

Council of Academic Hospitals of Ontario
Adopting Research to Improve Care:
Phase II evaluation of the ARTIC Program

Final report
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Executive summary

Overview of findings from the phase II evaluation of the ARTIC program

Executive summary

The ARTIC program is designed to accelerate and support the implementation of research evidence into practice in Ontario hospitals and to contribute to quality across the system. Over its first five years, the ARTIC program has accomplished all that it set out to, and more.

Key enablers contributing to success include:

- Strategic and rigorous project selection.
- Senior leadership commitment.
- Centralized implementation supports.
- Coaching from lead project teams.
- Designated implementation lead.
- Implementation roadmap.
- Performance monitoring and reporting.
- In-kind contributions of time from the hospitals (representing over 60% of the investment made in the ARTIC program)

1. The ARTIC program supported rapid, high-fidelity implementation of evidence-based interventions.

2. The ARTIC program supported high levels of sustainment.

3. The ARTIC program led to substantial spread within and beyond the CAHO hospitals

4. The ARTIC program built substantial implementation capacity and leadership across the system.

5. Each of the ARTIC projects reported broader healthcare impacts.

6. The unique value of the ARTIC program lies in its proven model for implementing established evidence-based interventions.

1. The ARTIC program made implementation of evidence-based interventions more likely, faster and more consistent with the research evidence.

Directly through the ARTIC program, six selected interventions were implemented across 79 sites. The extent of implementation of these interventions is directly attributable to the ARTIC program; without it, 47% of the hospitals indicated that they would not have known about the intervention, or would not have chosen to adopt it. Once hospitals signed on to the ARTIC projects, they implemented them within two years.

2. The ARTIC program supported high levels of sustainment.

The first four ARTIC projects were fully sustained in 76% of the sites. This is an impressive sustainment rate, when compared with other relevant Ontario-based multi-site studies that cite sustainment rates of 50-60%.

3. Directly through ARTIC, the 6 projects were spread to 79 sites and beyond.

An unexpected, but very positive, outcome of ARTIC was extensive spread of its projects' interventions to more than 200 additional hospital sites. The ARTIC program acted as a spread agent by connecting the project leads with potential adopters and enabling the lead project teams to focus on packaging their interventions. According to the lead project teams, the interventions would not have spread as broadly or quickly without the support of the ARTIC program.

4. The ARTIC program built substantial implementation capacity and leadership across the system.

The ARTIC program built a broad range of capacity and leadership in the implementation of research evidence by providing active hands-on implementation experience to >25 researchers, >220 site champions/ coordinators, and >1500 site staff/volunteers.

5. Each of the ARTIC projects reported broader healthcare impacts.

The ARTIC projects collectively impacted the care of over 18,000 patients. The lead project teams reported a variety of outcomes related to improved patient care, interprofessional collaboration, patient experience, health outcomes, and system efficiency.

6. The unique value of the ARTIC program lies in its proven model for implementing established evidence-based interventions.

The ARTIC program is more than just the sum of its project parts. The real value of its first five-years lies in the unique model it established and tested. This model has proven effective at implementing selected evidence-based interventions in multiple sites consistently, rapidly, and with high levels of fidelity and sustainment. The ARTIC program is unique in this respect: there are no other programs identified in Ontario (or Canada for that matter) that focus exclusively on intensive multi-site implementation of established interventions.

What the ARTIC program accomplished: 2010-2014

Implemented ...

6 | projects in

26 | hospitals¹ across

79 | sites

Built capacity and leadership ...

>25 | developers/researchers learned more about what it takes to implement their projects.

>220 | site level **champions** were connected with researchers and gained experience leading implementation.

>1500 | other **staff or volunteers** gained new expertise.

↳ 76% sustainment rate

Improved ...

Quality of care for over 18,000 patients

- C-Spine rule applied at triage with 1,408 patients.
- Reduced antimicrobial consumption by 23%.
- Increased patient mobilization by 10%.
- Increased compliance with ERAS guidelines.
- Introduced bridging support to psychiatric discharges.

Collaborative practice among 79 health teams

- Expanded teamwork to better support patients.
- Enhanced team communication.
- Improved ability to provide effective feedback.
- Improved working relationships.

Patient experience and health outcomes

- Patients felt positive about the changes in care.
- Enhanced patient comfort and safety in ED.
- Reduced post-surgical infections.

System efficiency

- Saved hospital patient days:
 - 1.1 hrs. in ED.
 - 1 day post surgery.
 - 6.1 days for elderly patients.
- Saved \$330,000 in antimicrobials.
- Saved 5,809 hours of hand hygiene auditing and reporting.

Invested ...

\$19.8 million

\$7.6 million in direct costs

\$12.2 million in-kind

1 : 1.6 ratio

Overview of the evaluation

Purpose of the evaluation and overview of methods

Evaluation purpose and scope

This evaluation provided an opportunity to assess what the ARTIC program has accomplished since its launch in 2010, and to consolidate what has been learned through the implementation of the first six ARTIC projects and the phase I evaluation. Lessons from this evaluation will inform future efforts to accelerate the implementation of evidence into practice.

The evaluation of the ARTIC program was completed in two phases. Phase I of the evaluation was carried out in 2013, and explored whether the program was well-positioned to meet its objectives and how it could be improved. Phase II, which was conducted in 2014, explored program impact, sustainability, and value to the system.

This report summarizes the findings of the Phase II evaluation, with a focus on:

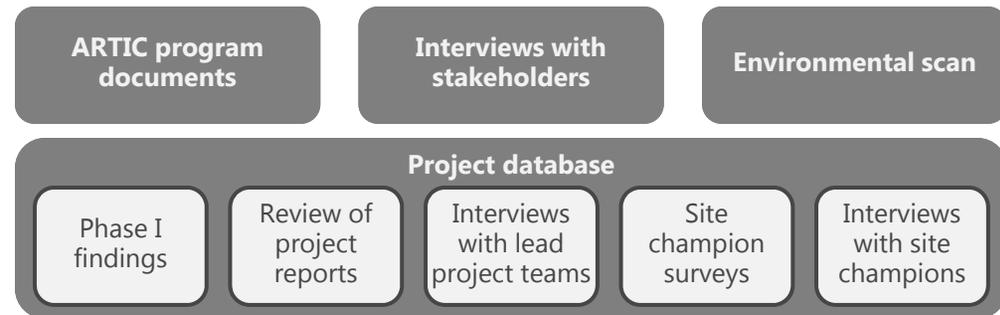
- 1. Program impact:** How the ARTIC program has contributed to implementation of evidence into practice, healthcare outcomes, and capacity/leadership development.
- 2. Sustainability and spread:** The extent to which the practices introduced by the ARTIC projects have been sustained and/or spread.
- 3. Program value:** The unique value that the ARTIC program provides within the healthcare system.
- 4. Implementation impact:** Lessons learned from the implementation of the first six projects that can be applied to future plans for the ARTIC program.

Highlights from the Phase I evaluation have been incorporated where appropriate.

Phase II evaluation methods

The impact of the ARTIC program was assessed, to a large extent, based on the combined impact of the six funded projects. A project database was created to compile information for all of the projects in a consistent and systematic way (e.g., project activities and costs, barriers and enablers to implementation, implementation timelines and fidelity, sustainment, spread, and healthcare outcomes).

Project information was gathered from multiple sources (see the diagram below).



Evaluation limitations

Information about the **healthcare impacts** of the ARTIC projects was drawn from reports prepared by the lead project teams, and has **not been validated** by Cathexis.

Because the ARTIC program did not have an overarching evaluation framework, there was considerable variability in the content and level of detail provided in the project reports. As a result, there are some **information gaps** related to implementation fidelity, patient volumes and healthcare outcomes.

Fidelity of implementation results are not precise, since assessments were made by the evaluators using limited information.

Project reports, a key source of information about implementation and outcomes, were reviewed for clarity and transparency of methodology and findings. Additional information was requested from lead project teams as needed to understand the methods or findings.

Additional information about the enablers, impact, and value of the ARTIC program was drawn from ARTIC program documents (particularly the Phase I evaluation report) and interviews with stakeholders. An environmental scan was also undertaken to gather information about other programs with similar goals.

Triangulation of findings (i.e., synthesis and integration of data from multiple sources through collection, examination, comparison, and interpretation) was used to identify themes and variations across the different sources in order to strengthen conclusions about each project.

Appendix B contains additional information about the data collection methods and project database.

Overview of the ARTIC program

Purpose, program model, projects supported, and costs of the ARTIC program

The ARTIC program's purpose

The unique mandate of a research hospital – the integration of research, teaching, and specialized care – provides an exceptional environment for innovation. From bench to bedside, research hospitals are the creators and early adopters of innovations that improve the lives of patients and the care that the system can provide.

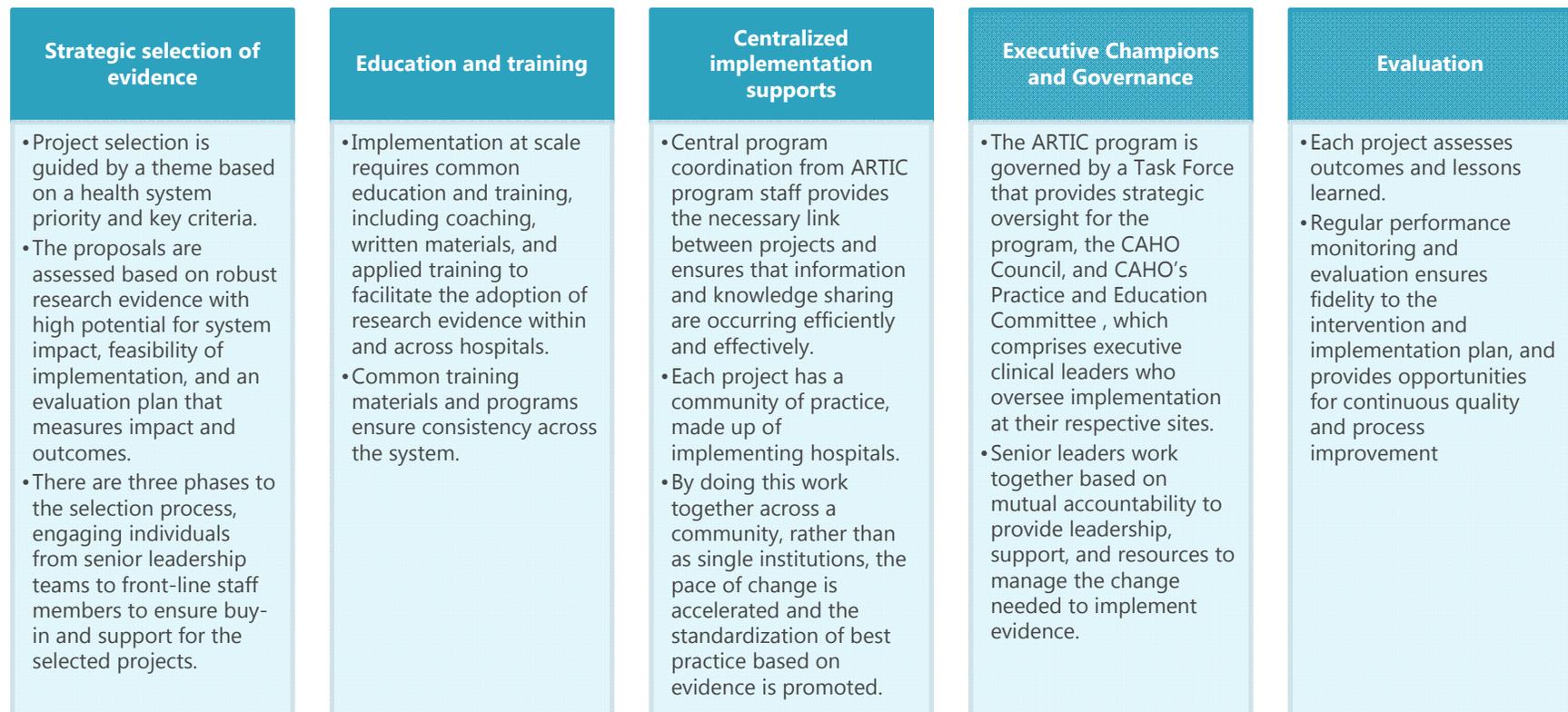
The ARTIC program was created to address the challenge of moving evidence into practice to drive quality improvement in the Ontario health care system. Transitioning evidence into routine practice of health care delivery is a significant challenge, as it can take 17 years or more for this diffusion to occur.

The Council of Academic Hospitals of Ontario (CAHO) launched the ARTIC program in 2010, and with the support of the Ministry of Health and Long-Term Care (MOHLTC) has continued to adapt the program into a model for evidence implementation.

The ARTIC program accelerates and supports the implementation of research evidence into practice in Ontario hospitals, and contributes to quality across the system.

The ARTIC model

The ARTIC model has been refined year over year through a process of continuous quality improvement that draws on the accumulation of experience and learning. It includes five core enablers, shown below.



Costs of the ARTIC program

In-kind costs include:

- Executive leadership support.
- Project champions/site lead time.
- Peer support volunteer time.
- Staff training time.

Over 60% of the investment made in the ARTIC program was through hospital in-kind contribution of staff time (ratio of 1:1.6).

Implementation of the first six ARTIC projects over a four-year period cost just under 19.8 million dollars. The full cost of the ARTIC program included:

- \$7.6 million in **direct costs**.
- \$12.2 million in **in-kind costs**.

The ARTIC program funding supported implementation of six projects, described on the following page.

MOHLTC funding for the ARTIC program began in 2011. Prior to that, direct project costs were spread across the participating hospitals.

The Phase I evaluation found that the intentional selection of projects that were aligned with system priorities, combined with senior leadership commitment, enabled hospitals to contribute substantial in-kind resources.

Costs of the ARTIC program over a 4-year period	CCR	Handy Audit	ASP in ICU	MOVE ON	iERAS	TDM	ARTIC Program
Year(s)	2011-13	2011-12	2012-14	2012-14	2013-15	2013-15	
Duration	3 years	1 year	2 years	2 years	2 years	2 years	
# hospitals participating	8 ¹	16	12	14	15	9	
ARTIC central office costs (2010-2015)	\$1,600,000						\$1,600,000
Direct costs - ARTIC program funding	\$124,000	\$0	\$841,900	\$1,224,897	\$1,729,506	\$1,400,046	\$5,320,349
Direct cost – Hospital fee	\$377,889	\$277,450	\$0	\$0	\$0	\$0	\$655,339
In-kind contributions	\$1,243,320	\$120,000	\$2,613,600	\$1,496,688	\$3,711,600	\$3,037,770	\$12,222,978
Total costs	\$1,745,209	\$397,450	\$3,455,500	\$2,721,585	\$5,441,106	\$4,437,816	\$19,798,666

¹9 hospitals began CCR, 1 withdrew.

ARTIC projects

In its first three rounds of funding, the ARTIC program supported the implementation of the following six projects (described further in Appendix A).

CCR seeks to optimize resources in the assessment of patients by the Canadian C-Spine Rule. It is aimed to decrease Emergency Department (ED) wait times and increase patient satisfaction by quickly and effectively identifying patients who do not require immobilization.

Canadian C-Spine Rule



ASP in ICU aims to optimize the use of antimicrobials through establishing a fully functional ASP in each participating hospital's ICU and be able to report antimicrobial consumption, antimicrobial costs, antimicrobial resistance, and C. difficile infection rates.

Antimicrobial Stewardship Program



iERAS aims to implement a guideline using a multi-faceted knowledge translation strategy to ensure a coordinated approach to patient care (from pre-op to post-op) to optimize patient outcomes, accelerate recovery, and reduce lengths of hospital stay following colorectal surgery.

Enhanced Recovery After Surgery



HandyAudit™ is an innovative device that increases the efficiency of the hand hygiene compliance reporting process by reducing time spent transcribing and generating hand hygiene compliance reports.

HandyAudit™



MOVE ON aims to implement and evaluate a multifaceted program designed to increase mobilization and prevent functional decline in older patients admitted to acute care facilities in Ontario.

Mobilization of the Vulnerable Elderly in Ontario



TDM aims to support the successful discharge of people diagnosed with mental illnesses from hospital to community by providing both bridging out of clinical support and peer support from the community.

Transitional Discharge Model



Phase I evaluation findings

Core elements of the ARTIC model identified in the Phase I evaluation:

- Strategic and rigorous project selection.
 - Senior leadership commitment.
 - Centralized implementation supports.
 - Coaching from lead project teams.
 - Designated implementation lead.
 - Implementation roadmap.
 - Performance monitoring and reporting.
-

The ARTIC program is designed to encourage uptake of carefully-selected innovations within CAHO hospitals

The intentional alignment of funded projects with current healthcare priorities increases hospitals' interest in ARTIC projects and makes it easier for them to commit the resources required for implementation.

Because of the ARTIC program's rigorous selection process, a project that is chosen under the ARTIC program is perceived to be a worthwhile endeavor. This enhances hospitals' willingness to participate and commit necessary resources.

By leveraging CAHO as a forum, the ARTIC program brings these carefully-selected projects to the attention of senior hospital leadership.

By agreeing to participate in an ARTIC project, hospital CEOs are making a commitment to implement the intervention, which increases the likelihood that implementation will be given priority among other emerging opportunities.

The ARTIC program is designed to create the ideal conditions for implementation of the funded innovations

The ARTIC program is intentionally designed to support, enhance, and accelerate the implementation of new interventions by addressing barriers and strengthening enablers.

The ARTIC central office provides centralized implementation supports, which include advice, linkages between projects and hospitals, funding, and a common structure for implementation.

Effective elements of the ARTIC program's implementation structure include:

- Individualized supports/coaching from the lead project teams that developed the intervention.
- Designated implementation leads at each site who are responsible for implementation.
- A clearly articulated but flexible implementation roadmap.
- Performance monitoring and reporting.

Impact of the ARTIC program

Accelerated movement of evidence into practice, sustainment and spread of ARTIC projects, increased system capacity, and health care impacts

Moving evidence into practice

(implementation of the ARTIC projects)

The concept of implementation

Implementation is understood to mean the adoption and ongoing use of an intervention at a hospital site, with fidelity to the core elements of the evidence-based intervention.

There is no lack of research evidence about effective practice in healthcare, but often healthcare professionals are too busy to access and make use of it. To drive quality improvement, the evidence needs to be translated for broader use. The lead project teams have done this by developing specific interventions that are based on the research evidence. To get the full benefits of evidence-based practice, these interventions must be implemented with fidelity to the core elements of the evidence. (Kilbourne, 2007)

How implementation was determined

Project reports were the primary source of information about implementation at the hospital sites. Supplementary information was gathered through surveys and interviews with site champions. Fidelity to the core elements could be assessed for five of the ARTIC projects.

The extent of implementation through the ARTIC program was compared against what would likely have happened in the absence of the ARTIC program, which was established through an online survey of project site champions. Site champions were asked whether their hospital would have adopted the intervention in the absence of the ARTIC program, and whether implementation would have been faster/slower and more/less coordinated without the ARTIC program. Interviews with the site champions provided clarification and substantiated the survey findings.

The impact of the ARTIC program on implementation was also assessed by reviewing the history of each ARTIC project, looking at adoption of the interventions prior to the ARTIC program. The lead project teams were also interviewed about the impact the ARTIC program had on broader implementation of their projects.

Implementation of ARTIC projects

The ARTIC program implemented ...

6 projects in

26 hospitals, across

79 distinct sites

¹ Information was available to assess fidelity in 61 of the 79 ARTIC project sites, representing five of the ARTIC projects (including one where information was available for most but not all sites). No information was available to assess fidelity for one project.

ARTIC projects were implemented with fidelity to the core elements

Through the ARTIC program, six evidence-based interventions were implemented in 79 distinct sites within 26 hospitals (including 23 of the 24 CAHO hospitals and three non-CAHO hospitals).

Fidelity to the core elements could be assessed for 61 of the 79 ARTIC project sites¹. **95% of these sites implemented with fidelity.**

The ARTIC program supported well-coordinated and rapid implementation

Without the ARTIC program, only 7% of the sites would have implemented as rapidly or thoroughly. According to the site champions:

- Implementation would have **taken longer** in **87%** of sites.
- Implementation would have been **less coordinated** in **80%** of the sites.

How fidelity was determined for each project

Implementation fidelity at any given site was determined based on adherence to core elements of the project, as reported by lead project teams (listed below) and/or as determined through site champion interviews or surveys.

CCR

- Medical directive in place.
- Nurses trained & certified.
- C-Spine Rule regularly being used at triage by certified nurses.

HandyAudit™

- HandyAudit™ license in place.
- Actively using the HandyAudit™ tool for hand hygiene audits and reporting.

ERAS

- Enrolling ERAS patients.
- Complying with core ERAS guidelines .

ASP

- ASP pharmacist and ID physician meeting with the ICU team 3-5x/week to review antimicrobial use for each patient.
- Monitoring antimicrobial usage.

MOVE ON

- Mobility encouraged 3 times per day.
- Mobilization is progressive and scaled.
- Mobility assessments within 24 hours of admission.

TDM

- Transitional bridging of clinical support out into the community.
 - Support from a trained peer who has experienced a similar transition.
-

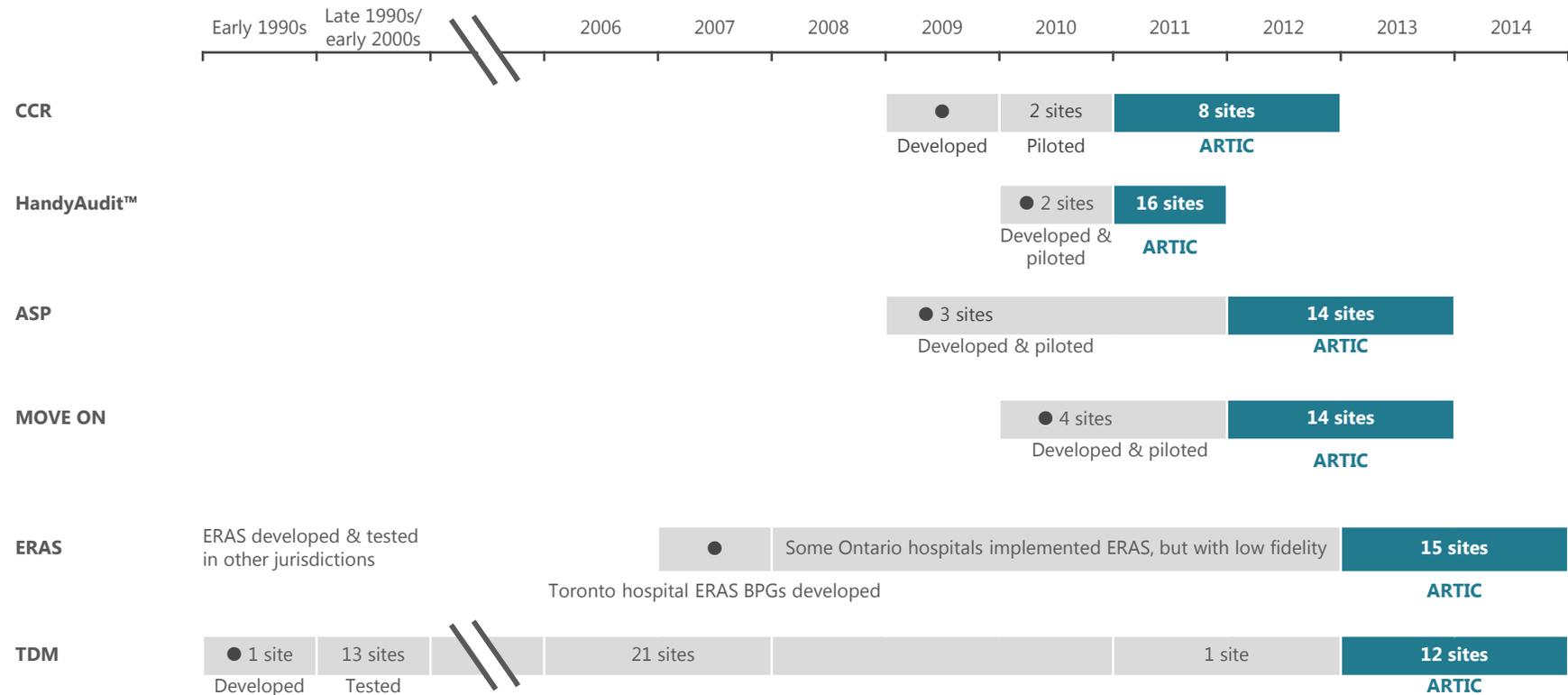
Impact of the ARTIC program on implementation

Much of the implementation is directly attributable to the ARTIC program

As can be seen in the timeline below, there was a dramatic jump in the number of sites implementing the interventions once the ARTIC projects were active. Prior to that, few hospitals beyond the lead institution had adopted the interventions.

Without the ARTIC program, 47% of the site champions indicated their hospital would not have known about the intervention, or would not have chosen to adopt it. Once hospitals signed on to the ARTIC projects, they implemented **within two years**.

Number of new Ontario hospital sites that implemented each intervention over time



The ARTIC model enables rapid, high-fidelity implementation of evidence-based interventions

The table below shows how the enablers of the ARTIC model make implementation more likely, faster, and more consistent with the core elements of the intervention (i.e., its intended design).

Enablers in the ARTIC model	Specific elements	How these elements support implementation	Effect on implementation
Strategic selection of evidence	Alignment with system priorities	Chosen interventions align with hospital priorities.	More likely
	Rigorous project selection	Brings interventions to the attention of senior executives. Interventions viewed as worthwhile.	More likely
	Readiness assessment	Clarified expectations and ensures critical resources are in place (e.g., dedicated time for site champion, information systems) before implementation begins.	Faster More consistent
Executive champions and governance	Governance structure	Friendly competition drives implementation forward.	Faster
	Senior executives' commitment	Ensures critical resources are in place, addresses barriers as they arise, establishes the project as a priority, and motivates site-level teams.	Faster More consistent
Centralized implementation supports	Infrastructure framework (oversight and accountability by the ARTIC central office)	Ensures implementation is taking place as intended, and that barriers are addressed in a timely way.	Faster More consistent
	Standardized approach / sharing learning across projects	Clear implementation roadmap and development/use of effective implementation resources (tools, training materials, and process templates) and strategies make implementation easier.	Faster More consistent
Education and training	Coaching from lead project teams	Hands-on support from developers of the intervention: assisting each site in identifying and overcoming barriers to implementation.	Faster More consistent
	Community of practice	Provides opportunities for the sites to share ideas and solutions.	Faster
Evaluation	Performance monitoring & reporting	Regular site-level reporting identifies sites with low/high performance so issues can be addressed. Friendly competition drives implementation forward Seeing improvements helps to motivate site-level teams.	Faster More consistent

The ARTIC program addresses barriers to implementation

Lack of time / too much work

Implementation barrier: There is an initial investment of time and effort as staff learn and integrate new practices into their routines.

The ARTIC program addressed this by selecting projects that aligned with priorities; articulating staff time required (through readiness assessment); providing funding to implementing sites for temporary implementation roles; and ensuring a champion is appointed primary responsibility for site-level implementation (part of the standardized implementation approach).

Effective? Somewhat. Implementation often still happened “off the side of peoples’ desks.”

Data collection

Implementation barrier: In many cases, patient records did not contain the information needed to assess performance. Additional data gathering was burdensome, and in some cases produced unreliable data.

The ARTIC program addressed this by requiring a feasible monitoring and evaluation plan (e.g., data collection incorporated into the tools used for implementation, and monitoring/reporting back results).

Effective? Somewhat. Barriers were mitigated when these strategies were used, but some challenges remained.

Pervasive barriers at the practitioner, organization, and system level can derail implementation efforts. The figures below show **how the ARTIC model addressed common barriers**. While most barriers were addressed, there remain challenges related to workload and data collection.

Resistance

Implementation barrier: Some healthcare team members resisted new practices, not believing they were an improvement over their old practice.

The ARTIC program addressed this by ensuring healthcare team members were aware of the intervention’s strong evidence base (part of the standardized implementation approach); and demonstrating the benefits in real time through performance monitoring and reporting.

Effective? Yes, these barriers were largely overcome.

Lack of fit with the context

Implementation barrier: Interventions had been developed in different settings, and sometimes with different populations than the implementing sites. They needed to be adapted to fit the new context while maintaining the essential core elements.

The ARTIC program addressed this by involving the healthcare teams at each site in barrier assessment; establishing a community of practice (both parts of the standardized implementation approach); and providing coaching by the lead project team

Effective? Yes, most issues resolved.

Hospital bureaucracy

Implementation barrier: Some projects involved new medical directives, procurement, or changes to electronic medical records (EMR). Getting these pieces in place was a complex, multi-step process.

The ARTIC program addressed this by engaging executive leaders to help navigate hospital requirements; providing coaching by the lead project team; and providing direct assistance through the ARTIC central office.

Effective? Yes, most issues resolved.

Competing priorities

Implementation barrier: For some of the healthcare team members, the ARTIC project was low on their long list of priorities.

The ARTIC program addressed this by involving healthcare teams members in planning the implementation; leveraging champions (both parts of the standardized implementation approach); encouraging executive leaders to demonstrate their interest and support; and selecting projects that address a real need in the setting.

Effective? Yes, most issues resolved.

Sustainment

The concept of sustainability

Sustainability is “the degree to which an innovation continues to be used after initial efforts to secure adoption are completed.” (Rogers 2005)

After investing heavily in the implementation of a new practice, it would seem both practical and logical for organizations to ensure the practice changes are sustained. However, sustainability is not guaranteed. It is a complex construct and influenced by many factors (both internal and external to the context in which the intervention is implemented).

How sustainment was determined

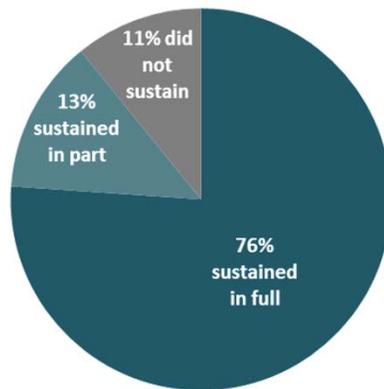
At the time of the evaluation, only four of the six ARTIC projects were at a point where it was appropriate to assess sustainability.

We asked, in surveys, if the site had sustained the intervention in full, partially, or not at all. When available, additional evidence from interviews and the surveys was used to validate survey responses by determining whether the core elements of each project were / were not sustained. In three cases, we adjusted the level of sustainment based on this assessment. Sustainment levels were determined for 46 out of 50 sites that had implemented ARTIC projects¹ (there was insufficient information to determine the sustainment levels of the remaining four sites).

In order to validate the sustainability findings of this evaluation and to evaluate the efficacy of any changes to the ARTIC program, CAHO should monitor sustainment of the projects on an annual basis.

¹ 51 sites participated in the first four ARTIC projects, and 50 of these sites actually implemented them.

Sustainment of the ARTIC projects



The ARTIC program supported high rates of sustainment

The first four ARTIC projects were fully sustained in 76% (35 out of 46) of sites that originally implemented them 1.5 to 2.5 years prior. This is a high level of sustainment when compared with other relevant Ontario-based multi-site studies that cite sustainment rates of 50-60% (Ragusila 2014 and Davies et al. 2006) over similar periods of time.

An additional 13% (six sites) partially sustained the ARTIC projects. In other words, only 11% (five sites) did not sustain an ARTIC project they had implemented.

Among the six sites that sustained in part, at least two had originally implemented in full and one had implemented only partially. Among the five sites that did not sustain the ARTIC project, at least two had originally implemented it in full and one had implemented only partially.

It's part of **what we do now**. If you ask some of the newer nurses trained, they wouldn't know that it was done differently before.

-Hospital senior executive

Why some projects were not fully sustained

Deviations from the original intervention (i.e., partial sustainment) may be intentional and beneficial in some cases, enabling organizations to achieve even better outcomes. However, in other cases, deviations may be undermining and unintentional, as when there is “slippage” due to competing priorities, staff turnover, or limited resources. Stirman et al. (2012) recommend exploring the reasons for any modifications to determine whether they are a result of conscious, evidence-informed decisions, or unintentional slippage.

There were six sites¹ that had partially sustained the interventions. In some cases, the modifications were a result of slippage from the original intervention (e.g., because of limited opportunity to use the practice, or lack of skills/knowledge among key staff). In others, a conscious decision was made to cut back on core elements because of competing demands on staff time.

There were five sites² that had discontinued the interventions. In some cases, they were discontinued for reasons that had nothing to do with the intervention itself (e.g., a hospital merger, adoption of a patient-centered approach to the practice, which the original intervention could not support).

In other cases, key determinants of sustainability (specifically, staff buy-in and/or leadership support) were insufficient from the outset. These issues may have been forestalled if the readiness assessment (which was implemented in the third round of funding) had been applied to the projects.

¹ These six sites were from three different ARTIC projects.

² These five sites were from three different ARTIC projects.

How the ARTIC program supports sustainability

Planning for sustainability cannot be a back-end exercise; it must be initiated when implementation efforts are being designed and undertaken. Based on critical assessment of the body of research about sustainability, Davies et al. (2013) identified six important factors to be considered in the development of sustainability-oriented action plans: health needs and expected benefits, effectiveness of the system to monitor progress, adaptability and alignment of the improved practice, multi-level and collective leadership, financial and human resources, and community stakeholder support.

An assessment of the ARTIC projects using the NHS Institute for Innovation and Improvement's Sustainability Model (Maher 2010), shown in the table on the next page, indicates that the ARTIC program is well designed to ensure the presence of most sustainability factors identified above, through:

- Strategic and rigorous project selection;
- The readiness assessment process;
- Standardized implementation approach (based on best practices – e.g., launch, barriers assessment, staff education, communities of practice, coaching support for the sites), and provision of implementation supports (e.g., funding, coaching for lead project teams, problem solving as needed); and
- Engagement of executive champions through CAHO governance structures.

The need for ongoing financial and/or human resources in particular is a persistent and significant hurdle identified by hospital representatives to sustaining some of the ARTIC projects. Hospitals are more willing to ensure these resources are in place for the longer term when there is genuine leadership support, clear benefits, and/or alignment with external expectations.

How performance on the NHS sustainability elements was determined

Projects were assessed against the detailed four-tier rubrics in the NHS model, drawing evidence from project final reports, combined with information from interviews and surveys. Lower ratings were given where 1/3 or more sites in a particular project raised a concern. Elements were considered “present” if the project scored in the top two of the four tiers of the rubric.

NHS sustainability elements (Maher, 2010)	ARTIC projects ¹	How the ARTIC program supports sustainability
Benefits are credible (e.g., supported by evidence, visible to staff).	★★★★	The ARTIC program supports this through its rigorous project selection process, which requires evidence of impact.
There are benefits beyond helping patients (e.g., increased efficiencies, making jobs easier).	★★★☆	The ARTIC program supports this by including efficiency in its selection criteria.
Staff buy in to the intervention (positive attitudes towards it).	★★★☆	The ARTIC program supports this through its standardized implementation approach, which includes initial education about the benefits as well as skills training.
Senior leadership takes responsibility for the change process, is engaged and provides advice to support implementation.	★★★☆	The ARTIC program supports this through the readiness assessment, and by engaging executive champions through CAHO governance structures.
The intervention is aligned with the organization’s strategic aims and culture.	★★★☆	The ARTIC program supports this through its project selection process, including the readiness assessment.
Clinical leadership is engaged and supports the intervention.	★★★☆	The ARTIC program supports this through its readiness assessment, which includes clinical leadership support.
Infrastructure is in place for sustainability (equipment, job descriptions, policies, procedures, communication systems, etc.).	★★☆☆	The ARTIC program supports this through its central office, which provides coaching to the lead project teams as part of its implementation supports. However, this element is undermined if the ARTIC program provides funds for site-level resources that will need to be continued post-implementation.
There is an effective system to monitor evidence of progress, act on it and communicate results.	★★☆☆	The ARTIC program supports this through its selection process, which requires an evaluation plan. However, the evaluation plans are not required to include a monitoring/feedback component, which would strengthen this element.
Staff have the skill/knowledge to implement the intervention.	★★☆☆	The ARTIC program supports this through its standardized implementation approach, which includes skills training. However, plans are not always made to ensure training is maintained once the project ends.
There is flexibility to adapt to changes in the context.	★★☆☆	The ARTIC program is not intentionally designed to impact this element.

¹ Each blue star represents one of the first four ARTIC projects in which the sustainability element was strong in at least 2/3 of the sites.

Spread

The concept of spread

Spread is understood to mean the expansion of an intervention to additional sites (or within a site to serve more people).

There is no question that it would be advantageous to widely spread effective health practices to all healthcare settings in which they are relevant. While some innovations spread like wildfire, others “take endless time to catch on or never propagate beyond a few early adopters.” (Bodenheimer 2007)

The ARTIC program aimed to spread and facilitate adoption of evidence-based interventions within the CAHO community. ARTIC was very successful (as per previous sections) in ensuring rapid adoption within CAHO. An unintended, but very positive, additional consequence was the spread of ARTIC projects that occurred beyond the implementation in the CAHO community.

How spread of ARTIC was determined

The evaluation identified substantial spread of the ARTIC interventions within and beyond the planned CAHO hospitals (i.e., additional sites, beyond the original 79, that took up each project subsequent to the ARTIC program).

To determine the extent of spread, we asked the lead project teams, through interviews, about spread of their interventions beyond the ARTIC program. In addition, we asked site level leads/champions, through surveys, about their knowledge of spread of each project to other areas of their hospital and spread to other hospitals in their respective region (beyond the initial ARTIC group).

Spread of ARTIC projects

The ARTIC program facilitated spread of evidence-informed interventions, beyond its original scope.

Directly through ARTIC, six selected projects were implemented within **79 sites**, collectively. (see pp. 19-23 of this report for details).

According to the lead project teams themselves, their projects would not have been implemented as broadly and quickly without the support of the ARTIC program. The role of the lead project teams in supporting implementation also enabled them to devote time and attention to refining their interventions and the materials that aid in their implementation, which is believed to have contributed to broader spread beyond ARTIC.

Though not an originally identified goal of the ARTIC program, three of the six projects have spread substantially *beyond* the original ARTIC sites. Combined, these three projects have been adopted by **more than 200 additional hospital sites** since involvement in the ARTIC program.

The literature on spread (and scale-up) of health innovations is still relatively limited (it is fairly new and there are few conclusive studies). At this point, there is no meaningful benchmark against which to compare the spread performance of the ARTIC program, however the results are encouraging.

We probably wouldn't be around right now; we'd be **dead in the water**. It would have been too difficult to convince hospitals to go forward with something [*i.e., the project*] they're not used to.

– Project lead

How the ARTIC program is supporting spread

What supported further spread of the ARTIC projects?

The evaluation found that projects were more likely to spread beyond the original ARTIC sites when:

- There were **external requirements** supporting them (e.g., accreditation, reporting requirements, province-wide policy).
 - **Additional funding** was available/secured for broader roll out – both for lead project teams and for the specific sites.
 - The **lead project team** was particularly motivated to see it taken up more broadly.
-

The ARTIC program acts as a spread agent

The assessment of spread enablers in the table on the following page indicates that the ARTIC program is already playing a significant role as a spread agent, by:

- Identifying evidence-based interventions that are worth spreading, through its selection process;
- Connecting innovators with potential adopters, via its executive champions and governance structure; and
- Building the capacity of the lead project teams to package their interventions for implementation in the CAHO hospitals and beyond.

Natural diffusion in the absence of a deliberate and proactive knowledge translation strategy is insufficient in healthcare (WHO 2010). Intentional and systematic planning and preparation are required to support the spread of effective new practices and products (WHO 2010 and Nieva et al. 2011).

Few innovations have the necessary packages, since development of spread packages requires considerable resources and focused effort.

Recent reports (e.g., Nieva et al., 2012, WHO 2010), have provided valuable advice about how spread can be optimized:

- **Define core elements:** The essential features of the innovation (those that “make the difference” and must be preserved when implementing the intervention in other settings) must be clearly and concisely articulated.
- **Message compelling benefits:** Benefits must be clearly and strongly stated in terms that are relevant to each stakeholder audience.
- **Package innovation for spread:** Spread packages can include an array of implementation aids / support materials (e.g., training, operational manuals/guides, organization charts, process flows, checklists, templates) with clear directions for linking it all together. They might include services in addition to materials.

Spread is more likely to occur when innovators are connected with **spread agents**. Spread agents can identify interventions worth spreading, provide infrastructure and capacity building, and directly help innovators package and “sell” their innovations. In addition, spread agents can act as a conduit between different stakeholder communities and serve as an intermediary between innovators and adopters. (Nieva *et al.* 2011).

How performance on the spread enablers was determined

Projects were assessed against each enabler, drawing evidence from project documents and stakeholder interviews. Each star represents one of the six ARTIC projects.

Spread enablers (Nieva et al., 2012)	Performance of the ARTIC program ¹	How the ARTIC program supports spread
Connect innovators and potential adopters.	★★★★★★	The ARTIC program supports this through its governance structure, which connects the lead project teams with potential adopters in CAHO hospitals.
Provide a range of implementation aids & supports.	★★★★★★	The ARTIC program supports this through its standardized implementation approach, which includes a range of implementation supports.
Clearly define core elements of the intervention.	★★★★★☆	This has improved over the years. The ARTIC program now supports this through its project selection process, which requires the lead project teams to articulate core elements in preparation for the readiness assessment.
Effectively communicate resources required for implementation.	★★★★☆☆	This has improved over the years. The ARTIC program now supports this through its project selection process, which requires the lead project teams to identify resource requirements in preparation for the readiness assessment.
State benefits in direct and compelling ways (sell points).	★★★★☆☆	The ARTIC program is not designed to impact this enabler.
Streamline interventions to minimize cost of implementation.	★★★☆☆☆	The ARTIC program supports this through its project selection process, which requires detailed budget information, and includes feasibility as a selection criterion.
Provide a clear implementation roadmap (with some room for flexibility).	★★☆☆☆☆	Implementation direction is provided largely via the lead project teams.

How else the ARTIC program can support spread

ARTIC could support further spread by partnering with external system partners who can reach out to a broader healthcare audience. ARTIC could also support spread by making spread planning a more explicit component of the program (i.e., encouraging lead project teams to use the ARTIC implementation process to refine and package their interventions for broader spread). This may minimize, but not necessarily eliminate, the ongoing need for intensive human supports (e.g., implementation facilitation/coaching) when other hospitals seek to adopt the interventions.

¹ Each blue star represents one of the six ARTIC projects in which the sustainability element was strong in at least 2/3 of the sites.

System capacity and leadership development

The ARTIC program's impact on implementation capacity and leadership development

>25 developers/researchers learned more about what it takes to implement their projects

The lead project teams (primarily made up of researchers) had the opportunity to be actively involved in the implementation of their project at multiple sites at the same time. The dynamic exchange afforded by this process helped the lead project teams learn:

- What works in moving evidence into practice.
- How to overcome barriers in different contexts.
- How to package their projects for broader spread.

In several cases, the project leads have become important provincial resources as a result of their participation in ARTIC.

The ARTIC program's systematic, collective approach to implementation built substantial capacity and leadership across the system.

The ARTIC program **engaged at least 26 senior hospital executives** as implementation champions for the ARTIC projects, in addition to providing active hands-on implementation experience to lead project teams, site champions/coordinators, and site staff.

>220 site level champions were connected with researchers and gained experience leading implementation

Each of the ARTIC projects depended on local champions and coordinators to support implementation at the site level. Through their involvement, champions worked together with the researchers who developed the intervention to:

- Lead collaborative planning to overcome barriers and support successful implementation within their sites.
- Put infrastructure in place to support practice change.
- Educate and train hospital staff.
- Sustain the momentum of practice change.

>1500 other staff or volunteers gained new expertise

All of the ARTIC projects required that staff and/or volunteers learn new practices and approaches to care (often through formal launch and training activities). The ARTIC projects have built broader system expertise in:

- Application of the Canadian C-spine Rule.
- Use of an innovative electronic device for hand hygiene auditing
- Antimicrobial stewardship.
- Patient mobilization.
- Perioperative surgical best practices.
- Psychiatric discharge / transition to community.

Healthcare impacts

Impact of ARTIC projects on healthcare

The ARTIC projects reported a broad range of different healthcare impacts, which can be grouped into four primary categories: patient care, interprofessional collaboration, patient experience / health outcomes, and system efficiency.

The six ARTIC projects collectively impacted the care of **over 18,000 patients** across 26 hospitals.

The ARTIC program contributed to these healthcare impacts *indirectly*, via the ARTIC projects. In other words, the ARTIC program supported improved healthcare impacts by a) selecting projects designed to have these impacts, and b) supporting implementation of the resulting projects.

<p>Improved healthcare quality Six projects</p> <ul style="list-style-type: none"> • Impacted the care of over 18,000 patients. • Improved quality and consistency of hand hygiene auditing. • Applied C-Spine Rule at triage with 1,408 patients. • Reduced antimicrobial consumption by 23% in adult ICUs. • Standard antimicrobial measures and reporting in CCIS. • Increased out-of-bed mobilization of elderly patients by 10%. • Increased compliance with ERAS best practice guidelines. • Introduced bridging supports to psychiatric discharges. 	<p>Improved interprofessional collaboration Six projects</p> <ul style="list-style-type: none"> • Increased cohesion across surgical perioperative teams. • Improved collaboration between hospitals and community-based consumer survivor initiatives. • Greater shared responsibility across the healthcare team for patient mobilization and antimicrobial use. • More immediate feedback and coaching about hand hygiene practices. • Better working relationships between nurses and physicians in ED.
<p>Improved patient experience and health outcomes Three projects ¹</p> <ul style="list-style-type: none"> • Improved patient comfort for 331 immobilized ED patients. • Improved patient safety, when immobilization was applied to 203 patients who arrived (without mobilization) at ED, nine of whom turned out to have neck fractures. • Psychiatric patients felt more safe and comfortable through the discharge process. • Surgery patients expressed high levels of satisfaction with their care. • Decreased post-operative infections. 	<p>Improved system efficiency Six projects</p> <ul style="list-style-type: none"> • Reduced length of stay in hospital: <ul style="list-style-type: none"> • 1.1 hrs. in ED. • 1 day post surgery. • 6.1 days for elderly patients. • 5,809 hours of hand hygiene auditing and reporting saved over six months (equivalent to 5.5 FTE positions). • Reduced antimicrobial consumption by 23% (\$330,000 saved).

¹ Four of the six projects were designed to directly impact patient experience and health outcomes; the other 2 projects focused on improving system efficiency and/or quality.

The ARTIC projects improved healthcare quality

“High quality care is better for patients and it is also less expensive. Getting it right the first time means better outcome for patients and better value for the system. Consistently applying the best evidence and clinical guidelines to delivering care are critical to effectively transforming the system. Policy and clinical decisions must be driven by evidence and health care.” (MOHLTC website - Quality and Evidence Adoption)

The ARTIC program supported improved healthcare quality by a) selecting projects designed to improve quality, and b) supporting high fidelity implementation of the resulting projects. **All six projects reported improved healthcare quality**, in most cases by implementing safe, effective, patient-centred healthcare practices. It is estimated that these six projects collectively impacted the care of over 18,000 patients.

- HandyAudit improved the quality and consistency of hand hygiene auditing and reporting in 16 hospitals.
- Through CCR, the Canadian C-Spine rule was applied at triage with 1,408 patients, leading to unnecessary immobilization being removed at triage, and appropriate immobilization being applied.
- Evidence-based antimicrobial stewardship programs (ASPs) were established in 14 ICUs, ensuring appropriate antimicrobial use for about 3,000 patients (assuming 21 beds per ICU and 10 patients per bed in a year). In addition, the ASP project has augmented quality improvement capacity at a provincial level by having antimicrobial indicators/reports added to the provincial Critical Care Information System (CCIS) database.
- By educating healthcare teams about the importance of progressive and scaled patient mobilization at least three times per day, MOVE ON increased out-of-bed mobilization of elderly patients by 10%. This is estimated to have impacted the care of 7,500 patients (about half of those enrolled).
- iERAS introduced five best practice guidelines to perioperative surgical teams, significantly increasing compliance with the guidelines in 10 out of 12 key areas. This impacted the care of 2,475 patients.
- To ensure a safety net exists for clients throughout the discharge and community reintegration processes, TDM provided transitional bridging of clinical support into the community, followed by peer support from a trained volunteer. This is estimated to have impacted the care of about 3,300 patients over a 10-month period, assuming the 12 sites collectively discharged 330 patients each month.

The ARTIC projects improved interprofessional collaboration

“Interprofessional collaboration [IPC] is the process of developing and maintaining effective interprofessional working relationships with learners, practitioners, patients/clients, families and communities to enable optimal health outcomes. Elements of collaboration include respect, trust, shared decision making, and partnerships.” (CIHC 2010, p. 8) Effective IPC is supported by strong **communication** among members of the care team.

The ARTIC program supported improved interprofessional collaboration by a) selecting projects designed to improve IPC, and b) supporting implementation of the resulting projects. **All six ARTIC projects reported improved communication and collaboration.**

- By removing the personal judgment element from the auditing process, HandyAudit™ enabled hand hygiene auditors to provide more immediate and effective feedback to staff about hand hygiene performance.
- CCR evidenced successful expansion of ED nurse skills/role which supported stronger working relationships between nurses and physicians in ED, in at least some sites.
- ASP established interprofessional antimicrobial stewardship rounds in 14 ICUs, in which infectious disease physicians and pharmacists met with the ICU team 3-5 times per week, involving prospective audit and feedback of all patients on antimicrobials.
- MOVE ON improved staff communication and collaboration around patient mobilization by establishing mobilization as a shared responsibility.
- TDM increased communication and collaboration among hospital staff and community-based consumer survivor initiatives in 12 psychiatric units by establishing systems and processes which required they all work together to collectively support the successful transition of patients into the community.
- All of the care providers along the surgical path from pre-op to post-op worked together to implement iERAS, which improved communication, collaboration, and team cohesion.

The ARTIC program improved patient experience or health outcomes

“True improvements by definition, are measured in terms of ‘better’. And to a patient, there is nothing in the world more important than **getting better**.” (OHA 2013, p. 3)

Positive benefits for patients, such as improved experience and/or other positive health outcomes, are the ultimate drivers of quality improvement in healthcare.

The ARTIC program contributed to improving patient experience and/or health outcomes by a) selecting projects designed to improve patient experience or health outcomes, and b) supporting implementation of the resulting projects.

Three projects reported improved patient experience (each in substantially different ways)

- CCR improved patient comfort by more quickly removing unnecessary immobilization (back board, neck brace) at triage for 331 trauma patients in the ED (41% of immobilized patients).
- TDM helped patients feel safer and more comfortable about being discharged from the psychiatric facility by providing a stronger clinical and social safety net through the transition process back into the community (qualitative).
- iERAS resulted in high levels of satisfaction (91%) among patients receiving colorectal surgery, largely due to more consistent communication with patients about the surgery process.

One project reported increased patient safety

- CCR resulted in immobilizations (e.g., neck brace) being applied to 203 patients who arrived at ED with potential neck fractures without immobilization, nine of whom turned out to actually have neck fracture).

One project reported prevented infections

- iERAS decreased urinary tract infections following colorectal surgery from 5% to 2% by ensuring best post-surgical practices were followed.

¹ Four of the six projects were designed to directly impact patient experience and health outcomes; the other 2 projects focused on improving system efficiency and/or quality.

The ARTIC program improved system efficiency

“Public discourse on the performance of the Canadian health system has shifted from increasing the available resources to making better use of those resources...Improving health system efficiency is seen as one way to ensure its sustainability.” (CIHI 2014, p.1)

The ARTIC program supported improved system efficiency by a) selecting projects designed to improve efficiency, and b) supporting implementation of the resulting projects. Efficiencies included reduced length of stay in hospital, time savings for healthcare workers, and reduced consumption of antimicrobials.

Four projects reported reduced length of stay in hospital

- CCR reduced patients' time in ED by 1.1 hours (average), by removing unnecessary immobilization without the need for physician assessment and/or diagnostic imaging, and allowing for triage to a less acute area.
- iERAS reduced length of stay by one day (median), following colorectal surgery by using best practices (related to fluid management, early mobilization, etc.) known to accelerate patient recovery.
- MOVE ON reduced length of stay by 6.1 days (median) for elderly patients in various sites by getting them up and moving more.
- TDM reduced length of stay (with associated cost savings).

One project reported saved staff time

- By automating the most time consuming aspects of the hand hygiene auditing and reporting process (i.e., data input, analysis and reporting), HandyAudit™ reduced the time required for hand hygiene auditing and reporting by 64%, saving 5,809 hospital staff hours over six months.

One project reported reduced use of antimicrobials:

- ASP saved \$300,000 by reducing antimicrobial consumption by 23% .

Value of the ARTIC program

The ARTIC program's value within the system

How value was assessed

Value: The regard that something is held to deserve; the importance, worth, or usefulness of something.

-Oxford English Dictionary

To understand the value of the ARTIC program, the evaluation looked holistically at the sum of what was accomplished through the monetary investment in the ARTIC program. An environmental scan (details provided in Appendix C) was also undertaken to identify other initiatives with similar goals of moving evidence into practice. This scan helped to place ARTIC within the context of existing programming.

The evaluators also explored the possibility of doing a cost-benefit analysis comparing the impacts of the program with its investments, but this was not feasible due to limitations in the available information.

If it is important to capture collective program outcomes (and corresponding value), the ARTIC program will need to develop a more systematic project reporting framework, with common measures of:

- Fidelity of implementation
- Volumes of patients, staff, and others affected by the project
- Key outcomes of interest (e.g., length of stay, quality of life, patient experience, adverse event, readmissions), including averages and standard deviations (in addition to medians if desired)

The value of the ARTIC program

“The real accomplishment of ARTIC isn’t the specific projects that were implemented.

It’s **real accomplishment** is that it established a new way for the province to first identify and then bring evidence to practice – that is the greater success.”

– *Senior hospital executive*

The value of the ARTIC program can be looked at as the combined worth of its many accomplishments (as evidenced by the infographic on the following page).

However, the ARTIC program is more than just the sum of its parts. Its real value lies in the ARTIC model, which has **proven effective at implementing selected evidence-based interventions in multiple sites consistently, rapidly, and with high levels of fidelity and sustainment**. The ARTIC program is unique in this respect: no other programs were found through the evaluation that focus primarily on consistent multi-site implementation of established interventions. Instead, most either a) support research and development of *new* interventions and/or b) build capacity for evidence-based practice through training.

The ARTIC program’s stakeholders believed that the ARTIC model should be leveraged to move evidence into practice more broadly across Ontario, beyond the CAHO context. Other jurisdictions may also be interested in introducing the ARTIC model to their own mix of evidence-to-care programming.

It remains to be seen whether the model is transferable outside of the CAHO environment, where it won’t be possible to leverage the CAHO governance structure. When expanding beyond CAHO, it will be important to establish an effective governance structure that is representative of the participating organizations, as well as a means of engaging senior hospital leaders.

What the ARTIC program accomplished: 2010-2014

Implemented ...

6 | projects in

26 | hospitals¹ across

79 | sites

Built capacity and leadership ...

>25 | developers/researchers learned more about what it takes to implement their projects.

>220 | site level **champions** were connected with researchers and gained experience leading implementation.

>1500 | other **staff or volunteers** gained new expertise.

↳ 76% sustainment rate

Improved ...

Quality of care for over 18,000 patients

- C-Spine rule applied at triage with 1,408 patients.
- Reduced antimicrobial consumption by 23%.
- Increased patient mobilization by 10%.
- Increased compliance with ERAS guidelines.
- Introduced bridging support to psychiatric discharges.

Collaborative practice among 79 health teams

- Expanded teamwork to better support patients.
- Enhanced team communication.
- Improved ability to provide effective feedback.
- Improved working relationships.

Patient experience and health outcomes

- Patients felt positive about the changes in care.
- Enhanced patient comfort and safety in ED.
- Reduced post-surgical infections.

System efficiency

- Saved hospital patient days:
 - 1.1 hrs. in ED.
 - 1 day post surgery.
 - 6.1 days for elderly patients.
- Saved \$330,000 in antimicrobials.
- Saved 5,809 hours of hand hygiene auditing and reporting.

Invested ...
\$19.8 million

\$7.6 million in direct costs

\$12.2 million in-kind

} 1 : 1.6 ratio

¹ 23 CAHO hospitals and three non-CAHO hospitals.

Conclusions and recommendations

Conclusions

1. The ARTIC program supported rapid, high-fidelity implementation of evidence-based interventions.

2. The ARTIC program supported high levels of sustainment.

3. The ARTIC program led to substantial spread within and beyond the CAHO hospitals.

4. The ARTIC program built substantial implementation capacity and leadership across the system.

5. Each of the ARTIC projects reported broader healthcare impacts.

6. The unique value of the ARTIC program lies in its proven model for implementing established evidence-based interventions.

The Adopting Research to Improve Care (ARTIC) program is designed to **accelerate and support the implementation of research evidence into practice in Ontario hospitals** and to contribute to quality across the system.

CAHO launched the ARTIC program in 2010, and with the support of the MOHLTC has continued to adapt the program into a strong model for evidence implementation.

This second phase of the evaluation assessed the accomplishments of the ARTIC program since its launch in 2010, and consolidated what has been learned through the implementation of the first six ARTIC projects and the phase I evaluation.

1. The ARTIC program made implementation of evidence-based interventions more likely, faster, and more consistent with the research evidence.

The ARTIC program has effectively leveraged the CAHO infrastructure to bring carefully-selected interventions to the attention of senior hospital executives, who sign on to the ARTIC projects.

Prior to involvement in the ARTIC program, few hospitals beyond the lead institutions had adopted these interventions. Through the ARTIC program, the six interventions were implemented across 79 sites. Once hospitals signed on to the ARTIC projects, they implemented them within two years.

Much of this implementation is directly attributable to the ARTIC program. Indeed, without the ARTIC program, 47% of the hospitals indicated that they would not have known about the intervention, or would not have chosen to adopt it.

Key enablers contributing to implementation success include:

- Strategic and rigorous project selection.
- Senior leadership commitment.
- Centralized implementation supports.
- Coaching from lead project teams.
- Designated implementation lead.
- Implementation roadmap.
- Performance monitoring and reporting.
- In-kind contributions of time from the hospitals (representing over 60% of the investment made in the ARTIC program).

2. The ARTIC program supported high levels of sustainment.

The need for ongoing financial and human resources is a common barrier to sustaining new interventions. The ARTIC program is designed to mitigate these barriers.

The first four ARTIC projects were fully sustained in 76% of the sites. **This is a high level of sustainment**, when compared with other relevant Ontario-based multi-site studies that cite sustainment rates of 50-60% (Ragusila 2014 and Davies et al. 2006) over similar periods of time.

The ARTIC program's rigorous project selection and engagement of senior executives help to support these high levels of sustainment. Hospitals are more willing to ensure the resources are in place for the longer term when there is genuine leadership support, clear benefits, and/or alignment with external expectations.

3. The ARTIC program facilitated the spread of evidence-informed interventions, even beyond the intended spread to 79 sites.

Broader spread (beyond CAHO hospitals) was not an explicit goal of the ARTIC program. Nonetheless, three of the projects have been **adopted by more than 200 additional hospital sites** since involvement in the ARTIC program. This was an unexpected positive outcome.

According to the lead project teams, the projects would not have spread as broadly and quickly without the support of the ARTIC program.

The ARTIC program **acts as a spread agent** by identifying interventions that are truly worth spreading, connecting innovators with potential adopters, and enabling the lead project teams to focus on packaging their interventions for ease of implementation. These actions set the stage for implementation beyond CAHO hospitals.

4. The ARTIC program built substantial implementation capacity and leadership across the system.

The ARTIC program's systematic, collective approach to implementation **built implementation capacity and leadership across the system**. The ARTIC projects provided active hands-on implementation experience to lead project teams, site champions/coordinators, and site staff:

- Developers/researchers learned more about what it takes to implement their projects, by being actively involved in the implementation of their project at multiple sites.
- Site champions were connected with researchers and gained experience leading implementation.
- Staff or volunteers who applied the interventions in their hospitals learned new practices and approaches to care, building expertise across the system in a broad range of areas.

“The real accomplishment of ARTIC isn’t the specific projects that were implemented.

It’s **real accomplishment** is that it established a new way for the province to first identify and then bring evidence to practice – that is the greater success.”

– *Senior hospital executive*

5. Each of the ARTIC projects reported broader healthcare impacts.

The ARTIC projects collectively **impacted the care of over 18,000 patients**. The lead project teams reported a broad range of improvements in patient care, interprofessional collaboration, patient experience, health outcomes, and system efficiency. The ARTIC program’s rigorous selection process (with its emphasis on projects that could improve quality and/or efficiency, and its requirement of robust evidence) contributed to high levels of impact in these areas.

6. The real value of the ARTIC program lies in its proven model for implementing established evidence-based interventions.

The value of the ARTIC program can be looked at as the combined worth of its many accomplishments. However, the ARTIC program is more than just the sum of its parts. Its real value lies in the ARTIC model, which has **proven effective at implementing selected evidence-based interventions in multiple sites consistently, rapidly, and with high levels of fidelity and sustainment**.

The ARTIC program is unique in this respect: no other programs were found through the evaluation that focus primarily on consistent multi-site implementation of established interventions. Instead, most either a) support research and development of *new* interventions and/or b) build capacity for evidence-based practice through training. Accordingly, the ARTIC program’s stakeholders believed that the ARTIC model should be leveraged to move evidence into practice more broadly across Ontario, beyond the CAHO context.

Recommendations

This evaluation provided an opportunity to assess the accomplishments and lessons learned over the first 5 years of the ARTIC program. The evaluation has also generated ideas and opportunities to strengthen the ARTIC program.

The following recommendations should be taken into consideration as the ARTIC program evolves.

<p>1. Develop an overarching (program-level) evaluation framework.</p> <p>The ARTIC program should develop and implement an overarching evaluation framework for all ARTIC projects, including systematic project reporting and common measures of:</p> <ul style="list-style-type: none">• Fidelity of implementation• Volumes of patients, staff, and others affected by the project• Key outcomes of interest (e.g., length of stay, quality of life, patient experience, adverse event, readmissions), including averages and standard deviations (in addition to medians if desired) <p>Such a framework will enable the ARTIC program to a) effectively monitor implementation across projects, b) assess and report collective program outcomes, and c) assess the combined value of the projects it supports.</p>	<p>2. Refine the ARTIC model to further support implementation.</p> <p>The ARTIC model could better support implementation if it were refined in two ways:</p> <ol style="list-style-type: none">1. Ensure dedicated time: The ARTIC program should identify and implement additional ways of ensuring that site champions have dedicated time to support implementation, so they are not leading implementation “off the sides of their desks.” Measures already put in place (including the readiness assessment, executive commitment, and funding) have helped, but do not fully address the problem.2. Monitoring: The ARTIC program should require all projects to incorporate ongoing monitoring and reporting of site-level results, as this was found to improve implementation and support sustainment.	<p>3. Continue to monitor sustainment of the ARTIC projects on an annual basis.</p> <p>The sustainment rates identified through this evaluation reflected a relatively short post-implementation period (1.5–2.5 years), and did not include the last two projects.</p> <p>CAHO should survey hospitals annually to confirm sustainment of the ARTIC projects they implemented, and update sustainment rates accordingly.</p> <p>This will help to validate the findings of the evaluation and ensure that ARTIC is able to communicate up-to-date information.</p>
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Opportunities for broader impact

The evaluation determined that the ARTIC program has been acting as a spread agent, leading to broader spread of the ARTIC projects than was originally planned. It also found that there was an interest in applying the ARTIC model more broadly.

The ARTIC program could broaden its impact by formalizing its role as a spread agent and/or expanding the program beyond the CAHO environment.

1. Make spread planning a more explicit component of the ARTIC program.

Broader spread (beyond CAHO hospitals) was not an explicit goal of the ARTIC program, yet it has contributed to substantial spread in this regard.

To further leverage this strength, ARTIC could make spread planning a more explicit and intentional component of the program. This would help the ARTIC projects would continue to spread beyond the ARTIC program.

This would involve supporting the lead project teams in:

- Clearly defining the core elements of their interventions.
- Messaging compelling benefits of the intervention (clearly and strongly stated in terms that are relevant to potential implementers).
- Packaging interventions for spread (pulling together guides, training material, tools and templates that support implementation).

2. When applying the ARTIC model beyond the CAHO environment, ensure to establish meaningful governance structures.

Since it has proven so successful, it may be advantageous to apply the ARTIC model beyond the CAHO community.

When expanding beyond CAHO, it won't be possible to leverage the CAHO governance structure (which currently makes it much easier to engage senior leadership support within the implementing sites). Therefore, it will be important to establish:

- a) an effective governance structure that is representative of the participating organizations,
- b) a means of effectively engaging senior hospital leaders as/executives champions.

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Appendix A: ARTIC project descriptions

Additional details about the ARTIC projects

Canadian C-Spine Rule (CCR) ARTIC Project

Project Lead: Dr. Ian Stiell

Lead Hospitals: The Ottawa Hospital

Timeline: February 2011- January 2013

9 participating hospitals:

Kingston General Hospital⁴;

London Health Sciences Centre;

Hôpital Montfort;

North York General Hospital;

St. Michael's Hospital;

Health Sciences North;

Sunnybrook Health Sciences Centre;

Thunder Bay Regional Health Sciences Centre; and

University Health Network.

⁴ KGH discontinued participation in the project in December 2012.

Project overview

Canadian Emergency Departments (EDs) annually treat 1.3 million patients who have suffered blunt trauma from falls or motor vehicle collisions and who are at risk for cervical spine (c-spine) injury. Most such cases are alert and stable adults and less than 1% has a c-spine fracture. A majority of trauma victims transported in ambulances are protected by a backboard, collar, and sandbags and, on arrival at the ED, are sent to high acuity resuscitation rooms, where they remain fully immobilized for hours until physician assessment and x-rays are complete.

This prolonged immobilization is often unnecessary and adds considerably to patient discomfort and to the burden on our overcrowded Canadian EDs in an era when they are under unprecedented pressures. These patients use valuable ED resuscitation room space and endure long wait times, which contribute to lower patient satisfaction.

Researchers at The Ottawa Hospital developed a clinical decision rule, the Canadian C-Spine Rule (CCR), to allow clinicians to “clear” the cervical spine without the need for an x-ray and to decrease immobilization times. This rule has been widely adopted by ED physicians and has recently completed testing for accuracy, reliability, and safety amongst ED triage nurses. This project will optimize resources through the use of interprofessional teams, allowing for specially trained nurses to assess patients using the Canadian C-Spine Rule, and potentially decrease ED wait times and increase patient satisfaction by quickly and effectively identifying patients who do not require immobilization.

Project outcomes assessed

- Reduce ED wait times for applicable adult trauma patients through the appropriate adoption of the Canada C-Spine Rule in acute care EDs by ED triage nurses.
- Increase efficiencies within acute care EDs for adult patients by maximizing the use of interprofessional resources.
- Assess the clinical impact of implementing the CCR ARTIC Project across the CAHO community and the potential for the broader health care system as a whole.

HandyAudit™ ARTIC Project

Project Lead: Dr. Geoff Fernie

Lead Hospitals: Toronto Rehabilitation Institute

Timeline: January 2011 - December 2011

16 participating hospitals:

Bruyere Continuing Care;
Centre for Addictions and Mental Health;
Children's Hospital of Eastern Ontario;
Hamilton Health Sciences;
Kingston General Hospital;
Hôpital Montfort;
Hotel Dieu Hospital Kingston;
Providence Care;
Royal Ottawa Health Care Group;
The Hospital for Sick Children;
St. Joseph's Healthcare Hamilton;
St. Michael's Hospital;
Health Sciences North (formally Sudbury Regional Hospital);
Thunder Bay Regional Health Science Centre;
UHN (Toronto, Rehabilitation Institute); and
Women's College Hospital.

Project overview

In 2008, the Ontario Ministry of Health and Long-Term Care (MOHLTC) introduced mandatory reporting of hand hygiene compliance as a patient safety indicator. The standard practice for mandatory reporting of hand hygiene compliance rates in Ontario is direct observation using a paper reporting form. Early experience with collecting and reporting compliance data using the Ministry's paper-based form is proving to be cumbersome and costly.

The HandyAudit™, developed by researchers at the Toronto Rehabilitation Institute, is an innovative PDA device that records the real time of relevant caregiver actions and produces data that can be analyzed at any time using any rule set (e.g. guidelines used by the World Health Organization and Ontario Ministry of Health and Long-Term Care).

The HandyAudit™ eliminates the need for auditors to assess whether hand hygiene compliance has occurred, removes the need for manual transcription of compliance results, and simplifies report generation and other data management operations.

Project outcomes assessed

- Impact of the adoption of HandyAudit™ on hospitals' hand hygiene auditing practices.
 - Increased efficiency: time saved performing common hand hygiene audit activities using HandyAudit™ (versus traditional approaches).
 - Cost effectiveness: Costs savings as a result of staff time saved.
-

Antimicrobial Stewardship Program (ASP) in Intensive Care Units ARTIC Project

Project Lead: Dr. Andrew Morris

Lead Hospitals: Mount Sinai

Timeline: January 2012- January 2014

12 participating hospitals:

Children's Hospital of Eastern Ontario;
Hamilton Health Sciences;
Health Sciences North;
Kingston General Hospital;
London Health Science Centre;
Mount Sinai Hospital;
North York General Hospital;
The Ottawa Hospital;
The Hospital for Sick Children;
St. Joseph's Healthcare Hamilton;
St. Michael's Hospital; and
University Health Network.

Project overview

The goals of antimicrobial stewardship are to improve patient outcomes, reduce antimicrobial resistance, and reduce healthcare costs through the optimization of antimicrobial utilization. The primary objectives of the CAHO Antimicrobial Stewardship Programs (ASP) in Intensive Care Units (ICUs) ARTIC project is to have every participating hospital over two years successfully introduce and sustain an antimicrobial stewardship program in their ICU, report outcome measures regularly and accurately, and be able to compare their performance with peer ICUs in CAHO member hospitals.

The CAHO ASP Project aims to:

- Establish a fully functional Antimicrobial Stewardship Program in their ICU.
- Be able to report on a quarterly basis:
 - Antimicrobial consumption (defined as Days of Therapy or Defined Daily Dose).
 - Antimicrobial costs.
 - Antimicrobial resistance.
 - *C. difficile* infections.
- Be able to report, share, and compare themselves to their peers in their performance on antimicrobial resistance and *C. difficile* infection rates on a quarterly basis via a centralized database.
- Identify lessons learned on the implementation CAHO ASP Project across participating hospitals to the CAHO Secretariat.

Project outcomes assessed

- Reduction in antimicrobial consumption (defined as Days of Therapy or defined Daily Dose).
 - Reduction in antimicrobial costs.
-

Mobilization of Vulnerable Elderly in Ontario (MOVE ON) ARTIC Project

Project Lead: Dr. Barbara Liu and Dr. Sharon Straus

Lead Hospitals: Sunnybrook Health Sciences Centre and St. Michael's Hospital

Timeline: January 2012- January 2014

14 participating hospitals:

Baycrest;
Hamilton Health Sciences;
Health Sciences North;
Kingston General Hospital;
London Health Science Centre;
Hôpital Montfort;
Mount Sinai Hospital;
North York General Hospital;
The Ottawa Hospital;
St. Joseph's Healthcare Hamilton;
St. Michael's Hospital;
Sunnybrook Health Sciences Centre;
Thunder Bay Regional Health Sciences Centre; and
University Health Network.

Project overview

The objective of the Mobilization of Vulnerable Elders in Ontario (MOVE ON) ARTIC project is to implement and evaluate the impact of evidence-based strategy to promote mobilization and prevent functional decline in older patients admitted to acute care facilities in Ontario.

The MOVE ON ARTIC Project aims to:

- Increase the frequency of daily mobilization of patients aged 65 and older during their hospital stay.
- Evaluate the impact of the evidence-based MOVE ON strategy to promote early mobilization and prevent functional decline in older patients.
- Assess the implementation process of the MOVE ON ARTIC Project across participating hospitals by providing a list of lessons learned that can be carried into future CAHO project implementations.

Project outcomes assessed

- Primary Outcome:
 - Frequency of mobilization of patient.
 - Secondary Outcome:
 - Length of stay.
 - Functional status at admission and at discharge (ADL/IADL).
 - Discharge destination.
 - Falls.
 - Injurious falls.
-

Enhanced Recovery after Surgery (ERAS) Guideline – to Optimize Outcomes Following Colorectal Surgery ARTIC Project

Project Lead: Dr. Robin McLeod

Lead Hospitals: Mount Sinai Hospital

Timeline: December 2012⁵ – January 2015

15 participating hospitals:

Hamilton Health Sciences Centre;

Health Sciences North;

Kingston General Hospital;

London Health Sciences Centre;

Mount Sinai Hospital;

North York General Hospital;

St. Joseph's Healthcare Hamilton;

St. Michael's Hospital;

Sunnybrook Health Sciences Centre;

The Ottawa Hospital;

Thunder Bay Regional Health Sciences Centre;

University Health Network – Toronto General;

University Health Network – Toronto Western;

St. Joseph's Healthcare Toronto⁵; and

Toronto East General Hospital⁶

⁵Non-CAHO hospital participating as a pilot for the ARTIC Program.

⁶Non-CAHO hospital participating as a pilot for the ARTIC Program.

Project overview

The objective of the project was to implement the Enhanced Recovery after Surgery (ERAS) guideline using a multi-faceted knowledge translation (KT) strategy to implement a range of interventions to decrease perioperative stress, postoperative pain, gut dysfunction and infection, and promote early mobilization which can accelerate recovery and reduce length of hospital stay following colorectal surgery.

Project outcomes assessed

- Colorectal surgery patient outcomes, specifically:
 - Level of compliance with each intervention/recommendation.
 - Complication rate.
 - Length of stay.
 - Readmission rate.
 - Patient quality of life and satisfaction.
 - Assess the changes in multidisciplinary team and transitions in care across the participating hospitals.
 - Assess the effectiveness of various KT strategies and perceived barriers and facilitators across the participating hospitals.
-

Transitional Discharge Model (TDM) ARTIC Project

Project Lead: Dr. Cheryl Forchuk
Lead Hospitals: St. Joseph's Healthcare London and London Health Sciences Centre
Timeline: January 2013- January 2015

9 participating hospitals:

Baycrest;
Centre for Addiction and Mental Health;
Hôpital Montfort;
London Health Sciences Centre;
Providence Care;
St. Joseph's Healthcare Hamilton;
St. Joseph's Health Care London,
Thunder Bay Regional Health Sciences Centre; and
Ontario Shores Centre for Mental Health Sciences ⁷.

⁷ Non-CAHO hospital participating as a pilot for the ARTIC Program

Project overview

The objective of the project was to implement the Transitional Discharge Model (TDM) at nine hospitals across Ontario. The TDM supports the successful community integration of people diagnosed with a mental illness and aims to reduce length of stay, re-admission rate, emergency department usage and improve the quality of care for this population. The TDM is based on the provision of therapeutic relationships to ensure a seamless safety net exists for patients throughout the discharge and community reintegration processes.

The TDM has two components to assist patients in the transition from hospital to community:

- **Peer support:** Support from a person who has experienced a mental illness, is living successfully in the community, and has completed a peer training program. This includes regular contact on a schedule that suits both parties, for the purpose of providing social support and shared learning from the experience of someone who has lived through a similar transition; and
- **Staff Support:** Continued support from a staff person from the hospital program, or a community program (the patient identifies the staff person as someone who they have a therapeutic relationship with) until a therapeutic relationship has been established or re-established in the community.

Project outcomes assessed

- Client use of services, including:
 - Re-admission rates.
 - Length of hospital stay.
 - Emergency department usage.
- The cost effectiveness of the intervention (with regard to service use, length of stay, re-admissions and ED use).
- The types of clients accessing the intervention, and whether TDM is more effective for specific populations.
- Implementation effectiveness of TDM, specifically assessing the enablers and barriers to implementation.

Appendix B: Evaluation methods

Additional details about the evaluation methods

Review of ARTIC program documents and project reports

ARTIC program documents

Purpose: Extract findings from the Phase I evaluation that were relevant to the Phase II evaluation questions, obtain information about in-kind and direct costs, and obtain contextual information to support interpretation of the evaluation findings.

Documents reviewed: Phase I evaluation report and project summaries, project selection materials, and financial records.

ARTIC project reports

Purpose: To determine project goals, core elements, costs, activities, implementation of the interventions, barriers and enablers to implementation, and project outcomes.

Documents reviewed: Project proposals, agreements, websites, and all formal reports submitted to CAHO by the lead project teams.

Survey of participating sites

Survey of participating sites

Purpose: Fill gaps in existing information about implementation experiences, sustainment, spread and the ARTIC program's impact.

Methods: Survey was administered online between July and September, 2014. Invitations sent by email. The evaluators followed up at least two times with non-respondents.

Sample: All participating sites from five of the projects were invited to participate in the survey. A survey was not necessary for HandyAudit™, as sufficient information was already available from the Phase I evaluation.

Response rates:

ARTIC project	Response rate
CCR	7/8 hospitals (88%)
ASP	11/12 hospitals (92%)
MOVE ON	9/14 hospitals (64%)
iERAS	15/15 hospitals (100%)
TDM	8/9 hospitals (89%)

Survey questions

1. All projects: Please select your hospital.

2. iERAS and MOVE ON only: Choose the statement that best reflects what you believe would have happened if this [project] had **NOT** been introduced to your hospital via ARTIC.

- We wouldn't ever have heard of it. (1)
- It would have come to our attention another way, but we probably wouldn't have adopted it. (2)
- It would have come to our attention another way, and we probably would have adopted it. (3)
- Don't know (4)

3. iERAS and MOVE ON only: Without ARTIC, would your implementation of a full [project] have been...

- Much slower? (1)
- A bit slower? (2)
- About the same? (3)
- A bit faster? (4)
- Much faster? (5)
- Don't know (6)

4. CCR, MOVE ON & ASP only: Is your hospital continuing [the practices introduced by the project]?

- Yes, in full
- Yes, in part
- No
- Don't know

Please explain:

5. iERAS and TDM only: Does your hospital intend to continue [the practices introduced by the project] beyond the period of ARTIC funding?

- Yes, in full
- Yes, in part
- No
- Don't know

Please explain:

6. All projects except CCR: Have any aspects of [the practices introduced by the project] spread to other units/areas of your hospital?

- Yes
- No
- Don't know
- N/A

Please explain:

7. All projects : To your knowledge, have any of [the practices introduced by the project] spread to other hospitals in your region (beyond the initial ARTIC group)?

- Yes
- No
- Don't know

If yes, which hospitals?

8. All projects : Please use this space if there is anything else you would like to tell us about your experience with the [project].

Interviews with participating sites

Interviews with site champions

Purpose: Gather in-depth explanation about implementation experiences, sustainment, spread and impact of the projects, to contextualize what was learned through the Phase I evaluation and the Phase II champion surveys.

Methods: Interviews were conducted by telephone between August and October, 2014, using a semi-structured interview guide.

Sample: The sample comprised:

- Site champions from the three hospitals that are not CAHO members but that have participated in iERAS and TDM.
- Site champions from CAHO hospitals participating in all projects except for HandyAudit™ and iERAS. Interviews were not necessary for HandyAudit™, as sufficient information was already available from the Phase I evaluation. Interviews with iERAS site champions were carried out by the ERAS team (to reduce duplication), and a summary report was provided to the evaluators.

Potential interviewees were chosen to represent a range of geographic regions, with preference given to champions who were not interviewed in Phase I.

ARTIC project	# interviews conducted
CCR	4
ASP	2
MOVE ON	6
iERAS	2
TDM	7

Site interview questions

1. iERAS and TDM only: Last year when we spoke with hospitals about the [name of project], most hospitals had [previous implementation status]. What has happened with the [name of project] at your hospital since that time?

2. iERAS and TDM only: Was there anything in particular that made it easier or more difficult to implement the [name of project] ?

- What barriers have you had to deal with? How did you overcome them?
- Was there anything in particular that the [name of project] team did that made implementation easier?

3. ASP, CCR and MOVE ON only: The ARTIC funding for the [name of project] ended [date]. What has happened with the [name of project] at your hospital since that time?

- Probe for extent to which practice changes have been sustained

4. All projects: Does your hospital intend to continue the [name of project] into the future, in whole or in part?

- Which parts, and why?
- Why not?
- Probe for barriers to sustainability

5. All projects: Last year, we heard from some of the participating hospitals that the [name of project] had resulted in [list of primary impacts]. Have there been any impacts experienced at your hospital (positive or negative) as a result of implementing the [name of project] ?

- Probe for broader impacts across the hospital (e.g., spread of practice to other units)

6. iERAS and TDM only: How did your hospital come to participate in this ARTIC project?

7. All projects: If the project team or the ARTIC Program wanted to spread the [name of project] to other hospitals across Ontario, what could they do to make it easier for others to implement? What else would they need to consider?

Interviews with lead project teams

Interviews with lead project teams

Purpose: Gather information about the impact of the ARTIC program on the projects, and the impact, sustainability, and spread of the projects within the hospitals, and obtain clarification about the project evaluations/reports.

Methods: Interviews were conducted by telephone between July and October, 2014, using a semi-structured interview guide.

Sample: All project leads were interviewed. For four of the projects, other members of the lead project teams were also interviewed.

ARTIC project	# team members interviewed
CCR	1
HandyAudit™	1
ASP	2
MOVE ON	3
iERAS	2
TDM	2

Lead project team interview questions

1. Through the ARTIC program, you were able to move the [*name of project*] into [##] hospitals. What do you think would have happened, over this same period of time, without ARTIC?
2. Can you tell me about any past attempts to implement [*name of project*] in hospitals beyond your own?
 - How did this compare with your implementation experience through ARTIC?
 - Have you published any articles about your past implementation experiences? If so, can you provide a list of publications or other sources of information?
3. Over the last 4 years, is there anything that has been happening within the broader health system that would have:
 - Supported or impeded the adoption of your ARTIC project within hospitals?
 - Affected [*outcome of interest, from full list*]
4. ASP, MOVE ON, TDM, iERAS: Through this ARTIC project, what have you learned about moving research evidence into practice?
5. ASP, MOVE ON, CCR: Since the ARTIC project ended, what has happened with [*name of project*] at the participating sites? Probe for which changes have been sustained and which have been dropped
 - From your perspective, what made it easier or more challenging for the sites to sustain the practice changes?
6. iERAS and TDM: When the ARTIC project ends, what do you think will happen with [*name of project*] at the participating sites? Probe for which changes will be sustained and which will be dropped
 - From your perspective, what will make it easier or more challenging for the sites to sustain the practice changes?
7. The Phase 1 evaluation found that participating hospitals identified some common barriers to implementation, such as [*buy-in from front-line staff, concerns about workload, lack of necessary equipment, union issues, IT issues, etc.*] How did CAHO contribute to resolving these issues?
8. What do you think were the most significant benefits of [*name of project*] to hospitals that have implemented it?
9. In the course of implementing project [*name of project*] in the hospitals, have you observed any impacts or outcomes that surprised you? (good or bad)
10. What are your future plans for this intervention?
11. Based on your experience, if you wanted to spread [*name of project*] to other hospitals across Ontario, is there anything you would need to do differently?
 - What would you need to consider?
 - What adaptations would you need to make?

Project database

Project database

Purpose: Systematically compile consistent information about each ARTIC project, so information about individual projects could be rolled up to draw conclusions about the ARTIC program as a whole.

Data sources: Projects' proposals, agreements with CAHO, formal reports, survey results, and information gathered through interviews with the lead project team, site champions, or Practice & Education Committee members.

Types of information: The project database included information about:

Database section	Data fields
Core project information	Lead hospital(s), project lead(s), project managers/coordinators, year of funding, launch date, est. site implementation date, completion date, duration of project, number of participating hospitals/sites, and area of hospital affected.
Project description	One-line description of the project, stated objectives, implementation activities.
Cost	ARTIC program funding for lead project team, ARTIC funding for hospital sites, est. in-kind contributions, and total cost.
Implementation	# sites with implementation data, enablers & barriers, core elements, # sites with full/partial implementation.
Volumes	# patients affected, # staff trained/certified, # site champions, # hospital days saved.
Sustainability	#/% sites were fully/partly/not sustained, timeframe for assessing sustainability, reasons for partial/not sustaining, NHS elements.
Spread	# hospitals where there was spread to other sites, # other hospitals the intervention has spread to (beyond ARTIC), packaging elements.
Healthcare outcomes	Description of any patient experience outcomes, patient health outcomes, system outcomes, and communication outcomes; whether the project moved evidence into practice more rapidly than would have otherwise occurred.
Other information	History of the intervention, healthcare trends that may have affected uptake or outcomes.

Stakeholder interviews

Stakeholder interviews

Purpose: Gather information about the ARTIC program’s impact, sustainability, and spread from the perspectives of senior hospital executives (CAHO Council and Practice & Education Committee) and system partners, as well as those who have been actively involved in planning and implementing the ARTIC program (CAHO staff and ARTIC Program Task Force).

Methods: Interviews were conducted by telephone between July and August, 2014, using a semi-structured interview guide.

Samples: All CAHO staff involved in the ARTIC program, and representatives from both system partners, were invited to participate. Council members were selected based on their familiarity with the ARTIC program, and included the Issue Lead for ARTIC. Practice & Education Committee members were selected based on their geographic location, specialty area, and which ARTIC projects their hospital had implemented.

Stakeholder group	# in population	# interviews conducted
CAHO staff involved in the ARTIC program	3	3
ARTIC Program Task Force members	11	4
CAHO Practice & Education Committee members	25	7
CAHO Council	24	2
CAHO partners	2	2

Stakeholder interview questions

Specific questions asked of each stakeholder were dependent on their role and level of involvement. The following is the full list of potential interview questions.

1. With the ARTIC program, CAHO set out to build a platform that enables the adoption of research evidence into practice across Ontario more quickly (i.e., in less than 2 years).

- What progress has been made toward this goal?
- What still needs to be done?
- How has ARTIC contributed to leadership and implementation capacity among the project teams and/or in the hospitals?

2. Over the last 4 years, is there anything that has been happening within the broader health system that may contribute to ARTIC's impact and/or to the outcomes of individual projects? [*list of project outcomes*]

3. The Phase 1 evaluation found that participating hospitals identified some common barriers to implementation, such as buy-in from front-line staff, concerns about workload, lack of necessary equipment, union issues, IT issues, etc.

- How did CAHO respond to these issues?
- What would you do the same/differently next time?

4. Your hospital has implemented [*names of projects*]. Does your hospital intend to continue these projects into the future, in whole or in part?

- Which ones?
- Probe for barriers to sustainability

5. Have any aspects of these projects spread to or impacted other units/areas of your hospital?

6. a) What suggestions do you have for spreading the ARTIC projects to other hospitals? What would need to be considered?

b) What would need to be considered in spreading ARTIC projects (where appropriate) to community-based institutional organizations, such as CCACs, FHTs, or LTC homes?

7. CAHO does a lot of communications and advocacy about its programs, including ARTIC.

- Where have you heard ARTIC discussed? What have you heard about it?
- How do you share information about ARTIC?
- What else should CAHO be telling people about ARTIC?

Environmental scan of similar programs

Environmental scan

Purpose: Provide a point of comparison for better understanding the performance of the ARTIC program.

Parameters: Programs within the healthcare context that accelerate the adoption of evidence into practice across multiple sites

Methods: Initial scan identified 20 potential programs for inclusion. Short list of five most relevant programs selected for more in-depth exploration. Additional information obtained about these programs through internet search, literature scan, and/or interviews with program representatives.

Information sought: program goals, reach, target audience, program model/activities, volume of activity/outputs, budget, extent of implementation of evidence-based practices, sustainment levels, spread, capacity building outcomes, and other outcomes.

Appendix C: Environmental scan

Description of programs reviewed through the environmental scan

Environmental scan: List of all programs considered

Selection criteria:

- In health care (ideally hospital)
 - Objective is to accelerate the adoption of evidence into practice
 - Some effort to support implementation (ideally at multiple sites) - beyond library collection of practices
 - Sufficient information publicly available
 - Primary focus on Canadian programs
-

Selected for full review

The Registered Nurses' Association of Ontario (RNAO) **Best Practice Guidelines / Best Practice Spotlight Organizations (BPSO)**.

Canadian Foundation for Healthcare Improvement's **Executive Training for Research Application (EXTRA)**.

Alberta's **Partnerships for Research and Innovation in the Health System (PRIHS)**.

US Department of Veteran Affairs' **Quality Enhancement Research Initiative (QUERI)**.

AHRQ's **Accelerating Change and Transformation in Organizations and Networks (ACTION)**.

Others considered

American Hospital Association's **Hospitals in Pursuit of Excellence (HPOE)**.

The Health Council of Canada **Health Innovation Portal/Leading Practices Database**.

Alternative Funding Plan (AFP) **Innovation Fund for Academic Health Science Centres (AHSC)**.

MOHLTC, HQO and other partners **Building Bridges to Integrate Care (BRIDGES)**

UK National Health Service (NHS) **Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)**.

UK National Health Service (NHS) **National Institute for Health and Care Excellence (NICE)**.

Canadian Institute for Health Research (CIHR) **Expedited Knowledge Synthesis**.

Canadian Institute for Health Research (CIHR) **Partnerships for Health System Improvement (PHSI)**.

Health Quality Ontario (HQO) **Evidence Development and Standards / Quality-Based Procedures**.

Ontario health system partners **Improving & Driving Excellence Across Sectors (IDEAS)**.

Minnesota and Wisconsin **Institute for Clinical Systems Improvement (ICSI)**.

International non-profit **Institute for Healthcare Improvement (IHI)**.

Saskatchewan **Health Quality Council**.

Best Practice Guidelines (BPGs) / Best Practice Spotlight Organizations (BPSO)

The Registered Nurses' Association of Ontario (RNAO)

Jurisdiction: Ontario (provincial)

Year began: 1999

Annual budget: ~\$2.3 million

RNAO develops BPGs to support Ontario Nurses by providing them with practice guidelines for client care. To-date there are 53 published guidelines, as well as a toolkit and educator's resource to support implementation. Over the last 15 years, RNAO has supported 48 Best Practice Spotlight Organizations (BPSOs) in Ontario.

Goal/objective	To foster knowledge-based nursing practice, promote quality work environments, deliver excellence in professional development, and advance healthy public policy to improve health.
Model (core components)	<p>BPG Development (3-4 new BPGs each year). The steps in the process include: Topic Selection, Panel of Experts, Systematic Review, Recommendation Development, Stakeholder Review Publication/dissemination, and Guideline Review (every 3- to 5-years).</p> <p>Organizations applying for BPSO designation receive nominal funding (\$105k) and must commit to a) assigning a BPSO lead; and b) implementing five BPGs over a period of three years. RNAO provides some implementation coaching and resources. BPSOs are required to share their implementation experiences and approaches (e.g., through webinars and conferences).</p>
Outcomes	BPSOs required to evaluate outcomes/impacts (usually do so through chart audits and patient surveys). Historically, less systematic, but recently designed a common measurement system, NQuIRE, to measure and track similar outcomes in similar ways across BPSOs.
Sustainability	BPSOs must demonstrate sustainment in order to maintain designation. Reported sustainment rate of 60%.
Spread	73 BPSOs (48 in Ontario) comprising of over 330 healthcare and academic sites. 16 of these are CAHO hospitals. Beyond Canada, there are BPSO organizations in Australia, Colombia, Chile, South Africa, and Spain. BPGs have been translated into various languages for a domestic and international audience: 1 Chinese, 24 French, 17 Italian, 1 Japanese, and 29 Spanish.

Executive Training for Research Application (EXTRA)

Canadian Foundation for Healthcare Improvement

Jurisdiction: Canada (national)

Year began: 2003

Annual budget: ~\$1.9 million

EXTRA offers education and coaching to develop the capacity of executive leadership teams to use research evidence for quality and performance improvement (~ nine teams each year). Teams identify pressing issues and develop/ implement solutions for their own organization. In the past 11 years, >300 leaders have been trained, and >200 initiatives have been developed and implemented, each in single sites.

Goal/objective	To facilitate the spread of evidence-informed health system management throughout senior levels until a critical mass is achieved in the system.
Model (core components)	14-month program. Each team must develop and implement a quality improvement initiative in their own organization. Team-based: participating teams of up to four health leaders. Curriculum: teams receive training in better use of evidence for quality and performance improvement. It includes three residency sessions (1-2 weeks each). Coaching: each team is provided with dedicated support from an organizational coach and academic mentor. Governance and sponsorship: program managed by staff at CFHI, which receives oversight from an Advisory Council that includes representation from health leaders (various professions). Each team must have a CEO or ADM sponsor. One-time (\$7,500) program fee charged per individual enrolled.
Outcomes	Improved participants' knowledge of change management. Improved participants' ability to create a more evidence-based decision environment. Impact of EXTRA has been found to be predominantly within close circles; that is, in trainee's immediate work environments.
Sustainability	Information unavailable.
Spread	Information unavailable. In an evaluation, it was found that the number of individuals trained (i.e. critical mass) was not a sufficient condition to assure organizations' dissemination of knowledge.

Partnerships for Research and Innovation in the Health System (PRIHS)

Alberta Health System (AHS) partnership

Jurisdiction: Alberta (provincial)

Year began: 2014

Annual budget: ~\$2.5 million

PRIHS provides funding to Strategic Clinical Networks (SCNs) (multi-disciplinary groups of physicians, researchers, patients, and managers focused on creating improvements around specific healthcare topics in Alberta). The SCNs were specifically designed to avoid 'top down' structures that try to implement programs and projects designed by others. PRIHS funds support SCNs to develop, implement, and study innovative practices intended to improve quality and value in Alberta's health system. 10 projects have been funded in the first year.

Goal/objective	<ul style="list-style-type: none"> • Support SCN research and innovation with the aim of improving care and value for money; • Enable AHS to make evidence-informed clinically appropriate changes that eliminate activities that make little or no contribution to positive patient outcomes or to the system; • Build relevant applied health research capacity in Alberta; • Encourage collaboration of research and innovation activities between Alberta's academic institutions, SCNs, and AHS operations in order to achieve measurable and sustainable impacts in the health system.
Model (core components)	<p>Essentially provides funding to SCNs for specific research and innovation projects. It emphasizes the value of creating networks of health researchers and clinical practitioners for evidence-informed practice to improve the health system. Provides up to \$250k per year per project for up to three years. All projects selected to date have received the full \$750k of funding.</p> <p>The following criteria are used for project selection: Significance and feasibility, Scientific merit and environment, Value for money (economic) impacts, Capacity building, and Quality improvement.</p>
Outcomes	Funded projects must provide evidence of maintaining or improving one or more of the six dimensions of quality recognized by Alberta Health Services (efficiency, effectiveness, safety, appropriateness, acceptability, and accessibility), while also attending to value for money.
Sustainability	Information unavailable (too early).
Spread	Information unavailable (too early).

Quality Enhancement Research Initiative (QUERI)

US Department of Veteran Affairs (VA)

Jurisdiction: United States (national)

Year began: 1998

Annual budget: unknown

QUERI was launched in 1998 as part of a system-wide transformation aimed at improving the quality of the VA health care system, the largest integrated health care system in the United States. Harnessing the power of research in partnership with VA operations, QUERI applies innovative strategies to more rapidly implement effective treatments and other evidence-based system improvements in routine care. QUERI has achieved this goal as a field-based program comprised of nine Coordinating Centers and projects that primarily focus on conditions contributing to the major causes of morbidity and mortality among Veterans.

Goal/objective	Improve the health and care of Veterans by supporting more rapid implementation of clinical research findings and evidence-based recommendations into routine clinical practice.
Model (core components)	Key elements of the QUERI Program include a set of disease or problem-focused QUERI Centers, a core set of program-wide goals, and a complex 6-step framework, or "process," that guides each Center's activities. A QUERI Center is an organizational structure that provides dedicated infrastructure support, including a core team consisting of a research coordinator, clinical coordinator and implementation research coordinator. Each QUERI Center works with health system partners (clinical leaders and researchers) to develop/support a targeted agenda of research projects addressing their designated clinical condition. To date, QUERI has funded 531 projects. Typical budget per project is <\$350,000 per year to a maximum of \$1,100,000 (although exceptions are made).
Outcomes	Systematic approach to quality improvement has substantially improved health outcomes and care across the the VA health care system. Findings from various QUERI projects have been published. QUERI has built a cadre of researchers that are grounded in clinical realities, as well as clinicians who are engaged in the research process.
Sustainability	Information unavailable.
Spread	Once developed, successful innovations are rolled out across the VA health care system through a four-phased implementation process: <ol style="list-style-type: none"> 1. Single site pilot. 2. Small scale multi-site evaluation. 3. Region-wide demonstration. 4. National rollout (system-wide).

Accelerating Change and Transformation in Organizations and Networks (ACTION)

Agency for Healthcare Research and Quality (AHRQ)

Jurisdiction: United States (national)

Year began: 2000

Annual budget: ~\$10 million

ACTION is a five-year program, which is currently being renewed for a third iteration. It is a model of field-based research designed to promote innovation in health care delivery by accelerating the diffusion of research into practice. It provides an impressive cadre of delivery-affiliated researchers and sites with a means of testing the application and uptake of research knowledge. The ACTION network includes large partnerships and collaborating organizations that, collectively, provide health care to more than 50% of the American population.

Goal/objective	Promote innovation in health care delivery by accelerating the development, implementation, diffusion, and uptake of demand-driven and evidence-based products, tools, strategies, and findings.
Model (core components)	<p>ACTION supports practice-based implementation research involving over 350 collaborating organizations. A particular focus is on understanding not only whether a particularly innovation “works”, but how and why it does or does not work.</p> <p>An RFP is posted at the beginning of each five-year ACTION cycle. AHRQ awards a five-year contract to approximately 15 organizations. These organizations are then invited to submit project proposals on a variety of topics of interest identified by ACTION throughout the five-year period. Some projects involve implementation of a proven, targeted intervention, while others are more like pilot studies. Project funding ranges from \$200,000 – \$3,000,000 over a period of two years (average is \$825,000). Most organizations provide significant in-kind support (i.e. clinical hours), which is not measured or accounted for.</p> <p>Rapid cycle approach: Task order proposals are solicited from the Awardees as requirements are identified. Task orders are awarded within approximately four months and are generally completed within 18–30 months of the award date.</p>
Outcomes	An evaluation of the IDSRN program (predecessor to ACTION) found that of 50 completed projects that were studied, 30 (60%) had an “operational impact or use.”
Sustainability	Information unavailable.
Spread	<p>Over the period studied, widespread diffusion was rare, beyond the participating awardees/partners.</p> <p>Encountered barriers to disseminating findings and promoting their use outside of the system in which they are generated (i.e. partners did not always see each other as important reference groups).</p>