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Introduction
Ontario’s health system priorities
Ontario is focused on improving quality of care and access to care through enhanced coordination, integration and sharing of information across the continuum of care.

Ontario’s Patients First: Action Plan for Health Care (2015) seeks to “put people and patients first by improving their health care experience and their health outcomes”. The plan focuses on four objectives:

› Providing faster access to the right care
› Connecting services through coordinated and integrated care
› Support patients through education, information and transparency
› Protecting Ontario’s universal health care system

Notable transformative initiatives currently being implemented in support of Patients First: Action Plan for Health Care include:

› The introduction of 69 community Health Links across Ontario providing better coordinated care for high-needs patients with multiple, complex conditions;
› The introduction of Health System Funding Reform to support evidence-based funding and improvements in quality; and
› Expansion of electronic networks to facilitate easier flow of patients and their respective health information across the health care continuum and eventually to their home.

The need for enhanced primary care service delivery enabled by productivity tools and improved access to clinical information among providers is vitally important. eHealth Ontario’s strategic focus on advancing the availability and use of Electronic Medical Records (EMRs) and enabling their connectivity with provincial Electronic Health Record (EHR) assets is critical to achieving the four provincial health transformation objectives succinctly summarized as access, connect, inform and protect.
EMR adoption in Ontario

Since 2005, Ontario has invested in the adoption and use of EMRs by community-based providers – a foundational and critical step toward every Ontarian having a comprehensive EHR.

Ontario’s investments in EMRs created one of the single largest EMR implementation project in Canada.

EMR adoption by community-based physicians

Adoption of OLIS and hospital reports

80% of Ontario hospital corporations are delivering electronic patient hospital reports totalling 500,000 reports/month to EMR-enabled clinicians.

OLIS provides electronic lab results to over 8,100 EMR-enabled clinicians resulting in over 145,000 queries per month.

Organizations with EMRs

75 Community health centres
10 Aboriginal health access centres
21 Nurse practitioner-led clinics

Family physicians with an EMR or currently implementing an EMR

70% 2012
86% 2015
EMR connectivity in Ontario

Having achieved a high degree of EMR adoption, Ontario’s focus is now on connecting providers across the continuum of care and enabling the transmission of information among EMRs, provincial and regional EHR assets.

With an 86% adoption rate, EMRs are now widespread in Ontario and recognized as a significant source of primary health care information. The valuable information contained within EMRs has yet to be fully integrated with other provincial assets to form a comprehensive EHR.

The value of all eHealth assets, including EMRs, can be greatly enhanced through continued integration and connectivity at regional and provincial levels. Future eHealth Ontario initiatives that will integrate EMRs with other provincial assets to support the creation of a comprehensive EHR include:

» Implementation of three regional eHealth clusters to connect existing local, regional and provincial eHealth assets through the Connecting Ontario agenda (cGTA, cSWO, cNEO)

» Broadened access to provincial assets:
  – Provincial clinical data viewer (CDV);
  – Provincial EHR integration assets (e.g. Health Information Access Layer (HIAL), Provincial Client Registry (PCR), Provincial Provider Registry (PRR), ONE ID, terminology services);
  – Clinical domain repositories (e.g. clinical data repository (CDR), Ontario Laboratories Information System (OLIS), diagnostic imaging repository(DI-rs))

» Development of interoperability standards to facilitate sharing of information in EMRs and across various other provincial assets

EHealth Ontario’s Connectivity Strategy supports the Action Plan for Health Care and defines the future of Ontario’s EHR as “a single, safe, standardized and provincially integrated record for every health care client in the province, with comprehensive, connected information, connected systems and streamlined access”.

1 Strategic context
Contents | Introduction | Findings and discussion | Recommended Next Steps | Appendix

EMR Benefits Realization Study Update
5 August 2015

Draft for discussion purposes only
**Study background and objectives**

eHealth Ontario engaged PwC to conduct an update to the EMR Benefits Realization Study completed in 2012, with a focus on understanding how benefits have evolved in support of *Patients First: Action Plan for Health Care*

In 2012, eHealth Ontario engaged 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. At that time, demonstrable benefits of both a qualitative and quantitative nature had been realized.

Since that study was undertaken, investments have yielded further progress toward the broader adoption of EMRs and the increased maturity of their use by clinicians. In addition, as investments made in provincial eHealth assets have matured and now more are connected to EMRs.

eHealth Ontario engaged PwC in 2015 again to conduct a study to revisit and refresh the findings from 2012 with the objective of understanding the extent to which benefits have been further realized over the past three years, focusing 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.
Overview of study methodology
This EMR Benefits Realization study utilized the 2012 study as the foundation for the methodology, findings and involved two phases and five major activities

**Phase 1: Evaluation Framework Development**

Methodology and findings from the 2012 study were leveraged to develop the evaluation framework:

1. Research questions were defined leveraging the methodology and findings from the 2012 study and leveraging eHealth Ontario’s Benefits Realization Framework

2. Qualitative and quantitative research methods were identified and designed, including:
   - a provider survey;
   - interview guides for primary care providers and key stakeholders; and
   - an EMR data extract request

**Phase 2: Analysis of Benefits Realization**

Quantitative and qualitative data was gathered through a combination of primary and secondary research to support a current state assessment of EMR benefits realization in Ontario:

3. Primary research
   - Interviews with primary care providers (13 interviews)
   - Interviews with key stakeholders (8 interviews)
   - Interviews internal eHealth Ontario stakeholders (4 interviews)
   - Provider survey (17 participants)
   - EMR data extracts (5 participants)

4. Secondary research
   - Other supporting research including National Physician Survey (2014)

Findings, analysis and recommendations were summarized and are provided in this report:

5. Findings and analysis from qualitative and quantitative data collected are summarized in this report along with recommendations for continued adoption and maturity of EMR use

Ongoing project management, communications and quality assurance
Interpreting study findings with discretion
While closely aligned with the 2012 study, this study presents differences in the composition and number of study participants that must be considered when assessing the study’s broader implications.

Composition of study sample and participants
- Study participation depended on clinicians’ availability and willingness to participate during the requested timeframe. As such, the pool of provider participants differed in numbers and composition among the interview, survey, and EMR data extract components of the study. The participant group also differed from the pool of participants in 2012 and there was a greater diversity in users in 2015 (ranging from average to expert EMR users). This is to be considered when drawing comparisons between results in 2012 versus 2015 and extrapolation across Ontario.

Measurement of EMR benefits
- As part of the data collection activities in this study, clinicians were asked to provide sample data extracted from their EMRs. In most instances, providers were not able to extract high quality data from their EMRs. This challenge was encountered when undertaking the study in 2012, and it was noted that little progress has been made to support extraction and analysis of data from EMRs. Study findings are thus largely based on reported benefits and supplemented by other supporting evidence obtained through a review of previous studies.
- Given that the majority of study participants were self-reported as advanced EMR users, findings regarding benefits of EMR use should be considered as ‘directional’ and not representative of the order of magnitude possible.
- It was observed that in many cases, survey results showed a decline in the number of participants that “strongly agreed” with questions related to the benefits of EMR use between 2012 and 2015. Users’ perception of reality and the degree of usefulness may have plateaued overall. Through the survey and interview results, it is suggested that users’ expectations of what their EMR products may be able to do versus what they are capable of has changed significantly from 2012. This has translated into recalibrated user perceptions of how impactful the use of EMRs are on their practices.
Findings and discussion
**Presentation of findings and discussion**

Guided by eHealth Ontario’s Benefits Realization (BR) Framework, four key benefits domains were utilized as the foundation to assessing EMR use. Findings, evidence and related implications are discussed in this section.

<table>
<thead>
<tr>
<th>eHEALTH ONTARIO BR FRAMEWORK</th>
<th>Quality of care</th>
<th>Cost of care</th>
<th>Patient and provider experience</th>
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<tr>
<td><strong>1. Quality of care</strong></td>
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<td>Clinical and administrative tasks</td>
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<td><strong>4. Patient experience</strong></td>
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</table>

**PRESENTATION OF FINDINGS**

Findings for each category have been synthesized from provider survey results, interviews and commentary, EMR extracts, and supporting evidence from other studies.
Evidence-based decision making at the point of care has improved as a result of EMR use

EMR users indicated that the ability to readily locate current, comprehensive patient information such as annual physicals, lab reports, test results, medication records and diagnostic images helped improve evidence-based decision-making at the point of care. The ease of accessing this information allows providers to address a range of topics with their patients during appointments and to discuss their health care needs holistically, rather than requiring follow-up visits which are inefficient.

Clinical decision support tools, such as flagging mechanisms to alert physicians to results that are below or above pre-determined thresholds were noted by providers as helpful at the time of clinical decision-making. This finding was supported by survey results: 94% of respondents strongly or moderately agree that EMR use improves decision-making via clinical support tools, with 2015 results showing a slight increase in agreement over 2012 suggesting that users may be increasingly adopting the use of these tools into their practice. It was noted that this functionality would be further enhanced with broader access to additional data sets and decision support tools within the EMR (e.g. access to smoking cessation guidelines and adverse drug combinations). Integration of EMRs with provincial assets such as the Client Registry and User Registry were cited as important opportunities for improvements in evidence-based decision-making to ensure the patient’s records are consistent across multiple settings and electronic assets.

Survey results indicated a slight drop (12%) in perceptions that EMR use enhances the quality of care delivered. By comparison, over 70% of the 11,700 respondents to the National Physician Survey agreed that EMR use has indeed improved quality of care in varying degrees. It is important to note that IT is one of many factors that influence evidence-based decision making at the point of care.

Findings suggest that evidence made readily available to providers through EMRs has great value in supporting the advancement of key objectives, including improved quality of care and the efficient allocation of resources for health system sustainability.

“Informed decision-making has improved with the use of custom forms and stamps that help providers remember specific problems related to certain disease types that need to be addressed with patients”

93% of physicians who use an electronic medical record said EMRs allow them to provide improved patient care.

Source: Alberta POSP Benefits Survey (2012)
The use of certain EMR functionality has supported health promotion, screening and prevention

Enhanced preventative care and proactive patient management have been enabled by EMRs with the ability to conduct searches for patients with certain diseases and receive automated reminders. For example, providers report that the ability to track and trend patient data from the EMR facilitates early detection of disease by providing alerts when test results fall outside of healthy ranges.

Interview findings are supported by the survey results: 82% of survey participants strongly or moderately agree that EMR use enables their practice to do needs-based planning, and 94% agree that EMR use assists in the provision of preventative services for their patients (e.g. screening, immunization). Common reasons provided in open-ended responses include:

- Ease of searching for or generating reports for patients to determine the status of their preventative services and any gaps in care
- Inclusion of tools or auto-populating of patient profiles to determine the need for recall for preventative services

EMR data provided by study participants points to the potential impact of EMR use on population health management. One practice reported 71% of patients aged 50 to 74 had a screening test ordered for colon cancer, compared to the high of 56% in the 2012 study. Additionally, the percent of patients age 65 and older who received an influenza immunization reached as high as 81% in EMR-enabled practices.

It is widely acknowledged by study participants and in several studies (including PwC’s 2013 Canadian study on the Emerging Benefits of EMR Use), that there remains significant opportunity to advance maturity of use of EMRs in support of preventative care. Through the continued and enhanced use of EMRs for this purpose, coupled with increased connectivity of EMRs with EHR and other crown agencies’ (e.g., Cancer Care Ontario) assets, providers and patients will have the information they need to better support preventative care.
EMR functionality is being used to improve chronic disease management

Study participants readily recognized that the ability to conduct searches for target patient populations, receive alerts for interventions and follow trends enables the identification and better management of chronic diseases. For example, trends such as blood pressure can be recorded and tracked over time, thereby encouraging assessment of current self-management and more informed decision-making. Effective integration and monitoring of laboratory history and treatment progress also supports chronic disease management.

Nearly all survey participants in 2012 and 2015 agree that EMR use has improved their ability to offer services to patients with chronic conditions. Common reasons provided include:

- The ease of searching records or generating reports for target populations
- The ability to establish tracking sheets that follow particular vitals, lab data and patient conditions
- The use of coding standards
- The ability to share chronic disease management data with other health professionals

EMR data provided by study participants shows the potential impact of EMR use on chronic disease management. The percent of patients (age 18 years and older) with their diabetes under control (i.e. last HbA1c was 7.0% or less in the last 15 months) was between 42% and 58%, compared to 34% in the 2012 EMR Benefits Realization study. Additionally, the percentage of patients with diabetes (age 18 years and older) who were tested for diabetic complications reached as high as 91%.

It is widely acknowledged that there remains significant opportunity to advance maturity of use of EMRs in support of population health management and improved outcomes for those with chronic diseases. Through the enhanced use of EMRs for this purpose, coupled with increased connectivity of EMRs with provincial and regional assets, providers will be better able to manage care in a timely manner for those in greatest need.

In the United States, 61.9% of primary care clinics who have patients with diagnosed diabetes have a diagnostic code and, additionally, for patients with available quality of care indicators, coded diagnosis of diabetes had a significantly higher level of quality of care.

Source: Holt et al. (2014)
**Patient safety has improved as a result of timely sharing of patient information and response to patient needs**

Integration of EMRs with hospital reporting solutions such as Hospital Report Manager (HRM) provide more rapid access to acute care information required for making patient care decisions, potentially leading to improvements in safety. Providers noted that the average time it takes to receive discharge summaries following hospital visits was approximately two weeks but is now reduced to as low as 30 minutes following the integration of HRM.

In keeping with 2012 results, 94% of survey respondents who are users of HRM agree that the availability of discharge summaries through HRM improves their ability to provide patient care, as all admission and discharge information, including drug administration at the acute care level, is known.

Providers note that HRM has been a success where available but that the completeness of reports can vary among hospitals. Greater access to HRM among providers and hospitals is seen as worthwhile, as is online and mobile access.

Interviewees report that the availability of a current and accurate list of patient medications within the EMR enables improved drug management. Tools such as risk calculators for drug combinations and alerts about potential prescribing errors and adverse drug events due to interactions with other medications is also seen as a key benefit of EMR use.

The ability for primary care providers to access complete medication data from pharmacies and other care settings is seen by a number of interviewees as an important opportunity for improved drug management and patient outcomes.

Study findings suggest that continued implementation of the Agency’s Connectivity Strategy is critical to improving patient safety as there will be greater information exchange between primary care and other domains of care.
Sharing of patient data and electronic scheduling can improve communication and coordination within care teams

When a team shares an EMR, data is centralized and collaboration is easier because you’re building on other providers’ information rather than chasing information down

Providers report that EMR use better enables them to share patient information and coordinate care with members of their team. This was attributed to having common access for all practice members to a comprehensive patient record. While the 2015 survey results showed a slight drop in agreement that the EMR improves the sharing of information within their practice and coordination of care, interview and anecdotal information point strongly to the benefit.

Broader access to patient information in EMRs by other primary care and community-based providers, such as telehealth nurses, pharmacists and others, is seen as an opportunity to enhance the continuity of care for patients. Access to other providers will vary depending on the primary care model followed by the practice. Physicians are increasingly accepting of patient information accessed by the full care team so that communications and coordination can be fully enhanced, further supporting the need for EMR-to-EMR integration, and integration of EMRs with other provincial assets.

Improved scheduling and coordination of patient visits as a result of EMR use was also noted to improve access to care. A key goal of Patients First and Health Links is to strengthen access and care delivery for those greatest in need. Providers report that electronic scheduling of appointments has improved their ability to schedule same-day appointments for patients with acute needs. Improved coordination of patient visits has helped avoid repeat and unnecessary visits to multiple providers in the care team due to the ability to view schedules of all team members.

As strides continue to be made to integrate and connect patient information across the province, the potential to enhance access to care, improve the experience of both patients and providers, and increase efficiencies is heightened.

63% of Ontario family physicians and specialists report that continuity of care has improved within the first year of implementing their EMR.

Source: OntarioMD Physicians EMR Usage and Satisfaction Survey, 2013
Comprehensiveness of patient records would be further enhanced through greater interoperability and integration among EMRs and other provincial assets.

Study participants report that significant progress has been made to bring helpful information from different care settings into primary care EMRs. As noted previously, discharge reporting through hospital reporting solutions, such as HRM, is widely reported to improve the flow of information from the acute to primary care setting. Reductions in time spent waiting for discharge summaries and referrals expedite and facilitate the coordination of care such that patient needs can be addressed in a timely fashion following discharge.

Connectivity to the Ontario Laboratory Information System (OLIS) has improved laboratory management among practitioners and health care teams. Clinicians are able to download lab results from private and public health laboratories and connected hospitals to build a comprehensive profile for patients to inform decision-making.

Providers also widely report that the referral process is much more efficient with the use of pre-populated data in referral forms, which can more efficiently direct patients to the appropriate levels of care.

Notwithstanding the reported improvements in data communication and coordination, greater integration among EMRs is needed to support a bi-directional exchange of information across the continuum of care. Greater connectivity with of EMRs with community care settings such as pharmacies, allied health professionals and other speciality physicians is in demand according to the National Physician Survey (see chart).

Providers note that an increased flow of data from community to acute care settings would further enable quality improvements at the point of care. ePrescribing, eConsults and eReferrals are also seen as important opportunities for greater and more efficient interdisciplinary coordination of care. These information exchanges would be enabled through greater interoperability and integration among EMRs.

Provider interview results strongly supported the hypotheses that EMRs support the ability to coordinate care. Moreover, as physicians rely on tools within EMRs, greater integration with provincial assets will support a more comprehensive EMR and EHR patient record, enabling more evidenced-based care in the future.

In Ontario, 77% of respondents who were hospitalized in the previous two years say that, when they left the hospital and went back to see their family doctor or clinic, the health care providers there seemed up-to-date about the care they had received in the hospital.

OLIS, eNotifications, and eConsults all lead to better coordinated care between physicians, relevant case workers, and home care workers, etc...

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<table>
<thead>
<tr>
<th>EMR tools used by physicians</th>
<th>58%</th>
<th>35%</th>
<th>81%</th>
<th>63%</th>
<th>30%</th>
<th>14%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receipt of hospital visit and discharge information</td>
<td>Interface to pharmacy/pharmacist</td>
<td>Lab/diagnostic test results</td>
<td>Referral to other physicians</td>
<td>Access to provincial/territorial patient information systems</td>
<td>Interface to non-doctor health professionals</td>
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</tr>
</tbody>
</table>

Source: Health Quality Ontario 2014

Source: National Physician Survey, 2014
EMR use can positively impact productivity and effectiveness of certain clinical and administrative activities and support more efficient patient interactions

“Spending less time charting, filing, retrieving information and looking for labs allows you to see more patients”

Interviews and survey results suggest that, while efficiency gains are difficult to measure, EMR use can positively impact productivity within a practice. Most providers (82%) agree that automated tools such as pre-populated forms, templates and stamps at the point-of-care streamlines clinical and administrative workflows by reducing the time spent completing patient documentation. A PwC study conducted for Canada Health Infoway estimated that in 2013, $177 million in administrative efficiencies could be achieved across Canada related to redeployment of staff time as a result of EMR use (see graph below). We expect this upward trend to continue across Canada and in Ontario as EMRs continue to be adopted and maturity of use is enhanced to generate greater productivity and efficiency among all users.

Providers report reduced wait times for appointments and procedures as a result of a faster flow of clinical activity. They are also able to more efficiently stream patients to the most appropriate level of care (e.g. from hospital to long term care or from primary care provider to specialist). These factors are essential in supporting Patients First by providing patients with greater access to primary care.

Respondents agree that clinical decision support features at the point-of-care support more efficient patient interactions. The ability to access patient information remotely in multiple locations throughout the day was noted to contribute to more timely response to patient needs. Providers report accessing their EMRs remotely in the evening to review test results requiring immediate follow-up with a patient and to plan their day more effectively.

Cumulative benefits from reduced chart pulls, 2006-2012 ($millions)

Source: Emerging Benefits of EMR Use in Community-based Care, PwC study for Canada Health Infoway, 2013
EMRs allow for faster transmission and communication of laboratory results and can reduce the volumes of unnecessary testing

Rapid access to test and lab results has contributed to more efficient processing of patient records; in keeping with the 2012 results, 94% of survey respondents strongly or moderately agree that EMR use reduces the time from when a laboratory test result is available to when the result is made available to the provider through the EMR.

OLIS provides practitioners with more comprehensive laboratory test information by providing more timely and broader access to laboratory test results from other providers. Among OLIS users, 73% of survey respondents agree that the ability to access OLIS through its integration with EMRs improves the efficiency and/or quality of patient care delivered. One provider noted that prior to having an EMR and access to OLIS, one staff member was assigned solely to calling labs to retrieve patient results. With immediate access to test and lab results, providers are able to provide follow-up with patients at the point of care and discuss results, diagnosis and treatment.

Expanded availability and the ability to share laboratory information among different disciplines and providers increases the accuracy of information and thereby reduces the likelihood of unnecessary or duplicate lab tests. This finding is supported by a 2013 PwC study conducted for Canada Health Infoway which drew on 250 research publications and estimated that financial benefits related to fewer duplicate tests were $99 million across Canada in 2012. In keeping with these findings, providers report realizing a reduction in volume of laboratory requisitions since the introduction of OLIS. A supporting study conducted for the NHS (2014) suggests that the demand for lab tests is reduced by 12% when lab systems are integrated with EMRs.

Integration of OLIS to EMRs is delivering results, further integration through the Connectivity Strategy is expected to yield enhanced value. It is anticipated that providers, patients and the health system will continue to realize benefits through continued integration of other EHR assets to EMRs.
EMR use can enhance patients’ experience and empowerment by helping them take a more active role in managing their health

The ability to provide patients an opportunity to view and understand their health information at the point of care is seen to greatly improve patient education and empowerment. Nearly all survey respondents (94%) strongly or moderately agree that EMR use supports patient education.

For example, the ability to instantly create charts that compare results (e.g. blood sugar readings) contributes to effective patient education. One provider noted the benefits of having results for patients that would not otherwise be in their charts supports discussion of a management plan. This ability is seen as a significant opportunity for patient education and can help patients better understand and manage their health.

One provider suggested that patient experience is also greatly enabled by the ability to measure the quality of the patient-provider relationship which is supported by current and comprehensive patient records.

There is an increasing amount of patient-facing functionality based on EMR data that can potentially drive greater practice efficiency and patient education and experience improvements, such as customer portals and apps that help patients manage their health. Interviewees suggested that the opportunity for patients and physicians to communicate without having to schedule an office appointment is seen as a benefit to both patients and providers. In addition, patient access to their personal EMR data through improved consumer functionality is seen as a significant opportunity for efficiency and patient experience improvements, including: eBooking, review of lab/test results online, virtual consultations, emailing of documentation, input of symptoms prior to appointments. These capabilities and interactions are not widespread, but are starting to be seen in leading practices across Ontario.

Patient enablement and involvement in dialogue around their care choices are essential in Ontario’s rapidly evolving health care landscape. The accessibility of accurate and timely information through EMRs will continue to improve patient experience and support Patients First.

Source: Alberta POSP Benefits Survey, 2012

93% of physicians in Alberta report that access to a summarized patient history means that patients spend less time repeating the same information to care providers; and 97% report that they and their clinic associates and care team have more complete patient information.

48% 47%
6% 8%
44% 47%

Don't know/NA
Strongly Disagree
Moderately Disagree
Moderately Agree
Strongly Agree

2012 2015

Supports patient education (e.g. electronic educational material/references or trending patterns such as BMI, blood sugar levels and labs, etc)
Opportunities for further benefits realization

Ontario's investments in EMRs to date have yielded noteworthy, tangible benefits, but significant potential exists to extend those benefits by focusing on enhancements in three areas.

Through their use of EMRs, community-based providers have demonstrated continued realization of several benefits initially identified by the study team in 2012. It is anticipated that users of EMRs will continue to play a significant role in supporting the achievements of the goals of Patients First: Action Plan for Health Care, and that the full realization of benefits in support of these goals will require targeted efforts from a broad range of stakeholders. Findings from this study highlight three short to medium term areas of opportunity for further benefits realization related to EMR use across community-based care settings in Ontario. Each of the following are discussed in further detail.

<table>
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<th>Integration and interoperability</th>
<th>EMR benefits would be further realized with greater interoperability of systems and the bi-directional flow of data across care settings</th>
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<tr>
<td>Data quality and management</td>
<td>The value of information contained within EMRs across the province would be further enhanced through improved data quality, standards and management</td>
</tr>
<tr>
<td>Maturity of use</td>
<td>The effective realization and maximization of benefits is highly supported by greater maturity of EMR use – defined as the level of adoption and functional use of the EMR in the practice setting</td>
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Integration and interoperability

EMR benefits would be substantially enhanced with greater interoperability of systems and the bi-directional flow of data across care settings and in support of eHealth Ontario’s Connectivity Strategy.

- As one component of an interoperable EHR, EMRs are central, transformative enablers to achieving transformation objectives in support of provincial policy initiatives.
- Anecdotal evidence suggests that the implementation of OLIS, hospital reporting solutions and other reporting applications has improved the management of information within and across patient care settings, particularly for inbound data into EMRs. However, there was consensus among interview participants that EMRs are currently “islands” of valuable information but significant challenges exist extracting the information they hold and sharing data outside of individual primary care practices.
- Connectivity in primary care is being demonstrated in some instances in pockets of the province. For example, ClinicalConnect allows physicians in certain primary care practices in the connectingSouthWestOntario eHealth cluster to download EHRs directly into their EMR. However, the bi-directional flow of information across care settings and with provincial assets (e.g. EHR, HIAL) is not widespread due to limited integration and interoperability capabilities among the various EMR providers and platforms.
- eHealth Ontario’s Connectivity Strategy, which is grounded in architectural standards, will play an instrumental role in ensuring interoperability across multiple platforms and drive the enhanced use of the EHR.

A continued focus on improving integration and interoperability among EMRs, the EHR, and other systems external to the community-based setting is required to realize the full benefits related to investment made in EMRs to date.
Data quality and management

The value of information contained within EMRs across the province could be further enhanced through improved data standards, quality and management that enable decision-making and analytics capabilities

- There was consensus among interview participants that having structured data within an EMR is a critical prerequisite to advanced use of EMR functionality and to enable broader capabilities in support of population health management and health system sustainability.

- Interviews and data collection activities in this study indicated that data collected in many current EMRs are not generally comparable nor portable and have limited ability to support coordinated, interdisciplinary care and the goal of an interoperable provincial EHR for improving quality and health outcomes. Challenges were commonly attributed to:
  - Significant variability of data input standards and quality audits as a result of the use of free-text entries which allow for non-standard, unstructured information in EMRs
  - Lack of functionality in their EMR or the need to engage vendors to extract specific data

- There are a number of initiatives underway in Ontario to facilitate EMR data analytics for the purpose of improving population health management, chronic disease management and evidence-based decision making, including for example:
  - Electronic Medical Record Administrative Data Linked Database (EMRALD) – a database housed at the Institute for Clinical Evaluative Sciences that consists of EMR data from about 350 family physician practices in Ontario
  - The Canadian Primary Care Sentinel Surveillance Network (CPCSSN) – a primary care research initiative that extracts data from a variety of EMR applications across Canada for the purpose of improving the way chronic diseases and neurologic conditions are managed

To fully harness the power of information contained in EMRs across the province, further efforts need to be made to improve data quality and management.
Maturity of use
For the purpose of this study, maturity of use can be defined as the level of adoption and functional use of the EMR in the practice setting

- For all areas of benefit identified through the course of the study, it is acknowledged that improvements in maturity of use of EMRs by clinicians and/or administrators can yield further benefit. Such maturity of use is typically characterized by optimal adoption and use of broad EMR functionality, for both episodic care and population health management. Study participants widely agree that maturity of use is critical to supporting the transformation and the realization of benefits stemming from EMR use, such as improvements in patient care, positive health outcomes at individual and population levels, and efficiencies for providers.

- Investments in EMRs to date have yielded noteworthy, tangible benefits to clinicians and patients, but significant potential exists to extend those benefits with broader and more mature adoption of EMRs by primary care providers and their staff. Previous studies have also found that the degree of EMR benefits realized is linked to levels of maturity and experience with use of EMRs. The 2014 National Physician Survey found that many physicians report short term quality of care and productivity gains but perceived benefits of practice productivity and quality of care tend to rise as practices gain experience and broaden use. For example, the more EMR functionality providers reported using, the more likely they were to report that their productivity and the quality of care they provide has improved with EMR use.

- Benefits cited in studies are aligned with stakeholder and provider comments from this study. Stakeholders report that EMR use is becoming more mature across Ontario with more providers using their EMRs to connect to additional sources of patient information and useful care tools; however, many providers note that the most mature users are typically practicing in the larger clinics that have resources to fund a dedicated EMR data analyst, medical scribe or other technology leadership position that can support analytical capability within the practice. This was attributed to the fact that maturity of use requires having and using a rich mix of EMR functionalities and data discipline which smaller practices may have not yet had the time or resources to adopt.

- OntarioMD has recently refocused its transition support activities away from the initial adoption of EMRs in primary care setting to advancing maturity of use for both episodic and population health management purposes. These initiatives will continue to drive maturity of use and related benefits.

A continued focus in advancing maturity of EMR use will contribute to a greater diversity of sustainable benefits across the health system in support of provincial goals.
Recommended Next Steps
Significant progress has been made in recent years to reach a high degree of EMR adoption in primary care settings and to get “data in” to EMRs. EMRs are now recognized by the majority of stakeholders as a significant source of information for primary health care and as a tool for productivity and management of patient information. Given that EMRs are essential to EHRs in Ontario, focused efforts are now required to realize key areas of benefits through greater maturity of use, data quality and management, and integration and interoperability of EMRs with provincial assets.

While efforts may ultimately be required from a broad range of stakeholders, key recommendations arising from this study in support of further benefits realization and the broader implementation of *Patients First: Action Plan for Health* are addressed below.

1. **Continue to optimize and broaden access to clinical decision support tools and provincial and regional assets that expand and extend the benefits of EMR use, including**
   - Enabling greater access to provincial repositories such as OLIS, DI Reports, Integrated Assessment Record, Drug Profile Viewer and Panorama (for vaccination/immunization data)

2. **Improve EMR data quality and management through a variety of initiatives that include:**
   - Continuing to implement provincial data standards that are fit for purpose and align with individual provider workflows and providing education and awareness to ensure data standards are being interpreted and understood the same way by all parties
   - Providing education and awareness for improving data integrity, including quality and security
   - Working with system partners to establish specific performance measures and the infrastructure required for data collection, analysis and reporting
3. Improve flow of data across care settings through focused efforts to improve integration and interoperability of EMRs, including
   › Continuing to enable regional integration through the Connectivity Strategy
   › Continuing to implement EHR interoperability standards and work with EMR vendors and other stakeholders to ensure they are taking an active role to enable ease of data extraction by practices for broader health care purposes

4. Continue to advance EMR maturity of use by providing tools and knowledge that enable providers to maximize the use of their EMR, including:
   › Implementing change management strategies and user support initiatives that reflect practice needs and priorities
   › Providing education and awareness for providers regarding how to use their EMR’s functionality to its full potential
   › Promoting the availability of dedicated resources within practices who are responsible for championing data discipline and quality initiatives, developing queries and analytical procedures to support teams with their quality improvement goals and engaging teams in clinical process change related to EMR use
   › Supporting provincial stakeholders and engaging EMR vendors in providing enhanced training and user support
References


Canada Health Infoway and PwC  The emerging benefits of electronic medical record use in community-based care 2013


http://www.ehealthontario.on.ca/en/progress-report

Health Quality Ontario. Experiencing Integrated Care: Ontarians’ views of health care coordination and communication. Results from the 2014 Commonwealth Fund International Health Policy Survey of Older Adults.


## eHO Stakeholder Interviewees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Organization</th>
<th>Date Interviewed</th>
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</thead>
<tbody>
<tr>
<td>Peter Bascom</td>
<td>Chief Architect / VP, Architecture &amp; Planning</td>
<td>eHealth Ontario</td>
<td>May 26</td>
</tr>
<tr>
<td>Rob Basque</td>
<td>Sr. VP, Integration Services</td>
<td>eHealth Ontario</td>
<td>May 27</td>
</tr>
<tr>
<td>Emmanuel Casalino</td>
<td>Sr. Director, Integration Services</td>
<td>eHealth Ontario</td>
<td>May 27</td>
</tr>
<tr>
<td>Sime Pavlovic</td>
<td>VP, Clinical Data Management</td>
<td>eHealth Ontario</td>
<td>June 2</td>
</tr>
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# External Stakeholder Interviewees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
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<tbody>
<tr>
<td>Mr. Sean Simpson</td>
<td>Pharmacist</td>
<td>Simpson's Pharmacy</td>
<td>May 26</td>
</tr>
<tr>
<td>Mari Teitelbaum</td>
<td>VP, Technology and CIO</td>
<td>BORN</td>
<td>May 26</td>
</tr>
<tr>
<td>Elizabeth Keller</td>
<td>Vice-President Product Management &amp; Operations</td>
<td>Ontario MD</td>
<td>May 28</td>
</tr>
<tr>
<td>Rodney Burns</td>
<td>CIO</td>
<td>AOHC</td>
<td>May 29</td>
</tr>
<tr>
<td>Christine Sham</td>
<td>Manager</td>
<td>MOHLTC</td>
<td>May 29</td>
</tr>
<tr>
<td>Ed Brown</td>
<td>CEO</td>
<td>OTN</td>
<td>June 3</td>
</tr>
<tr>
<td>Simon Hagens</td>
<td>Director</td>
<td>Canada Health Infoway</td>
<td>June 8</td>
</tr>
<tr>
<td>Lee Fairclough</td>
<td>VP, Quality Improvement</td>
<td>HQO</td>
<td>June 19</td>
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# Primary-Care Provider Interviewees

<table>
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<tr>
<th>Name</th>
<th>Role</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Dr. David Barber</td>
<td>Physician</td>
<td>Queen’s Family Health Team</td>
<td>May 20</td>
</tr>
<tr>
<td>Dr. Eli Orrantia</td>
<td>Physician</td>
<td>Marathon FHT</td>
<td>May 20</td>
</tr>
<tr>
<td>Dr. David Daien</td>
<td>Lead Physician</td>
<td>Summerville FHT</td>
<td>May 22</td>
</tr>
<tr>
<td>Dr. David Kaplan</td>
<td>Physician</td>
<td>North York FHT</td>
<td>May 27</td>
</tr>
<tr>
<td>Dr. Karen Tu</td>
<td>Physician &amp; Senior Core Scientist</td>
<td>UHN FHT, ICES</td>
<td>May 28</td>
</tr>
<tr>
<td>Dr. Kevin Samson</td>
<td>Physician</td>
<td>East Wellington FHT</td>
<td>May 28</td>
</tr>
<tr>
<td>Ms. Tanya S. Cameron</td>
<td>Nurse Practitioner</td>
<td>Timmins FHT</td>
<td>June 3</td>
</tr>
<tr>
<td>Dr. George Southey</td>
<td>Physician</td>
<td>Dorval Medical</td>
<td>June 4</td>
</tr>
<tr>
<td>Dr. Barbara Ann Teal</td>
<td>Physician</td>
<td>Hamilton Family Physician</td>
<td>June 9</td>
</tr>
<tr>
<td>Dr. Sharon Domb</td>
<td>Lead Physician</td>
<td>Sunnybrook Academic FHT</td>
<td>June 9</td>
</tr>
<tr>
<td>Dr. Sanjeev Goel</td>
<td>Physician</td>
<td>Wise Elephant FHT</td>
<td>June 9</td>
</tr>
<tr>
<td>Dr. James MacLean</td>
<td>Physician</td>
<td>Ontario MD</td>
<td>June 11</td>
</tr>
<tr>
<td>Dr. Ronnie Aronson</td>
<td>Physician</td>
<td>LMC Diabetes &amp; Endocrinology</td>
<td>June 24</td>
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</table>
**Design of qualitative and quantitative research**

The information that was collected from the following data sources together with findings from the 2012 study and other supporting research formed the basis for findings and recommendations in this report.

<table>
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<tr>
<th>Data source</th>
<th>Objective and description</th>
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| **Interviews** | In order to determine the benefits that can be realized through broad and mature EMR use in primary care settings across Ontario, interviews with a broad spectrum of stakeholders were conducted. The target participant population for interviews was as follows:  
› For provider interviews, participation was sought from those who are above average or advanced users of EMRs.  
› For interviews with key stakeholders and experts internal to eHealth Ontario, participation was sought from those with significant experience and involvement supporting the further adoption and use of EMRs in Ontario.  

The emphasis of the interviews was to:  
› identify relevant insights, experience and lessons learned that supported benefits realization and demonstrated the role of EMRs (direct and indirect) in realizing these benefits  
› any changes in benefits realized in the three years since the last study was completed; and,  
› the challenges and opportunities for further benefits realization related to mature and broad use of EMRs.  

Where possible, information was also obtained in relation to the selected indicators.  

A structured interview guide was developed and emailed to each interviewee prior to the interview. Three sets of questions were developed and tailored to each interview participant group: providers, key stakeholders and stakeholders internal to eHealth Ontario. |
| **Provider Survey** | A provider survey was developed and distributed electronically to primary care providers who are advanced users of EMRs.  

To allow for an understanding of any changes in benefits realized since the 2012 study was completed, the provider survey included many of the same questions as those that were included in the 2012 provider survey. Minor revisions were made including:  
› the removal of any questions related to indicators that were not selected for measurement in 2015; and,  
› the addition of questions that would allow for deeper understanding of the contributions of some recent initiatives toward EMR benefits evaluation (e.g. experiences related to Hospitals Report Manager (HRM) and the Ontario Laboratories Information System (OLIS)). |
| **EMR extracts** | A request for EMR system reports related to specific indicators was requested from study participants in order to measure benefits related to some of the key indicators identified for measurement in 2012. |