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eHealth Ontario is completing the Electronic Health record (EHR) foundational elements that will serve as the core platform for electronic health information exchange in Ontario. Tremendous progress has already been made this year; providers and patients alike have realized clinical benefits from the interoperable EHR, which will continually improve as more patient data flows in through the entire continuum of care.

Technology is already playing a vital role within health care to enable the Ministry of Health and Long-Term Care’s (MOHLTC) “Patients First” priorities. Ontario’s health sector has a complex, heterogeneous information technology (IT) environment comprised of various assets and capabilities serving the acute, community and primary care sectors. There is a critical need to leverage the investments already made in health information technologies and to provide a mechanism for releasing health information from these systems to be available to care providers in the continuity of care. Enhanced coordination of information technologies will ensure health information is available to care providers in their care setting when they need it, and this will be done through wise use of limited resources. To help prioritize and direct spending, the Agency has employed the benefits realization methodology, which is the iterative process of planning, measuring, evaluating, and modifying plans to ensure technology implementations are providing value.

In the summer of 2015, eHealth Ontario prepared a Benefits Realization Update that included a comprehensive global environmental scan of the value of EHR assets. The Agency also showcased the results from the benefits realization studies that were completed by eHealth Ontario on its own assets and the Agency is using the results to help make more informed decisions.

In this edition of the Benefits Realization Update, the content focuses primarily on Ontario’s Electronic Health Record with a summary of the results on the next page. This report introduces a new approach to realizing the EHR’s clinical value. It discusses the three interlinked key agency frameworks and methodologies developed for the purpose of understanding and fulfilling clinician and patient expectations. In addition, this update details eHealth Ontario’s alignment with Ontario’s Patients First Agenda, prioritizing the patient experience, and putting the patient at the centre of the care system.

Collaboration with stakeholders is integral in understanding the value of the EHR. eHealth Ontario works closely with the ConnectingOntario regional programs, leveraging the ConnectingOntario Benefits Realization Forum, touch point meetings, and clinical working groups to receive updates on the status and findings of the benefits and impact of the regional EHR. The feedback received by the clinical working groups within the three regions is incorporated into the planning, measurement and interpretation of the BR study findings.

As access to, and usage of, EHR assets by clinicians increases, benefits realization studies help understand the clinical and financial value of these assets. Feedback from clinicians also helps improve the system tools to ensure that these systems are optimized to create the most value possible to support those involved at the point of care. User engagement is intertwined throughout the three agency frameworks and is a priority of the Agency; it has allowed benefits realization studies to focus on best usage practices to be shared to the greater clinical community. These study results are also shared in this report.

**Executive Summary**

The purpose of this report is to provide an update to eHealth Ontario’s Board of Directors, the Ministry of Health and Long-Term Care, and sector stakeholders on Benefits Realization with a focus on:

- Ontario’s Patients First Agenda;
- The development of a Clinical Value Framework and its role in benefits realization;
- The importance of user engagement;
- Results from Agency Benefits Realization Studies; and
- Testimonials and stakeholder stories.
Results from eHealth Ontario

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<th>Ontario Adoption Progress</th>
<th>Benefits Statements</th>
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<td>Connecting South West Ontario Program</td>
<td>• Over 40,000 clinicians have access to the EHR&lt;br&gt; • The EHR in the SWO region is rolled out to 69 hospitals, 4 CCACs, 286 community sector organizations, 4 public health units and is used by 2,029 primary care/secondary care practices</td>
<td>• Access to the EHR has improved a number of performance indicators, such as “30 day readmission” and “time to treatment”, and has decreased uncertainty in clinical decision making&lt;br&gt; • Lab test duplication has been avoided using data from the EHR&lt;br&gt; • Better care in long-term care homes by updating residents’ care plans more effectively due to access to patient hospital visit information</td>
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<td>ConnectingOntario in the Greater Toronto Area</td>
<td>• Over 41,000 clinicians in the GTA have access to the EHR&lt;br&gt; • 19 care facilities (hospital and CCACs) contribute data to the provincial Clinical Data Repository (CDR)&lt;br&gt; • 37 care facilities can view the CDR</td>
<td>• EHR has improved both the quality of the care they provide and the system cost/capacity&lt;br&gt; • The users stated that the EHR is used more frequently for patients with co-morbidities and/or chronic conditions, frequent visitors and those unable to provide a reliable medical history</td>
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<td>ConnectingOntario in the Northern and Eastern Ontario Region</td>
<td>• 2 hospitals and 2 community care facilities have access to a clinical viewer that provides provincial lab information to 500 clinicians&lt;br&gt; • The Clinical Viewer is a pilot of the provincial EHR in the NEO region that, once rolled out, will provide access to clinicians in 64 hospitals, 4 CCACs and the community</td>
<td>• In a pilot survey, the Clinical Viewer users showed high satisfaction with the system&lt;br&gt; • In Kingston General Hospital, 86% of the users found the viewer easy to use and 77% found it dependable&lt;br&gt; • More than 80% of the Clinical Viewer users in both community and acute settings believe that the viewer enhances their efficiency and productivity</td>
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<td>Diagnostic Imaging Repositories</td>
<td>• 100% of hospitals and 24 Independent Health Facility Hubs (which equates to 200 facilities) are connected to one of the 4 regional DI-rs that span the province</td>
<td>• Responses from clinicians suggest that the DI-r has decreased the need to order or repeat avoidable exams&lt;br&gt; • Survey responses also demonstrate that the DI-r has enabled clinicians to provide better care for patients</td>
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<td>Registries</td>
<td>• Approximately 90% of regulated healthcare professionals are represented in the Provider Registry (PR) with over 25,500 provider records accessed by adopters on a monthly basis&lt;br&gt; • Demographic information for 98% of Ontarians is represented in the Provincial Client Registry (PCR) with approximately 900K monthly transactions run against PCR by its adopters</td>
<td>• Survey results suggest PCR improves workflow and enables clinicians to link EHR data with other regional and provincial data assets&lt;br&gt; • PCR can save a significant amount of time and effort when merging hospitals to one health information system</td>
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<td>Patient Portal</td>
<td>• Out of 227 patients enrolled in a patient portal pilot project (MyChart), 206 (91%) completed registration&lt;br&gt; • The use of MyChart increased over time among registered users</td>
<td>• Over 93% of participating registered patients agreed that they will recommend it, demonstrating high satisfaction rates&lt;br&gt; • Enhances patient ability in self-care management and to have more informed discussions with their care providers about their health</td>
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<td>Electronic Medical Records (EMRs)</td>
<td>• All FHTs have an EMR&lt;br&gt; • Over 10 million Ontarians are covered by a clinical practice equipped with an EMR</td>
<td>• The evaluation of the AFTHO’s Data to Decision (D2D) initiative showed a higher participation of the family health teams (FHTs) in the initiative relative to its last iteration. The number of participating FHTs increased from 48 to 102&lt;br&gt; • According to survey responses, EMRs help improve decision-making, patient safety, and supports patient education</td>
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Figure 1. Summary of eHealth Ontario Benefits Realization Studies and Adoption.
1. Ontario eHealth Update
Overview

The journey of electronic health in Ontario has demonstrated significant progress since its initial stages in the early 2000’s. With continuous change in direction as platforms evolved, Ontarians have seen a dramatic shift in the way health care is delivered from an archaic system plagued with inefficiencies and paper-based medical records, to investments in the infrastructure required to create a common electronic health record (EHR) and individual investment in hospital information systems, to delivering electronic medical records and collecting foundational data for key eHealth assets with thousands of connected users. With an overarching goal of integrated, patient-centered care enabled by technology, Ontario’s eHealth journey continues to advance the Patients First agenda by making information technology an integral and routine part of high-quality patient care.

Agency Priorities

eHealth Ontario is committed to providing value to Ontarians by ensuring their health record is available to care providers. Regardless of whether access is through a hospital information system, the electronic system in a doctor’s office, in the community or through a regional viewer, the electronic health record will be interoperable. Interoperability will ensure that the right data is available at the right time to the right people, improving clinical workflows and reducing information fragmentation.
 Patients First

Patients First is the next phase of Ontario’s plan for changing and improving Ontario’s health system and exemplifies the commitment to put people and patients at the centre of the system.

Healthcare is experiencing a global trend moving from volume-based (transactional, fee for service) to value-based (patient-centric). Although reducing cost is important, the ultimate goal must be value for patients. The value is driven by the provider, consumer, and the system itself and it must be universally measured and reported.

The Ministry of Health and Long-Term Care has recognized the importance of patient value and has shown commitment to transform the province’s health care system into one that puts the needs of patients at its centre, with the Patients First Action Plan. The plan has four key objectives: improving access, connecting services, informing people and patients, and protecting the patient.

![Figure 3. Patients First.](image)

eHealth Ontario recognized the importance in understanding the clinical and financial value of ehealth initiatives and has developed a benefits realization methodology and framework for Agency-wide adoption to collect data to help inform ongoing investments.

As will be discussed in the next section of the report, this benefits realization framework focuses on the quality of care (accessibility, safety, equity), cost of care (efficiency, productivity), and the patient and provider experience (satisfaction, and health system outcomes). eHealth Ontario continues to measure the value of the EHR assets and the dimensions of which the framework is built upon is closely aligned with the Patients First Action Plan.
2. Focus on Clinical Value
Focus on Clinical Value

Realizing the EHR’s Clinical Value

While Electronic Health Records (EHRs) have the potential to greatly improve quality of care, many jurisdictions, including Australia, Germany and UK, are struggling to determine the value of mass expenditure on implementing EHR services due to limited understanding of adoption and usage. Healthcare organizations are increasingly looking to capture the realized benefits and true clinical value of EHR solutions.

As deployment of EHR services and integration of health information continues, the need for better planning, coordination, and evidence-based decision making increases. Firstly, having a clear understanding of the client market (patients and clinicians) we are serving is pivotal to (1) finding opportunities to positively influence health outcomes; (2) identifying data-specific clinical value across healthcare sectors and settings, especially during the transition of care across care settings, in order to capture meaningful use; and (3) enhancing value for tax payer dollars. Secondly, the Agency needs to monitor the performance of our existing products and services to ensure we are meeting current and future EHR demands. Lastly, partially or fully deployed products and services should be assessed by the value that has been accrued by the clinicians, patients and the system overall. Benefits Realization will play a key role in ascertaining how we can improve planning and delivery of the EHR to further enhance the value derived.

Approach

The approach to realizing the EHR’s clinical value (Figure 4) was developed as a way to ensure that, not only is the Agency providing exceptional system performance, but we are also doing so with clinical expectations and needs in mind while also continuously evaluating benefits accrued.

It encompasses three key Agency frameworks and methodologies, each developed for the purpose of understanding and fulfilling clinician and patient expectations and ensuring that eHealth Ontario services are exceptionally delivered.

1. Clinical Value Framework: captures meaningful use from a clinical perspective by way of understanding user behaviour and value.
2. Performance Measurement Framework: captures the operational effectiveness of eHealth Ontario products and services by way of measuring system performance and status on a monthly basis.

The three methodologies combined will inform eHealth Ontario strategy, planning and reporting, and will ensure that clinical needs and expectations are met.

Figure 4. Realizing the EHR’s Clinical Value.
Focus on Clinical Value (Cont’d)

Clinical Value Framework

The first framework, which is critical to the success of realizing the EHR’s Clinical Value, is the Clinical Value Framework. Effectively identifying clinical value, by way of meaningful use and user behaviour, can play a key role in future planning of the EHR; positively impacting both the providers and patients, through more effective use of time and resources and improved quality of care, resulting in better overall health outcomes. The Agency recognizes that clinical leadership is a critical success factor to support health care reform, the government’s eHealth agenda, and to ensure clear benefits realization from eHealth investments. The Clinical Value Framework applies a care sector/setting lens onto the Performance Measurement Framework dashboard metrics and is the focus of current engagement activities with our clinical community.

Engagement with the Clinical Advisory Council

To meet the need of clinical engagement, the Agency established the Clinical Advisory Council (CAC) in October 2014. The CAC meet on a semi-annual basis and provide clinical input and advice on eHealth strategy, priorities and programs. The formation of the CAC ensures that the Agency is communicating with and gathering feedback from clinicians.

On September 10th 2015, eHealth Ontario hosted its third Clinical Advisory Council meeting. One of the key outcomes of the valuable discussions was the need to establish separate clinical working groups, attended by a subset of the CAC members, to provide context and clinician input into specific topics raised by eHealth Ontario programs. The topics raised required more detailed clinical discussions over a short series of meetings that the semi-annual full member meetings were not able to provide.

Connectivity Strategy

Ontario’s EHR connectivity strategy describes how health care information will be connected to create a safe, cost-effective, provincially-integrated electronic health record (EHR).

The connectivity strategy defines the path to connecting a patients’ health information to their care team. Its focus is identifying the sources of EHR information in Ontario, making it sharable with the EHR through integration with EHR assets, and delivering it to the people who need it. It outlines current and futures states of the EHR and the transition between the two. And it describes how health care information will be connected to create an integrated EHR – one that provides a lifetime record of an individual’s health history.

To date, the Agency has facilitated CAC working groups on the following topics:

- Communication of the Connectivity Strategy and future state of the EHR to clinicians;
- Use of a federated ID for Single Sign On and Off and log off options; and
- Clinical review of the Conceptual Information Model, which documents all of the clinical data elements that are captured in the EHR.

These smaller working groups have been invaluable to the Agency by providing timely clinical input into its deliverables and ensuring they are aligned to clinical needs.
Focus on Clinical Value (Cont’d)

Emphasis on Integration into Clinical Workflow

As mentioned previously, the CAC working groups provided input on how to communicate the future state of the EHR to clinicians. This was done through the creation of clinical scenarios which followed a patient on their care journey through various health care providers. The Planning and Reporting Team developed multiple sample patient journeys that the clinicians in the working group reviewed for clinical accuracy in the current healthcare system.

The Architecture teams were then able to identify the information flow and the systems in use in both the current state of the EHR implementation and connectivity, as well as what the future state of EHR connectivity will be, as described in the Connectivity Strategy. These scenarios depict the value that many clinicians currently get from EHR assets and the data and value predicted with a fully integrated and connected EHR. By using clinically relevant and accurate patient scenarios, the information is delivered in a clinician-friendly way that is not seen as “too technical”.

These same workflows will be utilized, and further developed, in the Clinical Value Framework to identify where clinicians in each care sector will find value and benefits using the EHR, with an emphasis on the transition of care between settings. These benefits are especially prevalent for patients that visit multiple care providers during the course of treatment as the data is made available in the EHR for each clinician to access, providing a complete history. The aim is to understand where information and the EHR are of most value to clinicians and how, as an Agency, we can ensure that information is seamlessly transferred and available across and between care sectors and settings. In addition to identifying hypothetical scenarios, the Clinical Value Framework identifies the clinical value placed on EHR elements. Clinical validation will be sought to understand which elements are most commonly accessed and used in different care sectors and settings.

For example, which EHR elements are of value in primary care versus acute care? This will be further supported by market research on patient volume, which will show the magnitude of the potential benefits to the clinical and patient population.

Performance Measurement Framework

The second part of the approach is the Performance Measurement Framework which aims to systematically collect, analyze and report on the performance of our products and services. The Agency’s budget priorities are driven by business priorities, government direction and clinical value. Measuring the achievement of the business priorities is embedded within eHealth Ontario’s Annual Business Plan and regular in-year reporting to senior management and the Board of Directors.

The Performance Measurement Framework, developed by the Planning and Reporting team, offers five program-level dashboards that provide a granular level of metrics for various assets (e.g. adoption across clinician types or sub-sectors).

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<th>Domains</th>
<th>Definition</th>
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<tr>
<td>Financial</td>
<td>Measuring the progress of business outcomes against approved budget</td>
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<tr>
<td>Connected Environment</td>
<td>Measuring the progress of business outcomes associated with the development and integration of EHR assets (foundational data assets and connected backbones)</td>
</tr>
<tr>
<td>Contribution</td>
<td>Assessing transaction data relevancy and volume accumulated in EHR assets in relation to the overall transaction volume produced in the province (data in)</td>
</tr>
<tr>
<td>Use</td>
<td>Evaluating volume of users enrolled to utilize any EHR asset, and monitoring their frequency of use (adoption, use and satisfaction) based on highest value clinical use scenarios</td>
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Figure 5. Performance Measurement Framework.
Focus on Clinical Value (Cont’d)

Benefits Realization Framework

Finally, the Benefits Realization Framework is the third component of the approach to realizing the EHR’s Clinical Value. Using several academic sources, industry best practices, and eHealth governing organizations, the Planning and Reporting Team developed a three domain model and seven dimensions to help measure metrics that are valued in the industry.

The three domains are based on the Institute for Healthcare Improvement (IHI) Triple Aim that focuses on Population Health, Experience of Care, and Per Capita Cost. The Agency model focuses on the Quality of Care, Cost of Care, and the Patient and Provider Experience with the dimensions ensuring that care is:

- Accessible, Safe, Equitable within Quality of Care;
- Efficient and Productive within the Cost of Care; and
- Providing Satisfaction and improved Population Health Outcomes within Patient and Provider Experience.

All internal benefits realization studies will inform planning moving forward whereas external studies can provide insight into how the Agency can benefit from lessons learned or avoid risks associated with certain efforts.

Alignment and Outcome

eHealth Ontario is on the cusp of completing Agency priority projects and continuing sustainment and integration efforts. The Clinical Value Framework, Performance Measurement Framework and Benefits Realization Framework offer the Agency the ability to:

- Plan the maturity of the EHR based on current and future market demands that are driven by the Patients First Action Plan;
- Monitor our assets’ performance for ongoing engagement that will be instrumental in ensuring the Agency is maintaining the EHR as per market demands, specifically relating to system agility and scalability; and
- Measure the value of the EHR to patients, clinicians and the system.

All of these efforts simultaneously bring rigour to our planning that is rooted and aligned with MOHLTC expectations and sector demands.
3. eHealth Ontario Results
**User Engagement**

User engagement plays an important role in the realization of both clinical value and benefits. If users are not engaged during system implementation, the expected benefits will not come to fruition.

**User Engagement Framework and Toolkit**

eHealth Ontario provides clinical value driven and integrated eHealth systems to facilitate a sustainable and quality health care system for the people of Ontario. To do this the Benefits Realization Framework (Figure 6) was developed to support the ongoing measurement and analysis of the impact of Health Information Technology (HIT) solutions. User engagement is an important priority in the Value Driven Planning process, which allows the evaluation of HIT investments to track adoption rates. All these efforts need to be in place in order to proceed with measuring realized benefits and to determine if other tactics are needed to further enhance the use of the HIT solutions.

By definition, user engagement is the process by which the perceptions, issues and expectations of users are learned. Appropriate and successful user engagement leads to the adoption of change. In the case of a HIT solution, adoption means acceptance of the technology innovation into everyday practice, regardless of the degree of infusion.

The purpose of the User Engagement Toolkit is to establish best practices for improving user engagement as part of an overall change management process, and to ease the adoption of new HIT system practices leading to realized benefits of eHealth assets.

Physicians and other clinicians are the primary front-line users of HIT solutions. As such, they are central to the success of HIT investments in an organization. With the implementation of a new system, resistance to change is sometimes inevitable and can result in a negative reaction. Engaging clinicians throughout a HIT process is paramount. Often times, the manner in which this change is managed can mean adoption or rejection of a HIT solution.

Engaging users from the start secures staff ownership of the EHR process and contributes to overall transformation from practice to future state. True transformation happens when the EHR is fully adopted. However, this involves ongoing user engagement through an innovative approach to becoming more proficient and sustaining the changes of using a new system. An important factor in user engagement is inspiring clinical leadership in an organization to foster and disseminate down high levels of user-engagement tactics and drive clinical involvement within an organization.

Outcomes of successful eHealth change lead to clinical value, adoption, benefits realization and overall positive health care delivery transformation. If users are made aware of the changes through clearly explained benefits, value and appropriate levels of knowledge transfer, there will be a positive impact on the success of the project and higher level of adoption.

Adopting the core elements of the national change management framework with the phases from the Prosci ADKAR model, eHealth Ontario has proposed a clinician user engagement approach encompassing four main areas (Figure 7). The User Engagement Framework also identifies when the activities around these four focus areas should take place throughout an implementation project and provides tools to assist with user engagement, such as stakeholder analysis tools, a communication plan template and training lesson plan checklists.

**Prosci’s ADKAR® Model**

Prosci’s ADKAR® Model is a goal-oriented change management model to guide individual and organizational change. When applied to organizational change, this model allows leaders and change management teams to focus their activities on what will drive individual change, and therefore achieve organizational results.
**User Engagement in Benefits Realization**

User engagement plays an important role in the realization of both clinical value and benefits. If users are not engaged through communication and training during the implementation of ehealth systems, then adoption and usage will suffer. Also, if performance of ehealth systems is poor, and users have a negative interaction with the system, they are unlikely to adopt and use the system. With limited adoption and use, the expected benefits will not come to fruition.

User engagement is built into the benefits realization methodology and the Agency ensures that they are engaged in the following ways:

- Clinical working groups, forums and advisory council members tend to be champion users of systems; they provide a valuable communication feedback loop and clinical validation to projects;
- Users are engaged in the measurement of quantifiable indicator data pre- and post-go-live for benefits realization studies;
- They are engaged for the completion of surveys that provide qualitative data for studies; and
- Users provide anecdotal feedback through interviews and user testimonials, which add to study results.

**Figure 7. User Engagement Framework.**
ConnectingOntario Benefits Realization Forum

ConnectingOntario is the provincial hub for the electronic health record (EHR), and has now expanded across Ontario with more than 77,000 clinicians having access to timely patient health information.

ConnectingOntario Benefits Realization Forum

The ConnectingOntario Benefits Realization Forum (BR Forum) at eHealth Ontario, with representation from the regional connecting programs, eHealth Ontario program areas and MOHLTC, aims to align the three regional benefits realization studies and facilitate knowledge sharing to enhance the best practice of provincial EHR benefits evaluation and its application to improve adoption and implementation of the ConnectingOntario Program.

Current Status

Since its launch in April 2015, the BR Forum has collaboratively produced a guideline for the provincial BR study. This guideline uses a multi-methods approach informed by a variety of clinical, research, and system experts and provides recommendations on the indicators for measuring the value of the EHR. The BR Forum also collects and disseminates information yielded from the regional BR studies to the other programs and to interested audiences.

Next Steps

The BR Forum will continue to build upon the methodology of the provincial BR study as the studies progress and new information becomes available. The BR Forum will also facilitate the coordination and administration of surveys, collection of indicators and analysis, as well as interpretation of the findings.

Additionally, the BR Forum collects and shares anecdotal evidence on the benefits of ConnectingOntario from users or programs. Some of this anecdotal evidence is presented in this update.
The Connecting South West Ontario Program's Adoption

The Connecting South West Ontario (cSWO) Program provides access to regional patient information to over 40,000 clinicians. The regional EHR clinical viewer, ClinicalConnect, is accessible to providers from across the continuum of care, such as primary care, acute care, long-term care, mental health, public health and home care. In February 2016, 12 hospitals from the four Local Health Integration Networks (LHINs) within the SWO region are currently engaged to contribute data to the provincial Clinical Data Repository (CDR).

The Regional Clinical Viewer, ClinicalConnect Deployment Status

- 41,288 of 36,241 registered users target - 114%.
- 69 of 69 hospital sites - 100%.
- 2,076 of 1,344 target primary care/secondary/other physician practices - 154%.
- 4 of 4 community care access centres - 100%.
- 310 of 265 target community sector orgs - 117%.
- 4 of 16 target public health units - 25%.

* Active user: Minimum three logins per quarter

Figure 9. Number of registered users and active users with access to ClinicalConnect continues to grow on a monthly basis.
Connecting South West Ontario Program (Cont’d)

ClinicalConnect Survey

The clinicians in the SWO region were asked on two different occasions about their satisfaction with and perceived usefulness of ClinicalConnect. Figure 10 summarizes the findings of these two surveys: Question 1 - Obtaining patient health information from an external organization using the EHR is: complete, accurate, relevant, timely, available when needed, and organized. Question 2 - Obtaining patient health information from an external organization has a positive impact on: my work performance, health care cost, quality of patient care.

The survey results indicate an ongoing and changing opinion related to expectations. Users are also increasingly confident in the extent to which the available data is having a positive impact on work performance, improved cost efficiency, and quality of patient care.

Case Studies - Impact of ClinicalConnect on clinical workflows

Case 1. Patients with Severe Infection (e.g. Sepsis)

Clinicians in south west Ontario have used ClinicalConnect to access and integrate patient health information, such as microbiologic and radiographic data, to better manage patients with complex and life threatening infectious diseases, such as sepsis. This holistic view of patients’ medical information has improved clinical decision making and has improved patient outcomes by decreasing the uncertainty in management of infectious diseases.

“ClinicalConnect ensures that I have access to all of the pieces required to help my patients in a timely and accurate fashion.”

Dr. William Ciccotelli, MD, FRCPC - Infectious Diseases/Medical Microbiology, Grand River Hospital and St. Mary’s General Hospital, Kitchener.
Case 2. Long-Term Care Home Care Plans

By viewing the EHR using ClinicalConnect, care providers in long-term care (LTC) homes are able to view changes to a patient’s status during and acute stay and better incorporate that information into care plans in LTC homes in advance of their residents’ return from hospital.

In a study of two LTC homes in cSWO, better communication channels between acute and LTC care resulted in more proactive changes to care plans that coincided with decreased readmissions to hospital.

A 2011 study by the Canadian Institute for Health Information reported the annualized cost of hospital readmissions from long-term care costs $2 billion. These repeat transitions also cause considerable stress to patients and families. These readmissions can be reduced by enhanced communication between the hospital and LTC homes through better access to information. The communication processes between clinicians across the continuum of care are improved when informed by an electronic health record like the one accessed through ClinicalConnect in South West Ontario.

Case 3. Secondary Stroke Prevention Clinics (SSPC)

One of the best predictors of an impending major stroke event is the occurrence of a minor stroke. A secondary stroke prevention program in SWO uses ClinicalConnect to access diagnostic imaging results when they receive referrals and it is improving preventative care for those at risk.

“ClinicalConnect has positively impacted peopleCare’s nursing leadership team’s ability to provide continuity of care to our residents upon return from acute care. The ability to retrieve information through ClinicalConnect allows us to plan their ongoing care based on new medical information gathered during their hospital stay.”

Susan Thibert, RPN, RAI-C. Director Informatics and Data Quality, peopleCare Inc

“ClinicalConnect has improved the internal workflow of the SSPC and has influenced the way that we are pursuing care for patients. ClinicalConnect has allowed the staff in the clinic to process referrals rapidly in order to deliver best practice care.” Amanda Plozzer, Clinical Manager, Secondary Stroke Prevention Clinic, Grand River Hospital.
ConnectingOntario in the Greater Toronto Area

The ConnectingOntario Program in the GTA is delivering a regional electronic health record system for central Ontario. Once fully implemented, it will benefit clinicians and providers at more than 750 health care organizations across the continuum of care.

ConnectingOntario Adoption in GTA

The ConnectingOntario Program in the Greater Toronto Area (GTA) will provide clinicians at more than 750 care facilities timely and secure access to patient health information. The region covers a population of 6.75 million.

By February 2016, 11 hospitals and six CCACs contributed patient data to the provincial clinical data repository (CDR). This number increased to 19 care facilities in April 2016.

By April 2016, ConnectingOntario was accessible by over 41,000 clinicians from 37 care facilities including 11 GTA hospitals, six Community Care Access Centres (CCACs), over 10 Family Health Teams and over 10 LTC homes.

ConnectingOntario Benefits Realization Study

Using a mixed methods approach (interview, indicator collection and survey) informed by a variety of clinical, technical and system stakeholders, the GTA Benefits realization study covers four areas:

- Clinical Productivity & Satisfaction
- Organizational Efficiency & Capacity
- Patient Care, Experience & Quality of Care
- System Coordination & Capacity

Figure 15. Areas of impact of the ConnectingOntario GTA BR study.

Figure 14. ConnectingOntario adoption in the Greater Toronto Area.

* Active user: Minimum one login per month
ConnectingOntario in the Greater Toronto Area (Cont’d)

ConnectingOntario Intention to Use Survey (Pre-Go-Live)

The ConnectingOntario Intention To Use Survey, distributed to all potential users from 20 early adopter GTA sites before go-live in June 2015, collected information about user perceived benefits, ease of use, and threats of ConnectingOntario from over 2,200 users.

Survey Results:

The majority (71%) of the ConnectingOntario (potential) users perceived the application as useful for better coordination, decision-making and timely care.

The group of users that were most confident of ConnectingOntario’s usefulness were physicians (81%) and nurses (74%) while administrative users were the most unsure (50%).

78% of ConnectingOntario users perceived the application to improve their relationship with patients; just over 50% believed it to be compatible with their workflow.

The groups who were most unsure about the positive impact of ConnectingOntario on their relationship with their patients were administrative staff (22%), allied health professionals (58%) and clinical support staff (67%).

The findings of the Intention To Use Survey provide valuable information on where the most benefits or challenges are perceived and will inform change management, and implementation and adoption teams about opportunities to effectively tailor training and communication strategies.
Future Suggested Improvements

The interviewed participants provided valuable suggestions to improve ConnectingOntario:

- Improving the speed/system performance;
- Adding more clinical information e.g. specialist notes; and
- Having access to historical patient information (prior to 2013).

ConnectingOntario User Facilitators

The users of ConnectingOntario believe that the system provides the most value in:

- Patients with specific characteristics:
The system is more frequently used for patients from other hospitals/regions, patients who are frequent visitors, and those with language barriers, complex diseases, comorbidities and unable to provide reliable medical history.
- Sites or departments with better system ease of use:
In sites with higher speed, no or minimal technical issues, etc., users are more likely to use the system. Ease of use is of most importance in care settings where time is a critical element, such as emergency departments where low performance will negatively impact adoption.

ConnectingOntario in the Greater Toronto Area (Cont’d)

ConnectingOntario In-depth Interviews (Post-Go-Live)

16 volunteer users of ConnectingOntario in the GTA early adopter sites provided input on the benefits, barriers and facilitators of the application.

The interview participants, from a variety of roles including physicians, nurses, social workers, care-coordinators, pharmacists and administrators identified the benefits in two categories of “quality of care” and “system cost and capacity”.

Although the participants mentioned that using the application did not decrease their work load, they believed that the extra time spent was to extract valuable patient information to improve health outcomes and their decision making process. Furthermore, users believed that improving system performance (e.g. faster speed, single sign on, etc.) can help with realizing benefits in the above areas.

Figure 16. The main benefits of ConnectingOntario identified by interview participants.
ConnectingOntario in the Northern and Eastern Ontario Region

The ConnectingOntario program, once implemented fully in northern and eastern Ontario, will provide access to clinicians and care providers at 64 hospitals, four CCACs, and the community.

**The Clinical Viewer Delivery (CVD) Pilot Project**

The Clinical Viewer Delivery (CVD) pilot project was rolled out in late 2015. The viewer provides single sign-on access to patient’s laboratory results from the Ontario Laboratories Information System (OLIS) to approximately 500 clinicians. The four health service provider partner sites for the pilot include two hospitals, Kingston General Hospital (KGH) and Thunder Bay Regional Health Sciences Centre (TBRHSC), a long-term care home, St. Patrick’s Home of Ottawa and Lanark County Mental Health. The strong usage patterns and feedback received from the clinicians are a testament to the success of the single sign-on capability that is directly integrated with the clinicians’ existing clinical document system and supports patient context within the hospital sites.

Next, ConnectingOntario will help replicate this single sign-on capability, which was developed for the pilot, throughout all the hospital sites within northern and eastern Ontario. ConnectingOntario priorities also include sharing patient health information from the 64 hospitals and four CCACs with clinicians from across the continuum of care.

**The CVD Benefits Realization Survey**

Leveraging the survey developed by the Connecting Ontario BR Forum, the project collected feedback from the early adopters of the viewer to understand the value of the application from a user perspective. The survey responses are summarized in Figure 18. At Kingston General Hospital, 86% of the users found the viewer easy to use. It improved access to lab results (97%) and it has reduced the need for unnecessary duplication of testing (81%). Access to lab information helps reduce the number of unnecessary duplicate tests and improves patient management, both of which can have significant cost implications for the province. The clinicians also identified challenges and suggested improvements for the future roll-out of the solution:

- Requesting additional health information types, such as digital imaging reports;
- Decreasing the number of steps required for access;
- Increasing the speed to access patient information; and
- Requesting remote access for hospitals users.

*"The viewer has been most helpful in decreasing the amount of time spent calling, faxing, etc. to track down lab results - very helpful in day to day workflow!"
Clinician at Kingston General Hospital.
Diagnostic Imaging Repositories

The four regional Diagnostic Imaging Repositories provide DI reports, and in some cases, images, to over 200 hospital sites and to 25 Independent Health Facility (IHF) hubs across the province of Ontario.

Introduction to Diagnostic Imaging Repositories

Diagnostic imaging information is captured in two types of facilities:

- Hospitals, which include acute care centres, long-term care facilities and mental health centres, and make up 60% of total diagnostic imaging volume in Ontario; and
- Independent Health Facilities (IHF’s) that are privately owned for-profit clinics in the community, representing the additional 40% of diagnostic imaging in the province.

For the delivery of the Diagnostic Imaging Repositories (DI-rs) the province of Ontario was divided onto four regions (Figure 19). The purpose of the DI-rs is to provide healthcare providers within the regions secure electronic access to their patients’ comprehensive DI health record from participating facilities, at any time. With each regional DI-r established, the next phase is the cross-collaboration of the DI-rs, called Diagnostic Imaging Common Service (DI-CS), providing province-wide access to a patient’s DI information and resulting in improved healthcare and patient outcomes in Ontario.

**SWODIN DI-r** = Southwestern Ontario Diagnostic Imaging Network
- LHINS 1, 2, 3, 4
- 70 hospital sites
- 7 IHF hubs

**NEODIN DI-r** = Northern and Eastern Ontario Diagnostic Imaging Network
- LHINS 11, 13, 14
- 67 hospital sites
- 7 IHF hubs

**GTA WEST DI-r** = Greater Toronto Area West Diagnostic Imaging Repository
- LHINS 5, 6, part of (7 & 8), 12
- 33 hospital sites
- 2 IHF hubs

**NDIRIS DI-r** = Hospital Diagnostic Imaging Repositories Services
- LHINS 9 & 10, part of (7 & 8)
- 38 hospital sites
- 9 IHF hubs

**LHINS**
1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Halton
7. Toronto Central
8. North Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

Figure 19. Diagnostic Imaging Repositories map.
Diagnostic Imaging Repositories (Cont’d)

Adoption

The first region, HDIRS, began contributing to its regional repository in fiscal year 2010-2011. By fiscal year 2014-2015, 100% of hospitals that performed diagnostic imaging exams and 24 Independent Health Facility (IHF) hubs, which are comprised of over 200 facilities, were integrated with one of the four regional DI-rs in Ontario.

As of the end of February 2016, the cumulative total number of exams stored in the four regional DI-rs was 70,930,509. This number includes exams contributed by hospitals and IHFs as well as exams taken before the implementation of the DI-rs that have been migrated over to give a full patient history.

DI-r Benefits Study: Survey Results

The eHealth Ontario DI Program and Benefits Evaluation team engaged the four regional DI-r’s in a study of the benefits and value the DI-r’s are providing to the province since implementation. The aim of the study was to provide qualitative and quantitative analysis of the benefits, linked to the cost and quality of care and provider experience.

The benefits realization study conducted a survey of clinicians in each of the four regions. The survey found that over 70% of respondents had been using the DI-r for more than a year and 35% access the DI-r frequently, which is classified as more than once a day. Overall, the responses were positive that the DI-r’s enabled clinicians to provide better patient care, make accessing historical information easier and reduces the number of requests for information to other care providers.
Diagnostic Imaging Repositories (Cont’d)

**DI-r Benefits Study: Survey Results**

As shown in Figure 24, 56% of survey respondents, to which the question was applicable, indicated that there was a decrease in the need to order or repeat avoidable diagnostic imaging exams as the information was available in the DI-r. As the information was already available in the DI-r, this is a time saving for care providers and patients; there is an increase in the efficiency of care and patients can then be diagnosed and treated faster. The decrease in duplicated exams also has a positive impact on overall patient health as it reduces repeated exposure to the radiation used to take the images. Exam avoidance can amount to significant cost savings to the health care system given that the average cost of diagnostic imaging exams are $40.88 for x-rays, $54.43 for ultrasound studies and $66.03 for CT scans within Ontario. This is discussed in more detail in the following case study.

![Figure 23](image-url) **Figure 23.** The majority of survey respondents agree that the DI-rs have a positive impact on information availability and patient care.

![Figure 24](image-url) **Figure 24.** Over half of survey respondents confirmed that the DI-r has decreased the unnecessary DI exam orders.
Case Study
Duplicate Exam Avoidance and the Impact on Cost

Real-time data on the number of x-ray exams avoided, due to the availability of foreign exams in the DI-r, was collected by hospital staff at Lakeridge Health Centre (Oshawa site), which is located within the HDIRS regional DI-r. The data collection was conducted twice, during the same two-week period in September in consecutive years and focused on reducing duplicate tests ordered by the Emergency Department (ED) and Fracture Clinic. The hospital adjusted their clinical workflow within the ED and fracture clinic requiring staff to check the DI-r for foreign exams in the DI-r before ordering imaging for a patient. If a comparable foreign exam was available, the ordering physician would then determine if the patient needed to be re-imaged locally. The workflow is shown below. The hospital staff was provided with a calendar covering the two-week time period and would note when a patient was prevented from being locally imaged, due to the availability of foreign exams. The study captured the following information: how many patients were marked as prevented from re-imaging, how many patients received a DI exam in the ER and/or fracture clinic during the time of the study, and how many of the total patients that received DI exams had available foreign exams. The study results compare the total number of patients that were prevented from re-imaging against the total number of DI patients that had foreign imaging available.

The adjusted workflow identified six and five duplicate exams ordered by the Emergency Department in the two-week period studied in 2014 and 2015, respectively. Study 1: Sept 14-27, 2014, 896 ER patients received DI service. Of those patients, 36 had foreign exams available in the DI-r. Six patients were prevented from being re-imaged, resulting in 17% of patients with available foreign imaging prevented from re-imaging. Study 2: Sept 13-26, 2015, 880 ER patients received DI service. Of those patients, 34 had foreign exams available in the DI-r. Five patients were prevented from being re-imaged, resulting in 15% of patients with available foreign imaging prevented from re-imaging.

In a study of the value of the diagnostic imaging repositories conducted in 2015, 56% of clinicians surveyed indicated a decrease in the need to order or repeat diagnostic imaging exams as the information was available to them in the provincial repository. This resulted in a decrease of 15-17% of DI exams for patients who had a previous test available in the DI-rs. A CHI study of the picture archiving and communication system (PACS) reported an estimate of 10-20% reduction in duplicate exams. The findings of this study are consistent with the DI-r survey conducted in Ontario. The majority of clinicians responded to the survey agreed that 6% to more than 30% of duplication in DI exams can be avoided by access to the DI-rs. Exam avoidance can amount to significant cost savings to the health care system given that the average cost of diagnostic imaging exams are $40.88 for x-rays, $54.43 for ultrasound studies and $66.03 for CT scans within Ontario. Based on MOHLTC data, there were almost three million DI exams in Ontario in ambulatory settings in 2015. If a conservative estimate of 10% reduction is achieved, this can result in a potential for cost savings of over $12 million per year to the health system. The potential for cost savings and reduced risk to patients is significant.
Registries

The function of the client registry is to provide an authoritative repository of identification data, which enables the accurate identification of individuals receiving health care in Ontario.

**The Provincial Client Registry (PCR)**

The Provincial Client Registry (PCR) is a data repository that stores and links together data from a range of sources to create a unique identity for every person receiving health care in Ontario. This enables the creation of a comprehensive electronic health record for a person, by linking all of their clinical data from different care settings with this single unique identity.

As PCR integrates with all provincial EHR assets and access to PCR is granted to health care providers to assist in the provision of care, early case studies confirmed that the impact will be positively realized in the safety, quality, and cost of care.

**Reported Benefits**

An example of the reported benefits according to users:

- **Ontario Association of Community Care Access Centres (14 CCACs)**
  
  PCR will reduce the time to admit/re-admit patients by nearly 500 days per year.

- **Grey Bruce Health Network (14 Hospitals)**
  
  PCR can save 3 months of time and effort required to merge 14 hospitals on to one health information system.

- **Hamilton Health Sciences (ClinicalConnect)**
  
  Integration with the PCR will allow clinicians to link ClinicalConnect data with other regional and provincial data assets.

**Case Study**

An evaluation of the use of PCR by clinical participants was conducted during the limited production release. The results demonstrated a high percentage of successful patient searches. When integrated with the Diagnostic Imaging Portal, approximately 50% of the pilot users reported time savings between 20 minutes to half a day while decreasing length of stay by several hours. Survey responses also suggest PCR improves workflow and timely communication between health care providers and their patients.

![Figure 26. Examples of user feedback.](image)

![Figure 27. Survey responses suggest PCR improves workflow.](image)
Patient Portal

New information communication tools, such as a patient portal, may help address some of the issues in regards to the communication gap after a hospital discharge. Funded by eHealth Ontario, MyChart offers viewing and sharing selected patient health information to a pilot of Mount Sinai Hospital (MSH) patients.

MyChart BR Study

To understand the value of a patient portal from the patient and provider perspective, MSH has conducted a BR study focused on:

- Patient/provider satisfaction;
- Improved chronic disease management through better collaboration; and
- Improved care plan compliance.

MyChart Adoption and Usage

227 in-patients on the General Internal Medicine, Cardiology, and Inflammatory Bowel Disease Units were invited to enroll in MyChart over a period of 13 months, among which 206 (91%) patients completed registration. The adoption and usage data confirmed that usage increased as more patients were enrolled. However, once enrollment was completed, usage continued to increase, which is a good indication of patient’s perceived usefulness of MyChart and its ease of use. Despite the popularity of the ‘sharing” feature within MyChart that enabled patients to share their reports and lab results with their family or care providers, this feature was only used by 16% of the enrolled users.

MyChart Benefits Evaluation

Patient navigator focus group

Patient navigators played a key role in the facilitation of the recruitment and patient registration process. In a patient navigator focus group, providing education about the patient portal and visual demonstration were identified as success factors. Furthermore, patient navigators believed that addressing some of patients’ concerns about security and privacy of sharing their health information may increase their adoption of the Sharing feature.

Patient survey, phone interviews and focus group findings:

The majority of patient survey respondents (88%) and phone interview participants (79%) perceived MyChart as easy to use. 85% of survey respondents and 72% of interview participants agreed that the information accessed was valuable in enhancing patient health self-management, while over 70% agreed that MyChart improves communication between patients and their care providers. Ninety three percent (93%) of survey respondents agreed that they will recommend MyChart to their friends and family. On the other hand, 79% of the interview participants agreed that MyChart helped them to better understand their conditions and the purpose of medications and stated that having access to MyReport and MyLab modules helped them to ask better questions to their care provider and make informed decisions about their health.

![Figure 28. MyChart adoption and usage increased over a period of 13 months.](image-url)
Data Mart for the Electronic Health Record (EHR)

Understanding the Data Mart

The Data Mart is an access mechanism for big data that allows business users to efficiently access data housed within a data warehouse. The Data Mart is critical to the management of an application and its systems as it enables sustainability, data quality, and data analytics. eHealth Ontario’s clinical data assets are integral for health service planning and population health management. The following is an example of OLIS data within the Data Mart, with similar data becoming available for other EHR assets.

Adoption of OLIS

eHealth Ontario tracks adoption and usage of ehealth assets, including the Ontario Laboratories Information System. Increasing access and studying usage patterns also help guide ongoing improvements to the systems. As displayed in Figure 29 comparing unique logins per quarter, OLIS has seen increased usage from 126 logins in Q2 of 2011 to over 35,000 in Q1 of 2016, suggesting clinicians are finding value in the consumption of OLIS. Along with increased usage has come increased information. The OLIS repository of lab orders, test requests, and observations continues to increase year over year, giving access to the greater health care provider community to make more informed decisions in their patient encounters.
**Value of the Data Mart**

Clinical data, along with the need to manipulate integrated datasets from different assets, is crucial for health service planning, and the Data Mart provides the ability to aggregate data from multiple clinical data assets to monitor trends and analyze data. The information in the Data Mart provides three levels of value: business intelligence, sustainability, and the potential for secondary use of data. The Data Mart has the potential to reduce the cost of managing and using data, as well as the cost of delivering services to clients and users. It improves data quality, helps monitor performance and capacity, and utilizes interactive and predictive analysis to understand trends. In addition to the value provided to the Agency, the richness of the Data Mart’s datasets will also be of significant use to our stakeholders such as the Ministry of Health and Long-Term Care (MOHLTC), Cancer Care Ontario (CCO), the Institute for Clinical Evaluative Sciences (ICES) and the Ontario Agency for Health Protection and Promotion (OAHPP) for secondary use purposes.

The Data Mart (DM) is being used today to understand both adoption and the clinical settings. It contains billions of laboratory records as far back as 2007. The data is robust and very rich and contains 90 percent of all Ontario laboratory information. Using the DM through interactive analysis, we can drill down into the OLIS clinical data. Clinical data can be cross referenced by organization, clinician, date, volumes, etc. An example of the type of analysis that can be done is the volume of A1C tests in diabetic patients, for any organization over time. The possibilities for clinical analysis are limitless.

**Future of the Data Mart**

As the Data Mart expands, providers will have the ability to aggregate data from multiple sources to monitor trends and tailor treatment plans proactively. eHealth Ontario’s assets, overtime, will become invaluable for health service planning and population health management as greater information becomes widely available in an interoperable fashion. As the information within the Data Mart expands to include data from other EHR assets, it will play an integral role in Agency decision making. To discuss the future of ehealth, interoperability is an essential part of any future for an integrated care system. The advantage of the investments made using the Data Mart will one day enhance care to patients.
Early Insights on EHR Benefits

Data from the DataMart and other health sector databases provides an opportunity to examine some of the value statements on electronic health records in various care settings and the use of data analytics strengthens benefits realization studies.

**Settings: Acute and Community**

**Value Statement:** Care providers use the EHR when they need access to information that they don’t have.

**Hypothesis:** EHR is used more in settings that have low access to data through other means/systems.

**Method:** The number of active users by care facility in the GTA (from the DataMart) was used as a proxy for EHR use. The percent active was calculated by comparing active users to registered users (Jan 2015-May 2016).

**Results:** CCACs and community-based hospitals (e.g. Lakeridge and North York General) have the highest proportion of active users vs. registered users. Some large teaching hospitals have relatively low (35-50%) proportion of active users vs. registered users.

**Early Insights:** Care providers from the community and hospitals not part of a larger corporation may see more value in using the EHR compared to settings that have access to required data. It should be noted that many of the low user sites were on-boarded less than a year ago and as they mature, the usage may increase.

![Facility Name](chart)

*Percent Active is calculated by dividing the number of active users by the registered users.

Figure 32. Site comparison of percent of active users from January 2015 to May 2016.
Setting: Community Care Access Centres (CCACs)

Value Statement: Care providers in CCACs use EHR data to process client referrals before admission to home care.

Hypothesis: There is a correlation between patient volume and EHR use.

Method: The number of active EHR users from the DataMart was compared to the number of CCAC assessments and admissions from the MOHLTC portal (IntelliHealth), from January 2014 to December 2015.

Results: On average, the EHR was used for 60 out of 1000 clients admitted to Waterloo Wellington CCAC. There is a positive correlation between client volume and EHR use.

Early Insights: In the community, the positive correlation between the clients served and the usage of the EHR may suggest that cross-sector information sharing is of great value in this setting.
Benefits of Electronic Medical Records (EMRs) - PwC Study

eHealth Ontario commissioned PricewaterhouseCoopers to complete an in-depth study and provide an update on the use and clinical impact of electronic medical records in Ontario.

**EMR Benefits Realization Study Update**

eHealth Ontario engaged PricewaterhouseCoopers in 2015 to conduct an in-depth study on the use and clinical impact of electronic medical records in Ontario for a second time to determine the increase in benefits over time. This study highlighted the increase in adoption and enhanced use of EMRs and focused on: the nature and impact of benefits that primary care practices have realized directly and indirectly through advanced EMR adoption and use; any changes in benefits realized by patients, providers and the health system in the three years since the last study was completed; alignment of benefits with the provincial Patients First (2015) Plan and eHealth Ontario’s Connectivity Strategy; and ongoing opportunities for enhanced realization of benefits through EMR use.

Surveys and interviews with clinicians using EMRs, some of which participated in the 2012 study, showed benefits related to the quality of care as 94% reported improved patient care and decision-making due to clinical decision support tools, which has led to improved patient safety and proactive monitoring. The use of EMRs have also supported health promotion, screening, and prevention by facilitating early detection of disease by providing alerts when test results fall outside of healthy ranges. In addition to the clinical benefits realized, EMRs positively impact productivity and efficiency of clinical and administrative duties and by 2012, resulted in savings of $84 million related to reduced chart pulls across primary care physicians and community-based specialists in Canada.

**Background**

In 2012, eHealth Ontario engaged PricewaterhouseCoopers (PwC) to undertake a study to evaluate the impacts of EMR use on patients, providers, and the health system. This study identified several categorical benefits using a framework and indicators that were measured through qualitative and quantitative means.
**Benefits of Electronic Medical Records (EMRs) - AFHTO Study**

The Association of Family Health Teams of Ontario (AFHTO) supported by its Family Health Team members and Quality Improvement Decision Support Specialists (QIDSSs), is leveraging the capabilities of the EMR to improve patient-centered relationship-based comprehensive primary care.

**Introduction to D2D**

Data to Decision (D2D), as the main deliverable of the Quality Improvement Decision Support Initiative, is a voluntary summary of the performance of Family Health Teams (FHT) across Ontario on a small number of indicators that were both meaningful to providers and possible to measure by the Family Health Teams.

This document provides insight on a benefits evaluation of the D2D in its second iteration. The Agency, driven by its Connectivity Strategy and User Engagement Strategy, has high interest in initiatives that measure the benefits of the EMR, especially from the connectivity with the EHRs and patient focus point of view. The impact assessment of D2D 2.0, funded by eHealth Ontario, provides invaluable recommendations on areas in which EMRs can enhance a patient centric primary care.

**AFHTO’s Methodology to D2D and D2D Impact Assessment**

**D2D Approach**

Based on Barbara Starfield’s comprehensive and patient-centered care approach and IHI’s Triple Aim Methodology, AFHTO collects a number of indicators to measure primary care performance by choosing a number of meaningful and measurable indicators. The choice of indicators rooted in the Primary Care Performance Measurement Framework (PCPMF) is endorsed by a variety of stakeholders including FHT members, AFHTO’s board of directors and patients.

To incorporate a patient perspective into measuring quality, a “roll-up” indicator was added to the second iteration of D2D. The roll-up indicator is a composite measure that incorporates patient ratings, on a number of indicators, using a survey, and combines them into one indicator.

**Impact Assessment of D2D 2.0**

Using a variety of methods, tools and sources AFHTO has evaluated the impact of the D2D 2.0 initiative on:

- Behaviours and processes of AFHTO member-organizations with respect to performance measurement;
- Human factors associated with quality improvement (QI) activities (e.g. self-efficacy, goal orientation, team climate); and
- Performance on selected primary care performance metrics (e.g. immunization rates, aspects of patient experience, etc.).

**D2D 2.0 Participation**

The participation in D2D 2.0 and the level of voluntary contribution to the indicators has increased from the last iteration (D2D 1.0).

102 FHTs provided indicators for this initiative (D2D 2.0) compared to 48 FHTs in D2D 1.0. The FHTs also reported higher use of EMR standard queries despite minimum enhancement to EMR functionalities. The role of QIDSSs in collaborating with FHTs in building standard EMR queries for QI activities was crucial to the success of this initiative.

The teams also reported a small increase (7%) in identifying a physician ambassador for QI activities. Having a physician ambassador showed to be associated with better team climate and different goal orientation.

Teams with a physician ambassador had higher goal orientation towards learning and proving rather than avoiding.
Next Steps and Recommendations

AFHTO’s D2D 2.0 initiative revealed a number of areas for future consideration and in-depth exploration both by AFHTO and other health care organizations such as eHealth Ontario. AFHTO will continue the meaningful measurement in primary care during the third iteration of the D2D initiative. An area of focus during D2D 3.0 is to develop more practical methods to measure EMRs mature use and measure the impact of mature use on a number of primary care performance indicators. Another area of focus is to identify, recognize and increase the impact of physician ambassadors for QI, as well as increasing conversation about QI activities.

To improve the impact of EMRs in quality improvement initiatives, AFHTO recommended to:

- Enhance functionality of EMRs for QI tasks;
- Support people and processes involved in QI and performance improvement;
- Integrate EMRs with other systems;
- Spread the process and tools for performance measurement beyond the EMRs and FHTs with a focus on system wide patient centered indicators; and
- Centralize support for patient surveys.

Lessons Learned

The findings from the D2D 2.0 initiative and the impact assessment reiterated the crucial role of an EMR to enable meaningful cost, quality and experience measurements in primary care. Without having an EMR, teams were not able to provide standard data on the required indicators for the D2D 1.0 and D2D 2.0 initiatives.

Despite an increase in the number of teams with an automated connection between their EMRs and hospitals to receive patient data, the quality and penetration of this much needed feature was insufficient. 60% of the participating FHTs have access to hospital patient data in their local EMRs.
4. Key Success Factors and Conclusions
Key Success Factors

In an ever changing, data intensive and complex healthcare environment with competing priorities, technology provides great opportunity to improve quality, health system capacity and user/patient satisfaction. However, the success of any innovative technology depends on a number of factors best categorized into organizational, people (user) and system factors. These key success factors are intertwined and one may lead to the other.

System
System performance measurement is key to the success of an EHR. System performance (system up-time, security, etc.), appropriate infrastructure (use of tablets, single sign on feature, etc.) and integration of the EHR with other systems (e.g. EMRs or a patient portal) will ensure better adoption and usage of the system as users start to see the added value of using an ehealth solution compared to their stand-alone EMRs. The better a system is designed and integrated with users’ needs and workflows, the more it is perceived as useful and easy to use. Furthermore, by systems being designed in a way to support benefits realization, data analytics and quality improvement activities, enhancements and improvements towards common patient-centric goals will become the norm. Design and use of the OLIS Data Mart and AFHTO’s D2D initiative are crucial steps in that direction.

People
As mentioned in the previous section, adoption is driven by the value of the EHR to a clinician’s practice, and its ease of integration with their clinical workflow at each care setting. A well designed system that considers user perspectives and places emphasis on user engagement from the very beginning of the IT solution development is the one that will be used and will provide value. eHealth Ontario, through a variety of means, is incorporating stakeholder feedback into design and implementation of its assets.

Organizational
Benefits realization measures, together with system performance measures, can be used to inform evidence-based decision making at an organizational level. At the same time, the policies, mandates, and incentives set forth by a health care organization, will have an impact on system adoption and perceived usefulness. Initiatives such as Patients First and D2D will ensure that patient-centric value driven healthcare is always a top priority.

A few examples are: the Clinical Advisory Council, the ConnectingOntario Benefits Realization Forum and the ConnectingOntario Adoption Forum.

![Figure 36. Innovative technology key success factors.](image-url)
Next Steps and Conclusions

**Next Steps**
The Planning and Reporting team continue to seek opportunities and engage in benefits studies to demonstrate the ongoing value of the EHR. The following activities are planned and/or underway:

**Furthering of benefits realization of OLIS**
The team will be partnering with McMaster University and Hamilton Health Sciences Centre on studying the best usage practices of OLIS, with the published results providing learnings to other users;

**Understanding the provincial value of the EHR and its assets**
Leveraging site-specific regional studies with favourable early results and replicating these studies in larger care settings. This will provide provincial results of usage and cost savings, which will create the opportunity to conduct health economic evaluation studies of the EHR;

**Advancement of the ConnectingOntario Benefits Realization Forum**
Work will continue with representatives from across the province on aligning benefits metrics so that province-wide reporting is possible with standard indicators and surveys;

**Engagement with the Clinical Advisory Council (CAC)**
As communicated in Section 2 (Focus on Clinical Value), the CAC will be engaged in working group discussions on the Clinical Value Framework and the identification of the value of EHR elements in the various care settings, and will continue to meet semi-annually;

**Further development and use of User Engagement Framework**
The team continues to develop the tools to supplement the User Engagement Framework and to circulate the framework for use; and

**Alignment to MOHLTC initiatives**
As additional information and direction is provided based on the MOHLTC’s eHealth 2.0 agenda and Patients First proposals, the Planning and Reporting team will ensure the ongoing work is aligned and demonstrating the value to patients, care providers and the health care system.

**Conclusions**
In conclusion to this 2016 update on Benefits Realization, determining the clinical value of the EHR and the benefits of individual assets continues to be a major focus for eHealth Ontario. The Agency recognizes the importance of user engagement and clinical input into the planning and development of the EHR to ensure that usage and adoption levels reach that critical volume where benefits to the health care system, in terms of cost, quality and patient and provider experience, are realized. By using a combination of different evaluative methods, such a real-time studies, clinician and patient surveys, and data mart analysis, the Agency is able to gain a broad understanding of how the EHR is being used to provide patient care, always ensuring that the systems are putting patients first.
5. Testimonials
Testimonials

ConnectingOntario Program

Bridging the gap with the ConnectingOntario in the GTA

Reducing duplicate testing with Connecting South West Ontario Program

How ConnectingOntario will improve primary care for patients with complex medical history

Video - https://www.youtube.com/watch?v=9tvoIdBr838

Video - https://www.youtube.com/watch?v=1DPlQWiRhKo

https://www.youtube.com/watch?v=JMwmPqz2Srk&feature=youtu.be
ConnectingGTA is most valuable in maintaining continuity of care across institutions. Patients often have their care scattered at multiple facilities.

Before connectingGTA it was difficult to get the necessary information for appropriate patient care and tests may have been needlessly repeated. ConnectingGTA provides us with an aggregation of medical information that we need to properly care for patients.

Lorne N Small, MD, Infectious Disease Antimicrobial Stewardship, Medical Director Infection Prevention and Control, Trillium Health Partners

I recently saw a patient in consultation where access to ConnectingGTA changed the entire course of disease management. I was able to identify a prior laboratory value that was not previously appreciated by the patient’s treating oncologist.

The patient had previously been treated as having a cancer of unknown primary site, but when I found the AFP level was markedly elevated this pointed towards a primary liver cancer as the underlying diagnosis.

Dr. Philippe Bedard, Cancer Clinical Research Unit, Princess Margaret Cancer Centre
“When we do assessments, we always look for what kind of lab work has been done. Just having the information to look at remotely is huge for us.” Shelly, director of a team funded by a $40 million provincial initiative dedicated to enhancing services for older people with responsive behaviours linked to cognitive impairments and people at risk of the same, said “information is key” in her line of work. In the past, she said, “it often took hours to collect patient data with no guarantees the information being collected was complete. We’re a small team that assesses behaviours in long-term care homes; we actually sit in long-term care homes. To be able to understand the history of our patients is a game changer. Just having it at our fingertips is huge.”

Shelly Hazzard, BSO Registered Nurse, Behavioural Support Unit (BSO) at Steeves & Rozema Nursing Homes in the Erie St. Clair Local Health Integration Network (ESC LHIN).

We receive patient transfers to our program from hospitals across our LHIN and we can use ClinicalConnect [the cSWO regional viewer] to gather more details such as Labs, EKG etc. Transfer notes don’t include that level of detail. We can also access records from previous visits. The ClinicalConnect application is not difficult to use and very user-friendly.

Elizabeth Chow-Tung, Clinical Pharmacist, Child and Youth Mental Health
With the cNEO clinical viewer, patients’ laboratory history is readily available for our clinicians. Clinicians have access to previous test results and can be confident we are working together to provide the right treatment plan for our patients.

Todd D. Marriner, RN CPMHN(C), CCPE, Program Manager, Lanark County Mental Health

As some of my patients have no fixed address and have language barriers, having even two weeks of information would be of great value to me, such as the ER reports from a recent visit.

Dr. Carol Geller, Physician, Centretown Community Health Centre
The ability to access patient imaging through OneView [the SWODIN region DI-r viewer] is also indispensable for our outpatient clinics; many patients are from out-of-town and have not had their imaging performed in the LHSC system, nor do they bring their imaging on a disc. This allows the convenience of having basic diagnostic imaging performed close to home and also avoids congestion and scheduling conflicts with the LHSC Radiology Department.

Michael Staudt, Neurosurgery Resident, PGY-3, uses SWODIN DI-r

The radiologists at the True North Imaging have all been impressed with our ability to access studies done at facilities outside for our own. We had theorized that it would provide better patient care, eliminate duplication of services and save the government money in the long-run. I just completed a case that proved the point. A pregnant woman in her first trimester was seen in a hospital in the Toronto area four days ago and had an ultrasound for a possible miscarriage. As this is an area of expertise of ours, she was sent to our clinic today. Having access to the foreign examination images, as well as our own, I was able to give the patient and her physician the proper reassurance. I was able to give the patient better medical care, give reassurance, as well as save her and the taxpayer of Ontario the need for a follow-up ultrasound. This is a valuable service that will prove to be invaluable to patient-care in Ontario.

Dr. Alex Hartman, MD, FRCOP, True North Imaging (an Independent Health Facility (IHF)), uses HDIRS DI-r

The Vascular and Interventional Therapy group at Royal Victoria Hospital in Barrie, Ontario makes routine use of the Foreign Exam Management functionality in the GTA West DI-r. It is primarily used to review diagnostic images, taken at other health service providers, of patients prior to interventional radiology procedures. Having access to a patient’s longitudinal diagnostic history provides us with the most up-to-date information. It reduces the need for repeat exams and assists in a faster diagnosis.

Dr. Mark Otto Baerlocher, MD, FRCPC, DABR, Chief Interventional Radiology, Royal Victoria Hospital, uses GTA West DI-r

The connection with NEODIN has been great. A huge benefit for our patients—quicker results, less travel and fewer unnecessary redo studies. Already have examples where our studies are viewed same day by our physician and specialist colleagues at the hospital, influencing management decisions. Faster radiologist reporting times helps greatly with our clinical decision-making here in the clinic (in essence brings the radiologist input directly into the primary care process). We are also more effective at accessing our patients’ studies from hospital, for comparison and consultation with specialists, for example, discussing the latest CT with the oncologist while we both view the images simultaneously, even though 200 km separate our offices.

Dr. Robert Hamilton, Owner, Gore Bay Medical Clinic, uses NEODIN DI-r
Testimonials

“If hospitals could have all my information it would relieve a lot of my stress.”

Raymond, Patient

“I am confident that...my health record will be much more accessible with ConnectingOntario.”

Kim, Patient