

Accountabilities of Ontario's Research Hospitals



Cover Image: Dr. Rebecca Auer. Recruited to the Ottawa Hospital Research Institute after completing a fellowship at New York's Memorial Sloan-Kettering Cancer Center. She was attracted to the Institute's supportive team, mentorship opportunities and dedication to excellence. Photograph courtesy of The Ottawa Hospital.



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Executive Summary: Defining Value

Ontario's research hospitals play a unique and vital role in the province's health care system. In fact, they are traditionally understood to play three roles: provide Ontario residents with timely access to advanced patient care services, train the next generation of health care professionals and conduct leading-edge research. As we demonstrate in this paper, it is the integration of these three roles that leads to a fourth accountability to the system: acting as a connector and partner with others in the system, thereby building capacity for all.

The province's 24 research hospitals are leaders in the system, and when they act in unison, they contribute to the competitive strength of the province by directly impacting its creation of wealth through commercialization and job creation.

So how can we define the value of these hospitals? That is the central question of this report. All health care organizations provide value to the system, so how did we identify those accountabilities that are unique to research hospitals?

We did this by constructing a list of five distinguishing components, shared by all research hospitals, to identify accountabilities where the *value creation* or *added value* to the system can be found. Research hospitals distinguish themselves by doing the following core business activities:

1. Discover, provide access to and support the implementation of the next best care;
2. Attract, develop and retain the world's talent, knowledge and skills to Ontario;
3. Act as provincial resources for clinical skills and capabilities, and quality improvement;
4. Provide regional partners with management, technology and operational expertise for improved efficiency;
5. Stimulate change and advise system partners on implementing change.

We also categorized the accountabilities of research hospitals into four broad groups with distinct but highly interrelated components: (1) system role, (2) research and innovation, (3) excellence and innovation in patient care and (4) excellence and innovation in education. (See **Figure A** for key points in each of the four areas.)

On the system level, for example, research hospitals foster a culture of inquiry that serves as a resource for the health care system. At the patient level, they promote and drive the adoption of research evidence into practice changes. On an economic level, they demonstrate a return on investment where discoveries can create sustainable, knowledge-based jobs and opportunities.

The facts speak for themselves: Ontario's research hospitals employ more than 15,000 researchers and research staff and, in 2011-2012, these hospitals generated \$1.2 billion in research revenues.

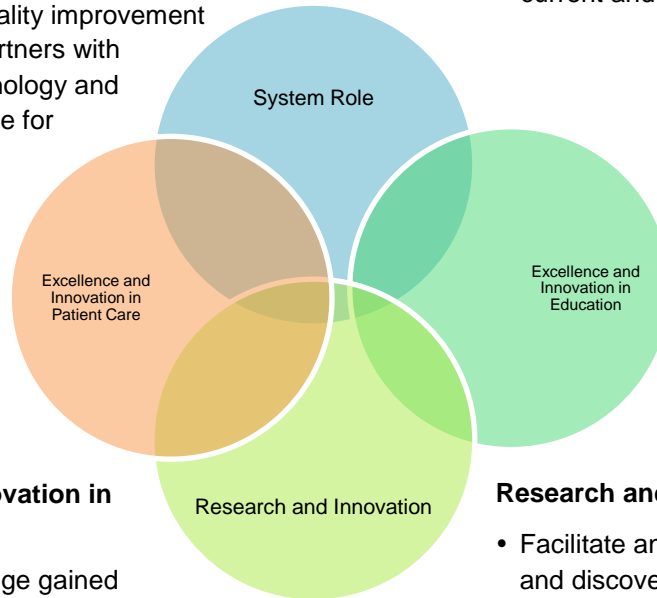
Boxed inserts throughout the report help to illustrate the value of research hospitals with real life stories from Ontario's research hospitals. Interviews with key respondents outside of the research hospital community—an effective qualitative addition to this report—provide a more fulsome picture of the impact

and value of these research hospitals. A table at the end of the report summarizes all of the key points as to how research hospitals add value.

Figure A: Accountabilities of Research Hospitals

System Role

- Discover, provide access to, and support the implementation of the next best care
- Attract, develop and retain the world's talent, knowledge and skills to Ontario
- Act as provincial resources for clinical skills and capabilities, and quality improvement
- Provide regional partners with management, technology and operational expertise for improved efficiency
- Stimulate change and advise system partners on implementing change



Excellence and Innovation in Patient Care

- Adopt new knowledge gained through research and innovation
 - Accelerate broad adoption of evidence-based best practices
 - Provide the range of primary to quaternary patient services
 - Develop new models of organizing patient care
 - Provide standby and surge capacity
 - Provide specialized diagnostics, treatment and disease management
 - Offer backup and consultation services
 - Coordinate care for patients with complex chronic conditions
 - Achieve critical mass for complex, rare and expensive procedures

Excellence and Innovation in Education

- Achieve critical mass and infrastructure for teaching
- Undertake leadership in education of current and future health professionals
 - Provide an inter-professional team-based educational environment
 - Facilitate and lead continuous quality improvement in education
 - Provide education of patients, families and caregivers

Research and Innovation

- Facilitate and lead knowledge creation and discovery
- Provide the appropriate environment to undertake research
- Facilitate and lead knowledge transfer
- Work with industry, government and other system partners to ensure rapid technology development and transfer
- Provide competitive environment for industry-sponsored and investigator-led clinical trials
- Demonstrate return on investment of research
- Attract global talent
- Train the next generation of researcher



About the Research Hospital Accountabilities Task Force

RESEARCH HOSPITAL ACCOUNTABILITIES TASK FORCE TERMS OF REFERENCE

1. To provide advice to CAHO Council on the accountabilities on Ontario's research hospitals.
2. To provide recommendations, for the approval of CAHO Council, for ensuring research hospitals achieve and adhere to the accountabilities that have been developed.
3. To identify key success factors to enable the research hospitals' accountabilities to be achieved.

RESEARCH HOSPITAL ACCOUNTABILITIES TASK FORCE MEMBERS

CAHO Practice and Education Committee:

Dr. Maureen Shandling, VP Medical Affairs, Mount Sinai Hospital (Chair)

Dr. Robin Walker, Integrated VP Medical Affairs and Medical Education, London Health Sciences Centre and St. Joseph's Health Care

CAHO Chief Nursing Executive Representatives:

Joy Richards, VP Health Professions & CNE, University Health Network

Kirsten Krull, VP Interprofessional Practice & CNE, Hamilton Health Sciences

CAHO Research Committee:

Dr. David Hill, Integrated VP Research & Chief Scientific Director, London Health Sciences Centre and St. Joseph's Health Care

Dr. Janet Rossant, Chief of Research, The Hospital for Sick Children

CAHO Resources Committee:

Jim Flett, EVP & COO, Kingston General Hospital

Brenda Flaherty, EVP & COO, Hamilton Health Sciences

FEEDBACK FROM THE CAHO STANDING COMMITTEES

The draft Accountabilities were presented to the three CAHO Standing Committees: Research, Resources, and the Practice and Education Committee. Input from these Committees has been incorporated in this report.

Introduction

It has long been recognized that Ontario's research hospitals are designed to deliver three related missions:

- to provide Ontario residents with timely access to advanced patient care services;
- to train the next generation of health care professionals; and
- to conduct leading-edge research.

It is the integration of specialized patient care, education and research that has historically differentiated research hospitals from other organizations in the health care system.

The tripartite role of research hospitals provides the unique environment necessary to facilitate highly specialized care, to nurture and incubate the research enterprise, to train the next generation of health care providers and researchers, to inform research questions through clinical problems, and conversely, to transform clinical practice through research (Bernstein, 2002). As a result of their traditional tripartite mission, research hospitals play a significant and distinct role in the Ontario health care system.

Numerous policy documents have identified the synergistic impact of research hospitals' tripartite mission and their broader system role. Nevertheless, a number of government policies and uncoordinated funding models and sources may hamper the ability of research hospitals in achieving their full potential. Isolating individual components of the mission-related goals of research hospitals is not supported by existing research. Although Koenig and his colleagues note that it is important to identify and analyze the components of the academic mission, they do not support selectively choosing which missions to fund, since "teaching hospitals' missions are highly interrelated and mutually supportive" (Koenig et al., 2001).

Background

Ontario's research hospitals are traditionally defined by their tripartite mission of patient care, education and research. However, they also contribute in a unique way to the competitive strength of the province by directly impacting its generation of wealth through commercialization, job creation and leadership in the health care system as a whole.

RAPID DIFFUSION OF RESEARCH EVIDENCE AND INNOVATION

While the approaches differ, recent documents advising on the future of research hospitals identify the rapid diffusion of research evidence and innovation as the key differentiator of research hospitals from other health system entities (e.g., UK Department of Health 2012, Bressler and Campbell 2009; Lozon and Fox 2002). Adoption of research evidence not only leads to the implementation of new technologies and practices, but also to the discontinuation of ineffective or obsolete ones. The capacity of research hospitals to diffuse innovation underlies their success in all four key components:

- patient care, through implementation of new practices and technologies;
- education, by arming future and current health care providers with the tools to adopt new practices and discontinue ineffective or obsolete ones;
- research and innovation, by not only creating new knowledge but translating it into practice; and
- the ability to offer expertise, capacity building and innovation to the broader health care system.

Research hospitals are engines of health innovation through the interplay between research, education and clinical practice, which accelerates the translation of new knowledge into potentially cost-effective leading practices, new models of organizing and delivering care, as well as breakthrough drugs and/or medical devices. These new medications and tools can, in turn, revolutionize diagnosis, treatment and improve health outcomes. Research hospitals have a crucial role to play in converting new knowledge into a range of innovative products and services. The benefits that flow from Ontario's research hospitals extend well beyond local, regional and provincial boundaries (National Task Force, 2010).

CAHO has recognized the role that research hospitals play in the broad-scale diffusion of research evidence. Through the Adopting Research to Improve Care (ARTIC) Program, CAHO has funded six innovative evidence-based projects that are being implemented in a number of CAHO hospitals with a longer-term goal of disseminating the projects, and others, throughout the health care system, thereby contributing to building an evidence implementation pathway for Ontario.

VALUE CREATION AND VALUE ADD

All health care organizations provide value to the system. However, in order to identify those accountabilities that are unique to research hospitals, we have focused on accountabilities where the *value creation* or *added value* to the system can be identified. These are the characteristics that differentiate research hospitals from large community hospitals, universities and other key contributors in the health care, education and research system in Ontario.

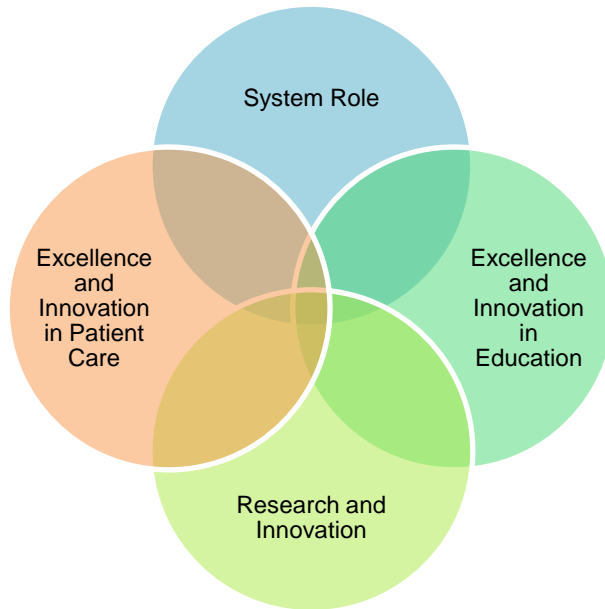
ONTARIO'S RESEARCH HOSPITALS: CURRENT ENVIRONMENT

For the purpose of this report, Ontario's research hospitals are defined as the 24 members of CAHO. These hospitals vary considerably in size, scope and patient populations. As well, they are at different levels of maturity and sizes of their research enterprise. The accountabilities outlined in this document are both actual and aspirational, and take into account all CAHO hospitals, regardless of the size and scope of their research enterprise(s).

Going beyond the traditional definition of an academic health science centre, we proposed that Ontario's research hospitals have a four-part mission, and the accountabilities of research hospitals fall into four distinct but highly interrelated components (see **Figure 1**):

- system role;
- research and innovation;
- excellence and innovation in patient care; and
- excellence and innovation in education.

Figure 1: Accountabilities of Research Hospitals



Key Components of Research Hospitals: Accountabilities

SYSTEM ROLE

Ontario’s research hospitals are unique in their ability to align education and training, research and innovation, and health care delivery, allowing them to act as key “connectors” and partners in the health care system, building capacity for all.

The traditional tripartite mission of a research hospital is most fully realized through the integration of these three missions as well as effective and mutually beneficial partnerships with government, universities, hospital foundations, other hospitals and health care providers as well as other contributors to the delivery and sustainability of health care in Ontario, including patients and families. As a result, Ontario’s research hospitals are relied upon and play a key role in contributing to a sustainable health care system in Ontario that provides evidence-based quality care at an efficient cost.

Accountabilities of Research Hospitals

1. Discover, provide access to, and support the implementation of the next best care

The business model of Ontario’s research hospitals is founded on the integration of complex and specialized care; an environment of teaching and learning that occurs around it; and emerging breakthrough discoveries to inform delivery of the next best care. These components, together, create a deeply entrenched culture of inquiry and discovery that serves as a resource for the local, provincial and global health care system.

Inherently through this business model, research hospitals are held to account for catalyzing innovations into improved practice; evaluating the outcomes of innovative practices; and standardizing best practice for distribution to the broader health care system. Together, Ontario's research hospitals are relied upon for diffusing this knowledge to establish an elevated health care system that optimizes both quality and efficiency through delivery of evidence-informed care at the bedside for patients and families.

Concurrently, as new knowledge is adopted into practice, research hospitals acquire expertise in the translation of evidence into practice, thereby establishing change management capacity for the benefit of the system. Given the emerging shifts in Ontario's aging population, change management capacity is fundamental to ensuring new and improved practices and care delivery models that are the foundation for transforming Ontario's health care system.

2. Attract, develop and retain the world's talent, knowledge and skills to Ontario

Ontario's research hospitals are globally renowned for their deeply entrenched cultures of inquiry and discovery, thereby delivering excellence in research that is exported to improve the health of local, provincial, and global populations. This breeding ground and export of discovery and innovation, in turn, attracts leading-edge researchers, clinicians and clinical educators from across the globe to leverage Ontario's research engine. Ontario's research hospitals offer unique opportunities to partner with other leading edge researchers and to advance academic pursuits for global scale impact.

Recruitment and retention of world-leading researchers is extremely competitive among nations. Leading edge researchers are the foundation for attracting research funding from a multitude of sources, thereby contributing to localized economic development through the creation of jobs. Ontario's research hospitals play a fundamental role in sustaining the Ontario research engine such that it remains competitively attractive to scientists from across the globe. All of this leads to a healthier, wealthier and smarter Ontario. (See **Box 1.**)

3. Act as provincial resources for clinical skills and capabilities, and quality improvement

Ontario's research hospitals employ a broad range and large number of health care professionals, and therefore have established capacity necessary to enable seamless operation of health care delivery, providing the support necessary to allow health care practitioners to deliver high-quality, efficient care. Furthermore, research hospitals play a significant role in developing health care providers, administrators, researchers and other highly trained professionals who then go on to assume key positions in other parts of the health care system, including government and industry.

Research hospitals are leaders in patient safety approaches, continuous quality improvement, and performance and accountability measures, including methods such as balanced scorecards. This leadership elevates the standard of quality for the entire system, allowing others to leverage tried and tested approaches from the experience of research hospitals.

Box 1: Research Hospital Attracts Talent on a Global Scale

Sudbury's Health Sciences North (HSN) has recruited a DNA expert from the esteemed Mayo Clinic to oversee the hospital's new Personalized Medicine Program: Dr. Rebecca McClure.

She was drawn to the hospital's cutting-edge facility, the Advanced Medical Research Institute of Canada (AMRIC), and its brand new next-generation DNA sequencing machine, an ION Torrent Personal Genome Machine, to be used exclusively by McClure. This equipment puts HNS at the forefront of actual clinical testing using this new technology.



Dr. Rebecca McClure, Health Sciences North

Bringing McClure on board, with this new technology, will attract the next generation of researchers and health care providers to this research hospital.

4. Provide regional partners with management, technology and operational expertise for improved efficiency

Over time, Ontario's research hospitals have evolved into hubs that support and advance regional health care improvement efforts through the provision of expertise in areas such as human resources management, leadership development, decision support and financial management. As "connectors" across health care sectors, research hospitals enable regional initiatives, provide efficiency in communication among providers, and enhance the operation of the health systems for the regions in which they reside.

In their established role as innovators, research hospitals seek to identify and diffuse innovative information technologies that act as catalysts to enable the transformation of service delivery, leading to improved patient outcomes and sustainability of the health care system. The collection, analysis and use of information—particularly in the area of clinical, patient and population outcomes — form the foundations for the work of research hospitals in evaluating innovative practices.

Together, this capacity enables the efficient delivery of care across the continuum and serves as a provincial resource to inform future policy directions.

5. Stimulate change and advise system partners on implementing change

Throughout the evolution and transformation of Ontario's health care system, leadership from research hospitals has been at the forefront of these changes, contributing expertise and credibility as partners to government, and key opinion leaders in planning for the future of health care delivery. Additionally, research hospitals form creative solutions to systemic issues and are counted on to participate and lead various initiatives focused on improving quality and efficiency.

Given their size, knowledge, leadership and mix of skills, research hospitals are exemplars for visioning, testing and modeling advancements in health care delivery; offering expertise based on lived experience on provincial policy directions, thereby contributing to the fidelity of a modernized health care system and to a better patient experience.

RESEARCH AND INNOVATION

While research and community hospitals may share distributed teaching models and many patient-care programs, the former offers the broad synergies gained through locating research and innovation with clinical care. Therein lies the opportunity for research hospitals to define their unique role in Ontario's health care system (Lozon and Fox, 2002). Research hospitals are exceptional in their ability to embed researchers within clinical teams, thereby allowing researchers, health care providers and students to interact. This, in turn, provides an opportunity for new discovery and learning, and the rapid translation of research into practice. This bench-to-bedside model is distinctive to the research hospital.

Accountabilities of Research Hospitals

1. Facilitate and lead in knowledge creation and discovery

The research enterprises of CAHO hospitals had annual revenue of approximately \$1.2 billion in 2011-2012. Through discovery and applied research, these hospitals have produced many world firsts and have made, and will continue to make, significant contributions to the state of health care.

Research hospitals create the appropriate culture and provide the infrastructure to support curiosity in how to prevent disease, diagnose and treat patients, and provide leading-edge health care. (See **Box 2.**) Embedding researchers in active patient care promotes applied experimentation that leads to better approaches to health care and creates a skill base to test existing approaches to ensure their continued efficacy.

2. Provide the appropriate environment to undertake research

Research hospitals require an environment that is conducive to undertaking a range of scientific endeavors including dedicated space, infrastructure, state-of-the-art equipment and technologies, IT,

Box 2: Research Hospital Turns to Viruses to Stop Cancer

In 2011, researchers lead by Dr. John Bell at the Ottawa Hospital Research Institute (OHRI) saw promising results when using oncolytic viruses to treat cancerous tumours without harming normal tissues in humans.



Dr. John Bell, the Ottawa Hospital Research Institute

By August 2013, the virus-to-kill-cancer idea took another promising turn at OHRI. Drs. John Bell and David Conrad developed virus-derived particles that kill human blood cancer cells in the lab and eradicate Leukemia in mice with few side effects.

This is the first major success this team has seen for treating Leukemia. Conrad says this novel therapy is very safe at high doses, and it worked extremely well in the lab.

The two doctors hope to test this in patients in the near future. Bell believes that someday, viruses and other biological therapies could truly transform our approach for treating cancer.

research ethics boards and administrative support. For example, medical imaging equipment in research hospitals is often the latest beta test version of new generations of technologies, provided through research funding, but subsequently available to deliver the leading edge of patient care.

3. Facilitate and lead knowledge transfer

Research hospitals not only create new knowledge that will ultimately improve health outcomes, they also develop the means to translate results of existing research into practice in order to optimize health care and clinical outcomes. Additionally, research hospitals facilitate the dissemination of new knowledge to students, trainees and staff, and the health care system at large.

4. Work with industry, government and other system partners to ensure rapid technology development and knowledge transfer

Research hospitals develop effective links with industry to capitalize on the economic potential and wealth creation opportunities afforded by the commercialization of goods and products from health research (National Task Force, 2010).

As well, research hospitals work with government, MaRS EXCITE, OHTAC and, potentially, industry partners to accelerate the possible adoption of disruptive technologies. (Disruptive technology refers to new technology that changes the social organization of earlier technologies. It's often cheaper, less complex and involves less expertise of effort to use.)

5. Provide a competitive environment for industry-sponsored and investigator-led clinical trials

By supporting and collaborating with national partners and Clinical Trials Ontario, research hospitals can collectively create an environment to attract more industry-sponsored trials to Ontario and allow the testing of investigator-initiated ideas that can subsequently be adopted by industry.

6. Demonstrate return on investment of research and create jobs

The health research and innovation that take place in our research hospitals drive a knowledge-based economy that engages and attracts the brightest scientific and clinical minds from here and around the world. It creates new jobs and industries by commercializing discovery and marketing it globally. For every \$1 invested in health research in Ontario's 24 research hospitals, \$3 of economic output is generated, approximately \$2.50 of labour income is generated, and **36,000 jobs are created**. Our research hospitals are home to 15,000 researchers and research staff. These are good, high paying jobs for people working across the province—jobs from highly skilled research talent, to the entrepreneurs that supply the inputs for research, to the businesses that provide the goods and services that are then consumed by the thousands of end users. For example, Hamilton Health Sciences hosts one of the most successful clinical trials institutes in the world now employing 275 highly trained individuals that have replaced lost manufacturing jobs in the region.

7. Attract global talent

Through the collocation of specialized patient care and world-class research institutes, research hospitals are able to attract top researchers, clinical investigators and specialists to Ontario. Training extends to individuals from all parts of the world, which both generates income through educational fees and encourages globalization of Ontario's health system and values.

8. Train the next generation of researchers

Research hospitals deliver not only education for future health care providers, but also provide significant opportunities for training future researchers and clinician scientists. Many of these trainees go on to assume positions in research hospitals, universities and private industry.

Considerations for Innovation and Research

1. The current model of research grant funding is focused on the direct cost of the project; it does not allow for the full recovery of indirect costs. Therefore, the infrastructure costs must be maintained by other sources, which are becoming increasingly unpredictable, unstable and at-risk in the current economic environment. Research hospitals continue to advocate that the full cost of research be supported by funding agencies and government.
2. The future of the Ontario Research Fund is critical to the sustainability of the research enterprise in Ontario, with a significant impact on the discovery pipeline in Ontario, and our ability to attract global talent to our province.
3. A clear strategy and resources to support it would help optimize the health research engine in Ontario. CAHO continues to advocate for a Health Research and Innovation Council and, in the meantime, will support the Ministry of Research and Innovation in ensuring that we continue to build an effective end-to-end health research and innovation pipeline – from molecule, to medicine to market.
4. Ongoing salary support for scientists is a significant concern for research hospitals. Most federal and provincial granting agencies do not cover salaries for principal investigators, and funding for Career Scientist Awards has been significantly reduced in recent years. Granting agencies in other countries, such as the United States, cover salary costs of principal investigators, which may put Ontario research institutes at a competitive disadvantage.
5. Research hospitals are home to academic physicians who, along with many others, contribute to the research and innovation, and academic productivity of research hospitals. Many fall under the Alternative Funding Plans (AFPs) for academic physicians. The recent success of utilizing a portion of AFP funds to encourage physician-led innovation is evidence of the value of these environments. A future area for discussion and consideration is the role and accountability of research hospitals in relation to these AFPs.

EXCELLENCE AND INNOVATION IN PATIENT CARE

Accountabilities of Research Hospitals

1. Adoption of new knowledge gained through research and innovation

Research hospitals are at the forefront of both developing new technologies and practices, as well as translating this new knowledge into practice changes. Patient care innovations contribute to improved outcomes and experiences for patients, and/or reduce costs to the system.

Research hospitals refine both locally and globally developed innovations for the broader health care system. For the former, the clinician scientist that develops and tests the new technology or practice can facilitate local adoption and secure buy-in for the change.

2. Accelerate broad adoption of evidence-based best practices

Research hospitals accelerate the dissemination of research-based evidence into clinical practice to enhance the quality, accessibility and affordability of health care services, and to improve patient and population health outcomes. This may include supporting and working with system partners, such as Health Quality Ontario, in the adoption and spread of provincially designated innovations (e.g. based on OHTAC recommendations) and identifying other innovations that the research hospitals decide to prioritize for rapid diffusion. The CAHO ARTIC program is an example of the ability of CAHO hospitals to translate innovation into practice.

Research hospitals are not only leaders in adopting new evidence-based therapeutic methods, practices and technologies, but also participants in processes that refine these methods, practices and technologies to encourage (where appropriate) widespread adoption across the system. Research hospitals play a central role in translating research into practice, including bio-medical, health services research and clinical and economic evaluations; modeling innovations; and encouraging broad-scale adoption that benefits the whole population.

The evaluation of innovations, to demonstrate their clinical and cost effectiveness, is a crucial part of creating the business cases that will underpin the local and provincial adoption of best practices.

3. Provide a range of patient services

Research hospitals provide comprehensive patient care from basic to the most advanced services. It is often a key requirement that research hospitals balance high-end tertiary services with the necessity to serve the health needs of the local catchment areas by providing preventative, primary and secondary services (Lozon and Fox, 2002).

Research (Hay, 2009) has shown, however, that Ontario's research hospitals, relative to community hospitals of comparable size, provide care to a greater proportion of patients whose cases are more complex, who are transferred from another facility, and who have conditions that are known to increase significantly the cost of their hospital stay.

The provision of secondary level services in research hospitals is critical. Not only do many research hospitals serve the needs of their local catchment areas, but students from a variety of health care disciplines and medical residents who receive the majority of training in research hospitals require a broad range of clinical experiences to advance their knowledge and skills. Since research hospitals have the existing infrastructure, capacity and expertise to provide not only highly specialized care but secondary care as well, the full use of the existing capacity ensures that resources are efficiently used. Finally, many innovations in the provision of primary and secondary care have resulted from research conducted in research hospitals and have led to improved health outcomes and potentially greater efficiencies.

4. Develop of new models of organizing patient care

Research hospitals need to participate in, and/or lead integrated health care systems to ensure that patients receive care in the right place, at the right time, and by the right provider. Without effective collaboration and transition between hospitals and community providers, optimal patient care and performance targets cannot be achieved.

While the importance of integration is not unique to research hospitals, given the research, clinical and management expertise in these hospitals, they are ideally suited to test new models of care that will inform patient care delivery across the health care system.

5. Provide standby and surge capacity

Standby capacity is defined as the capacity to provide high-technology or intensive services whose availability is essential to a modern health care system but which are not always in use. For research hospitals, standby capacity is a regional and sometimes a provincial resource. Koenig et al. (2003) estimated that of the tripartite mission-related costs of research hospitals, standby capacity represented the largest component of the costs.

Programs where standby costs can be significant for Ontario research hospitals include Level III NICUs, transplant programs, trauma programs and neurosurgery (Hay, 2009). This Hay group report also found that more than 80% of patients who require highly specialized care are admitted to CAHO hospitals. Furthermore, once patients receive specialized care at a CAHO hospital, because of their complex conditions, they are far more likely to be admitted to the CAHO hospital for other secondary services, even if there are other hospitals in closer proximity. These patients have significantly higher acuity ratings than those admitted from the local catchment area.

Surge capacity refers to the ability to evaluate and care for marked increases in patient volumes. Research hospitals and some large community hospitals have the ability to provide the 24/7 staffing and service availability that the province requires, and frequently experience significant increases in patient volumes during periods when smaller hospitals have reduced staffing due to holiday periods or over-capacity. Surge capacity most commonly resides in research hospitals due to their location, size, in-house expertise and the range of patient care services.

6. Provide specialized diagnostics, treatment and disease management

Research hospitals often have highly specialized staff and technology required to provide specialized diagnostics, treatment and disease management not available elsewhere in the system. (See **Box 3.**) Given the limited number of certain medical subspecialists and the high cost of many technologies, centralization of these scarce resources is cost effective, prevents the need to refer patients and services for expensive out-of-province care, and results in the best care for these patients.

7. Offer specialized backup and consultation services

Specialists in research hospitals frequently provide both backup and consultative services to community practitioners that enable patients to receive high-quality specialized care from their own provider close to home. Specialists also undertake outreach by holding clinics in surrounding community hospitals. This means that specialized care is readily available to the population and this also provides continuing practical education to clinicians and other health professionals in a distributed model.

8. Coordinate care for patients with complex chronic conditions

Research hospitals work with community providers to ensure that, upon discharge, patients with highly complex chronic conditions continue to receive the necessary appropriate care and remain medically stable to avoid unnecessary readmission to hospital.

9. Achieve critical mass for complex, rare and expensive procedures

Given the combination of specialized clinical expertise and medical technology, research hospitals can provide a range of procedures that are exceptionally complex, rare and costly (e.g., organ

Box 3: Research Hospital Applies Whole Genome Sequencing to Autism, Paves the Way for Personalized Medicine

A research team led by Dr. Stephen Scherer at The Hospital for Sick Children has identified genetic risk variants in half of its study participants. As the first autism study to apply whole genome sequencing, it represents a major step forward that could pave the way for faster diagnoses and better facilitate personalized medicine.



Dr. Stephen Scherer, The Hospital for Sick Children

The results of this study offer hope for new, faster ways to diagnose autism, particularly among siblings of children with autism where recurrence is approximately 18%. The results also bring personalized medicine to autism. “In the future, results from whole genome sequencing could highlight potential targets for pharmacological intervention and pave the way for individualized therapy in autism,” says Scherer. He believes this new technology will enhance researchers’ ability to examine regions of the genome and inherited genetic variants missed in other approaches.

transplants, trauma care, neonatal surgery). In addition, a number of research hospitals provide focused care for patient groups that require specialized expertise, such as psychiatric and pediatric patients.

While the number and mix of complex patients increases the cost per case, there are significant advantages to consolidating these services. It has been demonstrated that hospitals that achieve a critical mass have patients with better health outcomes (Tracy and Zelmer, 2005). In addition, consolidation of resources reduces the need for reserve excess or standby capacity for rare conditions in multiple sites. Consolidation also reduces inter-organizational competition for scarce human resources, technology and infrastructure.

Considerations for Excellence and Innovation in Patient Care

1. New technologies, practices and processes are often initially more expensive and do not have funding streams to support them, even when they may ultimately lead to significant cost savings for the health system and/or to improved patient outcomes.
2. Standby capacity accounts for the largest component of mission-related costs in research hospitals. Current case costing approaches do not adequately capture the full cost of these programs.
3. Research conduct by the Hay Group (2009) showed that patients who received tertiary or quaternary services in a research hospital become reliant on that hospital to provide non-tertiary care. In other words, by providing specialized care, the research hospital became the patients' "community of care" for subsequent health services. Due to the prior history of special care health needs for these patients, these needs are more complex and costly.

A recent study by the Institute for Clinical Evaluative Studies (ICES) demonstrated that higher hospital spending resulted in improved survival rates, lower hospital readmission rates, lower rates of adverse events and better quality of care for patients (Stukel et al., 2012). The ICES study suggests that while the cost of the initial hospital care is higher, reduction in readmissions and adverse events will ultimately lead to lower overall costs. More importantly, the additional resources required by these hospitals leads to improved patient health outcomes.

4. Research hospitals receive funding for patient care through a number of Ministry of Health and Long-Term Care (MOHLTC) streams, including funding through HBAM, Quality Based Procedures (QBPs), Provincial Program and Cancer Care Ontario, among other sources. Although this is the case for many hospitals, patients who receive care in research hospitals are among the most complex and resource-intensive cases.

EXCELLENCE AND INNOVATION IN EDUCATION

One of the best known portions of the traditional tripartite mission is the teaching mandate, and research hospitals continue to be the only settings that provide consistent positions for post-graduate training with residency positions in multiple specialties being delivered at any given time. The research hospital is still



the primary location for advanced specialty positions such as clinical fellows. In 2010-2011, CAHO hospitals accounted for more than 87% of the Medical Trainee Days funded by the MOHLTC.

Research hospitals play an integral role in the education of most non-physician health professionals. Students from faculties of pharmacy, nursing, physiotherapy, among many others, participate in clinical placements in Ontario's research hospitals.

Accountabilities of Research Hospitals

1. Achieve critical mass and infrastructure for teaching

Research hospitals have the critical mass of patients, educators and specialized health care providers to ensure high-quality interprofessional training for every level of learner, from undergraduate to fellowship. The education of specialized health care providers requires participation in the care of sufficient numbers and ranges of patients, from those for whom care is fairly routine, to those with the rare and highly complex medical issues that require sophisticated technology and sub-specialists.

Hospitals with significant education mandates provide preceptor time, clinical space, infrastructure and supplies to ensure high-quality teaching in their institutions. Research hospitals are home to academic clinician educators. They have the capacity to provide learners with simulation sites and other evolving evidence-based methods of clinical teaching.

2. Undertake leadership in education of current and future health professionals

Research hospitals have a strong link with their affiliated universities. While the universities provide the preclinical academic portion of education, research hospitals provide the vital bridge between the academia and practice, offering clinical and patient experience critical to developing future health care providers. Research hospitals are also a key partner in the universities' curriculum development. So the relationship is reciprocal and enriching.

Clinicians in research hospitals have the ability to develop their skills in a continuous learning environment. Research hospitals prepare current and future health care providers to adopt evidence and innovation.

3. Provide an inter-professional team-based educational environment

A multi-disciplinary approach to the education of health care professionals better prepares future health care providers to meet the needs of the communities in which they will work. While team-based learning is not unique to research hospitals, the inclusion of post-graduate levels of medical trainees in an environment with other clinical students in the teams may provide a broader learning environment.

4. Facilitate and lead in continuous quality improvement in education

Research hospitals demonstrate leadership in the development of systems of performance measurement and accountability that promote continuous improvement in education. They lead in the education of health care professionals, both provincially and nationally, and test new models that are not as readily available outside research hospitals (e.g., Sim Labs).

The adoption and spread of innovation occurs through the training and education of staff. Education and training activities create a workforce that is research-literate and innovative with skills in developing, adopting and diffusing the latest ideas and innovations. Education must ensure that future practitioners know how to access and use evidence.

5. Provide education of patients, families, caregivers and the public

Research hospitals are leaders in the education of patients, families and caregivers. (See **Box 4**.) Patient education has proven to increase self-management significantly, especially for chronic conditions, and to improve health outcomes of patients. Effective education of patients, families and caregivers can contribute to overall efficiency of the health care system. Educating patients, families and caregivers is common in many hospitals, but research hospitals are ideally placed to test novel approaches, such as mobile apps for patient self-care.

Box 4: Research Hospital Educates Parents with New Model of Caring for Premies

A new model of caring for preterm infants, developed by Mount Sinai Hospital's Dr. Shoo Lee, has shown to have a significant positive effect on the baby's health (measurable by weight gain).

It's called Family Integrated Care (FIC) and it's the first of its kind in North America where, under the guidance of nurses, parents provide the majority of daily care to their infants in the neonatal intensive care unit (NICU).



Dr. Shoo Lee, Mount Sinai Hospital

The benefits are not limited to the babies. Parents gain a new feeling of empowerment, as the program promotes bonding with their babies and increases the parent's skills for looking after their babies. It also ensures a smoother transition to home because the parents are much more confident.

In addition to their role in education of patients and families, research hospitals are often called upon to provide specialized opinions to educate the public. Often, the media contacts research hospitals to provide expert opinion on emerging research and health care trends that stem from both local and global efforts. Not only does this attention bring light to the research that takes place within our own backyard, but it also shines a light on talent we have attracted from across the globe to advance medicine and health care delivery.

Considerations for Excellence and Innovation in Education

Research hospitals receive payment for medical students—the Medical Trainee Days (MTDs). Alternative funding plans do provide some protected time for teaching. However, these elements do not provide comprehensive funding for training of all health professionals and the full infrastructure and teaching intensity provided in research hospitals.

The Accountabilities are summarized in the Appendix.

What We Heard

To inform and validate the research hospital accountabilities outlined in this document, interviews and discussions with a number of key respondents were undertaken.

INTERVIEWS WITH KEY RESPONDENTS OUTSIDE THE RESEARCH HOSPITAL COMMUNITY

Twelve interviews with representatives from large and medium community hospitals, LHINs, Community Care Access Centres (CCACs), medical school deans and the MOHLTC were conducted. The questions asked of each respondent were:

- For what do you rely on research hospitals in your day-to-day role?
- What do you think research hospitals could do better in terms of providing value to the system?
- What partnerships do you have or would you like to have with research hospitals?

While there were a wide range of opinions, a number of common themes arose from the respondents. These themes were as follows:

- Research hospitals need to help others in capacity building. They have depth of knowledge, expertise, capacity and they either are, or should be, willing to share.
- Research hospitals are (or should be) leaders in “system thinking.”
- More research is needed (or increase the credibility and profile of it) on applied health care research, especially on questions that help answer administrative and policy questions in more “real time” as opposed to years from now.
- Want two-way partnerships.
- Want to know more about what is going on within research hospitals.
- Research hospitals should be early adopters, demonstrators and scale innovations to the rest of the system.

- Broad and deep expressions of the need for facilitation of implementation of evidence to improve patient care.
- Resourcing research hospitals. While there were a diversity of comments on how to resource research hospitals, there seemed to be a degree of consensus on what is special or unique about research hospitals (teaching, specialization, research). This should be appropriately resourced because it provides value to the system.
- There was only one comment on whether there is differential value from a research hospital. But this respondent acknowledged that teaching and research have to be appropriately resourced.
- A need for communication about (and justification of?) the value proposition of research hospitals.
- There needs to be a broader understanding of where the expertise in research hospitals is and how to access it.

KEY QUOTATIONS FROM RESPONDENTS [UNEDITED]

- *“It should have been a design feature of each LHIN to make ensure that there was an AHSC in each LHIN.”*
- *“ARTIC is a dream opportunity.”*
- *“Help us think about the system, not turf.”*
- *“Want help with very practical questions, not esoteric ones.”*
- *“Need more research, evidence and demonstration of how we can do care differently and better.”*
- *“Need a tool to access evidence other than Google or Watson.”*
- *“Look to research hospital CEOs as a sounding board and help in leading change – they have a depth of skill and influence. Can’t do it without them.”*
- *“Research hospitals should be leaders on ideas and follow-up with implementation.”*
- *“I work with a lot of researchers at different hospitals, but I am an administrator – I can’t wait four years to make a decision!”*
- *“The dream would be a longer-term relationship with the researcher so that the administrators could define the research together with the researcher...and then be motivated to take up the results because had helped design the research.”*
- *“Don’t have a strong approach to ‘identify best practice and spread it;’ research hospitals need to change business model to do this, rather than asking for more funding to do it.”*
- *“When I worked at a research hospital, I never worried about whether physicians practiced state of the art – then I went to a community hospital, and now I know they are NOT practicing state of the art- this is terrifying. I am without the compass of the evidence. We need the compass because people we treat have the right to progressive treatment.”*
- *“In the bigger scheme of things, we count on research hospitals to do the research – we are extraordinarily lucky to have that. In the 905 region, we have as much obligation to protect the research as those in the research hospitals. We should galvanize the non-research hospitals around the research protection agenda- quid pro quo would be to organize the academic centres in the best way possible...there should be a visible organization of research.”*
- *“Why is it so much more expensive at teaching hospitals? Need to get their costs in line – tighten their belts instead of saying ‘oh it is the academics’. Community hospitals have to pay hospitalists. They don’t have residents to do their work. We are not interested in being in a hub/spoke if the academic hospitals eat up the cost per weighted case.”*

Appendix: Accountabilities Summary Table: How Research Hospitals Add Value

Research Hospital (RH) Mission	RH Accountabilities	Value Creation and Value Add (What can RHs uniquely contribute?)
System Role	Discover, provide access to, and support the implementation of the next best care	<ul style="list-style-type: none"> • Create and foster culture of inquiry and discovery that serves as resource for local, provincial and global health care systems • Catalyze innovations into improved practice, evaluate outcomes, and standardize best practice for distribution to broader health care system • Establish change management capacity for the benefit of the system
	Attract, develop and retain the world's talent, knowledge and skills to Ontario	<ul style="list-style-type: none"> • Hub for attracting global talent including clinicians, clinical educators and researchers
	Act as provincial resources for clinical skills and capabilities, and quality improvement	<ul style="list-style-type: none"> • Professionals who receive training and experience in RHs move on to key positions in the health system or train or partner with others (e.g., decision support) • Leadership in patient safety approaches, continuous quality improvement, and accountability measures, including methods such as balanced score cards
	Provide regional partners with management, technology and operational expertise for improved efficiency	<ul style="list-style-type: none"> • Leaders in application of information technology to improve health care • Support and advance regional health care improvement efforts through the provision of expertise in areas such as human resources management, leadership development, decision support and financial management. • “Connectors” across health care sectors to enable regional initiatives, providing efficiency in communication among providers
	Stimulate change and advise system partners on implementing change	<ul style="list-style-type: none"> • Contribute expertise and credibility as partners to government and key opinion leaders in planning for the future of health care delivery

Research and Innovation	Facilitate and lead in knowledge creation and discovery	<ul style="list-style-type: none"> • Through discovery and applied research RHs have developed many world firsts • RHs create the culture and provide the infrastructure to support curiosity in developing knowledge of how to prevent disease, treat patients and provide better health care • Embedding researchers in active patient care promotes applied experimentation that leads to better approaches to health care
	Provide the appropriate environment to undertake research	<ul style="list-style-type: none"> • In order to undertake research, RHs require the appropriate infrastructure which includes labs, space, IT, REBs etc.
	Facilitate and lead knowledge transfer	<ul style="list-style-type: none"> • Creation, translation and application of knowledge into clinical best practice
	Work with industry, government and other system partners to ensure rapid technology development and transfer	<ul style="list-style-type: none"> • By providing innovations, ideas and expertise, working in partnership with industry, RHs can provide new business opportunities for Ontario-based companies
	Provide competitive environment for industry-sponsored and investigator-led clinical trials	<ul style="list-style-type: none"> • Creation of the competitive environment will attract funding and industry-partnerships
	Demonstrate return on investment of research	<ul style="list-style-type: none"> • Research leads to better patient outcomes and potential cost savings • Commercialization of research • Research discoveries can create sustainable and knowledge-based jobs through the creation of spin-off companies and other local business opportunities • Job creation (CAHO hospitals employ more than 15,000 researchers and research staff)
	Attract global talent	<ul style="list-style-type: none"> • Through the collocation of specialized patient care and world-class research institutes, RHs are able to attract top researchers, clinical investigators and specialists to Ontario
	Train the next generation of researchers	<ul style="list-style-type: none"> • Highly trained researchers who will go on to assume positions in RHs, universities and private industry

Excellence and Innovation in Patient Care	Adopt new knowledge gained through research and innovation	<ul style="list-style-type: none"> • Drive knowledge translation (adoption of research evidence into practice changes) • Patient care innovations improve outcomes for patients and/or reduce costs for the system • Refine global innovations locally to be shared with broader local health care system
	Accelerate broad adoption of evidence-based best practices	<ul style="list-style-type: none"> • Once practices/technologies have been implemented, evaluated and refined, RHs should use their experience to spread the innovation through the health system as appropriate • RHs support formal and informal knowledge translation networks
	Provide a range of patient services	<ul style="list-style-type: none"> • RHs need to balance the provision of tertiary services with the need to serve the health needs of their local catchment areas • A critical mass of specialists is required in RHs to ensure capacity is available when required • Ongoing innovations in the provision of all levels of health care are developed in RHs
	Develop new models of organizing patient care	<ul style="list-style-type: none"> • Given the research, clinical and management expertise in RHs, they are well suited to test new models of care that will inform patient care across the system
	Provide standby and surge capacity	<ul style="list-style-type: none"> • RHs need to have the capacity to provide high-technology or intensive services whose availability is essential to a modern health care system but not always in use • RHs need to have the capacity to accommodate increases in patient volumes 24/7
	Provide specialized diagnostics, treatment and disease management	<ul style="list-style-type: none"> • RHs provide specialized diagnostics, treatment and disease management to a range of patients referred by other hospitals and community providers • Frequently these diagnostics are not available outside RHs
	Offer backup and consultation	<ul style="list-style-type: none"> • Specialists in RHs provide backup/consultative services to community

	services	practitioners, which allows patients to receive high-quality specialized care from their own provider close to home
	Coordinate care for patients with complex chronic conditions	<ul style="list-style-type: none"> • Work with community providers to ensure appropriate care upon discharge to avoid unnecessary readmission
Excellence and Innovation in Education	Achieve critical mass and infrastructure for teaching	<ul style="list-style-type: none"> • RHS have the critical mass of patients, educators, and specialized health care providers to ensure high-quality training, and exposure for future providers • Requires them to participate in the care of sufficient numbers and ranges of patient populations • RHs require the appropriate infrastructure to accommodate high volume and highly specialized teaching environments
	Undertake leadership in education of current and future health care professionals	<ul style="list-style-type: none"> • RHs are closely linked with universities and provide the practical environment for training health care professionals • Although Ontario has moved to a distributed education model, 87% of all MTDs are in currently in CAHO hospitals • RHs have the ability to develop both skills and continuous learning environment preparing current and future health care professional to adopt evidence and innovation
	Provide an inter-professional team-based educational environment	<ul style="list-style-type: none"> • Inclusion of post-graduate medical residents in care teams provides a broad learning environment
	Facilitate and lead in continuous improvement in education	<ul style="list-style-type: none"> • Test, implement and share of new models of education
	Provide education of patients, families, caregivers and the public	<ul style="list-style-type: none"> • RHs test novel approaches to improve patient self-care (e.g., mobile apps), build capacity for patient/family education, and are often relied upon by the media to provide expert advice and share the most up to date research evidence

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“Ontario’s health innovation heritage has made our lives stronger and richer through many generations—from insulin and Pablum to stem cells and genetics.”

— Leslee Thompson, Chair, CAHO, at the Economic Club of Canada on September 23, 2013