanced knowledge in measurement for QI and the power of small samples</b>	Emphasis placed on developing a QI measurement plan that includes a family of measures that address key QI project elements, including problem theory, fidelity, and unintended consequences. Participants also learn to defend the use of small sample sizes in identifying local QI problems.	9.7
<b>Advanced diagnostic tools for QI</b>	Through the use of a highly interactive, hands-on exercise, participants apply commonly used QI tools – process map, Ishikawa diagram, Pareto chart – to characterize the process of donning and doffing personal protective equipment. Group reflection reinforces their intended use and application to their QI projects.	9.4
<b>Strategic selection of QI projects to maximize impact and success</b>	Participants are introduced to a framework that includes key project-related considerations (scope of the problem, availability of effective solutions, implementation issues, alignment with local interests) as well as key academic considerations (likelihood of publication, novelty of the intervention, opportunity to acquire a new skill, supervisor factors) to strategically select a QI project.	10

#### What did you like most about this day's sessions?

- Presentations were focused and simple and got the key messages across
- Practical instruction on tools of QI (Ishikawa, Pareto, process map, etc.)
- Very good speakers with real world examples
- Excellent faculty; practical tips

#### What new knowledge/skills/tools did you gain and how will you apply it?

- Frameworks to decide on a project
- How to think about/plan out a QI intervention before actually starting
- The importance of fidelity – will apply [this concept] early in QI projects

### Day 2

Session Name	Session Description	Evaluation Score (out of 10)
<b>Beyond the Model for Improvement – Authentic use of PDSA cycles</b>	Recognizing that many QI projects do not authentically apply PDSA, through the use of illustrative examples and completed QI projects, participants learn to appreciate that the primary intent of PDSA is learning and informed action, and that multiple PDSA cycles refine the intervention and lead to sustained improvement.	9.4
<b>PDSA – Anticipating problems and common pitfalls</b>	PDSA is often used to refine interventions and improve upon them. Through case-based discussions, participants apply a framework that considers missing ingredients, need to refine the intervention, or barriers to implementation – these then drive decisions around what to measure for any given PDSA cycle.	9.9
<b>Ethical considerations in QI work</b>	Focusing on answering the question “How do I carry out my QI work ethically?”, participants consider real-world scenarios and discuss the relevant ethical considerations and mitigation strategies. Key ethical considerations discussed include data privacy and confidentiality, informed consent, involvement of trainees and learners, conflict of interest and dissemination of results (including tips for how to prepare for peer-reviewed publication).	9.6
<b>User-centered design and the role of human factors</b>	Building upon the earlier session on Advanced Diagnostics, participants return to the Personal Protective Equipment (PPE) exercise and re-design a PPE removal station to encourage proper removal of PPE to illustrate core user-centered design principles.	9.9

Session Name	Session Description	Evaluation Score (out of 10)
<b>Introduction to teaching QI</b>	Participants discuss how medical education intersects with quality improvement, and reflect on the importance of integrating discussions about healthcare quality into the day-to-day clinical care of patients. During the session, they develop QI teaching scripts that they can use to create 'teachable QI moments' during their daily clinical supervision practices.	9.9

**What did you like most about this day's sessions?**

- Interactive sessions
- Really enjoyed teaching QI – as a new faculty and beginning in QI this was very instructive Very good speakers with real world examples
- Liked the simulation process improvement

**What new knowledge/skills/tools did you gain and how will you apply it?**

- Insert QI into teachable moments with residents
- Thinking hard about PDSAs
- Many points about ethics

## Day 3

Session Name	Session Description	Evaluation Score (out of 10)
<b>Evaluating your QI impact (run and control charts)</b>	Participants learn how to interpret both run and control charts to determine whether a QI initiative has resulted in an improvement. Participants construct and interpret run charts to demonstrate the added value of analyzing data over time as compared to a simple before-after comparison. We then used audience response polling to reinforce definitions such as attribute vs variable data, area of opportunity, and proportion vs rates, and linked this to a framework for selecting an appropriate control chart based on the way that data is represented.	9.8
<b>Leading change for QI</b>	Through exploration of several commonly-used frameworks for change (Kotter's 8 Steps, ADKAR, Highy-Adoptable QI), participants consider barriers to change, reflect on key stakeholders for their QI projects, and reflect on the different strategies needed for technical as opposed to adaptive changes. The session concludes with an exercise to prepare participants to better engage resistors to change.	9.7
<b>Disseminating your QI work</b>	Course director and BMJ Quality and Safety editor Kaveh Shojania brings his many years of editorial experience and imparts a number of key tips to support effective writing (illustrated through group peer review of mock QI project abstracts). Participants consider the importance of 'writing the abstract first' as a strategy both to identify QI project red flags	10
<b>Participant Project Feedback Session</b>	A pair of faculty members break out with 4-5 participants to discuss their project ideas and provide them with feedback. This session prepares EQUIP participants to take the next steps on their projects. To support initial stages of project work, participants are provided a project template that includes an illustrative example of a completed QI project to	9.8

**What did you like most about this day's sessions?**

- Really appreciated the leading change session – very practical
- Really interesting talk about statistical methods! Super engaging. Being able to present and get feedback
- Group discussions

**What new knowledge/skills/tools did you gain and how will you apply it?**

- Change thoughts unique; learned a lot about charts and data
- How to adjust my attitude when seeking stakeholder support
- Ideas for writing + where to submit work

# Appendix H

Method and search strategies used for estimating total publications related to QI/PS for C-QuIPS, University of Texas at Houston Memorial Hermann Center for Healthcare Quality and Safety, Northwestern University and Johns Hopkins University

## C-QuIPS

For C-QuIPS, we performed one search restricted to the 9 members who have held titles positions within C-QuIPS— Kaveh Shojania (Director), Trey Coffey (Associate Director, SickKids), Brian Wong (Associate Director, Sunnybrook), Edward Etchells (former Associate Director, Sunnybrook and Senior Faculty Quality Improvement Advisor), Jerome Leis (Faculty Quality Improvement Advisor), Alene Toulany (Faculty Quality Improvement Advisor), Ross Baker (Director of Graduate Studies), Joanne Goldman (Research Education Lead and Postdoctoral Fellow) and Leahora Rotteau (Program Manager and PhD Candidate) along with 16 core members.

### Search strategy in PubMed

kaveh shojania[au] or shojania KG[au] or brian m wong[au] or maitreya coffey[au] or baker GR[au] or edward etchells[au] or etchells e[au] OR ((brian wong[au] or ross baker[au] or jerome leis[au] or edward etchells[au] or alene toulany[au] or leahora rotteau[au] or joanne goldman[au] or chaim bell[au] or lianne jeffs[au] or tara kiran[au] or alexander lo[au] or rory mcquillan[au] or eric monteiro[au] or christine soong[au] or sanjeev sockalingham[au] or conor mcdonnell[au] or olivia ostrow[au] or gareth seaward[au] or patricia trbovich[au] or anne matlow[au] or marie pinard[au] or martin koyle[au] or janice kwan[au]) AND (Toronto OR Quality Indicators, Health Care[mh] OR Quality Assurance, Health Care[mh] OR Total Quality Management[mh] OR Quality Improvement[mh] OR Quality of Health Care[mh] OR Medical Audit[mh] OR Guideline Adherence[mh] OR benchmarking[mh] OR Disease Management[mh] OR medical error[mh] OR Diagnostic Errors[mh] OR iatrogenic disease[mh] OR Medication Errors[mh] OR Electronic Health Records[mh] OR Attitude of Health Personnel[mh] OR Decision Support Techniques[mh] OR Decision Support Systems, Clinical[mh] OR Medical Order Entry Systems[mh] OR Organization and Administration[mh] OR Medical Informatics[mh] OR Professional Competence[mh] OR Clinical Competence[mh] OR Health Care Quality, Access, and Evaluation[mh] OR safety[ti] OR quality[ti] OR performance[ti] OR error[ti] OR value[ti] OR appropriate\*[ti] OR inappropriate\*[ti]) AND (patient safety[MeSH] OR quality improvement[MeSH] OR safety[tw] OR quality[tw] OR improv\*[tw]))

Restricted to "From 2012/10/01 to 2017/08/23"

### C-QuIPS Publications

1. Sargeant J, **Wong BM**, Campbell CM. CPD of the future: a partnership between quality improvement and competency-based education. *Med Educ*. 2017 Oct 6. [Epub ahead of print]
2. **Koyle MA**, Koyle LCC, **Baker GR**. Quality improvement and patient safety: Reality and responsibility from Codman to today. *J Pediatr Urol*. 2017 Aug 3. [Epub ahead of print]
3. Yermak D, Cram P, **Kwan JL**. Five things to know about diagnostic error. *Diagnosis*. 2017;4(1):13-5.
4. Wong NC, **Koyle MA**, Braga LH. Continuous antibiotic prophylaxis in the setting of prenatal hydronephrosis and vesicoureteral reflux. *Canadian Urological Association Journal*. 2017;11(1-2Suppl1):S20-S4.
5. **Wong BM**, **Goldman J**, Goguen JM, Base C, **Rotteau L**, Van Melle E, Kuper A, **Shojania KG**. Faculty-Resident "Co-learning": A Longitudinal Exploration of an Innovative Model for Faculty Development in Quality Improvement. *Academic Medicine*. 2017;92(8):1151-9.

6. **Wong BM**, Ginsburg S. Speaking up against unsafe unprofessional behaviours: the difficulty in knowing when and how. *BMJ Qual Saf.* 2017.
7. **Wong BM, Coffey M**, Nousiainen MT, Brydges R, McDonald-Blumer H, Atkinson A, Levinson W, Stroud L. Learning Through Experience: Influence of Formal and Informal Training on Medical Error Disclosure Skills in Residents. *J Grad Med Educ.* 2017;9(1):66-72.
8. Wajchendler A, Anderson P, **Koyle MA**. The transition process of spina bifida patients to adult-centred care: An assessment of the Canadian urology landscape. *Can Urol Assoc J.* 2017;11(1-2Suppl1):S88-S91.
9. **Trbovich P, Shojanian KG**. Root-cause analysis: swatting at mosquitoes versus draining the swamp. *BMJ Qual Saf.* 2017;26(5):350-3.
10. Tran K, **Bell C**, et al. The Effect of Hospital Isolation Precautions on Patient Outcomes and Cost of Care: A Multi-Site, Retrospective, Propensity Score-Matched Cohort Study. *J Gen Intern Med.* 2017;32(3):262-8.
11. Stagg A, Lutz H, Kirpalaney S, Matelski JJ, Kaufman A, **Leis J**, et al. Impact of two-step urine culture ordering in the emergency department: a time series analysis. *BMJ Qual Saf.* 2017.
12. Silver SA, Harel Z, McArthur E, Nash DM, Acedillo R, Kitchlu A, Garg AX, Chertow GM, **Bell CM**, et al. 30-Day Readmissions After an Acute Kidney Injury Hospitalization. *Am J Med.* 2017;130(2):163-72 e4.
13. **Shojanian KG**, Dixon-Woods M. Estimating deaths due to medical error: the ongoing controversy and why it matters. *BMJ Qual Saf.* 2017;26(5):423-8.
14. **Shojanian KG**, Dixon-Woods M. Estimating preventable hospital deaths: the authors reply. *BMJ Qual Saf.* 2017;26(8):694.
15. Sharma A, Lo V, Lapointe-Shaw L, **Soong C**, et al. A time-motion study of residents and medical students performing patient discharges from general internal medicine wards: a disjointed, interrupted process. *Intern Emerg Med.* 2017 Mar 27. [Epub ahead of print]
16. Sears NA, Blais R, Spinks M, Pare M, **Baker GR**. Associations between patient factors and adverse events in the home care setting: a secondary data analysis of two Canadian adverse event studies. *BMC Health Serv Res.* 2017;17(1):400.
17. Sasangohar F, Donmez B, Easty AC, **Trbovich PL**. Effects of Nested Interruptions on Task Resumption: A Laboratory Study With Intensive Care Nurses. *Hum Factors.* 2017;59(4):628-39.
18. Santos JD, Lopes RI, **Koyle MA**. Bladder and bowel dysfunction in children: An update on the diagnosis and treatment of a common, but underdiagnosed pediatric problem. *Can Urol Assoc J.* 2017;11(1-2Suppl1):S64-S72.
19. Reeves S, Pelone F, Harrison R, **Goldman J**, et al. Interprofessional collaboration to improve professional practice and healthcare outcomes. *The Cochrane database of systematic reviews.* 2017;6:CD000072.
20. Redelmeier DA, **Etchells EE**. Unwanted patients and unwanted diagnostic errors. *BMJ Qual Saf.* 2017;26(1):1-3.
21. Perl J, McArthur E, **Bell C**, et al. Dialysis Modality and Readmission Following Hospital Discharge: A Population-Based Cohort Study. *Am J Kidney Dis.* 2017;70(1):11-20.
22. Okrainec K, Lau D, Abrams HB, Hahn-Goldberg S, Brahmabhatt R, Huynh T, Lam K, **Bell CM**. Impact of patient-centered discharge tools: A systematic review. *J Hosp Med.* 2017;12(2):110-7.
23. Moayedi Y, Schofield T, **Etchells E**, Silver SA, Kobulnik J, McQuillan R, **Bell C**, et al. Closing the Care Gap: A Primer on Quality Improvement for Heart Failure Clinicians. *Circ Heart Fail.* 2017;10(5).
24. Mery G, Dobrow MJ, **Baker GR**, et al. Evaluating investment in quality improvement capacity building: a systematic review. *BMJ Open.* 2017;7(2):e012431.
25. McIntyre C, **McQuillan R, Bell C**, Battistella M. Targeted Deprescribing in an Outpatient Hemodialysis Unit: A Quality Improvement Study to Decrease Polypharmacy. *Am J Kidney Dis.* 2017.
26. Lin YL, Guerguerian AM, Tomasi J, Laussen P, **Trbovich P**. Usability of data integration and visualization software for multidisciplinary pediatric intensive care: a human factors approach to assessing technology. *BMC Med Inform Decis Mak.* 2017;17(1):122.
27. **Leis JA, Shojanian KG**. A primer on PDSA: executing plan-do-study-act cycles in practice, not just in name. *BMJ Qual Saf.* 2017;26(7):572-7.

28. **Leis JA**, et al. Point-of-care Beta-lactam Allergy Skin Testing by Antimicrobial Stewardship Programs: A Pragmatic Multicenter Prospective Evaluation. *Clin Infect Dis*. 2017 Jun 1. [Epub ahead of print]
29. **Leis JA**. Advancing infection prevention and antimicrobial stewardship through improvement science. *BMJ Qual Saf*. 2017.
30. Lamb MJ, Baillie L, Pajak D, Flynn J, Bansal V, Simor A, Vearncombe M, Walker SA, Clark S, Gollish J, **Leis JA**. Elimination of Screening Urine Cultures Prior to Elective Joint Arthroplasty. *Clin Infect Dis*. 2017;64(6):806-9.
31. Kurdyak P, Vigod S, Duchon R, Jacob B, Stukel T, **Kiran T**. Diabetes quality of care and outcomes: Comparison of individuals with and without schizophrenia. *Gen Hosp Psychiatry*. 2017;46:7-13.
32. **Kiran T**, et al. The Impact of a Population-Based Screening Program on Income- and Immigration-Related Disparities in Colorectal Cancer Screening. *Cancer Epidemiol Biomarkers Prev*. 2017;26(9):1401-10.
33. Khan A, **Coffey M**, et al. Families as Partners in Hospital Error and Adverse Event Surveillance. *JAMA Pediatr*. 2017;171(4):372-81.
34. **Jefferies L**, et al. The Varying Roles of Nurses During Interfacility Care Transitions. *J Nurs Care Qual*. 2017 Feb 16. [Epub ahead of print]
35. **Jefferies L**, et al. Using Local Data to Improve Care and Collaborative Practice: Insights From a Qualitative Study. *J Nurs Care Qual*. 2017 Jun 23. [Epub ahead of print]
36. **Jefferies L**, Kulski K, Law M, Saragosa M, Espin S, Ferris E, Merkley J, Dusek B, Kastner M, **Bell CM**. Identifying Effective Nurse-Led Care Transition Interventions for Older Adults With Complex Needs Using a Structured Expert Panel. *Worldviews Evid Based Nurs*. 2017 Apr;14(2):136-144.
37. **Jefferies L**, et al. Exploring the utility and scalability of a telehomecare intervention for patients with chronic kidney disease undergoing peritoneal dialysis—a study protocol. *BMC Nephrol*. 2017;18(1):155.
38. Guan Q, Khoo W, Spithoff S, **Kiran T**, et al. Patterns of physician prescribing for opioid maintenance treatment in Ontario, Canada in 2014. *Drug Alcohol Depend*. 2017;177:315-21.
39. Gagliardi AR, Lehoux P, Ducey A, Easty A, Ross S, **Bell C**, **Trbovich P**, et al. "We can't get along without each other": Qualitative interviews with physicians about device industry representatives, conflict of interest and patient safety. *PLoS One*. 2017;12(3):e0174934.
40. Gagliardi AR, Ducey A, Lehoux P, Turgeon T, Ross S, **Trbovich P**, Easty A, **Bell C**, et al. Factors influencing the reporting of adverse medical device events: qualitative interviews with physicians about higher risk implantable devices. *BMJ Qual Saf*. 2017.
41. Firdouse M, Wajchandler A, **Koyle M**, Fecteau A. Checklist to improve informed consent process in pediatric surgery: A pilot study. *J Pediatr Surg*. 2017;52(5):859-63.
42. Feldman J, Davie S, **Kiran T**. Measuring and improving cervical, breast, and colorectal cancer screening rates in a multi-site urban practice in Toronto, Canada. *BMJ Qual Improv Rep*. 2017;6(1).
43. Evans JM, Brown A, **Baker GR**. Organizational knowledge and capabilities in healthcare: Deconstructing and integrating diverse perspectives. *SAGE Open Med*. 2017;5:2050312117712655.
44. **Coffey M**, et al. Resident Experiences With Implementation of the I-PASS Handoff Bundle. *J Grad Med Educ*. 2017;9(3):313-20.
45. **Coffey M**, Huang L. A single-centre hospital-wide handoff standardisation report: what is so special about that? *BMJ Qual Saf*. 2017;26(9):698-700.
46. **Coffey M**, Espin S, Hahmann T, Clairman H, **Lo L**, Friedman JN, **Matlow A**. Parent Preferences for Medical Error Disclosure: A Qualitative Study. *Hosp Pediatr*. 2017;7(1):24-30.
47. Chow SL, **Shojania KG**. "Rheum to Improve": Quality Improvement in Outpatient Rheumatology. *J Rheumatol*. 2017;44(9):1304-10.
48. Chan E, Hemmelgarn B, Klarenbach S, Manns B, Mustafa R, Nesrallah G, **McQuillan R**. Choosing Wisely: The Canadian Society of Nephrology's List of 5 Items Physicians and Patients Should Question. *Can J Kidney Health Dis*. 2017;4:2054358117695570.
49. Campbell RJ, El-Defrawy SR, Gill SS, Whitehead M, Campbell EL, Hooper PL, **Bell CM**, et al. New Surgeon Outcomes and the Effectiveness of Surgical Training: A Population-Based Cohort Study. *Ophthalmology*. 2017;124(4):532-8.



50. Brydges R, Stroud L, **Wong BM**, et al. Core Competencies or a Competent Core? A Scoping Review and Realist Synthesis of Invasive Bedside Procedural Skills Training in Internal Medicine. *Acad Med*. 2017 May 9. [Epub ahead of print]
51. Bai AD, Steinberg M, Showler A, Burry L, Bhatia RS, Tomlinson GA, **Bell CM**, Morris AM. Diagnostic Accuracy of Transthoracic Echocardiography for Infective Endocarditis Findings Using Transesophageal Echocardiography as the Reference Standard: A Meta-Analysis. *J Am Soc Echocardiogr*. 2017;30(7):639-46 e8.
52. Abuzeid W, Abunassar J, **Leis JA**, et al. Radiation safety in the cardiac catheterization lab: A time series quality improvement initiative. *Cardiovasc Revasc Med*. 2017;18(5S1):S22-S6.
53. **Wong BM**, Sullivan GM. How to Write Up Your Quality Improvement Initiatives for Publication. *J Grad Med Educ*. 2016;8(2):128-33.
54. **Wong BM**, Holmboe ES. Transforming the Academic Faculty Perspective in Graduate Medical Education to Better Align Educational and Clinical Outcomes. *Acad Med*. 2016;91(4):473-9.
55. Weizman AV, Mosko J, Bollegala N, Bernstein M, Brahmania M, Liu L, Steinhart AH, Silver SS, **Bell CM**, et al. Quality Improvement Primer Series: Launching a Quality Improvement Initiative. *Clin Gastroenterol Hepatol*. 2016;14(8):1067-71.
56. Vozoris NT, Wang X, Fischer HD, Gershon AS, **Bell CM**, et al. Incident opioid drug use among older adults with chronic obstructive pulmonary disease: a population-based cohort study. *Br J Clin Pharmacol*. 2016;81(1):161-70.
57. Vidarthi AR, **Coffey M**. Paperless handover: are we ready? *BMJ Qual Saf*. 2016;25(5):299-301.
58. Thomas A, Silver SA, Rathe A, Robinson P, Wald R, **Bell CM**, et al. Feasibility of a hemodialysis safety checklist for nurses and patients: a quality improvement study. *Clin Kidney J*. 2016;9(3):335-42.
59. Strudwick G, McGillis Hall L, Nagle L, **Trbovich P**. Understanding Nurses' Perceptions of Electronic Health Record Use in an Acute Care Hospital Setting. *Stud Health Technol Inform*. 2016;225:795.
60. Stockwell DC, Bisarya H, Classen DC, Kirkendall ES, Lachman PI, **Matlow AG**, et al. Development of an Electronic Pediatric All-Cause Harm Measurement Tool Using a Modified Delphi Method. *J Patient Saf*. 2016;12(4):180-9.
61. Stevens BJ, Yamada J, Promislow S, Barwick M, **Pinard M**. Pain Assessment and Management After a Knowledge Translation Booster Intervention. *Pediatrics*. 2016;138(4).
62. Steinberg M, Dresser LD, Daneman N, Smith OM, Matte A, Marinoff N, **Bell CM**, et al. A National Survey of Critical Care Physicians' Knowledge, Attitudes, and Perceptions of Antimicrobial Stewardship Programs. *J Intensive Care Med*. 2016;31(1):61-5.
63. Stang AS, **Wong BM**. Republished: Patients teaching patient safety: the challenge of turning negative patient experiences into positive learning opportunities. *Postgrad Med J*. 2016;92(1083):1-3.
64. Staiger TO, Mills LM, **Wong BM**, et al. Recognizing Quality Improvement and Patient Safety Activities in Academic Promotion in Departments of Medicine: Innovative Language in Promotion Criteria. *Am J Med*. 2016;129(5):540-6.
65. **Soong C**, Kurabi B, Exconde K, Tajammal F, **Bell CM**. Design of an orthopaedic-specific discharge summary. *BMC Health Serv Res*. 2016;16(1):545.
66. **Soong C**, Cram P, Chezar K, Tajammal F, Exconde K, Matelski J, Sinha SK, Abrams HB, Fan-Lun C, Fabbruzzo-Cota C, Backstein D, **Bell CM**. Impact of an Integrated Hip Fracture Inpatient Program on Length of Stay and Costs. *J Orthop Trauma*. 2016;30(12):647-52.
67. **Soong C**, **Bell C**. Response to: 'Recast the debate about preventable readmissions' by Sutherland et al. *BMJ Qual Saf*. 2016;25(5):388.
68. Silver SA, **McQuillan R**, Harel Z, Weizman AV, Thomas A, Nesrallah G, **Bell CM**, et al. How to Sustain Change and Support Continuous Quality Improvement. *Clin J Am Soc Nephrol*. 2016;11(5):916-24.
69. Silver SA, Harel Z, **McQuillan R**, Weizman AV, Thomas A, Chertow GM, Nesrallah G, **Bell CM**, et al. How to Begin a Quality Improvement Project. *Clin J Am Soc Nephrol*. 2016;11(5):893-900.
70. Shekelle PG, Sarkar U, **Shojania K**, et al. Patient Safety in Ambulatory Settings. Rockville (MD): Agency for Healthcare Research and Quality (US); 2016 Oct.
71. Seitz DP, Gill SS, Austin PC, **Bell CM**, et al. Rehabilitation of Older Adults with Dementia After Hip Fracture. *J Am Geriatr Soc*. 2016;64(1):47-54.

72. Sampson M, de Bruijn B, Urquhart C, **Shojania K**. Complementary approaches to searching MEDLINE may be sufficient for updating systematic reviews. *J Clin Epidemiol*. 2016;78:108-15.
73. Pariser P, Pus L, Stanaitis I, Abrams H, Ivers N, **Baker GR**, et al. Improving System Integration: The Art and Science of Engaging Small Community Practices in Health System Innovation. *Int J Family Med*. 2016:5926303.
74. Moriates C, **Wong BM**. High-value care programmes from the bottom-up... and the top-down. *BMJ Qual Saf*. 2016;25(11):821-3.
75. Morgan R, Katzman DK, Kaufman M, Goldberg E, **Toulany A**. Thanks for asking: Adolescent attitudes and preferences regarding the use of chaperones during physical examinations. *Paediatr Child Health*. 2016;21(4):191-5.
76. **McQuillan RF**, **Wong BM**. The SQUIRE Guidelines: A Scholarly Approach to Quality Improvement. *J Grad Med Educ*. 2016;8(5):771-2.
77. **McQuillan RF**, Silver SA, Harel Z, Weizman A, Thomas A, **Bell C**, et al. How to Measure and Interpret Quality Improvement Data. *Clin J Am Soc Nephrol*. 2016;11(5):908-14.
78. MacMillan TE, Slessarev M, **Etchells E**. eWasted time: Redundant work during hospital admission and discharge. *Health Informatics J*. 2016;22(1):60-6.
79. MacFadden DR, LaDelfa A, Leen J, Gold WL, Daneman N, Weber E, Al-Busaidi I, Petrescu D, Saltzman I, Devlin M, Andany N, **Leis JA**. Impact of Reported Beta-Lactam Allergy on Inpatient Outcomes: A Multicenter Prospective Cohort Study. *Clin Infect Dis*. 2016;63(7):904-10.
80. Levitt K, **Shojania KG**, Bhatia RS. Point-of-care decision support for reducing inappropriate test use: easier said than done. *BMJ Qual Saf*. 2016;25(1):6-8.
81. **Leis JA**, Corpus C, Rahmani A, Catt B, **Wong BM**, et al. Medical Directive for Urinary Catheter Removal by Nurses on General Medical Wards. *JAMA Intern Med*. 2016;176(1):113-5.
82. Larjani S, **Monteiro E**, et al. Preliminary cross-sectional reliability and validity of the Skull Base Inventory (SBI) quality of life questionnaire. *J Otolaryngol Head Neck Surg*. 2016;45(1):45.
83. Lakhani A, Lass E, Silverstein WK, Born KB, Levinson W, **Wong BM**. Choosing Wisely for Medical Education: Six Things Medical Students and Trainees Should Question. *Acad Med*. 2016;91(10):1374-8.
84. Kovacs-Litman A, Wong K, **Shojania KG**, Callery S, Vearncombe M, **Leis JA**. Do physicians clean their hands? Insights from a covert observational study. *J Hosp Med*. 2016;11(12):862-4.
85. Koller D, Rummens A, Le Pouesard M, Espin S, Friedman J, **Coffey M**, et al. Patient disclosure of medical errors in paediatrics: A systematic literature review. *Paediatr Child Health*. 2016;21(4):e32-8.
86. **Kiran T**, Pinto AD. Swimming 'upstream' to tackle the social determinants of health. *BMJ Qual Saf*. 2016;25(3):138-40.
87. **Kiran T**, et al. Those Left Behind From Voluntary Medical Home Reforms in Ontario, Canada. *Ann Fam Med*. 2016;14(6):517-25.
88. **Jeffs L**, et al. Making the case for graduate students and quality improvement. *Nurs Manage..* 2016;47(7):18-9.
89. **Jeffs L**, et al. Engaging Patients to Meet Their Fundamental Needs: Key to Safe and Quality Care. *Nurs Leadersh (Tor Ont)*. 2016;29(1):59-66.
90. **Jeffs L**, et al. Contextualizing learning to improve care using collaborative communities of practices. *BMC Health Serv Res*. 2016;16:464.
91. **Jeffs L**, et al. Enabling Role of Manager in Engaging Clinicians and Staff in Quality Improvement: Being Present and Flexible. *J Nurs Care Qual*. 2016;31(4):367-72.
92. Hensel JM, Shaw J, **Jeffs L**, et al. A pragmatic randomized control trial and realist evaluation on the implementation and effectiveness of an internet application to support self-management among individuals seeking specialized mental health care: a study protocol. *BMC Psychiatry*. 2016 Oct 18;16(1):350.
93. Harel Z, Silver SA, **McQuillan RF**, Weizman AV, Thomas A, Chertow GM, Nesrallah G, Chan CT, **Bell CM**. How to Diagnose Solutions to a Quality of Care Problem. *Clin J Am Soc Nephrol*. 2016;11(5):901-7.
94. Griffin MC, Gilbert RE, Broadfield LH, Easty AE, **Trbovich PL**. ReCAP: Comparison of Independent Error Checks for Oral Versus Intravenous Chemotherapy. *J Oncol Pract*. 2016;12(2):168-9; e80-7.

95. Goodman D, Ogrinc G, Davies L, **Baker GR**, Barnsteiner J, Foster TC, Gali K, Hilden J, Horwitz L, Kaplan HC, **Leis J**, et al. Explanation and elaboration of the SQUIRE (Standards for Quality Improvement Reporting Excellence) Guidelines, V.2.0: examples of SQUIRE elements in the healthcare improvement literature. *BMJ Qual Saf.* 2016;25(12):e7.
96. **Goldman J**, et al. A sociological exploration of the tensions related to interprofessional collaboration in acute-care discharge planning. *J Interprof Care.* 2016;30(2):217-25.
97. Gandhi TK, Berwick DM, **Shojania KG**. Patient Safety at the Crossroads. *JAMA.* 2016;315(17):1829-30.
98. Gagliardi AR, Ducey A, Lehoux P, Ross S, **Trbovich P**, Easty A, **Bell C**, et al. Meta-Review of the Quantity and Quality of Evidence for Knee Arthroplasty Devices. *PLoS one.* 2016;11(10):e0163032.
99. Fan M, Petrosioniak A, Pinkney S, Hicks C, White K, Almeida AP, Campbell D, McGowan M, Gray A, **Trbovich P**. Study protocol for a framework analysis using video review to identify latent safety threats: trauma resuscitation using in situ simulation team training (TRUST). *BMJ Open.* 2016;6(11):e013683.
100. Evans JM, Grudniewicz A, **Baker GR**, et al. Organizational Capabilities for Integrating Care: A Review of Measurement Tools. *Eval Health Prof.* 2016;39(4):391-420.
101. Evans JM, Grudniewicz A, **Baker GR**, et al. Organizational Context and Capabilities for Integrating Care: A Framework for Improvement. *Int J Integr Care.* 2016;16(3):15.
102. **Etchells E**, Ho M, **Shojania KG**. Value of small sample sizes in rapid-cycle quality improvement projects. *BMJ Qual Saf.* 2016;25(3):202-6.
103. Eskander A, **Monteiro E**, et al. Adherence to guideline-recommended process measures for squamous cell carcinoma of the head and neck in Ontario: Impact of surgeon and hospital volume. *Head Neck.* 2016;38 Suppl 1:E1987-92.
104. Dixon-Woods M, **Shojania KG**. Ethnography as a methodological descriptor: the editors' reply. *BMJ Qual Saf.* 2016;25(7):555-6.
105. Desveaux L, Gomes T, Tadrous M, **Jefferis L**, Taljaard M, Rogers J, **Bell CM**, et al. Appropriate prescribing in nursing homes demonstration project (APDP) study protocol: pragmatic, cluster-randomized trial and mixed methods process evaluation of an Ontario policy-maker initiative to improve appropriate prescribing of antipsychotics. *Implement Sci.* 2016;11:45.
106. Desveaux L, Agarwal P, Shaw J, Hensel JM, Mukerji G, Onabajo N, Marani H, Jamieson T, Bhattacharyya O, Martin D, Mamdani M, **Jefferis L**, et al. A randomized wait-list control trial to evaluate the impact of a mobile application to improve self-management of individuals with type 2 diabetes: a study protocol. *BMC Med Inform Decis Mak.* 2016;16(1):144.
107. Cleverley K, Bennett K, **Jefferis L**. Identifying process and outcome indicators of successful transitions from child to adult mental health services: protocol for a scoping review. *BMJ Open.* 2016;6(7):e012376.
108. Clark E, Barsuk JH, Karpinski J, **McQuillan R**. Achieving Procedural Competence during Nephrology Fellowship Training: Current Requirements and Educational Research. *Clin J Am Soc Nephrol.* 2016;11(12):2244-9.
109. Chan CT, Chertow GM, Nesrallah G, **Bell CM**. How to Use Quality Improvement Tools in Clinical Practice: A Primer for Nephrologists. *Clin J Am Soc Nephrol.* 2016;11(5):891-2.
110. Bollegala N, Patel K, Mosko JD, Bernstein M, Brahmania M, Liu L, Steinhart AH, Silver SS, **Bell CM**, et al. Quality Improvement Primer Series: The Plan-Do-Study-Act Cycle and Data Display. *Clin Gastroenterol Hepatol.* 2016;14(9):1230-3.
111. Bhawra J, **Toulany A**, et al. Primary care interventions to improve transition of youth with chronic health conditions from paediatric to adult healthcare: a systematic review. *BMJ Open.* 2016;6(5):e011871.
112. Bhattacharyya O, Schull M, **Shojania K**, et al. Building Bridges to Integrate Care (BRIDGES): Incubating Health Service Innovation across the Continuum of Care for Patients with Multiple Chronic Conditions. *Healthc Q.* 2016;19(2):60-6.
113. Bernstein M, Hou JK, Weizman AV, Mosko J, Bollegala N, Brahmania M, Liu L, Steinhart AH, Silver SS, Nguyen GC, **Bell CM**. Quality Improvement Primer Series: How to Sustain a Quality Improvement Effort. *Clin Gastroenterol Hepatol.* 2016;14(10):1371-5.
114. **Baker GR**, Fancott C, Judd M, O'Connor P. Expanding patient engagement in quality improvement and health system redesign: Three Canadian case studies. *Healthc Manage Forum.* 2016;29(5):176-82.

115. **Wong BM**, Dyal S, **Etchells EE**, Knowles S, Gerard L, Diamantouros A, Mehta R, Liu B, **Baker GR**, **Shojania KG**. Application of a trigger tool in near real time to inform quality improvement activities: a prospective study in a general medicine ward. *BMJ Qual Saf.* 2015;24(4):272-81.
116. **Wong BM**. Reporting on Patient Safety and Quality Improvement Education: Designing Projects for Optimal Dissemination. *J Grad Med Educ.* 2015;7(4):513-6.
117. Weinerman AS, Dhalla IA, Kiss A, **Etchells EE**, Wu RC, **Wong BM**. Frequency and clinical relevance of inconsistent code status documentation. *J Hosp Med.* 2015;10(8):491-6.
118. Vijenthira A, Goldberg AE, **Wong BM**. Appropriate Care of a Swollen Joint-Reply. *JAMA Intern Med.* 2015;175(11):1866-7.
119. Urbach DR, **Bell CM**. A Revised Quality Measure for Surgical Care: More Alpha Testing for Perioperative beta-Blockers? *JAMA.* 2015;313(23):2369-70.
120. Uppal NK, Eisen D, Weissberger J, Wyman RJ, Urbach DR, **Bell CM**. Transfer of care of postsurgical patients from hospital to the community setting: cross-sectional survey of primary care physicians. *Am J Surg.* 2015;210(4):778-82.
121. Thampi N, Showler A, Burry L, Bai AD, Steinberg M, Ricciuto DR, **Bell CM**, Morris AM. Multicenter study of health care cost of patients admitted to hospital with *Staphylococcus aureus* bacteremia: Impact of length of stay and intensity of care. *Am J Infect Control.* 2015;43(7):739-44.
122. Stang AS, **Wong BM**. Patients teaching patient safety: the challenge of turning negative patient experiences into positive learning opportunities. *BMJ Qual Saf.* 2015;24(1):4-6.
123. Stall NM, Fischer HD, Wu CF, Bierman AS, Brener S, Bronskill S, **Etchells E**, Fernandes O, Lau D, Mamdani MM, Rochon P, Urbach DR, **Bell CM**. Unintentional Discontinuation of Chronic Medications for Seniors in Nursing Homes: Evaluation of a National Medication Reconciliation Accreditation Requirement Using a Population-Based Cohort Study. *Medicine.* 2015;94(25):e899.
124. **Soong C**, Chen BH, **Wong BM**. A 62-year-old woman with syncope. *CMAJ.* 2015;187(1):48-9.
125. **Soong C**, **Bell C**. Identifying preventable readmissions: an achievable goal or waiting for Godot? *BMJ Qual Saf.* 2015;24(12):741-3.
126. So JP, Aleem IS, Tsang DS, **Matlow AG**, Wright JG. Increasing Compliance With an Antibiotic Prophylaxis Guideline to Prevent Pediatric Surgical Site Infection: Before and After Study. *Ann Surg.* 2015;262(2):403-8.
127. Silver SA, Thomas A, Rathe A, Robinson P, Wald R, Harel Z, **Bell CM**. Development of a hemodialysis safety checklist using a structured panel process. *Can J Kidney Health Dis.* 2015;2:5.
128. Silver SA, Harel Z, Harvey A, Adhikari NK, Slack A, Acedillo R, Jain AK, Richardson RM, Chan CT, Chertow GM, **Bell CM**, et al. Improving Care after Acute Kidney Injury: A Prospective Time Series Study. *Nephron.* 2015;131(1):43-50.
129. Silver SA, Goldstein SL, Harel Z, Harvey A, Rompies EJ, Adhikari NK, Acedillo R, Jain AK, Richardson R, Chan CT, Chertow GM, **Bell CM**, et al. Ambulatory care after acute kidney injury: an opportunity to improve patient outcomes. *Can J Kidney Health Dis.* 2015;2:36.
130. **Shojania KG**, et al. Temporal trends in patient safety in the Netherlands: reductions in preventable adverse events or the end of adverse events as a useful metric? *BMJ Qual Saf.* 2015;24(9):541-4.
131. **Shojania KG**, Catchpole K. 'The problem with...': a new series on problematic improvements and problematic problems in healthcare quality and patient safety. *BMJ Qual Saf.* 2015;24(4):246-9.
132. **Rotteau L**, et al. Ontario's emergency department process improvement program: the experience of implementation. *Acad Emerg Med.* 2015;22(6):720-9.
133. Pitzul KB, Lane NE, Voruganti T, Khan AI, Innis J, Wodchis WP, **Baker GR**. Role of context in care transition interventions for medically complex older adults: a realist synthesis protocol. *BMJ Open.* 2015;5(11):e008686.
134. Parshuram CS, Amaral AC, Ferguson ND, **Baker GR**, **Etchells EE**, et al. Patient safety, resident well-being and continuity of care with different resident duty schedules in the intensive care unit: a randomized trial. *CMAJ.* 2015;187(5):321-9.
135. Niven DJ, Mrklas KJ, Holodinsky JK, Straus SE, Hemmelgarn BR, **Jeffs LP**, et al. Towards understanding the de-adoption of low-value clinical practices: a scoping review. *BMC Med.* 2015;13:255.

136. Niven DJ, McCormick TJ, Straus SE, Hemmelgarn BR, **Jeffs LP**, et al. Identifying low-value clinical practices in critical care medicine: protocol for a scoping review. *BMJ Open*. 2015;5(10):e008244.
137. **McQuillan RF, Toulany A**, et al. Benefits of a transfer clinic in adolescent and young adult kidney transplant patients. *Can J Kidney Health Dis*. 2015;2:45.
138. **McQuillan RF**, et al. Performance of Temporary Hemodialysis Catheter Insertion by Nephrology Fellows and Attending Nephrologists. *Clin J Am Soc Nephrol*. 2015;10(10):1767-72.
139. Mahl S, Lee SK, **Baker GR**, et al. The Association of Organizational Culture and Quality Improvement Implementation With Neonatal Outcomes in the NICU. *J Pediatr Health Care*. 2015;29(5):435-41.
140. MacFadden DR, Gold WL, Al-Busaidi I, Craig JD, Petrescu D, Saltzman IS, **Leis JA**. An educational forum to engage infectious diseases and microbiology residents in resource stewardship modelled after the Choosing Wisely campaign. *Can J Infect Dis Med Microbiol*. 2015;26(5):231-3.
141. Luca SR, Kayedi M, **Wong BM**. False-positive test results in a patient with severe hepatitis: a teachable moment—the risk of treating the numbers. *JAMA Intern Med*. 2015;175(2):161-2.
142. Liu JJ, Alam AQ, Goldberg HR, Matelski JJ, **Bell CM**. Characteristics of Internal Medicine Physicians Disciplined by Professional Colleges in Canada. *Medicine*. 2015;94(26):e937.
143. **Leis JA**, Corpus C, Catt B, Jinnah F, Edgar B, **Wong BM**, et al. Indwelling urinary catheter surveillance using a Task-oriented nurse acuity system. *Am J Infect Control*. 2015;43(10):1112-3.
144. **Kwan JL**, Morgan MW, Stewart TE, **Bell CM**. Impact of an innovative inpatient patient navigator program on length of stay and 30-day readmission. *J Hosp Med*. 2015;10(12):799-803.
145. **Kwan JL**, Cram P. Do not assume that no news is good news: test result management and communication in primary care. *BMJ Qual Saf*. 2015;24(11):664-6.
146. Kozij NK, Devlin MK, **Wong BM**. Metrics for evaluating the quality of handovers—reply. *JAMA Intern Med*. 2015;175(4):655.
147. Kitto S, **Goldman J, Etchells E**, et al. Quality improvement, patient safety, and continuing education: a qualitative study of the current boundaries and opportunities for collaboration between these domains. *Acad Med*. 2015;90(2):240-5.
148. **Kiran T**, et al. Longitudinal evaluation of physician payment reform and team-based care for chronic disease management and prevention. *CMAJ*. 2015;187(17):E494-502.
149. Killane I, Fearon C, Newman L, **McDonnell C**, et al. Dual Motor-Cognitive Virtual Reality Training Impacts Dual-Task Performance in Freezing of Gait. *IEEE J Biomed Health Inform*. 2015;19(6):1855-61.
150. Joundi RA, **Wong BM, Leis JA**. Antibiotics "just-in-case" in a patient with aspiration pneumonitis. *JAMA Intern Med*. 2015;175(4):489-90.
151. **Jeffs L**, Thampi N, Maione M, Steinberg M, Morris AM, **Bell CM**. A Qualitative Analysis of Implementation of Antimicrobial Stewardship at 3 Academic Hospitals: Understanding the Key Influences on Success. *Can J Hosp Pharm*. 2015;68(5):395-400.
152. **Jeffs L**, et al. Leveraging data to transform nursing care: insights from nurse leaders. *J Nurs Care Qual*. 2015;30(3):269-74.
153. **Jeffs L**, et al. Identifying Strategies to Decrease Overtime, Absenteeism and Agency Use: Insights from Healthcare Leaders. *Nurs Leadersh (Tor Ont)*. 2015;28(3):23-40.
154. **Jeffs L**, et al. Implementation of the National Nursing Quality Report Initiative in Canada: Insights From Pilot Participants. *J Nurs Care Qual*. 2015;30(4):E9-16.
155. Higgins M, Kfoury J, Biringer A, **Seaward G**, et al. Teaching an Experienced Multidisciplinary Team About Postpartum Hemorrhage: Comparison of Two Different Methods. *J Obstet Gynaecol Can*. 2015;37(9):824-8.
156. Harel Z, Wald R, McArthur E, Chertow GM, Harel S, Gruneir A, Fischer HD, Garg AX, Perl J, Nash DM, Silver S, **Bell CM**. Rehospitalizations and Emergency Department Visits after Hospital Discharge in Patients Receiving Maintenance Hemodialysis. *J Am Soc Nephrol*. 2015;26(12):3141-50.
157. Halperin IJ, Sehgal P, Lowe J, Hladunewich M, **Wong BM**. Increasing Timely Postpartum Oral Glucose Tolerance Test Completion in Women with Gestational Diabetes: A Quality-Improvement Initiative. *Can J Diabetes*. 2015;39(6):451-6.

158. **Goldman J**, et al. Medical Residents and Interprofessional Interactions in Discharge: An Ethnographic Exploration of Factors That Affect Negotiation. *J Gen Intern Med.* 2015;30(10):1454-60.
159. Goldberg AE, Vijenthira A, **Wong BM**. Failure to cancel tests: a case of an unnecessary joint arthrocentesis: a teachable moment. *JAMA Intern Med.* 2015;175(6):891-2.
160. Fernandes O, Gorman SK, Slavik RS, Semchuk WM, Shalansky S, Bussieres JF, Doucette D, Bannerman H, Lo J, Shukla S, Chan WW, Benninger N, MacKinnon NJ, **Bell CM**, et al. Development of clinical pharmacy key performance indicators for hospital pharmacists using a modified Delphi approach. *Ann Pharmacother.* 2015;49(6):656-69.
161. Evans JM, Brown A, **Baker GR**. Intellectual capital in the healthcare sector: a systematic review and critique of the literature. *BMC Health Serv Res.* 2015;15:556.
162. Evans JM, **Baker GR**, et al. Culture and cognition in health systems change. *J Health Organ Manag.* 2015;29(7):874-92.
163. Doran D, **Jeffs L**, et al. Evaluating the late career nurse initiative: a cross-sectional survey of senior nurses in Ontario. *J Nurs Manag.* 2015;23(7):859-67.
164. Dimitropoulos G, **Toulany A**, et al. A qualitative study on the experiences of young adults with eating disorders transferring from pediatric to adult care. *Eat Disord.* 2015;23(2):144-62.
165. Detsky ME, Ailon J, Weinerman AS, Amaral AC, **Bell CM**. A two-site survey of clinicians to identify practices and preferences of intensive care unit transfers to general medical wards. *J Crit Care.* 2015;30(2):358-62.
166. Daneman N, Bronskill SE, Gruneir A, Newman AM, Fischer HD, Rochon PA, Anderson GM, **Bell CM**. Variability in Antibiotic Use Across Nursing Homes and the Risk of Antibiotic-Related Adverse Outcomes for Individual Residents. *JAMA Intern Med.* 2015;175(8):1331-9.
167. Campbell RJ, Gill SS, Ten Hove M, El-Defrawy SR, Strube YN, Whitehead M, Campbell Ede L, **Bell CM**. Strabismus surgical subspecialization: a population-based analysis. *JAMA Ophthalmol.* 2015;133(5):555-9.
168. Brehaut JC, Carroll K, Elwyn G, Saginur R, Kimmelman J, **Shojania K**, et al. Elements of informed consent and decision quality were poorly correlated in informed consent documents. *J Clin Epidemiol.* 2015;68(12):1472-80.
169. Bishop AC, **Baker GR**, et al. Using the Health Belief Model to explain patient involvement in patient safety. *Health Expect.* 2015;18(6):3019-33.
170. Bai AD, Showler A, Burry L, Steinberg M, Ricciuto DR, Fernandes T, Chiu A, Raybardhan S, Science M, Fernando E, Tomlinson G, **Bell CM**, et al. Impact of Infectious Disease Consultation on Quality of Care, Mortality, and Length of Stay in Staphylococcus aureus Bacteremia: Results From a Large Multicenter Cohort Study. *Clin Infect Dis.* 2015;60(10):1451-61.
171. Amaral AC, McDonald A, Coburn NG, Xiong W, **Shojania KG**, et al. Expanding the scope of Critical Care Rapid Response Teams: a feasible approach to identify adverse events. A prospective observational cohort. *BMJ Qual Saf.* 2015;24(12):764-8.
172. Al-Abri M, **Wong BM**, **Leis JA**. A urinary catheter left in place for slightly too long: a teachable moment. *JAMA Intern Med.* 2015 Feb;175(2):163.
173. Adams J, **Wong B**, Wijeyesundera HC. Root causes for delayed hospital discharge in patients with ST-segment Myocardial Infarction (STEMI): a qualitative analysis. *BMC Cardiovasc Disord.* 2015;15:107.
174. Wu PE, Stroud L, McDonald-Blumer H, **Wong BM**. Understanding the effect of resident duty hour reform: a qualitative study. *CMAJ Open.* 2014;2(2):E115-20.
175. **Wong BM**. How health professions education can advance patient safety and quality improvement. *Healthc Q.* 2014;17 Spec No:31-5.
176. Tsai JP, Rochon PA, Raptis S, Bronskill SE, **Bell CM**, et al. A prescription at discharge improves long-term adherence for secondary stroke prevention. *J Stroke Cerebrovasc Dis.* 2014;23(9):2308-15.
177. Starmer AJ, Spector ND, Srivastava R, West DC, Rosenbluth G, Allen AD, Noble EL, Tse LL, Dalal AK, Keohane CA, Lipsitz SR, Rothschild JM, Wien MF, Yoon CS, Zigmont KR, Wilson KM, O'Toole JK, Solan LG, Aylor M, Bismilla Z, **Coffey M**, et al. Changes in medical errors after implementation of a handoff program. *N Engl J Med.* 2014;371(19):1803-12.
178. Srigley JA, Furness CD, **Baker GR**, et al. Quantification of the Hawthorne effect in hand hygiene compliance monitoring using an electronic monitoring system: a retrospective cohort study. *BMJ Qual Saf.* 2014;23(12):974-80.

179. **Soong C**, Kurabi B, Wells D, Caines L, Morgan MW, Ramsden R, **Bell CM**. Do post discharge phone calls improve care transitions? A cluster-randomized trial. *PLoS one*. 2014;9(11):e112230.
180. Seitz DP, Anderson GM, Austin PC, Gruneir A, Gill SS, **Bell CM**, et al. Effects of impairment in activities of daily living on predicting mortality following hip fracture surgery in studies using administrative healthcare databases. *BMC Geriatr*. 2014;14:9.
181. Sarkar U, Simchowitz B, Bonacum D, Strull W, Lopez A, **Rotteau L**, **Shojania KG**. A Qualitative Analysis of Physician Perspectives on Missed and Delayed Outpatient Diagnosis: The Focus on System-Related Factors. *Jt Comm J Qual Patient Saf*. 2014;40(10):461-1.
182. **Rotteau L**, **Shojania KG**, Webster F. 'I think we should just listen and get out': a qualitative exploration of views and experiences of Patient Safety Walkrounds. *BMJ Qual Saf*. 2014;23(10):823-9.
183. Rochon PA, Gruneir A, Wu W, Gill SS, Bronskill SE, Seitz DP, **Bell CM**, et al. Demographic characteristics and healthcare use of centenarians: a population-based cohort study. *J Am Geriatr Soc*. 2014;62(1):86-93.
184. Prakash V, Koczmara C, Savage P, Trip K, Stewart J, McCurdie T, Cafazzo JA, **Trbovich P**. Mitigating errors caused by interruptions during medication verification and administration: interventions in a simulated ambulatory chemotherapy setting. *BMJ Qual Saf*. 2014;23(11):884-92.
185. Pinkney S, Fan M, Chan K, Koczmara C, Colvin C, Sasangohar F, Masino C, Easty A, **Trbovich P**. Multiple Intravenous Infusions Phase 2b: Laboratory Study. *Ont Health Technol Assess Ser*. 2014;14(5):1-163.
186. Ogrinc G, **Shojania KG**. Building knowledge, asking questions. *BMJ Qual Saf*. 2014;23(4):265-7.
187. Nicholls SG, Brehaut JC, Arim RG, Carroll K, Perez R, **Shojania KG**, et al. Impact of stated barriers on proposed warfarin prescription for atrial fibrillation: a survey of Canadian physicians. *Thromb J*. 2014;12:13.
188. Margel D, Urbach DR, Lipscombe LL, **Bell CM**, et al. Is pathology necessary to predict mortality among men with prostate-cancer? *BMC Med Inform Decis Mak*. 2014;14:114.
189. Marang-van de Mheen PJ, **Shojania KG**. Simpson's paradox: how performance measurement can fail even with perfect risk adjustment. *BMJ Qual Saf*. 2014;23(9):701-5.
190. Liu J, Griesman J, Nisenbaum R, **Bell CM**. Quality of care of hospitalized internal medicine patients bedspaced to non-internal medicine inpatient units. *PLoS One*. 2014;9(9):e106763.
191. **Leis JA**, Rebick GW, Daneman N, Gold WL, Poutanen SM, Lo P, Larocque M, **Shojania KG**, et al. Reducing antimicrobial therapy for asymptomatic bacteriuria among noncatheterized inpatients: a proof-of-concept study. *Clin Infect Dis*. 2014;58(7):980-3.
192. **Leis JA**, et al. Lessons from audit and feedback of hospitalized patients with bacteriuria. *Am J Infect Control*. 2014;42(10):1136-7.
193. Law MP, Orlando E, **Baker GR**. Organizational interventions in response to duty hour reforms. *BMC Med Educ*. 2014;14 Suppl 1:S4.
194. Lau D, Livshits O, Stewart T, Shandling M, Morgan M, Snider J, **Bell CM**. The MSH Effective and Efficient Utilization Committee: An Approach to Improving Care Quality, Value and Patient Experience. *Healthc Q*. 2014;17(4):52-7.
195. Lapointe-Shaw L, **Bell CM**. It's not you, it's me: time to narrow the gap in weekend care. *BMJ Qual Saf*. 2014;23(3):180-2.
196. Kromm SK, **Baker GR**, et al. Acute care hospitals' accountability to provincial funders. *Healthc Policy*. 2014;10(Spec issue):25-35.
197. **Kiran T**, et al. Effect of payment incentives on cancer screening in Ontario primary care. *Ann Fam Med*. 2014;12(4):317-23.
198. **Kiran T**, et al. The relationship between primary care models and processes of diabetes care in Ontario. *Can J Diabetes*. 2014;38(3):172-8.
199. Khor S, Beca J, Krahn M, Hodgson D, Lee L, Crump M, Bremner KE, Luo J, Mamdani M, **Bell CM**, et al. Real world costs and cost-effectiveness of Rituximab for diffuse large B-cell lymphoma patients: a population-based analysis. *BMC cancer*. 2014;14:586.
200. Palmay L, Walker SAN, Leis JA, et al. Antimicrobial Stewardship Programs: A Review of Recent Evaluation Methods and Metrics. *Curr Treat Options Infect Dis*. 2014;6:113.

201. **Jeffs L**, Hayes C, Smith O, Mamdani M, Nisenbaum R, **Bell CM**, et al. The effect of an organizational network for patient safety on safety event reporting. *Evaluation & the health professions*. 2014;37(3):366-78.
202. **Jeffs L**, Dhalla I, Cardoso R, **Bell CM**. The perspectives of patients, family members and healthcare professionals on readmissions: preventable or inevitable? *Journal of interprofessional care*. 2014;28(6):507-12.
203. **Jeffs L**, et al. Insights from staff nurses and managers on unit-specific nursing performance dashboards: a qualitative study. *BMJ Qual Saf*. 2014;23(12):1001-6.
204. Ivers N, Tricco AC, Trikalinos TA, Dahabreh IJ, Danko KJ, Moher D, Straus SE, Lavis JN, Yu CH, **Shojania K**, et al. Seeing the forests and the trees--innovative approaches to exploring heterogeneity in systematic reviews of complex interventions to enhance health system decision-making: a protocol. *Syst Rev*. 2014;3:88.
205. Hamilton J, Verrall T, Maben J, Griffiths P, Avis K, **Baker GR**, et al. One size does not fit all: a qualitative content analysis of the importance of existing quality improvement capacity in the implementation of Releasing Time to Care: the Productive Ward in Saskatchewan, Canada. *BMC Health Serv Res*. 2014;14:642.
206. Gagliardi AR, Straus SE, **Shojania KG**, et al. Multiple interacting factors influence adherence, and outcomes associated with surgical safety checklists: a qualitative study. *PLoS One*. 2014;9(9):e108585.
207. Fan M, Koczmara C, Masino C, Cassano-Piche A, **Trbovich P**, et al. Multiple Intravenous Infusions Phase 2a: Ontario Survey. *Ont Health Technol Assess Ser*. 2014;14(4):1-141.
208. Evans JM, Grudniewicz A, Wodchis WP, **Baker GR**. Leading the implementation of health links in Ontario. *Healthc Pap*. 2014;14(2):21-5; discussion 58-60.
209. Evans JM, **Baker GR**, et al. A cognitive perspective on health systems integration: results of a Canadian Delphi study. *BMC Health Serv Res*. 2014;14:222.
210. Doran DM, **Baker GR**, et al. Identification of serious and reportable events in home care: a Delphi survey to develop consensus. *Int J Qual Health Care*. 2014;26(2):136-43.
211. Doran D, Blais R, **Baker GR**, et al. The safety at home study: an evidence base for policy and practice change. *Healthc Q*. 2014;17(3):42-7.
212. Dhalla IA, O'Brien T, Morra D, Thorpe KE, **Wong BM**, Mehta R, Frost DW, Abrams H, Ko F, Van Rooyen P, **Bell CM**, et al. Effect of a postdischarge virtual ward on readmission or death for high-risk patients: a randomized clinical trial. *JAMA*. 2014;312(13):1305-12.
213. Devlin MK, Kozij NK, Kiss A, Richardson L, **Wong BM**. Morning handover of on-call issues: opportunities for improvement. *JAMA Intern Med*. 2014;174(9):1479-85.
214. Clark EG, Paparello JJ, Wayne DB, Edwards C, Hoar S, **McQuillan R**, et al. Use of a national continuing medical education meeting to provide simulation-based training in temporary hemodialysis catheter insertion skills: a pre-test post-test study. *Can J Kidney Health Dis*. 2014;1:25.
215. Chalk T, Lau D, Morgan M, Dietrich S, Beduz MA, **Bell CM**. Mount Sinai Hospital's approach to Ontario's Health System Funding Reform. *Healthc Q*. 2014;17(1):42-7.
216. Bogoch, II, Scully EP, Zachary KC, Yawetz S, Mayer KH, **Bell CM**, et al. Patient attrition between the emergency department and clinic among individuals presenting for HIV nonoccupational postexposure prophylaxis. *Clin Infect Dis*. 2014;58(11):1618-24.
217. Blair GK, Duffy D, Birabwa-Male D, Sekabira J, Reimer E, **Koyle M**, et al. Pediatric surgical camps as one model of global surgical partnership: a way forward. *J Pediatr Surg*. 2014;49(5):786-90.
218. Batthish M, Tse SM, Feldman BM, **Baker GR**, et al. Trying to improve care: the Morbidity and Mortality Conference in a division of rheumatology. *J Rheumatol*. 2014;41(12):2452-8.
219. **Baker RG**. An opportunity for reflection. *Healthc Q*. 2014;17 Spec No:1-2.
220. **Baker RG**. Governance, policy and system-level efforts to support safer healthcare. *Healthc Q*. 2014;17 Spec No:21-6.
221. **Baker GR**. Improving healthcare using Lean processes. *Healthc Q*. 2014;17(2):18-9.
222. Wu RC, Tzanetos K, Morra D, Quan S, Lo V, **Wong BM**. Educational impact of using smartphones for clinical communication on general medicine: more global, less local. *J Hosp Med*. 2013;8(7):365-72.



223. Wu RC, Lo V, Morra D, **Wong BM**, et al. The intended and unintended consequences of communication systems on general internal medicine inpatient care delivery: a prospective observational case study of five teaching hospitals. *J Am Med Inform Assoc.* 2013;20(4):766-77.
224. **Wong BM**, Kuper A, Hollenberg E, **Ethchells EE**, Levinson W, **Shojania KG**. Sustaining quality improvement and patient safety training in graduate medical education: lessons from social theory. *Acad Med.* 2013;88(8):1149-56.
225. **Wong BM**, Imrie K. Why resident duty hours regulations must address attending physicians' workload. *Acad Med.* 2013;88(9):1209-11.
226. **Wong BM**, Goguen J, **Shojania KG**. Building capacity for quality: a pilot co-learning curriculum in quality improvement for faculty and resident learners. *J Grad Med Educ.* 2013;5(4):689-93.
227. Vozoris NT, Fischer HD, Wang X, Anderson GM, **Bell CM**, et al. Benzodiazepine use among older adults with chronic obstructive pulmonary disease: a population-based cohort study. *Drugs Aging.* 2013;30(3):183-92.
228. **Trbovich PL**, et al. The effects of interruptions on oncologists' patient assessment and medication ordering practices. *J Healthc Eng.* 2013;4(1):127-44.
229. **Trbovich PL**, et al. Implementation and optimization of smart infusion systems: are we reaping the safety benefits? *J Healthc Qual.* 2013;35(2):33-40.
230. Stroud L, **Wong BM**, et al. Teaching medical error disclosure to physicians-in-training: a scoping review. *Acad Med.* 2013;88(6):884-92.
231. **Soong C**, et al. A novel approach to improving emergency department consultant response times. *BMJ Qual Saf.* 2013;22(4):299-305.
232. **Soong C**, Daub S, Lee J, Majewski C, Musing E, Nord P, Wyman R, **Baker GR**, Zacharopoulos N, **Bell CM**. Development of a checklist of safe discharge practices for hospital patients. *J Hosp Med.* 2013;8(8):444-9.
233. **Shojania KG**, Thomas EJ. Trends in adverse events over time: why are we not improving? *BMJ Qual Saf.* 2013;22(4):273-7.
234. **Shojania KG**, Dixon-Woods M. 'Bad apples': time to redefine as a type of systems problem? *BMJ Qual Saf.* 2013;22(7):528-31.
235. **Shojania KG**. Conventional evaluations of improvement interventions: more trials or just more tribulations? *BMJ Qual Saf.* 2013;22(11):881-4.
236. Shekelle PG, Pronovost PJ, Wachter RM, McDonald KM, Schoelles K, Dy SM, **Shojania K**, et al. The top patient safety strategies that can be encouraged for adoption now. *Ann Intern Med.* 2013;158(5 Pt 2):365-8.
237. Sears N, **Baker GR**, et al. The incidence of adverse events among home care patients. *Int J Qual Health Care.* 2013;25(1):16-28.
238. Salanitro AH, Kripalani S, Resnic J, Mueller SK, Wetterneck TB, Haynes KT, Stein J, Kaboli PJ, Labonville S, **Ethchells E**, et al. Rationale and design of the Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS). *BMC Health Serv Res.* 2013;13:230.
239. Reeves S, Perrier L, **Goldman J**, et al. Interprofessional education: effects on professional practice and healthcare outcomes (update). *Cochrane Database Syst Rev.* 2013 Mar 28;(3):CD002213.
240. Quan SD, Wu RC, Rossos PG, Arany T, Groe S, Morra D, **Wong BM**, et al. It's not about pager replacement: an in-depth look at the interprofessional nature of communication in healthcare. *J Hosp Med.* 2013 Mar;8(3):137-43
241. Quan SD, Morra D, Lau FY, Coke W, **Wong BM**, et al. Perceptions of urgency: defining the gap between what physicians and nurses perceive to be an urgent issue. *Int J Med Inform.* 2013 May;82(5):378-86.
242. O'Beirne M, Reid R, Zwicker K, Sterling P, Sokol E, Flemons W, **Baker R**, et al. The costs of developing, implementing, and operating a safety learning system in community practice. *J Patient Saf.* 2013;9(4):211-8.
243. Mueller SK, Kripalani S, Stein J, Kaboli P, Wetterneck TB, Salanitro AH, Greenwald JL, Williams MV, **Ethchells E**, et al. A toolkit to disseminate best practices in inpatient medication reconciliation: multi-center medication reconciliation quality improvement study (MARQUIS). *Jt Comm J Qual Patient Saf.* 2013;39(8):371-82.
244. **Matlow A**. Front-line ownership: imagine. *Healthc Pap.* 2013;13(1):69-74; discussion 8-82.

245. **Leis JA**, Gold WL, Daneman N, **Shojania K**, McGeer A. Downstream impact of urine cultures ordered without indication at two acute care teaching hospitals. *Infect Control Hosp Epidemiol*. 2013 Oct;34(10):1113-4.
246. **Kwan JL**, **Lo L**, Sampson M, **Shojania KG**. Medication reconciliation during transitions of care as a patient safety strategy: a systematic review. *Ann Intern Med*. 2013 Mar 5;158(5 Pt 2):397-403.
247. Kitto SC, Bell M, **Goldman J**, et al. (Mis)perceptions of continuing education: insights from knowledge translation, quality improvement, and patient safety leaders. *J Contin Educ Health Prof*. 2013;33(2):81-8.
248. Kitto S, Bell M, Peller J, Sargeant J, **Etchells E**, et al. Positioning continuing education: boundaries and intersections between the domains continuing education, knowledge translation, patient safety and quality improvement. *Adv Health Sci Educ Theory Pract*. 2013 Mar;18(1):141-56.
249. Kaushal A, **McDonnell CG**, Davies MW. Partial liquid ventilation for the prevention of mortality and morbidity in paediatric acute lung injury and acute respiratory distress syndrome. *Cochrane Database Syst Rev*. 2013 Feb 28;(2):CD003845.
250. John-Baptiste AA, Wu W, Rochon P, Anderson GM, **Bell CM**. A systematic review and methodological evaluation of published cost-effectiveness analyses of aromatase inhibitors versus tamoxifen in early stage breast cancer. *PLoS One*. 2013;8(5):e62614.
251. **Jeffs LP**, et al. Implementing an organization-wide quality improvement initiative: insights from project leads, managers, and frontline nurses. *Nurs Adm Q*. 2013;37(3):222-30.
252. **Jeffs L**, et al. Investing in nursing research in practice settings: a blueprint for building capacity. *Nurs Leadersh (Tor Ont)*. 2013;26(4):44-59.
253. **Jeffs L**, et al. Using theory and evidence to drive measurement of patient, nurse and organizational outcomes of professional nursing practice. *Int J Nurs Pract*. 2013;19(2):141-8.
254. **Jeffs L**, et al. Investing in the nursing workforce to improve quality of care: the reinvention imperative. *The Can J Nurs Res*. 2013;45(4):69-71.
255. **Jeffs L**, Lyons RF, Merkley J, **Bell CM**. Clinicians' views on improving inter-organizational care transitions. *BMC Health Serv Res*. 2013;13:289.
256. **Jeffs L**, Law MP, Straus S, Cardoso R, Lyons RF, **Bell C**. Defining quality outcomes for complex-care patients transitioning across the continuum using a structured panel process. *BMJ Qual Saf*. 2013;22(12):1014-24.
257. **Jeffs L**, et al. Enablers and barriers to implementing bedside reporting: insights from nurses. *Nurs Leadersh (Tor Ont)*. 2013;26(3):39-52.
258. **Jeffs L**, et al. Quality nursing care and opportunities for improvement: insights from patients and family members. *J Nurs Care Qual*. 2013;28(1):76-84.
259. **Jeffs L**, et al. The value of bedside shift reporting enhancing nurse surveillance, accountability, and patient safety. *J Nurs Care Qual*. 2013;28(3):226-32.
260. **Jeffs L**, et al. Implementing an interprofessional patient safety learning initiative: insights from participants, project leads and steering committee members. *BMJ Qual Saf*. 2013;22(11):923-30.
261. Hookey L, Armstrong D, Enns R, **Matlow A**, Singh H, Love J. Summary of guidelines for infection prevention and control for flexible gastrointestinal endoscopy. *Can J Gastroenterol*. 2013;27(6):347-50.
262. Harel Z, Wald R, Bargman JM, Mamdani M, **Etchells E**, Garg AX, Ray JG, Luo J, Li P, Quinn RR, Forster A, Perl J, **Bell CM**. Nephrologist follow-up improves all-cause mortality of severe acute kidney injury survivors. *Kidney Int*. 2013;83(5):901-8.
263. Evans JM, **Baker GR**, et al. The evolution of integrated health care strategies. *Adv Health Care Manag*. 2013;15:125-61.
264. Emery DJ, **Shojania KG**, et al. Overuse of magnetic resonance imaging. *JAMA Intern Med*. 2013;173(9):823-5.
265. Drucker AM, Cavalcanti RB, **Wong BM**, et al. Teaching dermatology to internal medicine residents: needs assessment survey and possible directions. *J Cutan Med Surg*. 2013;17(1):39-45.
266. Doran DM, Hirdes JP, Blais R, **Baker GR**, et al. Adverse events among Ontario home care clients associated with emergency room visit or hospitalization: a retrospective cohort study. *BMC Health Serv Res*. 2013;13:227.

267. Doran D, Hirdes JP, Blais R, **Baker GR**, et al. Adverse events associated with hospitalization or detected through the RAI-HC assessment among Canadian home care clients. *Healthc Policy*. 2013;9(1):76-88.
268. Chopra V, **Shojania KG**. Recipes for checklists and bundles: one part active ingredient, two parts measurement. *BMJ Qual Saf*. 2013;22(2):93-6.
269. Blais R, Sears NA, Doran D, **Baker GR**, et al. Assessing adverse events among home care clients in three Canadian provinces using chart review. *BMJ Qual Saf*. 2013;22(12):989-97.
270. **Wong BM**, Cheung CM, Dharamshi H, Dyal S, Kiss A, Morra D, Quan S, Sivjee K, **Ethchells EE**. Getting the message: a quality improvement initiative to reduce pages sent to the wrong physician. *BMJ Qual Saf*. 2012;21(10):855-62.
271. Romao RL, Farhat WA, Pippi Salle JL, Braga LH, Figueroa V, Bagli DJ, **Koyle MA**, et al. Early postoperative ultrasound after open pyeloplasty in children with prenatal hydronephrosis helps identify low risk of recurrent obstruction. *J Urol*. 2012;188(6):2347-53.
272. Mittmann N, Koo M, Daneman N, McDonald A, Baker M, **Matlow A**, Krahn M, **Shojania KG**, **Ethchells E**. The economic burden of patient safety targets in acute care: a systematic review. *Drug Healthc Patient Saf*. 2012;4:141-65.
273. Katsios CM, Burry L, Nelson S, Jivraj T, Lapinsky SE, Wax RS, Christian M, Mehta S, Bell CM, et al. An antimicrobial stewardship program improves antimicrobial treatment by culture site and the quality of antimicrobial prescribing in critically ill patients. *Crit Care*. 2012;16(6):R216.
274. **Jeffer L**, Kitto S, Merkley J, Lyons RF, **Bell CM**. Safety threats and opportunities to improve interfacility care transitions: insights from patients and family members. *Patient Prefer Adherence*. 2012;6:711-8.
275. **Jeffer L**, et al. Linking HOBIC measures with length of stay and alternate levels of care: implications for nurse leaders in their efforts to improve patient flow and quality of care. *Nurs Leadersh (Tor Ont)*. 2012;25(4):48-62.
276. Alam A, Kurdyak P, Klemensberg J, Griesman J, **Bell CM**. The characteristics of psychiatrists disciplined by professional colleges in Canada. *PLoS One*. 2012;7(11):e50558.

## U of Texas at Houston Memorial Hermann Center for Healthcare Quality and Safety

For U of Texas, we looked through <https://med.uth.edu/chqs/category/members/> and selected anyone on the list with hyperlink to picture AND a bio

### Search strategy in PubMed

(Aite Aigbe OR Jason M. Etchegaray OR Kevin O. Hwang OR Lillian S. Kao OR R. Priya Khatri OR Madelene J. Ottosen OR Hardeep Singh OR Dean F. Sittig OR Eric J. Thomas OR Emily W. Sedlock) AND (patient safety[MeSH] OR quality improvement[MeSH] OR safety[tw] OR quality[tw] OR improv\* [tw])

Restricted to "From 2012/10/01 to 2017/08/23"

## Northwestern University

For Northwestern, we looked through

<http://www.feinberg.northwestern.edu/sites/chs/members/index.html#page-2> and selected anyone on the list who has a photo AND a biography, EXCEPT for Kevin Weiss (no biography, but who runs the Masters/grad programs), and Donna Woods (no photo, but runs the Masters/ grad programs). Two members reviewed the first 100 titles of the search results from to screen for relevance to patient safety or quality improvement and found that only 50 were relevant. This was then extrapolated to the rest of the search results to calculate the number of publications.

### Search strategy in PubMed

(Ackermann, Ronald T OR Allen, Norrina Bai OR Alpern, Elizabeth R OR Badawy, Sherif M OR Baker, David W OR Bhushan, Bharat OR Bilimoria, Karl Y OR Butt, Zeeshan Ahmad OR Cameron, Kenzie A OR Cella, David OR Chang, Rowland W OR Chen, Diane OR Courtney, D Mark OR Cox, Suzanne Morrison OR Dresden, Scott M OR Dunlop, Dorothy D OR Ehrlich-Jones, Linda S OR Evans, Charlesnika Tyon OR Falciglia, Gustave H OR Feinglass, Joseph M OR Friedewald, John J OR Garfield, Craig F OR Goel, Mita S OR Gordon, Elisa J OR Grobman, William A OR Hahn, Elizabeth A OR Heinemann, Allen W OR Holl, Jane L OR Johnson, Emilie K OR Jordan, Neil OR Kumthekar, Priya U OR Ladner, Daniela P OR Lai, Jin-Shei OR Lautz, Timothy B OR LaVela, Sherri L OR Lee, Jungwha OR Lindquist, Lee Ann OR Mathew, Amanda OR McGrath, Kris G OR McHugh, Megan Colleen OR Mestan, Karen K L OR Mohammad, Saeed OR Montague, Enid OR Murthy, Karna OR Nowinski, Cindy J OR O'Leary, Kevin J OR Odell, David D OR Paquette, Erin Talati OR Persell, Stephen D OR Pinto, Daniel OR Powell, Emilie Susan OR Prabhakaran, Shyam OR Richards, Christopher T OR Ring, Melinda R OR Roth, Elliot J OR Rothrock, Nan E OR Rowe, Theresa A OR Sharma, Leena OR Simon, Melissa A OR Smith, Stephanie Shintani OR Smith, Zachary Adam OR Soulakis, Nicholas Dean OR Tan, Bruce K OR Toledo, Paloma OR Victorson, David E OR Wallia, Amisha OR Wang, Amy Y OR Weese-Mayer, Debra OR Weiss, Kevin B OR Wisner, Katherine L OR Woods, Donna M OR Yang, Anthony D) AND (patient safety[MeSH] OR quality improvement[MeSH] OR safety[tw] OR quality[tw] OR improv\* [tw]) AND (Northwestern[AD])

Restricted to "From 2012/10/01 to 2017/08/23"

## Johns Hopkins

We looked through [http://www.hopkinsmedicine.org/armstrong\\_institute/about/collaborate/faculty.html](http://www.hopkinsmedicine.org/armstrong_institute/about/collaborate/faculty.html) and selected anyone on the list with hyperlink to picture AND a bio. Two members reviewed the first 100 titles of the search results from to screen for relevance to patient safety or quality improvement and found that only 50 were relevant. This was then extrapolated to the rest of the search results to calculate the number of publications.

### Search strategy in PubMed

(Peter Pronovost OR Hanan Aboumatar OR Alicia Arbaje OR Rebecca Aslakson OR Matt Austin OR Eric Bass OR Sean Berenholtz OR Emily Boss OR Henry Brem OR Allen Chen OR Lisa Cooper OR Sara Cosgrove OR Maqbool Dada OR Cheryl Dennison-Himmelfarb OR Ray DePaulo OR Theodore DeWeese OR Aaron Dietz OR George Dover OR Sydney Dy OR Jemima Frimpong OR Sherita Golden OR Ayse Gurses OR Theresa Hartsell OR Elliott Haut OR Eugenie Heitmiller OR Felicia Hill-Briggs OR Eric Howell OR Lisa Ishii OR Geetha Jayaram OR Sewon Kang OR Gabe Kelen OR Steven Kravet OR Asad Latif OR W.P. Andrew Lee OR Scott Levin OR Thomas Louis OR Lisa Lubomski OR Martin Makary OR Lisa Maragakis OR Jill Marsteller OR Nestoras Mathioudakis OR Justin McArthur OR Peter McDonnell OR Marlene Miller OR Aaron Milstone OR Laura Morlock OR Brigitta Mueller OR Christopher Myers OR Paul Nagy OR Dale Needham OR William Nelson OR David Newman-Toker OR William Padula OR Philip Phan OR Samantha Pitts OR Lawrence Ramunno OR Clare Rock OR Michael Rosen OR Gedge Rosson OR Adam Sapirstein OR Suchi Saria OR Matthew Stewart OR Rosalyn Stewart OR Kathleen Sutcliffe OR David Thompson OR John Ulatowski OR Kristina Weeks OR Bradford Winters OR Scott Wright OR Albert Wu OR Christopher Wu OR Anping Xie OR Jonathan Zenilman) AND (patient safety[MeSH] OR quality improvement[MeSH] OR safety[tw] OR quality[tw] OR improv\* [tw]) AND (Hopkins[AD])

Restricted to "From 2012/10/01 to 2017/08/23"

# Appendix I

## Complete list of grants for C-QulPS staff and core members for 2012-2017

### Staff

#### 2017

2017 May - 2018 Sep. Choosing Wisely STARS (Students and Trainees Advocating for Resource Stewardship) Program. American Board of Internal Medicine Foundation (ABIM Foundation). PI: Moriates C. Collaborator(s): Valencia V, Born V, **Wong B**. 21,000 USD.

2017 Apr - 2019 Mar. Impact of E-monitoring feedback and unit-based improvement on hand hygiene compliance and healthcare-associated infections: A multicenter stepped-wedge randomized trial. Academic Health Sciences Centre AFP Innovation Award. Ontario Ministry of Health and Long-Term Care. PI: **Leis J**. 100,000 CAD.

2017 Apr – 2018 Mar. Measuring and Monitoring of Safety Demonstration Project. Canadian Patient Safety Institute, Canadian Institute of Health Information and BC Patient Safety and Quality Council. Co-PI: **Baker GR**, Flintoft G. 350,000 CAD.

2017 Jan - 2018 Sep. Choosing Wisely STARS (Students and Trainees Advocating for Resource Stewardship) Program. The Josiah Macy Jr Foundation. President's Grant. PI: Moriates C. Collaborator(s): Valencia V, Born V, **Wong B**. 21,000 USD.

2017-2019. High Reliability Organizing in Healthcare: Caring Safely at the Hospital for Sick Children. Physician Services Incorporated. PI: **Coffey M**. Co-Investigators: **Shojania K**, **Goldman J**, Rowland P, **Baker R**, et al. 112,170 CAD.

2017. A qualitative study on sexual health attitudes, experiences, and behaviours among adolescents with severe obesity. SickKids Centre for Healthy Active Kids (CHAK) Summer Student Micro-grant. PI: **Toulany A**, Dettmer E. 5,000 CAD.

#### 2016

2016 Jul - 2018 Jun. A case study of advanced post-licensure quality improvement and patient safety education. Royal College of Physicians and Surgeons of Canada (The). Medical Education Research Grant (MERG) competition. PI: **Goldman J**. Collaborator(s): **Baker R**, Bulmer B, **Coffey M**, Hayes C, **Jeffer L**, Kuper A, **Rotteau L**, **Shojania KG**, Whitehead C, **Wong B**. 39,530 CAD.

2016 Mar - 2017 Aug. Evaluating the Impact of Major Reductions in Resident Duty Hours in Quebec on Mortality and Hospital Readmissions. Sunnybrook Education Advisory Council (SEAC) and Education Research Unit (ERU). Education Research and Scholarship Grant. PI: **Wong B**. Collaborator(s): McDonald E, Wu P, Maniatis T, Stroud L, Lee T, Tamblyn R, **Bell C**. 10,000 CAD.

2016 – 2018. Sleep Pediatric Transition Clinic Cohort Study – Bridging the Gap between Pediatric and Adult Sleep Medicine. PSI Foundation PI: Ryan C, Co-I: Narang I, **Toulany A**, et al. 150,000 CAD.

2016 – 2018. An Innovative Day Hospital Approach to Address Obesity and Mental Health Issues in Adolescents. Medical Psychiatry Alliance. PI: Dettmer E, Grewal S. Co-I: **Toulany A**, et al. 496,000 CAD.

#### 2015

2015 Sep - 2016 Dec. Choosing Wisely Canada STARS (Students and Trainees Advocating for Resource Stewardship). American Board of Internal Medicine Foundation (ABIM Foundation). Putting Stewardship into Medical Education. PI: **Wong B**, Levinson W. 25,000 USD.

2015 Jul - 2018 Dec. Taking stock of healthcare reforms: A research program on transformative capacity of healthcare systems in Canada. Canadian Institutes of Health Research. PI: Denis JL. Co-I: Anderson, K, **Baker GR**, et al. 304, 390 CAD.

2015 Jun - 2016 Dec. Evaluating the Impact of Major Reductions in Resident Duty Hours in Quebec on Mortality and Hospital Readmissions. McGill University Health Centre (MUHC). McGill University Department of Medicine 2015 Research Award. PI: Maniatis T. Collaborator(s): **Bell C**, McDonald E, **Wong B**. 20,000 CAD.

2015 Apr - 2017 Mar. Academic Health Sciences Centre AFP Innovation Award. Ontario Ministry of Health and Long-Term Care. 410004233. PI: **Leis J**. 63,240 CAD.

2015 Mar - 2017 Apr. I-CATCH: A Novel Handover Bundle to Improve Morning Handover of On-Call Issues. Alternate Funding Plan. Innovation Fund. PIs: Zipursky J, **Wong B**. Collaborator(s): 62,852.92 CAD.

2015 – 2016. Improving Outcomes for Youth with Type 1 Diabetes in Transition to Adult Care Through Strengthening integration with Primary Care: An Exploratory, Cross-Provincial Study. CIHR: SPOR PIHCI Network Quick Strikes. PI: Chafe RE, Gatto A, Guttmann A. Co-I: Aubrey-Bassler FK, Bridger TL, Knight JC, Newhook LA, Shah BR, Shulman R, **Toulany A**. 75,000 CAD.

## 2014

2014 Nov - 2015 Nov. Achieving value in the health system: White paper series from IHPME and OHA. Funded by the Ontario Hospital Association, Brown A, Wodchis A, **Baker GR**. \$148,000 CAD.

2014 Oct - 2019 Sep. Team to Address Bariatric Care in Canadian Children (Team ABC3). CIHR: Team Grant in Bariatric Care. PI: Ball G, Birken CS, Hamilton JK, Holt NL, Masse LC, Morrison KM. Co-I: Anderson LN, Buchholz A, Carsley S, Chanoine JP, Cordeiro KM, Dettmer EL, Forhan MA, Hadjiyannakis A, Haines J, Hanning RM, Ho J, Johnson JA, Legault L, Luca PD, Maguire JL, Maximova K, McPherson A, Parkin P, Perez A, Sprague A, Thirsk JE, **Toulany A**. 1,480,881 CAD.

2014 Sep - 2019 Aug. AHRQ Patient Safety Network and Web Morbidity and Mortality (PSNet/WebM&M). US Agency for Healthcare Research and Quality. HHS290201400006C. PI: Wachter RM. Collaborator: **Shojania KG**. 2,375,877 USD.

2014 Sep - 2017 Sep. The SMH-Mentored Implementation I-PASS Project. Agency for Healthcare Research and Quality (AHRQ). PI: Landrigan C. Co-Investigators: Starmer A, **Coffey T** and the I-PASS Study Group. 1,999,179 USD.

2014 Jul - 2015 Dec. Resource Stewardship Curriculum: Teaching internal medicine and pediatric residents to communicate effectively with patients to avoid potential harm from unnecessary diagnosis tests. University of Toronto. Education Development Fund for Innovation in Education. PI: Mukerji G, Weirnerman A. Collaborator(s): Schwartz S, Moore C, Atkinson A, Stroud L, **Wong BM**. 11,647.5 CAD.

2014 May - 2014 Oct. Patient Safety Ten Years After. KPMG. PI: **Baker GR**. 50,000 CAD.

2014 Apr - 2018 Apr. A Multi-Centred Randomized Control Trial of an Educational and Feedback based intervention designed to reduce inappropriate TTE ordering in Ambulatory Care. Alternate Funding Plan. Innovation Fund. PI: Weirnerman A, **Wong B**. 40,867 CAD.

2014 Jan - 2017 Jan. Bringing I-PASS to the bedside: A communication bundle to improve patient safety and experience. Patient Centered Outcomes Research Institute (PCORI) (R-CRR-1306-03556). PI: Landrigan C. Co-Investigators: Bismilla Z, **Coffey M**, et al. 1,500,000 USD.

2014 Jan - 2014 Dec. A Qualitative Study to Explore the Barriers to Positive Airway Pressure in Children with Obstructive Sleep Apnea. Paediatric Consultants, Hospital for Sick Children. PI: Narang I, **Toulany A**, et al. 9,926.28 CAD.

## 2013

2013 Nov - 2016 Nov. Impacts du partenariat de soins sur l'amélioration de la qualité et la sécurité des soins. Programme de partenariat pour l'amélioration des services de santé. (CIHR-PHSI). PI: Pomey MP, Pelletier M. Co-I: Beaudoin D, Boily M, Chateauvert L, De Guise M, Lebel P, Racine H, Rioux Y, **Baker GR**, et al. 395, 976 CAD.

2013 Oct - 2014 Oct. Patient disclosure of adverse events in paediatrics: Synthesis of literature and research priorities. Canadian Institute of Health and Research, Planning Grant, Institute of Human Development, Child and Youth Health. PI: Koller D. Co-Investigators: Espin S, Friedman J, **Coffey M**, et al. 25,000 CAD.

2013 Sep - 2014 Aug. A scoping review of training and practice models for invasive bedside procedures performed by internists. Canadian Institutes of Health Research (CIHR). Knowledge Synthesis Grant. PI: Brydges R. Collaborator(s): Stroud L, **Wong BM**, et al. 49,985 CAD.

2013 Jun - 2018 Jun. Implementing models of primary health care for older adults with complex needs. Canadian Institutes of Health Research. PI: Wodchis W, Chan B, Ashton T. Co-I: Coe A, Farrell M, Meloche J, O'Brien T, Schragger A, Anderson GM, **Baker GR**, et al. 2,500,000 CAD.

2013 Jun - 2017 Jun. Delirium Prevention and Management Strategy in a Senior Friendly Hospital. Alternate Funding Plan. Innovation Fund. PI: Liu B. Collaborator(s): Brown-Farrell D, Denomme J, O'Leary B, Wong K, Ryan D, **Wong B**. 79,735 CAD.

2013 Apr - 2016 Mar. Health System Performance Research Network. Ontario Ministry of Health and Long Term Care. PI: Wodchis W. Co-I: **Baker GR**, et al. 4,645,190 CAD.

2013 Apr - 2014 Mar. Measurement Process for the Safer Health Care. Canadian Patient Safety Institute. PI: **Baker GR**. 209,701 CAD.

2013 Mar - 2013 Sep. Governance for Quality and Patient Safety in Primary Care. PI: **Baker GR**. Canadian Patient Safety Institute. 49,000 CAD.

2013 Jan – 2016 Dec. A Novel Family Based Intervention for Transition Age Youth and their Families: A Two Phase Feasibility Study. Ontario Mental Health Foundation. PI: Dimitropoulos G. Co-I: Colton P, Olmsted M, Kovacs A, **Toulany A**, et al. 110,000 CAD.

2013 Jan - 2013 Dec. Study the impact of novel mentorship program on the integration of IMGs into their residency training. University of Toronto. Dept. of Medicine Educational Scholarship & Research Grant. PI: Najeeb U. Collaborator(s): Kuper A, **Wong BM**, et al. 10,398 CAD.

2013 Jan - 2013 Dec. Piloting a research protocol and building key informant networks for a scoping review on training and practice models for invasive bedside procedures performed by internists. University of Toronto. Dept. of Medicine Educational Scholarship & Research Grant. PI: Brydges R. Collaborator(s): Stroud L, **Wong B**, et al. 9,215 CAD.

2013 Jan - 2013 Dec. Building Capacity for Quality: A Realist Evaluation of a Co-Learning Model for Resident Education and Faculty Development in Quality Improvement. University of Toronto. Dept. of Medicine Educational Scholarship & Research Grant. PI: **Wong B**. Collaborator(s): Goguen J, **Rotteau L**, McIntyre K, Kuper A, **Shojania KG**. 12,712 CAD.

## 2012

2012 Nov - 2013 Nov. "Letting stories breathe": Using patient narratives for organizational learning and improvement" Associate Medical Services (AMS), Ontario. PI: Fancott C, **Baker GR**. 7,000 CAD.

2012 Aug - 2013 Mar. International Perspectives in Quality Leadership and Transformation Dialogues and Knowledge Exchange Sessions. Funding from the Ontario Ministry of Health and Long Term Care. Co-PI: **Baker GR**, Brown A. 281,000 CAD.

2012 Jul - 2014 Dec. Teaching medical error disclosure skills to postgraduate internal medicine, surgery and pediatrics trainees. Royal College of Physicians and Surgeons of Canada (The). AMS/CanMEDS Research and Development Grant. PI: Stroud L, **Wong B**. Collaborator(s): **Coffey M**, Atkinson A, **Matlow A**, et al. 24,803.5 CAD.

2012 Jul - 2013 Jun. Integrating a focus on quality of care into a longitudinal ambulatory care rotation. University of Toronto. Education Development Fund for Innovation in Education. PI: **Matlow A**. Collaborator(s): Borschel T, **Wong BM**, et al. 10,275 CAD.

2012 Feb - 2013 Jan. Physician leadership and engagement for health system improvement and accountability. CIHR Expedited Synthesis Grant. Co-PI: **Baker GR**, Denis JL. 83,463 CAD.

- 2012 Jan - 2015 Sep. Seeing the forest and the trees - Innovative approaches to exploring heterogeneity in systematic reviews of complex knowledge translation. Canadian Institutes of Health Research (CIHR). Knowledge Translation. MOP - 123345. PI: Grimshaw J, Ivers N. Co-Investigator: **Shojania KG**. 416,702 CAD.
- 2012 Jan - 2014 Mar. SCOPE (Seamless Care Optimizing Patient Experience): A Quality Improvement Project to Reduce Emergency Department Use by Patients of Community Based Primary Care Physicians Without Access to Team Based Care. Bridges Project funded by Ministry of Health and Long Term Care. Hawker G, Ivers N, Dhalla I, Frost D, Friedman S, **Baker GR** et al. 400,000 CAD.
- 2012 Jan - 2013 Mar. Development and Evaluation of a Clinical Messaging System for Interprofessional Team-Based Care in the Outpatient Setting. Department of Medicine and Department of Family and Community Medicine. BRIDGES (Building Bridges to Integrate Care). PI: Wu R, Husain A, Jamieson T, Dhalla I. Collaborator(s): Morra D, O'Brien T, **Wong B**, et al. 201,377.42 CAD.
2012. Improving the transition from paediatric to adult care services for adolescents with eating disorders. SickKids Paediatric International Patient Safety and Quality Care (PIPSQC) Funding. **Toulany A**, et al. 4,500 CAD.
- 2011 Jan - 2015 Jun. Improving resident handoff in teaching hospitals: Understanding implementation and effectiveness of a handoff bundle. Physician Services Incorporated. PI: **Coffey M**. 154,820 CAD
- 2011 Apr - 2015 Mar. Building Bridges to Integrate Care. Ontario Ministry for Health and Long Term Care Building Bridges to Integrate Care. PI: Levinson W, Wilson L. Co-Investigator: **Shojania KG**. 5,000,000 CAD.
- 2011 Nov - 2013 Dec. Bundling effective Resident handoff practices to improve patient safety. National Institutes of Health. PI: Landrigan C. Co-Investigators: **Coffey M**, Mahant S, **Matlow A**, et al. 20,000 USD.
- 2011 Oct - 2012 Jun. Environmental Scan of Improvement Science Centers. Health Foundation, London, UK. **Baker GR**, **Shojania KG**, Fulop N. 29,280 GBP.
- 2011 Apr-2014 Mar. Ethics and values in health policy: improving care transitions for Ontario patients across the continuum of care. CIHR PHSI. PI: Gibson J, Alison PP, Upshur REG, Co-I: **Baker GR**, et al. 336,947 CAD.
- 2010 Oct - 2013 Mar. Research on Patient Engagement in Health Services. Canadian Health Services Research Foundation, PI: **Baker GR**. 178,305.96 CAD.
- 2010 Jul - 2013 Jun Leadership and Health System Redesign. CIHR Partnerships in Health Systems Improvement. PI: Dickson GS, Tholl WG. Co-I: Davies M, McDade KR, McGuire AI, Power CA, Rowlands GD, Tepper JD, Anis AH, Backman AM, **Baker GR**, et al. 400,000 CAD.
- 2010 Jun - 2012 Jul. Promoting Real-Time Improvements in Safety for the Elderly (PRISE) Study. Canadian Patient Safety Institute (CPSI). CPSI 2009 Research Competition. #724181451. PI: **Shojania KG**. Collaborator(s): **Wong B**, **Etchells E**, **Baker R**, et al. 260,000 CAD.
- 2010 Apr - 2013 Mar. Impact of Releasing Time to Care: The Productive Ward - Relationship of outcomes and context in a nurse-led health care improvement innovation. CIHR Partnerships for Health System Improvement (PHSI) with Centre for Health Quality Improvement at the Change Foundation, The Health Quality Council of Saskatchewan, Saskatchewan Union of Nurses and Saskatchewan Health Research Foundation. Co-PI: **Baker GR**. 3,323,583 CAD.
- 2010 Jan - 2012 Dec. A Virtual Ward to Reduce Re-admissions After Hospital Discharge. Alternate Funding Plan. Innovation Fund (Multi-site request). PI: Dhalla I. Collaborator(s): Mehta R, **Bell C**, Chan WS, Hwang S, Mourad O, Shadowitz S, **Wong B**. 91,800 CAD.
- 2009 Nov - 2012 Oct. Approaches to Accountability: Implications of Goals, Governance, Services, and Sub-sectors. Partnerships in Health System Improvement. CIHR. PI: Brown AD, Deber RSB, Dobrow M, Manson H. Co-I: **Baker GR**, et al. 349,881 CAD.
- 2008 Oct - 2013 Oct. Tier 2 Canada Research Chair in Patient Safety and Quality Improvement. Government of Canada Research Chairs Program. Principal Applicant: **Shojania KG**. 500,000 CAD.



## Core Members

### 2017

2017 Jun - 2022 Jun. Telephone-based cognitive behavioural therapy for post-operative bariatric surgery patients: a randomized controlled trial. Canadian Institutes of Health Research (CIHR) Project Grant. Co-PI: **Sockalingam S**, et al. 489,600 CAD

2017 Jun - 2020 Jun. Evaluating the impact of the Project ECHO model on primary care management of mental health and addictions. Canadian Institutes of Health Research (CIHR) Project Grant. Co-PI: **Sockalingam S**, et al. 573,750 CAD.

2017 Jun - 2019 Jun. Data and Lifelong learning (LLL): Understanding Cultural Barriers and Facilitators to Accessing and Using Clinical Performance Data to Support Continuing Professional Development (CPD). Phil Manning Grant Society for Academic Continuing Medical Education. Co-PI: **Sockalingam S**, et al. 50,000 USD.

2017 May - 2017 Aug. CFN 2017 Summer Student Awards Program. Management of opioid medications during end-of-life care in the home. Student PI: **Trbovich P**. 8,000 CAD.

2017 Apr - 2019 Mar. Reducing unnecessary sedative hypnotics among hospitalized patients in 5 hospitals. AMO innovation fund (MSH/UHN, Sunnybrook and St Michael's). AMO innovation fund. PI: **Soong C**. Collaborator(s): Liu B, **Bell C**, et al. 294,000 CAD.

2017 Apr - 2018 Dec. Identifying Medication Dispensing Processes that Facilitate Diversion. Becton Dickinson Canada Inc. PI: **Trbovich P**. 253,500 CAD.

2017 Apr - 2018 Mar. Evaluation of a goals of care e-learning module. Mount Sinai Hospital Department of Medicine. Mount Sinai Hospital DOM Education Committee. Co-PI: Branfield-Day L, **Soong C**. 4,000 CAD.

2017 Feb - 2019 Feb. Sunnybrook Health Sciences Centre. Ontario Centre of Excellence Health Technology Fund. PI: Charles J. Co-Investigator: **Trbovich P**. 499,500 CAD.

2017 Jan - 2019 Jan. Development of strategies to identify, analyze and prevent errors in the operating room – an inter-professional approach to enhancing technical and non-technical performance and improving patient safety: Operating Room Data Recorder" North York General Hospital Exploration Fund. Co-PI: Smith L, **Trbovich P**. 49,000 CAD.

2017 Jan - 2018 Dec. Prevalence and follow-up of pulmonary nodules discovered incidentally on computed tomography imaging. Mount Sinai Hospital Department of Medicine Pilot Project Grant. PI: **Kwan J**. 15,000 CAD.

2017 Jan - 2018 Jan. Implementing and evaluating the efficacy of an Acute Care Urology model of care in a large Canadian community hospital. North York General Hospital Exploration Fund. PI: Golda N; Co-Investigator: **Trbovich P**. 7,500 CAD.

2017 - 2018. Spreading Patient Oriented Discharge Summaries (PODS) Across Ontario. Adopting Research to Improve Care (ARTIC) 2016 Competition. Co-PI: Huynh T, Hahn-Goldberg S. Collaborators: Ramson M, Caput D, Okrainec K, **Bell CM**, **Jefferies L**, et al., 970,000 CAD.

2017 – 2018. Prioritizing Youth and Caregivers as Experts of Mental Health Care Transitions: A National Delphi Study. Canadian Institute of Health Research - Strategy for Patient-Oriented Research (SPOR). PI: Cleverley K. Collaborators: Bennett K; **Jefferies L**, et al. 62,004 CAN.

2017. Measuring the validity of a thyroid ultrasound guided fine needle aspiration biopsy simulator. Harry Barberian Scholarship Fund. Xu Jason, **Monteiro E**, Vescan A. 7,000 CAD.

### 2016

2016 Nov - 2017 Nov. Ethical Implications Related to Food Addiction in Obesity: A Planning and Knowledge Exchange Initiative to Develop a Research Network. Canadian Institutes of Health Research (CIHR) Planning and Dissemination Grant. Co-PI: **Sockalingam S**, et al. 20,000 CAD.

- 2016 Oct - 2020 Sep. Embedded Clinician Researcher Award. Canadian Institutes for Health Research. **Kiran T.** 300,000 CAD.
- 2016 Oct - 2019 Oct. A Multi-Method Approach to Exploring Prescribing Cascades. Canadian Institutes of Health Research. Project Grant. PI: Bronskill, SE, Rochon PA. Collaborator(s): Austin, PC, **Bell CM**, Farrell B, Gill SS, Gruneir A, Herrmann N, **Jeffer LP**, et al. 488,069 CAD.
- 2016 Oct - 2019 Oct. Feedback to Improve Rational STRategies of Antibiotic Initiation and Duration in Long Term Care (FIRST AID - LTC). Canadian Institutes of Health Research (CIHR). Project Grant. PI: Daneman N. Collaborator(s): **Bell CM**, et al. 489,601 CAD.
- 2016 Oct - 2017 Oct. Embedding Human Factors in Critical Care. Dr. Peter Laussen's David & Stacey Cynamon Chair in Paediatric Critical Care. PI: **Trbovich P.** 50,000 CAD.
- 2016 Aug - 2016 Dec. Pilot Project for the Conversion of Baxter (U.S.) Elastomeric Infusor Interactive Training Tools for Baxter Canada. Baxter Canada. PI: **Trbovich P.** 38,400 CAD.
- 2016 Jul - 2019 Jun. Comparative safety of aflibercept and ranibizumab in the treatment of retinal diseases. Canadian Institutes of Health Research (CIHR). Project Grant. PI: Campbell, RJ. Collaborator(s): **Bell CM**, et al. 27,500 CAD.
- 2016 Jul - 2019 Jun. The DIVERT-CARE (Collaboration Action Research & Evaluation) Study: A Multi-provincial Pragmatic Trial of Cardio-Respiratory Management in Home Care. Canadian Institutes of Health Research (CIHR). Project Grant. PI: Costa, AP. Collaborator(s): Agarwal, GR, **Bell CM**, et al. 172,013 CAD.
- 2016 Jul - 2017 Jun. Use of email between family physicians and patients: A descriptive survey of family physician practices and knowledge. UTOPIAN Small Grant Scheme 2015-16. Co-Investigator: **Kiran T.** 15,000 CAD.
- 2016 Jul - 2017 Jun. Death, Dying, and Doctors: A Qualitative Exploration of Physician-Assisted Death to Guide Continuing Professional Development. University of Toronto. Education Development Fund. PI: Sheehan K. Collaborator(s): Bell J, Abbey S, **Sockalingam S.** 9,997.5 CAD.
- 2016 Jul - 2017 Jun. Knowledge, skills and experiences of CanMEDS Leader role in Psychiatrists: A pilot study. University of Toronto. Education Development Fund. PI: Thakur A. Collaborator(s): **Sockalingam S.**, et al. 7,372.5 CAD.
- 2016 Jul - 2017 Jun. Application of Human Factors to Identify and Mitigate Safety Issues with Intravenous Infusion Devices. North York General Hospital Exploration Fund. PI: **Trbovich P.** 5,000 CAD.
- 2016 Jun- 2017 Feb. Improving the Safety of Administering Multiple IV Infusions Through Standardized IV Tube Labeling. Association for the Advancement of Medical Instrumentation (AAMI) Foundation. PI: **Trbovich P.** 8,312.50 USD.
- 2016 Apr - 2021 Mar. PPPDRMS – National Primary Care Registry for Diabetes for Earliest Detection of Complications and Analysis for Risk for Progression. Diabetes Action Canada. Strategy for Patient Oriented Research (SPOR) Network in Diabetes and Its Related Complications. Canadian Institutes for Health Research SPOR Program in Chronic Disease. Co-Investigator: **Kiran T.** 3,127,439 CAD.
- 2016 Apr - 2018 Mar. Co-designing screening invitations with patients to reduce income-related disparities in cancer screening. St. Michael's Hospital Medical Services Association Innovation Funds. Co-PI: **Kiran T.**, et al. 81,768.76 CAD
- 2016 Apr - 2016 Jun. Pilot study of an automated one-year mortality prediction tool to trigger Advance Care Planning. The mHOMR trigger tool was funded by TVN/CFN. PI: Downar J. Collaborator(s): Kobewka D, van Walraven C, Anstey K, McIsaac D, Ansari S, **Bell C.**, et al. 153,400 CAD
- 2016 Mar. Human Factors Assessment of the eCTAS Prototype. Cancer Care Ontario. PI: **Trbovich P.** 8,000 CAD.
- 2016 Feb - 2016 Nov. Evaluating the quality of socio-demographic data collected within a primary care setting: An analysis of over 11,000 patients. Toronto Central Local Health Integration Network. Co-PI: Pinto A, **Kiran T.** \$59,786.20
- 2016 Feb - 2016 Mar. Impact of capitation and team-based care on health care utilization and cost: a retrospective cohort analysis. INSPIRE Primary Health Care Program Applied Health Research Question. PI: **Kiran T.** 10,539 CAD.
2016. Creation of an educational time out in Otolaryngology-Head & Neck Surgery. Harry Barberian Scholarship Fund. Davies J, Xu J, Manojlovic Kolarski M, Rai S, Laliberte F, **Monteiro E.** 3,240 CAD.

2016 Jan - 2017 Jan. Young Adults and Bariatric Surgery: Impact on Interpersonal Relationships and Body Images. Collaborative Academic Practice Grant. University Health Network. Co-PI: Taube-Schiff, M, **Sockalingam, S**. 4,960 CAD.

2016. Assessment of emergency referrals to Otolaryngology-Head & Neck Surgery at tertiary centres in the GTA. Harry Barberian Scholarship Fund. Chen S, Chan Y, **Monteiro E**. 2,000 CAD.

2016. Improving the Perioperative Experience of Otolaryngology Patients using a web-based and smartphone application. Harry Barberian Scholarship Fund. Bensoussan Y, Vescan A, Witterick I, **Monteiro E**. 10,000 CAD.

## 2015

2015 Dec - 2017 Nov. Optimizing Prescribing of Cholinesterase Inhibitors for Older Women and Men with Dementia. PSI (Physicians Services Incorporated). Operating Grant. PI: Rochon PA. Collaborator(s): Bronskill SE, Gruneir A, Austin PC, **Bell CM**, et al. 169,000 CAD.

2015 Dec - 2016 Aug. Human Factors Validation Test. MyndTec Inc. PI: **Trbovich P**. 45,150 CAD.

2015 Oct - 2017 Oct. Prevention Of Delirium in Elderly with Obstructive Sleep Apnea (PODESA). Anesthesia Patient Safety Foundation. PI: Wong, J. Collaborator(s): Chung F (co-PI), Bradley D, **Sockalingam S**, et al. 149,000 CAD.

2015 Sep - 2018 Sep. Regional and temporal variations in incidence, prevalence and outcomes of critical illness among pregnant and post-partum women and newborns in Canada. CIHR. Canadian Institute for Research. PI: Fowler R. Collaborator(s): Aoyama K, Hladunewich M, Lapinsky S, Ray J, Scales DC, Shah Pr, **Seaward PG**. 41,325 CAD

2015 Sep - 2016 Sep. Examining the Prevalence of Binge Eating Disorder in Patients with Obstructive Sleep Apnea. Shire Pharmaceuticals Group. Investigator Initiated Study. Co-PI: **Sockalingam, S**. 33,791 CAD.

2015 Sep - 2016 Feb. Human Factors Comparative Analysis of Defibrillators. County of Simcoe Paramedic Services. PI: **Trbovich P**. 21,975 CAD.

2015 Jun - 2016 May. Phase 1: Letter of Intent Team Grant in Late Life Issues: Optimizing Prescribing in Late Life for Women and Men. Canadian Institutes of Health Research (CIHR). Team Grant: Late Life Issues - LOI. Co-PI: **Bell CM**, et al. Collaborator(s): Austin PC, Farrell B, Gill SS, Herrmann N, **Jefferies L**, et al. 24,945 CAD.

2015 Jul - 2015 Oct. Patient safety and patient-centered outcomes in general medicine inpatients: The GEMINI-PCO study. Canadian Medical Protective Association. Co-PIs: **Kwan J**, et al. 50,000 CAD

2015 Jul - 2016 Jun. Reducing income-related disparities in colorectal cancer screening. Translational Innovation Fund. St. Michael's Hospital. Co-PI: **Kiran T**, et al. 50,000 CAD.

2015 Jul - 2016 Jun. North American Peritoneal Catheter Registry. International Society of Peritoneal Dialysis & The Ontario Renal Network & Baxter Healthcare. PI: Oliver. Matthew. Site PI: **McQuillan R**. 326,600 CAD.

2015 Jun - 2015 Sep. Global Training Program –Summative Module Update Changes. Baxter Healthcare Corporation. UHN ref 2014-0161. PI: **Trbovich P**. 85,470 USD.

2015 May - 2017 May. Designing an Effective Outpatient Antimicrobial Stewardship Program to Reduce Unnecessary Antibiotic Use in Primary Care using a Mixed-Methods Collaborative Model. AHSC AFP Innovation. Operating Grant. PI: McIssac W, Morris A. Collaborator(s): **Bell C, Jeffers L**, et al. 169,695 CAD.

2015 Apr - 2017 Mar. Safer Decisions Save Lives—Enhanced Clinical Decision Support Systems Designed To Reduce Prescriptions For Opioids (SDSL). Health Canada. Drug Strategy Community Initiatives Fund (DSCIF). 1516-HQ-000018. PI: David U. Collaborator: **Trbovich P**. 622,100 CAD.

2015 Apr - 2016 May. Training on human factors methods and how they can be applied to healthcare projects. Hospital Sirio-Libanês, São Paulo, SP, Brazil. PI: **Trbovich P**. 40,000 CAD.

2015 Mar – 2016 Feb. The Development of the Senior Toronto Oncology Panel (STOP) Study. CIHR SPOR Patient Engagement Collaboration 2015 Competition. PI: Puts M. Collaborator(s): Alibhai SMH, Fitch MI, Hsu T, **Jefferies LP**, et al. 15,000 CAD.

2015 Feb - 2017 Jan. Trauma Resuscitation Using In-Situ simulation Team Training (TRUST Study). St. Michael's Hospital. PI: **Trbovich P.** 24,000 CAD.

2015 Feb - 2016 Apr. Human Factors Analysis of the Coordinated Care Tool: Understanding the Patient Experience. Sunnybrook Hospital. PI: **Trbovich P.** 13,500 CAD.

2015 Feb - 2015 Apr. Global Training Program- Development of three computer-based educational modules. Baxter Healthcare Corporation. UHN Ref 2014-0944. PI: **Trbovich P.** 101,850 USD.

2015 Jan - 2017 Jan. Human Factors Engineering into Product Development Process for Medical Devices. Brazilian Ministry of Education (MEC), Brazilian Foundation for Research Support. Fellowship-Special Visiting Researcher-Science Without Border. PI: **Trbovich P.** 85,000 BRL.

2015 - 2016. Identifying Indicators of a Successful Transition from Child to Adult Mental Health Services: An International Delphi Study. University of Toronto, Faculty of Nursing, Research Pilot Grant. PI: Cleverley K. Collaborator(s): Bennett K; **Jeffer L.** 30,000 CAD

2015. Improving the Perioperative Experience of Thyroidectomy Patients using a web-based and smartphone application. Harry Barberian Scholarship Fund. Bensoussan Y, Vescan A, Witterick I, **Monteiro E.** 5,000 CAD.

2015. Establishing the "learning Curve" on a virtual reality endoscopic sinus surgery simulator. University of Toronto Endoscopic Neurosurgery Competition. Chen S, Yao C, Lee J, Witterick I, **Monteiro E,** Vescan A. 5,000 CAD.

## 2014

2014 Dec - 2016 Nov. Frailty and recognizing appropriate medications in geriatrics and long-term care (FRAMING-LTC). Technology Evaluation in the Elderly Network (TVN). Operating Grant. Co PIs: Morris A, **Bell C,** Bronskill, S, **Jeffer L,** et al. 596,906 CAD.

2014 Nov - 2019 Oct. Investigator Award. Department of Family and Community Medicine, University of Toronto. **Kiran T.** 100,000 CAD.

2014 Nov - 2015 Nov. Improving Bariatric Surgery Post-Operative Outcomes Using a Patient Centred Approach to Interprofessional Bariatric Care. Health Quality Ontario. Improving & Driving Excellence Across Sectors Alumni Award G. Co-PI: **Sockalingam S.** 22,195 CAD.

2014 Oct - 2018 Jun. The Inference From Observational Research Methods (INFORM) Project. Canadian Institutes of Health Research (CIHR). Operating Grant. PI: Urbach DR. Collaborator(s): Baxter NN, **Bell CM,** et al. 337,620 CAD.

2014 Sep - 2015 Aug. Collaboration on the Application of Human Factors Methods to Health Care. University Hospital Marques de Valdecilla, Santander, Spain. PI: **Trbovich P.** 50,000 CAD.

2014 Jul - 2019 Jun. The Canadian STRIDER Trial: Sildenafil for dismal prognosis IUGR, A Randomized Controlled Trial of Sildenafil Therapy for Dismal Prognosis Early-Onset Intrauterine Growth Restriction. CIHR. Canadian Institute for Health Research. PI: Von Dadelszen P, Lim KI. Collaborator(s): Lalji S, Ansermino JM, Audibert F, Bujold E, Chanoine JP, Davidge ST, Gruslin AM, Magee L, Piedboeuf B, Robinson WP, **Seaward PG,** et al. 630,246 CAD

2014 Jul - 2015 Jul. Developing a Lifelong Learning Curriculum to Prepare Psychiatry Residents for Continuing Professional Development. University of Toronto. Education Development Fund. Co-PI: **Sockalingam, S.** 9,300 CAD.

**2014 Jul - 2015 Jun. Patient-centered goals of care family meetings as an entrustable professional activity. Department of Medicine. Mount Sinai Innovation in Education Awards. PI: Soong C. 10,000 CAD.**

2014 Jul - 2015 Mar. Bridging the care gap – The Mount Sinai LTC Transitions Project. Ministry of Health and Long-term Care (MOHLTC). Medically Complex Patients Demonstration Project. PI: **Soong C.** Collaborator(s): **Bell C,** et al. 54,400 CAD.

2014 Jul - 2014 Sep. TVN Summer Studentship Award. TVN. PI: **Soong C.** 6,000 CAD.

2014 Jun - 2016 May. Building Capacity to Improve and Sustain Antimicrobial Stewardship Programs in ICUs. Canadian Institutes of Health Research (CIHR). Operating Grant: Knowledge to Action. Co-PIs: **Bell CM, Jeffer LP,** et al. 178,083 CAD.

- 2014 May - 2015 Apr. GEneral MEdicine INpatient (GEMINI) registry. Green Shield Canada Foundation. PIs: Verma AA, Razak, F. Co-Investigator: **Kwan J.** 367,488.74 CAD.
- 2014 Apr - 2016 Mar. Reengineering the Discharge of Elderly Patients from Intensive Care. Technology Value Network of Centres of Excellence of Canada Core Research Grant Program. Operating Grant. Collaborator(s): Bagshaw S, Dodek P, Forser A, Lamontange F, Turgeon A, **Bell C**, et al. 589,573 CAD.
- 2014 Apr - 2015 Jun. Evidence-Based Practice Centre for the Usability and Safety of Health Technologies and Services. Health Quality Ontario. Health Technology Fund. PIs: **Trbovich P**, Easty A. 1,000,500 CAD.
- 2014 Apr - 2015 Jan. Baxter elastomeric infusion devices. Baxter Healthcare Corporation. Global Training Program. PI: **Trbovich P.** 203,700 USD
- 2014 Apr - 2014 Nov. Global Training Program. Baxter Healthcare Corporation. UHN REF #2014-0270 (master agreement 2014-0161). PI: **Trbovich P.** 203,700 CAD.
- 2014 Apr - 2017 Mar. Safety of medical devices licensed for use in Canada: A mixed methods study to inform policy for effective post-market surveillance. Canadian Institutes of Health Research (CIHR). Operating Grant. PI: Gagiardi AR, Urbach DR. Collaborator(s): **Bell CM**, Lehoux P, Ross S, Ducey A, Easty A, **Trbovich P.** 301,055 CAD.
- 2014 Mar - 2015 Feb. Telephone-Based Cognitive Behavioural Therapy for Bariatric Surgery Patients: A Randomized Controlled Trial. Canadian Institutes of Health Research (CIHR). Bariatric Care (Bridge Funding). 317877. Co-PI: **Sockalingam, S.** 100,000 CAD.
- 2014 Mar - 2014 Jul. Integrating Human Factors into the Brazilian Healthcare System. Brazil Ministry of Health. Collaborator(s): Calil, Saide. PI: **Trbovich P.** 40,000 USD.
- 2014 Feb - 2015 Feb. The Future of Quality Improvement and Continuing Professional Development in Psychiatry: How Can They Co-exist? Continuing Education Research and Development Grant, University of Toronto. University of Toronto, Continuing Professional Development. PI: **Sockalingam, S.** 4,990 CAD.
- 2014 Jan - 2015 May. Educating Clinicians on Critical IV Push Infusion Concepts Using Novel Visual and Interactive Training. Continuing Education Research & Development (CERD) award. PI: Easty A. Collaborator(s): **Trbovich P.** 4,750 CAD.
- 2014 - 2016. Nurse Led Care Transitions Interventions: A strategy to Improve Health System Integration and Performance. MOHLTC Health System Research Fund (HSEF) Targeted Research Competition. Operating Grant. PI: **Jeffs L**, Straus S. Collaborator(s): Kastner M, Law M, Kuluski K, Espin S, **Bell CM**, et al. 449,280 CAD.
- 2014 - 2015. From Primary Care to Home Care: Engaging Patients to Bridge the Gap. Canadian Patient Safety Institute 2014-2015 Research Competition. Fleming M, Bishop A, **Jeffs L**, et al. 45,000 CAD.

## 2013

- 2013 Oct - 2018 Sep. Early Results and Lessons Learned from Ontario's Roll-out of Antimicrobial Stewardship Programs. Canadian Institutes of Health Research (CIHR). Dissemination Events - Priority Announcement: Infection and. PI: Morris A. Collaborator(s): **Bell CM.** 24,000 CAD.
- 2013 - 2016 Translating Evidence to Enhance Quality Care and Health System Performance: A Focus on Nursing and Health Services. Ministry of Health and Long Term Care Knowledge Translation and Exchange. **Jeffs L**, et al. 1,494,828 CAD.
- 2013 Mar - 2015 Feb. Developing and Evaluating an Educational Intervention to Guide in the Implementation of Antimicrobial Stewardship Programs in Community Hospitals across Ontario. Canadian Society of Hospital Pharmacists. PI: L. Dresser. Collaborator(s): M. Steinberg, K. Duplisea, S. Nelson, M. So, **C Bell**, A Morris. 10,125 CAD.
- 2013 Dec - 2014 Dec. Evaluation of a Province Wide Roll-out of Antimicrobial Stewardship Programs in Critical Care Units: A Prospective, Stepped-wedge Observational Study. Physicians Services Incorporated Foundation (The) (PSI). Health Research Grant. PI: Morris A. Collaborator(s): **Bell C**, Burry L. 81,500 CAD.
- 2013 Nov - 2014 Nov. Bridging the psychosocial gaps during the transition from paediatric to adult general hospital

- settings: understanding patient experiences. University Health Network Psychiatry Research Grant Competition 2013. Department of Psychiatry, University Health Network. PI: Taube-Schiff, M. Collaborator(s): Dettmer E, D'Agostino N, **Sockalingam S**, et al. 5,448 CAD.
- 2013 Oct - 2014 Sep. Developing and Evaluating an Educational Intervention to Guide in the Implementation of Antimicrobial Stewardship Programs in Community Hospitals Across Ontario. Canadian Society of Hospital Pharmacists. Operating Grant. PI: Dresser L. Collaborator(s): Duplisea K, Nelson S, So M, Steinberg M, **Bell C**, et al. 10,125 CAD.
- 2013 Oct - 2014 Sep. Evaluating the Impact of Antimicrobial Stewardship Prospective Audit-and-Feedback Intervention in Patients with Malignant Haematological Diseases. Canadian Society of Hospital Pharmacists. Scott Walker Research Grant. PI: Miranda So. Collaborator(s): Shahid H, Schuh A, Kuruvilla J, Minden M, Mamdani M Poutanen S, Steinberg M, **Bell C**, et al. 1,000 CAD.
- 2013 Oct - 2014 Sep. Transitions Across the Continuum of Care for Older People with Complex Needs. Canadian Institutes of Health Research (CIHR). Operating Grant - Priority Announcement: Aging (Bridge Funding). PI: Anderson GM, Rochon PA. Collaborator(s): Austin PC, **Bell CM**, et al. 100,000 CAD.
- 2013 Jul - 2015 Jul. Human Factors Evaluation: Assessment of RNA Disruption Assay. MaRS EXCITE. MaRS EXCITE Investigational Award. 2013-0464. PI: **Trbovich P**. 82,800 CAD.
- 2013 Jun - 2014 Jul. Development of an Interactive Educational Module to teach the neuroscience principle behind the monitoring of brain activity to determine depth of anesthesia. Massachusetts General Hospital. Collaborator(s): Easty A, **Trbovich P**. 20,000 CAD.
- 2013 Jun - 2014 Jun. Body Image in Post-Bariatric Surgery Patients. University Health Network Allied Health Grant. University Health Network. PI: Royal, S. Collaborator(s): Wnuk S, Chi M, Weiland, M, **Sockalingam S**. 1,530 CAD.
- 2013 May - 2014 May. Development of a MetaVision Training Tool. Massachusetts General Hospital. PI: Easty A, **Trbovich P**. 10,000 USD.
- 2013 Apr - 2018 Sep. Developing Information Technology to Support Clinical Thinking During Safety-Critical Tasks. Natural Sciences and Engineering Research Council of Canada (NSERC). Discovery. RGPIN 418661. PI: **Trbovich P**. 125,000 CAD.
- 2013 Apr - 2014 May. Program for Health Technology Safety Research. Health Quality Ontario. PI: **Trbovich P**, Easty A. 588,000 CAD
- 2013 Apr - 2016 Mar. Primary Health Care Program. Health System Research Fund Program Award. PI: Stewart M. Co-Investigator: **Kiran T**. 450,000 CAD.
- 2013 Apr. Redesign of discharge practices in GIM. Physician's Fund Campaign. Mount Sinai Department of Medicine. PI: **Soong C**. Collaborator(s): **Bell C**. 25,000 CAD.
- 2013 Mar - 2015 Mar. Mindfulness based eating awareness training for bariatric surgery patients: A feasibility pilot study. University Health Network. CAP Research Internal Grant Competition. PI: Wnuk S. Collaborator(s): Du C, Wallwork A, Van Exan J, Tremblay L, **Sockalingam S**. 3,000 CAD.
- 2013 Mar - 2014 Dec. Human Factors Analysis & Training for the MyndMove System. Myndtec. UHN REF #2013-0181. PI: **Trbovich P**. 89,010 CAD.
- 2013-2015. CIHR Institute of Child and Youth Health and Hospital for Sick Children Foundation Transcranial Direct Current Stimulation for Depression in Pregnancy: A Pilot Randomized Controlled Trial. PIs: Vigod SN, Blumberger D. Co-Investigators: Murphy K, Dennis CL, Daskalakis ZJ, Ray JG, Oberlander T, Dalfen A, **Seaward PG**. 113, 725 CAD
- 2013 Jan - 2015 Jan. An Investigation of the Impact of Multi-day vs. Same-day Chemotherapy Treatment Models. Juravinski Cancer Centre, Hamilton, Ontario. Collaborator(s): Easty A, **Trbovich P**. 200,000 CAD
- 2013 - 2014. Exploring the feasibility of utilizing existing cardiac rehabilitation programs to enable physical activity pre-bariatric surgery. Alternate Funding Plan Innovation Grant. Toronto Rehabilitation Institute. PI: Alter, D. Collaborator(s): Forhan M, Thirds, G, Kmill C, Jackson T, **Sockalingam S**, et al. 52,714 CAD.
- 2013 - 2014. Barriers to the uptake of surgical telementoring: The perspectives of Canadian general surgeons.

Continuing Education Research and Development Grant, University of Toronto. Continuing Education Research and Development Awards. PI: Okrainec A. Collaborator(s): **Sockalingam S**, et al. 4,698 CAD.

2013 Jan - 2013 Dec. Economic Analysis: Maternal Complications; Perinatal Complications; Pregnancy Hypertension; Randomized Controlled Trial. CIHR. Canadian Institute for Health Research. PI: Magee LA. Collaborator(s): CHIPS Working & Study Group, **Seaward G**, et al. 25,000 CAD

2013. Antipsychotics for management of delirium – A systematic review thru Cochrane. Technology Evaluation in the Elderly Network. Operating Grant. PI: Burry L. Co-Investigators: **Bell C**, et al. 49,987 CAD.

## 2012

2012 Dec - 2015 Nov. Collaborative Integrated Pregnancy High- dependency Estimate of Risk: CIPHER Study. A clinical prediction model for critically ill pregnant women. Canadian Institute for Health Research (CIHR). PI: von Dadelszen P, et al. Co-Investigator: **Seaward G**. 100,000 CAD.

2012 - 2015. New Graduate Nurse Retention: A National Study of Factors Influencing New Graduate Nurses' Job and Career Transition in the First Two Years of Practice. Canadian Institutes of Health Research Partnerships for Health System Improvement (PHSI) Competition. Laschinger H, Foster BJ, Cummings G, Leiter M, Brunsdon-Clark B, Burkoski, V, Grinspun DR, Gurnham ME, Huckstep SL; **Jeffer LP**, et al. 349,000 CAD.

2012 – 2014. Building capacity in the practice of Knowledge Translation: Foundations of KT. Canadian Institutes of Health Research, Knowledge to Action Operating Grant 2011 Competition. Straus SE, Scarrow GD, Abramson C, Holmes B, Dainty KN, Grimshaw JM, **Jeffer L**. 176,216 CAD.

2012 Nov - 2013 Nov. Towards successful migration to computerized physician order entry for chemotherapy. Canadian Institutes of Health Research (CIHR). Planning Grant. PI: Cafazzo J. Collaborator(s): Kukreti V, Rossos PG, Easty A, **Trbovich P**, et al. 24,720 CAD.

2012 Oct - 2014 Oct. The Isolation Project: evaluating the impact of isolation precautions on systems outcomes and cost of care. Physicians Services Incorporated Foundation (The) (PSI). Operating Grant. Collaborator(s): Abrams H, **Bell CM**. 162,500 CAD.

2012 Oct - 2013 Sep. A Scoping Review of Medication Reconciliation Initiatives in Ambulatory Care. Canadian Institutes of Health Research (CIHR). Knowledge Synthesis Grant. PI: Mccarthy L, Turple J. Collaborator(s): **Bell CM**, et al. 47,274 CAD.

2012 Jul - 2015 Jun. Development of a book for the Human Factors in Biomedical Engineering. International Federation of Medical and Biological Engineering. Clinical Engineering Division. PI: Easty A, **Trbovich P**. 7,000 USD.

2012 May - 2013 Apr. A Survey to Evaluate Intensivists' Knowledge, Attitudes and Perceptions of Antimicrobial Stewardship Programs in Canadian Intensive Care Units. Canadian Critical Care Trials Group. Operating Grant. PI: Steinberg M. Collaborator(s): **Bell, CM**, et al. 2,500 CAD.

2012 Apr - 2016 Mar. Transitions Across the Health Care System and the Risk of Rehospitalization in Older Women and Men. Canadian Institutes of Health Research (CIHR). Operating Grant. PI: Gruneir A. Collaborator(s): Anderson GM, **Bell CM**, et al. 268,384 CAD.

2012 Mar - 2014. Quality improvement initiative to improve transitions of care for patients returning home from hospital. Physician's Fund Campaign. Mount Sinai Department of Medicine. PI: **Soong C**. 32,000 CAD.

2012 Apr - 2013 Jul. The Effectiveness of Different Methods to Deliver Training for a Syringe-based Mechanical Infusion Pump. Research Contract with Massachusetts General Hospital. PI: Easty A, **Trbovich P**. 25,000 CAD.

2011 Nov - 2014 Mar. Council of Academic Hospitals of Ontario Antimicrobial Stewardship Program in Intensive Care Units - Adopting Research to Improve Care Project. Council of Academic Hospitals of Ontario/Ministry of Health and Long-Term Care. Operating Grant. PI: Morris AM. Collaborator(s): **Bell C**, et al. 900,000 CAD.

2011 Nov - 2014 Mar. Council of Academic Hospitals of Ontario. ARTIC Community Hospital ICU Local Leadership (CHILL). Council of Academic Hospitals & Ministry of Health and Long-Term Care of Ontario (CAHO). Operating Grant.

Collaborator(s): **Bell CM**, et al. 200,000 CAD.

2011 Nov - 2013 Sep. The Safety of Admixture Work Processes for Parenteral Chemotherapy: A Pilot Study. Joint contract between Cancer Care, Alberta Health Services, CancerCare Manitoba, Cancer Care Nova Scotia, the University Health Network, and Canadian Association of Provincial Cancer Agencies. PI: Easty A. Collaborator(s): Fields A, White R, Walker S, Dobish R, Green E, Bourrier V, **Trbovich P**, et al. 271,240 CAD

2011 Nov - 2013 Feb. Introduction of Human Factors Engineering as a Research Theme in Brazil. Sao Paulo Research Foundation. PI: **Trbovich P**. 71,000 CAD

2011 Jul - 2014 Jun. New Investigator Award, Department of Family and Community Medicine, University of Toronto. **Kiran T**. 75,000 CAD.

2011 Sep - 2013 Aug. CIHR Strategic Training Fellowship in the ACHIEVE Research Partnership: Action for Health Equity Interventions, Centre for Research on Inner City Health, the Keenan Research Centre in the Li Ka Shing Knowledge Institute of St Michael's Hospital. **Kiran T**. 110,000 CAD.

2011 Jul - 2013 Jun. Metformin Use and Prostate Cancer Incidence and Mortality: A Novel Approach to Prevention to Prostate Cancer Prevention. Canadian Cancer Society Research Institute. CCS Prevention Init.-Intervention. PI: Fleshner, Neil. Collaborator(s): **Bell CM**, et al. 160,782 CAD.

2010 Oct - 2013 Sep. Cardiovascular and Ocular Adverse Events Associated with New Treatments for Age-Related Macular Degeneration. Canadian Institutes of Health Research (CIHR). Operating Grant. PI: Campbell, RJ. Collaborator(s): **Bell CM** et al. 176,906 CAD.

2010 Oct - 2013 Apr. More Effective Governance of Quality and Patient Safety. Canadian Health Services Research Foundation (CHSRF) and Canadian Patient Safety Institute (CPSI). PI: Jadad A, Glouberman S. Collaborator(s): **Trbovich P**, et al. 125,000 CAD.

2010 Apr - 2013 Mar. A Virtual Ward to Reduce Re-admissions after Hospital Discharge. Canadian Institutes of Health Research (CIHR). Partnerships for Health System Improvement (PHSI). PI: Dhalla I, Laupacis A, Levinson W. Collaborator(s): Anderson G, **Bell CM**, et al. 349,951 CAD.

2009 - 2015. Knowledge Translation Canada: Training Program. Canadian Institutes of Health Research Strategic Training Initiative in Health Research. Straus, SE., Grimshaw J, Brouwers M, McKibbin A, Laupacis A, Sales A, Majumdar S, Estabrook C, Stacey D, O'Connor A, Legare F, Jaglal S, Weijer C, **Jeffs L**, et al. 3,013,309 CAD.

2009 - 2014. Measuring psychiatry residents' competency in the physician-manager role: developing a resident assessment tool. University of Toronto. Dean's Fund New Staff Grant. 487608. PI: **Sockalingam, S**. 9,177.96 CAD.

2008 Sep - 2016 Mar. CIHR Team in Pharmacologic Management of Chronic Disease in Older Adults - II. Canadian Institutes of Health Research (CIHR). Team Grant: Obesity and Related Diseases - Operating Grant. PI: Rochon PA, Anderson GM. Collaborator(s): Austin PC, **Bell CM**, et al. 1,944,255 CAD.

2008 Apr - 2013 Mar. Program for the Human Factors Analysis of Medical Device Technologies. Ontario Ministry of Health and Long-Term Care. PI: Easty A. Collaborator(s): **Trbovich P**, et al. 2,709,000 CAD.