Final Report

OntarioMD EMR Physician Dashboard Proof of Concept

October 2017

Table of Contents

Glossary of Terms and Acronyms

The following explains some key terms and acronyms referenced in this report:

AFHTO: Association of Family Health Teams of Ontario

AOHC: Association of Ontario Health Centres

BIRT: Business Intelligence Reporting Tool (AOHC)

BRWG: Business Requirements Working Group, a clinical advisory group facilitated by OntarioMD and consisting of physicians and indicator framework representatives to define OntarioMD EMR Physician Dashboard requirements and to identify, prioritize and define provincial indicators for initial inclusion in the OntarioMD EMR Physician Dashboard Proof of Concept.

CIHI: Canadian Institute for Health Information

Dashboards:

> **dashboard:** Generic term used to describe a visual representation of clinical metrics.
>
> **OntarioMD EMR Physician Dashboard Framework (Dashboard Framework):** A physician-defined set of features and functionality available across all OntarioMD-certified EMRs that provides a visual representation of clinical indicators across the physician's patient population, allowing key practice information to be seen at a glance.
>
> **OntarioMD EMR Physician Dashboard (Dashboard):** A dashboard built on the OntarioMD EMR Physician Dashboard Framework which has been implemented into the EMR.
>
> **Local EMR Physician Dashboard (Local Dashboard):** The OntarioMD EMR Physician Dashboard of features and functionality which is developed within the EMR.
>
> **Common EMR Physician Dashboard (Common Dashboard):** The OntarioMD EMR Physician Dashboard of features and functionality that is developed externally and integrated into the EMR.
>
> **OntarioMD EMR Physician Dashboard Proof of Concept (Dashboard PoC):** An OntarioMD initiative to demonstrate improved clinical value of an EMR to a limited number of physicians, through access to high-value provincial clinical indicators within a local or common EMR Physician Dashboard that also enables improvements to EMR data quality and demonstrates scalability to physicians across multiple OntarioMD-certified EMR offerings and vendor platforms.

D2D: Data to Decisions (AFHTO)

HQO: Health Quality Ontario

IHI: Institute for Healthcare Improvement

Indicator Framework: A process of defining and prioritizing primary care clinical metrics to measure patient care outcomes or healthcare system performance. Organizations such as HQO, AFHTO and CIHI have each developed an indicator framework to support prioritized indicators and to provide indicator definitions. OntarioMD leverages these indicator definitions to select and develop an introductory indicator set used in the Dashboard PoC.

LHIN: Local Health Integration Network

PCPM: Primary Care Performance Measurement (HQO indicator framework)

PHI: Personal Health Information

QI: Quality Improvement

Executive Summary

Introduction

Electronic medical records (EMRs) hold tremendous potential for improving the workflow and efficiency of primary care practices, serving as a vital hub for an interconnected health care system, and ultimately improving health quality and patient outcomes. Since 2004, OntarioMD has played a central role in facilitating the widespread adoption and use of OntarioMD-certified EMRs by Ontario physicians. With more than 14,000 community-based family physicians and specialists now using EMRs in their practice, OntarioMD's mandate from the Ministry of Health and Long-Term Care (MOHLTC) has shifted to a focus on how to optimize EMR functionality and how to connect to products and services that increase the clinical value of EMRs.

OntarioMD's current EMR Agreement with the MOHLTC includes initiatives that advance interoperability and data portability. The OntarioMD EMR Physician Dashboard Proof of Concept (Dashboard PoC) builds on this by introducing a framework for an essential digital health tool that:

- provides immediate clinical value to physicians, through real-time visual representation of EMR data using widely-recognized, primary care indicators;
- provides the ability to drill down to patient level data for each indicator enabling physicians to take immediate proactive steps to improve patient care;
- helps physicians standardize their data entry to improve the quality of patient data in their EMR;
- allows physicians to trend and compare their indicator metrics with other physicians using the Dashboard;
- would scale provincially to all Ontario physicians using an OntarioMD-certified EMR, and is easily expanded with new and evolving data quality, practice and clinical indicators.

OntarioMD's work on the Dashboard PoC was conducted in partnership with Health Quality Ontario, the Association of Family Health Teams of Ontario, the Canadian Institute for Health Information and the Association of Ontario Health Centres (and funded by the MOHLTC) to develop the framework. OntarioMD led and facilitated the development of provincial indicators used in the OntarioMD EMR Physician Dashboard (Dashboard), and collaborated with participating EMR vendors to support related training and change management activities.

The OntarioMD EMR Physician Dashboard Proof of Concept Benefits Evaluation provides a summary of the key Dashboard PoC findings and recommendations from the perspective of participating physicians. This Final Report is intended to expand on those important findings and insights, casting a wider lens to present findings and recommendations from the perspective of multiple stakeholders. Whereas the Benefits Evaluation summarized findings and recommendations based on four key areas – Dashboard Supports and Service; Dashboard Use; Indicator Effectiveness; and User Satisfaction – this report considers additional themes to provide a complete picture of considerations for future project development.

Following this executive summary, key findings and recommendations are presented that OntarioMD considers to be the most important takeaways from the initiative. The balance of this report details additional lessons learned, key findings and recommendations organized by theme. The information in

this Final Report and in the Benefits Evaluation will be used to support and inform broader provincial planning around a dashboard strategy.

Approach

The Dashboard PoC was carried out between December 2015 and March 2017. A total of 111 physicians participated in the Dashboard PoC through their Practice Solutions Suite (PS Suite), Med Access or OSCAR 15 EMR. Participants spanned several regions of the province, and represented solo practitioners, care group specialists, Family Health Teams and group practices (FHGs, FHOs, FHNs).

Project work was carried out through the following stages:

- **Planning:** OntarioMD worked with selected EMR vendors, clinicians and indicator framework stakeholders to finalize the key business and technical requirements for the OntarioMD EMR Physician Dashboard Framework (Dashboard Framework), and finalize the selection of indicators to be included in the Dashboard PoC.
- **Development:** Vendors incorporated the OntarioMD EMR Physician Dashboard Framework into their OntarioMD-certified EMR.
- **Physician Engagement:** OntarioMD developed a strategy to reach out to physicians across all Local Health Integration Networks for participation in the Dashboard PoC.
- **Physician Demonstration:** Participating physicians used the OntarioMD EMR Physician Dashboard to demonstrate and evaluate the objectives of the Dashboard PoC.

Observations

Many of the participating physicians using the Dashboard realized important benefits in quality improvement (QI) and clinical outcomes. While not a mandatory component of the Dashboard PoC participation, approximately 15% of participating physicians indicated that they proactively used their Dashboard data to update patient records to accurately reflect 'Active' patients, and changed their data capture processes to use standard terminology, coding, and consistent entry of lab results. These physicians realized **dramatic improvements:**

- ***56% improvement*** in the coding of patients with diabetes
- ***70% improvement*** in the coding of patients with hypertension
- ***50% improvement*** in cervical cancer screening rates
- ***52% improvement*** in smoking status recorded

In most cases, staff resource issues limited the QI impact in participating physicians' practices. In other cases, the impact was limited because the practice was found to already be using best practices for data capture. However, the above results **suggest the potential for the Dashboard to drive dramatic QI impact for physicians if paired with appropriate change management supports.**

Physicians' ability to trend and compare their metrics with other Dashboard participants is a key driver of QI efforts. The Common Dashboard demonstrated during the Dashboard PoC can be extended to multiple EMR vendors, enabling physicians to trend and compare their metrics.

OntarioMD has extensive experience and a comprehensive set of associated change management tools to collaborate with EMR vendors to support physicians with enhanced EMR use and new product adoption that facilitate standards across EMRs. **These resources can be used to support a wider province-wide Dashboard rollout, and to support dashboard-connected physicians in improving data quality and clinical outcomes.**

However, QI must be driven by clinically relevant indicators in the Dashboard. Clinical engagement is needed to inform identification and development of these indicators. For this reason, **a provincial indicator governance structure is essential** to manage:

- selection of new provincial indicators and definition of queries with guidance from indicator framework representatives, clinicians, EMR vendors and OntarioMD;
- revision of existing indicators due to changing guidelines; and,
- indicator implementation and change management standards across EMRs.

As the sponsor for provincial indicators used in the Dashboard, and with an established reputation as a trusted advisor to the EMR vendor and physician communities, **OntarioMD is ideally suited to playing a key role in facilitating the development and evolution of indicator definitions and supporting clinicians in the adoption of new indicators.**Perhaps most importantly, the Dashboard PoC demonstrated that the Dashboard is easy to use. For clinicians in a busy practice, this is crucial for ensuring they realize the full clinical value of the tool.

Key Findings and Recommendations

The following table provides a summary of all the discoveries made during the Dashboard PoC, organized by theme. Recommendations are made based on the key findings. The Themes, Findings and Recommendations section of this report provides additional context and information to support these findings and recommendations.

<table>
<tr><th colspan="2">Dashboards</th><th>Page 19</th></tr>
<tr><td colspan="3">1. There are two main types of primary care dashboards in use: Clinical/Quality Improvement (QI), and “secondary” use. The OntarioMD EMR Physician Dashboard targets Clinical/QI use.</td></tr>
<tr><td colspan="2">Clinical/QI features:
Actionability (EMR functionality on patient drill-down lists)
Well-defined objective(s)
Accessed in EMR/at point-of-care
Real-time
Improved EMR data quality
Improved patient care
No PHI shared; based on EMR data</td><td>“Secondary” use features:
Health system
Population health
Correlation with other information systems
Big data / complex algorithms
Aggregates PHI</td></tr>
<tr><td colspan="3">2. The Dashboard PoC revealed that the OntarioMD EMR Physician Dashboard is the only QI dashboard in Canada today that:
provides access to high-priority provincial indicators on a broad scope of clinical and practice level outcomes;
reveals underlying EMR data quality of key clinical elements;
allows for improvements to clinical care for identified patients;
provides the capability to trend and compare against an aggregate of physicians;
is flexible enough to incorporate new clinical indicators and quality standards as they are produced;
is available to physicians across multiple OntarioMD-certified EMRs.</td></tr>
<tr><td colspan="3">Recommendation: Stipulate that the OntarioMD EMR Physician Dashboard should be a fundamental component of all EMRs to improve QI, clinical outcomes, practice efficiencies and data quality.</td></tr>
<tr><th colspan="2">OntarioMD EMR Physician Dashboard Development</th><th>Page 23</th></tr>
<tr><td colspan="3">1. Development and deployment of a Common Dashboard across all OntarioMD-certified EMR offerings are fundamental to province-wide cross-EMR scalability.</td></tr>
</table>

Recommendation: Develop a costing model for implementation of a Common Dashboard to ensure financial equity across EMR vendors and physicians.	
Recommendation: Encourage a complementary dashboard approach for vendors who have the capacity to offer other dashboards in addition to a Common Dashboard. For example, physician care groups may opt to create a group-specific set of indicators which is complementary to the broader provincial indicators, and which could be managed independently.	
Clinical Value in Dashboards	**Page 26**
1. Although data quality and clinical outcome improvements were not mandatory in the Dashboard PoC, it was noted that approximately 15% of physicians, spread over several clinics, used the Dashboard results to: update patient records to accurately record 'Active' patients and change data capture processes to use standard terminology, coding, and consistent entry of lab results. For these physicians, dramatic improvements were realized: • ***56% improvement*** of patients coded with diabetes • ***70% improvement*** of patients coded with hypertension • ***50% improvement*** of cervical cancer screening rate • ***52% improvement*** of smoking status recorded The majority of physicians showed little or no improvement during the Dashboard PoC because of limited staff resources and time to enable QI or because, in some instances, they were already using best practice for data capture. The effect of the preliminary results suggests the potential for the Dashboard to enable dramatic QI impact with appropriate change management supports in place for physicians.	
2. Indicators must be viewed as clinically relevant and supporting clinical and practice improvements to patient care in order to prompt use by physicians.	
3. Clinical value in the Dashboard is achieved through: • Real-time access • Access at point-of-care (within EMR) • Drill-down to actionable patient data • Ability to identity and improve data quality	
Recommendation: Engage clinicians in the identification and development of clinically relevant indicators to be used in the Dashboard.	
Share, Trend and Compare	**Page 32**
1. Physicians identified the ability to trend and compare their metrics with an aggregate of their peers as a key requirement. This can drive competitive spirit, which in turn can incent physicians to improve QI efforts.	
Recommendation: Add the functionality to alter scope for trending and comparing results (for example, by practice, region, clinical care group/speciality).	

Indicators	Page 34
1. Further clinical engagement is needed to translate clinical terms used in provincial indicator definitions across indicator frameworks (HQO, AFHTO, CIHI) into technical data queries that can be standardized across EMRs (e.g., define patients with diabetes, define acceptable range of lab values).	
2. The Dashboard PoC revealed a need to continually evolve indicators due to: • evolution of clinical guidelines and standards that impact the indicator definitions over time • identification of errors, omissions, or revisions in existing indicator technical data queries • physician requests for indicator enhancements or new indicators	
Recommendation: Establish a governance structure to manage the evolution of provincial indicators: • Selection of new provincial indicators and definition of queries with guidance from indicator framework representatives, clinicians, and OntarioMD • Revision of existing indicators due to changing guidelines • Indicator implementation and change management standards across EMRs • Establish roles and responsibilities of OntarioMD as the sponsor of provincial indicators used in the Dashboard • OntarioMD should provide a key role in facilitating development and evolution of indicator definitions for indicators used in the Dashboard	
Access to Data	**Page 38**
1. No PHI ever leaves the physician practice. Only physician-level indicator metrics (statistics, percentages) are aggregated in the Dashboard.	
2. Physicians are eager to see peer-level comparisons on physician-level indicator metrics. However, there is sensitivity around access to non-anonymized results from aggregated physician-level metrics beyond the clinic.	
3. The opportunity for OntarioMD to view metrics provided considerable value to QI efforts by: • facilitating personalized change management plans for individual physicians • revealing aggregate changes and trends over time, e.g., % of patients with smoking status recorded, # of patients with coded entries for diabetes diagnosis, % of eligible patients receiving cervical cancer screening	
Recommendation: Establish data-sharing agreements to define terms and conditions and to gain physicians' consent to share physician-level indicator metrics with multiple sponsors or stakeholders.	

Scalability	Page 40
1. Indicator scalability is dependent on EMR vendor capacity to implement additional indicators and to support additional queries and searches for sending metrics and running drill-down reports.	
2. Cross-EMR scalability is most readily achieved through deployment of a Common Dashboard.	
Recommendation: Support provincial deployment to a significantly greater number of physicians through streamlined processes / additional resources for collecting agreements, communicating with physicians, delivering training, and providing OntarioMD-led change management support.	
Data Quality	**Page 42**
1. Access to key data elements revealed through indicator drill-down patient lists identified inconsistencies in terms being used, where diagnosis coding has not been applied, and where patient interactions could support timely data updates. The ability to realize clinical and practice outcome improvements from Dashboard use motivates physicians to improve the quality of their existing data and to improve data capture practices.	
Recommendation: Support physicians with training and change management activities that focus on clinical and practice outcome improvements which can be realized by improving data capture and data quality.	
Change Management and Deployment	**Page 45**
1. Change management support is fundamental to physician adoption of the Dashboard and QI efforts. OntarioMD has extensive experience and has developed a comprehensive set of associated change management tools and approaches across EMRs to help support physicians in their understanding and adoption of the Dashboard.	
2. Primary users of the Dashboard will vary based on practice model, size and available staff. Available supports should consider all types of practice users, including physicians, specialists, nurses, admin/clerk, practice leads.	
Recommendation: OntarioMD should lead efforts to support the Dashboard, including training, support, and follow-up, in partnership with other stakeholders as needed.	
Recommendation: Make OntarioMD training and support services available to physicians using the Dashboard.	
Stakeholder Engagement and Collaboration	**Page 47**
1. Cooperation and collaboration between EMR vendors is achievable, and can result in implementation of common functionality across different product offerings.	
2. Dashboard Framework development was greatly enhanced by enabling physicians to drive the process of defining the Dashboard requirements and qualifying indicator definitions with relevant EMR criteria to enhance the definition of provincial indicators.	
Recommendation: Continue to involve physicians in driving the evolution of the Dashboard functionality and provincial indicators to ensure clinical value is fully realized.	

1 Introduction

1.1 Purpose of Final Report

This report is intended to describe the observations, key findings, and recommendations from the implementation of the OntarioMD EMR Physician Dashboard (Dashboard) within physicians' OntarioMD-certified EMRs. It considers input and feedback from all stakeholders, and covers the entire period from project implementation to completion. This report will help inform the planning for the next phase of the Dashboard initiative.

The OntarioMD EMR Physician Dashboard Proof of Concept Benefits Evaluation report provides a summary of key findings and recommendations specifically from the perspective of participating physicians. Whereas this Final Report examines key findings and recommendations across several identified themes, the Benefits Evaluation focused more broadly on four areas: Supports and Services, Dashboard Use, Indicator Effectiveness, and User Satisfaction.

1.2 Background

Physicians are unable to access and/or validate the quality of information collected in their EMR which limits their ability to improve patient and practice outcomes. A lot of work has been done around development of indicators that describe primary care outcomes relating to chronic disease management, preventive cancer screenings, and population health. However, current EMRs largely lack the tools to reveal the data that has been collected at the point-of-care. The OntarioMD EMR Physician Dashboard Proof of Concept (Dashboard PoC) is intended to demonstrate the value of a dashboard that provides physicians with real-time access to information and addresses the following challenges:

- inconsistent data capture;
- insufficient time or ability to create and run data searches; and,
- inadequate tools for accessing and/or updating data.

2 Project Overview

2.1 Business Drivers

- Enabling mature EMR use by physicians, through the ability to quickly and easily identify and advance patients who are overdue for various screenings, or need clinical interventions for chronic conditions;
- Improving EMR data capture at the point-of-care and reducing variability in how information is collected, to improve searches and reports that support chronic disease management and preventive care;
- Facilitating access to provincial indicators which support:
  - clinical outcomes and practice enhancement;
  - Quality Improvement Plans;
  - funded reporting requirements;
- Benefiting physicians in all practice models throughout the province who are using an OntarioMD-certified EMR offering.

2.2 Approach

This initiative investigates the value a real-time dashboard can bring to the clinical community at the point-of-care, and seeks to understand how revealing key data elements of dashboard indicators to physicians can impact data quality. The work was accomplished through three main phases:

1. **Planning Phase**
   a. **Environmental Scans**
   Two environmental scans were conducted prior to the launch of this initiative. An environmental scan of existing primary care dashboards used by the clinical community throughout Canada helped shape the scope and basic requirements for the Dashboard. An environmental scan of existing indicator frameworks helped identify provincial indicators that should be included in the Dashboard.

   b. **Physician Workshops**
   A Business Requirements Working Group (BRWG), comprised of physicians along with representatives of indicator framework organizations (HQO, AFHTO, CIHI) was formed to define business requirements and an initial set of indicators.

2. **Development Phase**
   a. **Vendor Selection**
   Vendors were selected through a request for services (RFS) process to build the Dashboard functionality and initial set of indicators into their OntarioMD-certified EMR offerings.

b. Development of Functionality Based on BRWG Requirements
Vendors demonstrated their ability to meet the Dashboard functionality requirements defined by the BRWG through a Gap/Fit analysis.

c. Development of Indicators and Queries Based on BRWG Requirements
Vendors demonstrated their ability to develop an initial set of indicators and corresponding queries based on BRWG requirements through a Gap/Fit analysis.

3. Proof of Concept Demonstration Phase
Physicians were selected to demonstrate key objectives through use of the Dashboard. Physician feedback was solicited informally and through the Baseline and Final Surveys that provided information for a Benefits Evaluation to evaluate how well the Dashboard PoC objectives were met. Lessons learned through the Dashboard PoC as outlined in this Final Report and key findings from the Benefits Evaluation will inform the next phase of the Dashboard initiative.

2.3 Objectives

The Dashboard PoC was launched in October 2015 with three primary objectives:

1. Demonstrate improved clinical value of an EMR to physicians through access to high-value provincial clinical indicators within the OntarioMD EMR Physician Dashboard Framework (Dashboard Framework).
2. Enable improvements in EMR data quality by exposing physicians' key data elements underlying each clinical indicator.
3. Demonstrate scalability across OntarioMD-certified EMRs and expandability by allowing new indicators to be added or existing indicators to be updated to reflect current provincial priorities or clinical guidelines.

A project extension allowed for the Dashboard PoC objectives to expand across an incremental scope change that included:

- provision of a feature to allow for the aggregation and trending over time of primary care indicator metrics shared by participating physicians
- physician access to a common shared dashboard for aggregating, trend viewing, and comparing provider-shared metrics for a set of indicators
- scalability across multiple OntarioMD-certified EMR offerings and vendor platforms
- support of approximately 100 physicians participating in the Dashboard PoC.

2.3.1 Assessing Real-Time Clinical Value

To assess the value of the Dashboard Framework to physicians, we considered:

- the clinical or practice value of the indicators chosen for initial inclusion in the Dashboard, and;
- the value of the Dashboard features and functionality that was prioritized by the BRWG and built into the EMRs by the vendors.

The BRWG initially identified 45 fundamental requirements for inclusion in the Dashboard Framework. Throughout the demonstration phase, some features and functionality emerged as having more value than others (e.g., the ability to identify patients requiring follow-up; the ability to drill down to patient lists). At the same time, some functionality not identified as fundamental was, in fact, viewed by participating physicians as critical for inclusion in the next phase (e.g., the ability to trend results and compare to an aggregate of participating physicians).

Similarly, of the 17 indicators selected for initial inclusion in the Dashboard PoC, some were identified by physicians as providing greater clinical value than others (e.g., cancer screening indicators used to recall patients overdue for screening). Participating physicians also identified some indicators not selected for the Dashboard PoC as candidates for inclusion in subsequent phases of the Dashboard initiative.

2.3.2 Improved EMR Data Quality Through Access to Underlying Indicator Data

An indicator's value to physicians depends on the quality of data captured in the EMR that is used to calculate that indicator's results. An indicator for smoking status, for example, cannot accurately reveal that 70% of a physician's patients are smokers if smoking status has only been recorded for 5% of patients. Similarly, a diabetes indicator will rely on physicians recording a patient with diabetes in a way that can be captured by the indicator.

By allowing the physician to view and access the underlying data that populates each indicator category, the Dashboard provides a means which allows physicians to identify and address errors or omissions in data capture.

Feedback and information from physicians participating in the Dashboard PoC demonstration phase, collected through touchpoint sessions and survey responses, provides insight into how access to underlying data has changed physician behaviour in capturing data.

2.3.3 Scalability and Expandability

Scalability refers to:

i.) The ability of all vendors with OntarioMD-certified EMRs across the province to incorporate the required features and functionality that make up the Dashboard Framework as well as implement an initial set of provincial indicators;

ii.) The ability to deploy the Dashboard to all physicians across the province using an OntarioMD-certified EMR.

Expandability refers to the ability to expand or modify the existing set of provincial indicators and to update the set of indicators for all Dashboard users.

2.4 Indicators

In the Dashboard PoC, an initial set of indicators was chosen to demonstrate the value of the Dashboard Framework, as well as the clinical value of the chosen indicators. The initial set of indicators was selected and prioritized from a pool of indicators developed through indicator frameworks by HQO, AFHTO, and CIHI.

HQO's Primary Care Performance Measurement (PCPM) framework is focused on determining which aspects of primary care performance are most valuable to measure. The PCPM includes a set of measures that align with HQO's *Nine Attributes of a High Performing Health Care System Framework*, as

well as the Institute for Healthcare Improvement's (IHI) Triple Aim (improving patient experience, improving population health, reducing per capita cost of health care) framework. HQO provided definitions for a priority subset of measures within the larger framework.

AFHTO's Decisions-To-Data (D2D) framework aims to identify and refine priority primary care performance measures at the system and practice level. Measures have been selected and prioritized to align with HQO, IHI, and CIHI frameworks, as well as the Starfield model, an approach to measuring quality, capacity, and total system cost based on the work of Barbara Starfield. AFHTO has additionally utilized the support of Quality Improvement Decision Support Specialists (QIDSS) to determine how to align measures with EMR data.

CIHI released a set of 105 pan-Canadian indicators in 2006, identified as necessary to measure and compare primary health care performance throughout Canada. At the time, only 18 indicators were assessed to be measurable from existing data sources. In 2011, an attempt was made to refine the original list of indicators based on measurability, alignment with current clinical practices and data sources, and how well they reflect priority aspects of primary health care performance in Canada. This resulted in two sets of 30 indicators, one set relevant to health care system performance and one set relevant to primary care providers. Each indicator aligned to a specific primary health care domain (e.g., accessibility, appropriateness, etc.). Definitions and methods of calculation were provided for each indicator.

Potential indicators for Dashboard PoC inclusion were narrowed down from these sources by focusing on practice-level indicators that could be measured by EMR data, as well as indicators that were represented across more than one indicator framework. The BRWG helped select, prioritize, and define a set of indicators from that smaller set to be included in the Dashboard PoC using an existing definition for each indicator from one of the three indicator frameworks. Seventeen initial indicators were ultimately chosen.

2.5 Proof of Concept

In February 2016, OntarioMD solicited vendor participation for the Dashboard PoC by inviting all OntarioMD-certified EMR vendors to respond to an RFS. TELUS Health and OSCAR EMR were selected to participate. TELUS demonstrated its implementation of the Dashboard Framework in PS Suite and Med Access (as part of the extended scope of work). OSCAR EMR demonstrated the Dashboard Framework implementation in OSCAR 15.

A total of 111 physicians participated in the Dashboard PoC:

- 87 participating physicians use TELUS-supported EMRs (PS Suite, Med Access); and
- 24 physicians use the OSCAR EMR (OSCAR 15).

The table below (Figure 1) shows a breakdown of physician participation based on practice type:

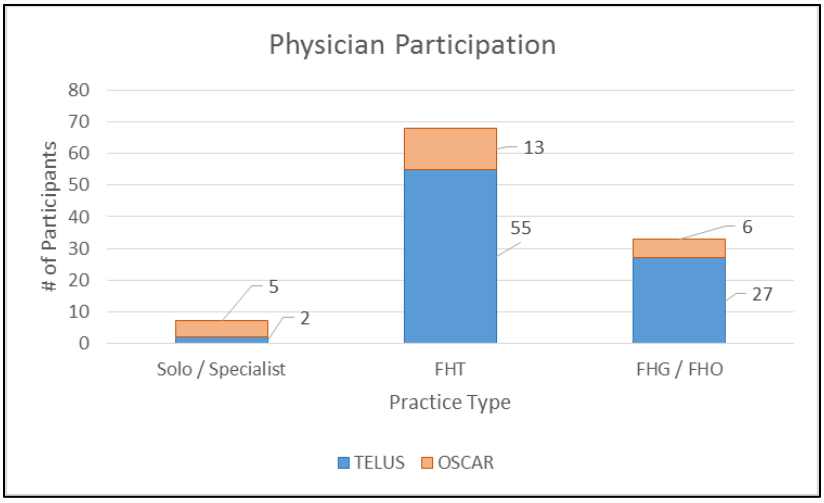

Figure 1. Physician Participation by Practice Type

The table below (Figure 2) shows a breakdown of physician participation by LHIN:

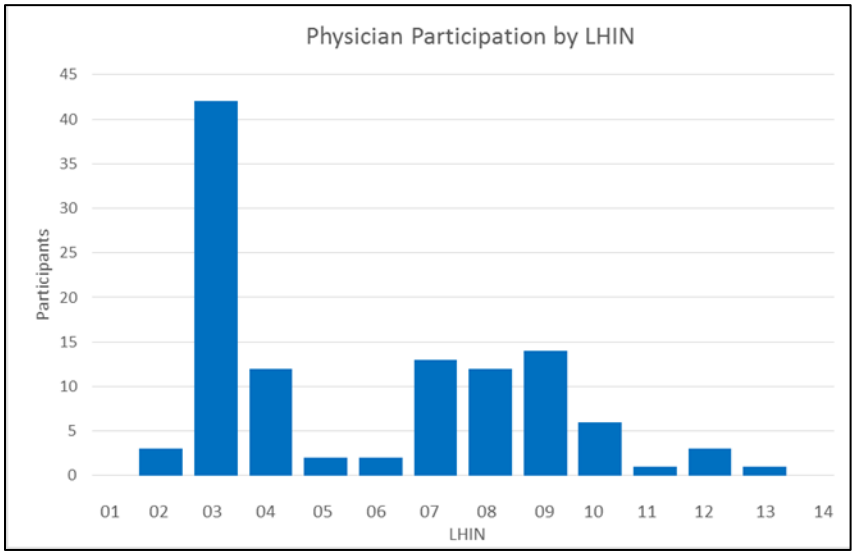

Figure 2. Physician Participation by LHIN

Physicians participated through the demonstration phase of the Dashboard PoC based on their individual capacity. This provided for a range of Dashboard comprehension levels and feedback.

Physicians were also asked to provide feedback through the **Baseline** Survey distributed after the first training session and **Final** Surveys distributed at the end of the Dashboard PoC timeframe.

3 Themes, Findings and Recommendations

3.1 Dashboards

3.1.1 Introduction

There are many types of dashboards in use displaying metrics derived from EMR data, and many more continue to be developed. An environmental scan of existing dashboards within the EMR landscape conducted at the start of the Dashboard PoC revealed dashboards with many different characteristics, and created for different purposes. This environmental scan influenced the BRWG's identification of specific requirements to meet the objectives for the Dashboard PoC:

- Real-time clinical and practice value from provincial primary care indicators;
- Improved EMR data quality of provincial indicator data elements, and;
- Scalability across provincial EMR offerings with ability to expand the provincial set of indicators.

3.1.2 Environmental Scan

Existing primary care dashboards can be differentiated in several ways. Some dashboards focus on helping physicians improve primary care outcomes, while others focus on improving system outcomes. While some dashboards are built for a focused or specific purpose (e.g., improvement of one single chronic condition), others focus on a broader set of primary care outcomes. Finally, some are focused on improving clinical outcomes, some focus on driving EMR data quality, and some consider both.

The following table summarizes the differences among primary care dashboards reviewed in the environmental scan:

Dashboard Attribute	**Primary Care (practice level) Outcome Dashboards:**	**Health Care System Outcome Dashboards:**
Focus on practice level vs. system level outcomes	• Point-of-care • Timely data • Improve clinical or practice patient outcomes • EMR data only • Simple metrics/queries • Clinical focus	• Aggregation into external data warehouse • Periodic data extraction • Improve health care system outcomes • EMR data combined with other data sources • Complex metrics or algorithms • Research focus
Dashboard Attribute	**Focused Scope:**	**Broad Scope:**
Focused vs. broad scope of outcomes	• Focus on specific chronic disease or preventive care outcome improvement	• Focus on broad range of primary care clinical and practice indicators

	• e.g., diabetes	• e.g., chronic disease indicators, preventive care indicators, or practice indicators
Dashboard Attribute	**Improvement of Clinical Outcomes:**	**Improvement of EMR Data Quality:**
Improvement of clinical outcomes vs. improvement of EMR data quality	• Provides physician with graphics or statistics which summarize patient outcomes, e.g., counts of patients aged 12 or older who smoke and who do not smoke • May also focus on improvement of EMR data quality	• Provides physician with graphics, statistics, or lists of patients which reveal quality of EMR data, e.g., patients aged 12 or older for whom no smoking status data is recorded • May also focus on improvement of clinical outcomes

3.1.3 Lessons Learned

#	Description	Explanation
LL-1.1	Real-time, point-of-care dashboards which focus on practice level outcomes are most relevant to physicians.	Primary care physicians prioritize dashboards that directly help improve clinical and practice patient outcomes over dashboards that enable better health care system outcomes.
LL-1.2	The quality and relevance of practice level outcomes is enhanced by timely data captured at the point-of-care.	• Dashboard data refreshed in real-time or daily provides physicians with a better ability to perform relevant patient follow-up activities than data that is refreshed on a periodic basis. • Dashboards based on point-of-care data captured by physicians in the EMR are more clinically relevant to physicians than dashboards which use external data sources.
LL-1.3	Dashboards with focused scope of outcomes are relevant to fewer primary care physicians than dashboards with a broader scope of outcomes.	• Dashboards focusing on management of a single chronic condition or on prevention of a specific illness will be limited in scope to physicians who prioritize improving patient outcomes in that area.
LL-1.4	Dashboards with focused scope may provide greater depth in managing a specific condition than a dashboard with broad scope.	• The complexity of specific chronic disease management is difficult to capture in a dashboard with a broad scope of outcomes.

		• A dashboard with a single or focused scope can provide primary care physicians with a more detailed set of metrics and outcomes for managing a specific condition.
LL-1.5	Broad scope and focused scope dashboards can coexist and complement each other as primary care dashboards.	• No single broad scope dashboard will satisfy the needs for managing patient outcomes by all primary care physicians.
LL-1.6	Primary care dashboards which display clinical outcomes only, without corresponding EMR data quality measures, may be based on incomplete or unreliable data.	• Dashboards which are only focused on clinical or practice outcomes provide no way of helping physicians assess data quality or improve data capture. • Dashboard outcomes are unreliable if based on incomplete data. • Physicians' desire for reliable reports drives quality improvement. • Aggregation of data for system outcome measurement or other future secondary uses relies on reliable data capture by physicians at the point-of-care.
LL-1.7	Primary care dashboards which reveal data quality measures only without providing clinical outcomes provide limited incentive for improvement by physicians.	• Physicians are motivated by improving patient care. • Dashboards that do not display clinical or practice outcomes provide no way for physicians to measure outcome improvements.
LL-1.8	The OntarioMD EMR Physician Dashboard provides unique value among existing primary care dashboards.	• Real-time, point-of-care dashboard • Focus on broad scope of practice-level outcomes that are high priority to measure • Reveals underlying EMR data quality of key clinical elements • Provides comparison and trending capability • Is flexible enough to incorporate new clinical indicators and quality standards as they are produced

3.1.4 Key Findings and Recommendations

<table>
<tr><th colspan="2">Dashboards</th></tr>
<tr><td colspan="2">1. There are two main types of primary care dashboards in use: Clinical/Quality Improvement (QI), and “secondary” use. The OntarioMD EMR Physician Dashboard targets Clinical/QI use.</td></tr>
<tr><td>Clinical/QI features:
Actionability (EMR functionality on patient drill-down lists)
Well-defined objective(s)
Accessed in EMR/at point-of-care
Real-time
Improved EMR data quality
Improved patient care
No PHI shared; based on EMR data</td><td>“Secondary” use features:
Health system
Population health
Correlation with other information systems
Big data / complex algorithms
Aggregates PHI</td></tr>
<tr><td colspan="2">2. The Dashboard PoC revealed that the OntarioMD EMR Physician Dashboard is the only QI dashboard in Canada today that:
provides access to high-priority provincial indicators on a broad scope of clinical and practice level outcomes;
reveals underlying EMR data quality of key clinical elements;
allows for improvements to clinical care for identified patients;
provides the capability to trend and compare against an aggregate of physicians;
is flexible enough to incorporate new clinical indicators and quality standards as they are produced;
is available to physicians across multiple OntarioMD-certified EMRs.</td></tr>
<tr><td colspan="2">Recommendation: Stipulate that the OntarioMD EMR Physician Dashboard should be a fundamental component of all EMRs to improve QI, clinical outcomes, practice efficiencies and data quality.</td></tr>
</table>

3.2 OntarioMD EMR Physician Dashboard Development

3.2.1 Introduction

Through the Dashboard PoC development phase, the participating vendors demonstrated their ability to integrate the Dashboard requirements and an introductory set of provincial indicators into their EMRs. Vendors collaborated on the integration of two different dashboard models into the EMRs — a "local" dashboard model, and a "common" dashboard model. The third Dashboard PoC objective, scalability, relates strongly to the ability of all EMR vendors to incorporate local or common dashboard functionality and associated indicators into their EMRs.

- A **Local Dashboard** requires the vendor to develop required dashboard functionality (as defined by the BRWG) into their EMR. The vendor is required to build searches and queries related to the introductory indicator set. As the set of provincial indicators evolves, the vendor will build new searches and queries that support the new or revised provincial indicators in the Local Dashboard. If the Dashboard requirements evolve, the vendor is responsible for modifying the Local Dashboard functionality accordingly.
- The Dashboard PoC revealed the opportunity to leverage WebFrame technology to integrate a **Common Dashboard** into all OntarioMD-certified EMR offerings. The Common Dashboard allows visualization of metrics through queries that are created and executed in the physician's EMR, with results shared in the Common Dashboard to support graphics. In the Common Dashboard, all PHI remains in the provider's EMR; only metric results are shared with the Common Dashboard. This capability also enables users to compare and trend their results with all other Common Dashboard users.

The Common Dashboard is built and developed externally to meet many of the functional requirements defined by the BRWG. This functionality is then integrated by the vendor into their EMR using WebFrame technology. The EMR vendor incorporating the Common Dashboard is required to build searches and queries that provide a standard set of metrics for display in the Common Dashboard, as well as developing the tabular patient list associated with the indicator and actionable functionality. As new indicators are implemented within the Common Dashboard, the EMR vendor integrating the Common Dashboard is required to build new searches and queries that provide metrics for display in the Common Dashboard and patient lists for action in the physician's EMR. Core capabilities and functionality are managed centrally through the Common Dashboard. This significantly reduces development commitment for the EMR vendor to just manage the agreed to query metrics supplied to the Common Dashboard and patient lists for action in the physician's EMR.

Vendor challenges and successes experienced during the Dashboard PoC provide some insight into the experience future vendors may face in implementing a Local or Common Dashboard into their EMRs.

3.2.2 Lessons Learned

#	Description	Explanation
LL-2.1	Development and management of a dashboard tool is reasonably complex.	• Some vendors may already have mature dashboard functionality in place that can be leveraged in developing a Local Dashboard. • Many vendors will have minimal dashboard functionality in place that would require significant development to meet the OntarioMD EMR Physician Dashboard Framework requirements.
LL-2.2	There is variation across vendors in their capacity to develop new functionality within a defined timeframe.	• Dashboards will require notable investment from EMR vendors, including resources to develop, test and support.
LL-2.3	The Local and Common Dashboard complement each other in functionality.	• Currently, ability to compare and trend indicators is available only in the Common Dashboard, while the ability for a user to add and customize indicators is available in the Local Dashboard. • Vendors' implementation of basic Dashboard requirements may result in innovative functionality that differs across the vendor community. • The Common Dashboard, while province-wide, will be somewhat more restrictive in introducing change. The Local Dashboard may more readily implement customized features to complement functionality in the Common Dashboard. • Vendor innovation can provide some features and functionality that go above and beyond the basic requirements.
LL-2.4	A Common Dashboard can be successfully implemented across EMR vendors.	• A high degree of vendor collaboration was demonstrated through the successful integration of a Common Dashboard. • Integration occurred in a timely manner. • Integration of a Common Dashboard into an EMR provided physicians with a seamless user experience.

3.2.3 Key Findings and Recommendations

OntarioMD EMR Physician Dashboard Development
1. Development and deployment of a Common Dashboard across all OntarioMD-certified EMR offerings are fundamental to province-wide cross-EMR scalability.
Recommendation: Develop a costing model for implementation of a Common Dashboard to ensure financial equity across EMR vendors and physicians.
Recommendation: Encourage a complementary dashboard approach for vendors who have the capacity to offer other dashboards in addition to a Common Dashboard. For example, physician care groups may opt to create a group-specific set of indicators which is complementary to the broader provincial indicators, and which could be managed independently.

3.3 Clinical Value in Dashboards

3.3.1 Introduction

Clinical value in the Local or Common Dashboard comes from any use of the Dashboard that improves clinical and practice outcomes for physicians and their patients. Physicians involved in the BRWG provided guidance in identifying and prioritizing Dashboard Framework requirements that would provide clinical value to physician participants. These requirements included key features and functionality seen as fundamental in creating value within the Dashboard. The same group of physicians also provided guidance in selecting and defining an introductory set of indicators that would provide clinical and practice value to physician participants. Further clinical value was introduced through the expanded scope, with the ability to share, trend and compare indicator metrics made available to all participants.

Clinical value was represented within the Dashboard through the following:

- High-value indicators selected for inclusion in the Dashboard PoC, adapted from a long list of indicators published by CIHI, HQO, and AFHTO
- Access to dynamic, real-time, visualized data from each physician's own EMR instance
- Access to actionable, patient data directly from the Dashboard graphical interface that could promote interventions that matter
- Opportunities to improve data quality by revealing patients with misplaced or missing data for key data elements
- The ability to share, compare and trend indicator metrics with an aggregate of all participating physicians
- Ease of use and integration with existing EMR and clinical workflows
- Ability to add indicators or customize indicators and associated queries to identify patients and EMR data

Key QI and clinical outcome improvements were realized by physicians using the Dashboard through participation in the Dashboard PoC.

The charts below (Figures 3 – 6) show changes realized by the approximately 15% of participating physicians who, by taking the opportunity to update patient records or change data capture practice while using the Dashboard, reported improvements to their data quality or clinical outcome by more than 10%. The 'Physician Onboarding' bar shows baseline results reported by participating physicians at the time they were first given access to the Dashboard.

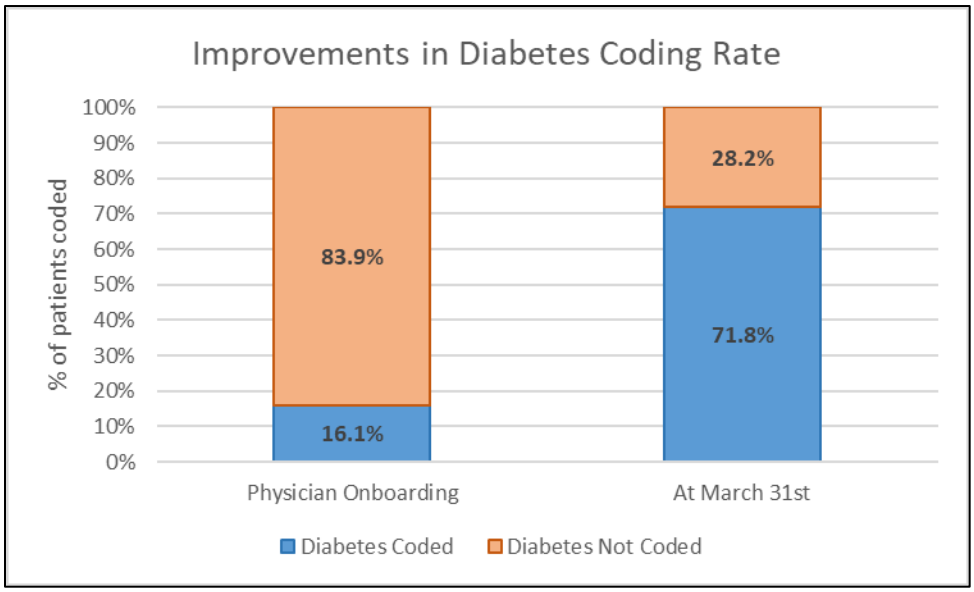

Figure 3. Improvements in Diabetes Coding Rate

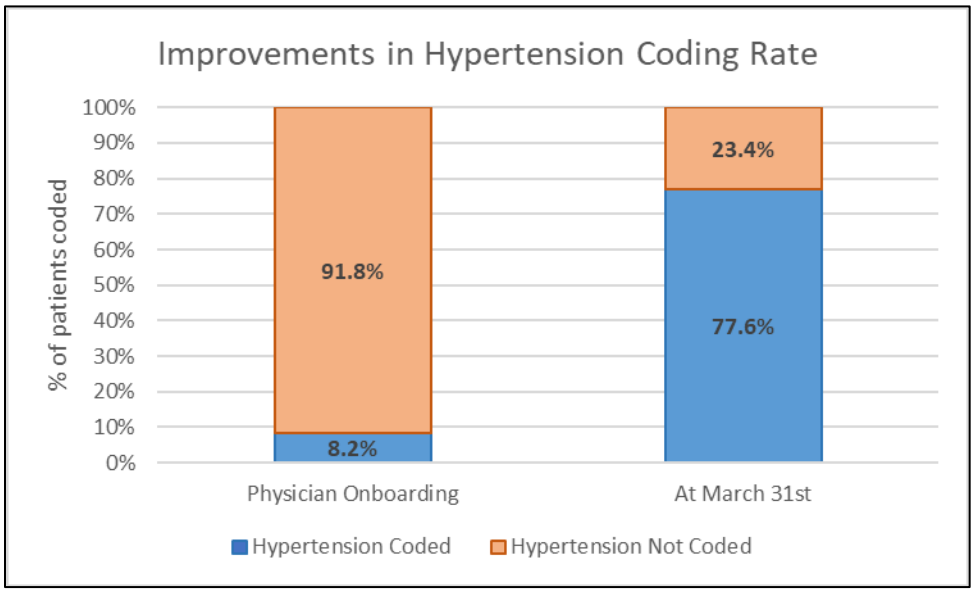

Figure 4. Improvements in Hypertension Coding Rate

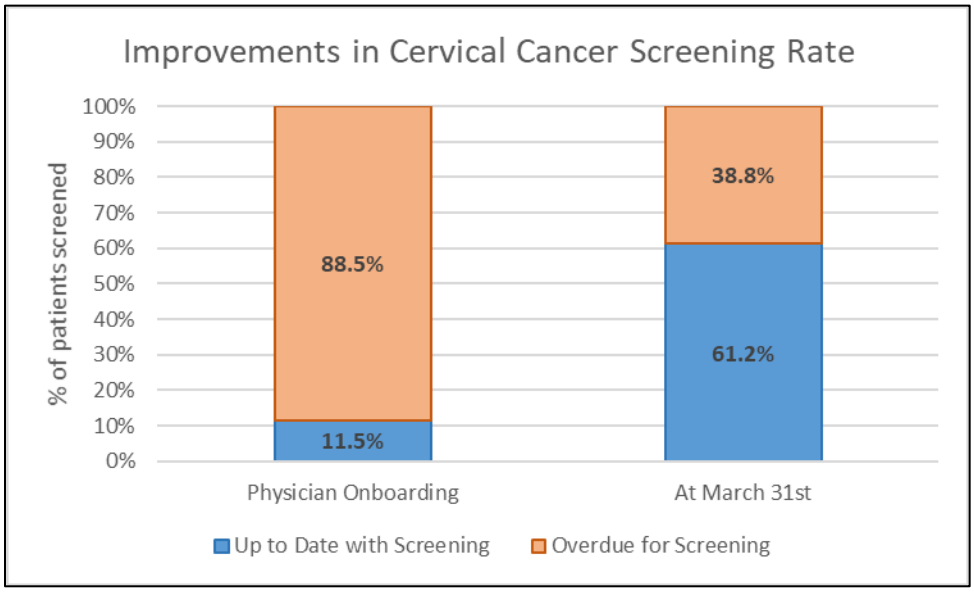

Figure 5. Improvements in Cervical Cancer Screening Rate

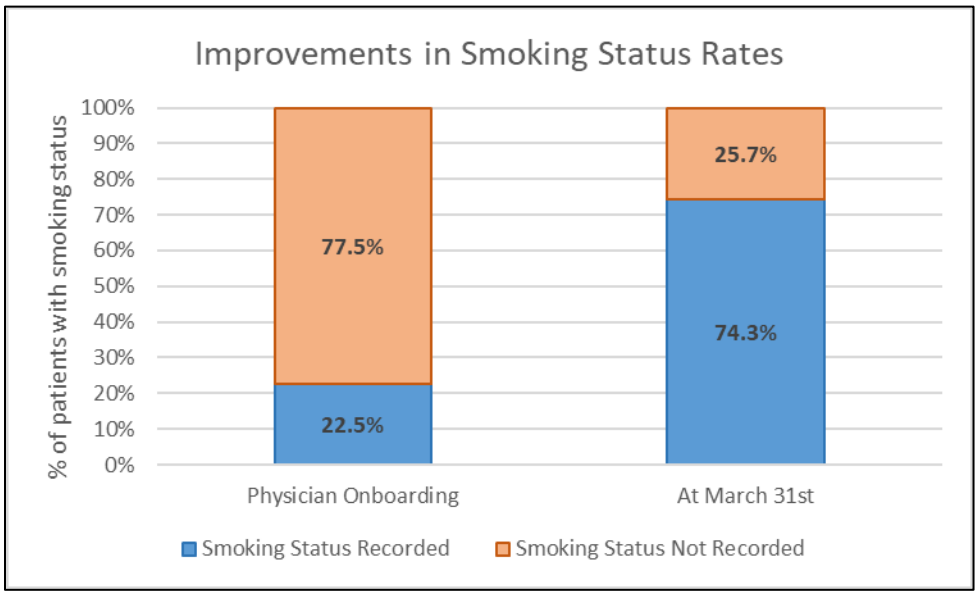

Figure 6. Improvements in Smoking Status Rate

These preliminary results support the potential for the Dashboard to enable dramatic QI impact with appropriate change management supports in place.

3.3.2 Lessons Learned

#	Description	Explanation
LL-3.1	Inclusion in the Dashboard does not by itself guarantee indicator use by physicians.	• Indicators must be clinically relevant, pertinent to the individual practice and subject to improvement to be used well. • Workflows around when to access the Dashboard and the information that comes from it are variable and education around how to derive insight from its visualization is required. Significant change management support is required to improve adoption and use of the product.
LL-3.2	Indicators enhance patient or practice outcomes when clinicians can act on the insights gleaned from viewing information in real time.	• Indicator queries must produce actionable results (e.g., diabetic patients with Hba1c > 8%; patients overdue for cancer screening). • Actionable results require specific follow-up actions (e.g., patients overdue for cancer screening would benefit from contact or recall for preventive screening).
LL-3.3	Indicator results need to be based on timely data to be actionable.	• Indicator metrics need to reflect up-to-date EMR activity for follow-up activities to be relevant. • A graphical view of indicator metrics is important for highlighting targeted quality improvement initiatives.
LL-3.4	Graphical elements should account for 100% of the indicator patient population.	• Indicator graphic elements should represent all segments of a patient cohort (e.g. indicator on smoking status for patients aged 12 or older should capture patients for whom no smoking data is recorded in addition to patients who smoke or don't smoke). • Range-based indicators should capture all segments within a patient cohort (e.g., diabetic patients with HbA1C below acceptable range, within acceptable range, above acceptable range, as well as diabetic patients who don't have an HbA1C recorded).

LL-3.5	The Dashboard can enhance EMR workflows for physicians.	• Access to timely patient data through drill-down lists, along with ability to leverage existing EMR functionality to produce action on one or more patients, increases efficiency of existing workflows. • Physician doesn't need to leave the Dashboard to perform the required intervention.
LL-3.6	The Dashboard can change physician data capture behaviour.	• The ability to reveal patients with no data or missing data for key data elements provides physicians with the opportunity to improve data capture and standardization, leading to better data quality. • Physicians are more likely to act when they can see information is inaccurate or incomplete.
LL-3.7	Ability to share, trend and compare indicator results among all Dashboard users provides significant clinical value to physicians.	• There is significant clinical value to physicians in the ability to trend their indicator results over time, and to compare their results to an average of all physicians sharing their metrics. This is particularly helpful in integrated primary care or speciality practices where an element of competition is created to incent QI efforts. • Physicians are interested in understanding their indicator-based patient population in comparison to other physicians/regions.
LL-3.8	Clinical value is realized through the ability to customize indicators.	• Clinical needs vary by speciality, so the ability to create customized indicators is especially important for specialists. • Ability to customize ranges used in broad care guidelines (e.g., out-of-range Hba1c values for diabetic sub-populations) is important, especially as guidelines about care of sub-populations evolve.

3.3.3 Key Findings and Recommendations

Clinical Value in Dashboards
1. Although data quality and clinical outcome improvements were not mandatory in the Dashboard PoC, it was noted that approximately 15% of physicians, spread over several clinics, used the Dashboard results to: update patient records to accurately record 'Active' patients and change data capture processes to use standard terminology, coding, and consistent entry of lab results. For these physicians, dramatic improvements were realized: • ***56% improvement*** of patients coded with diabetes • ***70% improvement*** of patients coded with hypertension • ***50% improvement*** of cervical cancer screening rate • ***52% improvement*** of smoking status recorded The majority of physicians showed little or no improvement during the Dashboard PoC because of limited staff resources and time to enable QI or because, in some instances, they were already using best practice for data capture. The effect of the preliminary results suggests the potential for the Dashboard to enable dramatic QI impact with appropriate change management supports in place for physicians.
2. Indicators must be viewed as clinically relevant and supporting clinical and practice improvements to patient care in order to prompt use by physicians.
3. Clinical value in the Dashboard is achieved through: • Real-time access • Access at point-of-care (within EMR) • Drill-down to actionable patient data • Ability to identity and improve data quality
Recommendation: Engage clinicians in the identification and development of clinically relevant indicators to be used in the Dashboard.

3.4 Share, Trend and Compare

3.4.1 Introduction

At the inception of the Dashboard PoC, it was suggested that the Dashboard should provide a "physician-only" view of indicators, and that comparison or aggregation of indicators within or across practices, LHINs or the province would be considered out of scope. The main reasoning behind this was the recognition that improvements in data capture and data quality start at the physician level. It was thought there would be little value in aggregation or comparisons between physicians until consistency in data capture was achieved throughout the Ontario primary care sector.

However, during requirements gathering for the Dashboard, physicians highlighted that the ability to compare and trend indicator results with peers would be fundamental to achieving the Dashboard PoC objectives. During the initial phase of the Dashboard PoC, OntarioMD realized that the ability to compare and trend results could be incorporated, and this feature was therefore added into the expanded scope using the Common Dashboard.

3.4.2 Lessons Learned

#	Description	Explanation
LL-4.1	Physicians identified the ability to trend their metrics with an aggregate of their peers as a key Dashboard requirement.	• Competition with peers and with past performance provides motivation that can incent QI efforts. • Allows physicians to see how their patient population compares with peers, e.g., number of smokers in practice compared to average across province.
LL-4.2	Indicator metrics for physician and peer aggregate trending are more meaningful when viewed as percentages.	• Currently, the Common Dashboard only allows trendlines to be viewed as counts. • Comparing indicator metrics by population percentages is more intuitive and is easier to visualize for tracking improvements.
LL-4.3	Ability to access trend and compare feature incents physicians to share their metrics.	• Trend and compare feature restricted to physicians who have opted in to sharing their metrics. • Dashboard PoC revealed that most physicians are willing to share their metrics.

LL-4.4	Positioning of sharing ability as an opt-in feature is understood and appreciated by most physicians.	• Most physicians understood the benefits and implications of sharing their metrics during the Dashboard PoC. • A few physicians sought additional clarification regarding the implications of sharing, and a couple of physicians made an informed decision not to share.
LL-4.5	Physicians would like additional peer comparison options.	• Physicians revealed an interest in the ability to compare their metrics to other peer aggregates: physicians in their practice, physicians in their region, and physicians in their clinical care group (i.e., specialty).

3.4.3 Key Findings and Recommendations

Share, Trend and Compare
1. Physicians identified the ability to trend and compare their metrics with an aggregate of their peers as a key requirement. This can drive competitive spirit, which in turn can incent physicians to improve QI efforts.
Recommendation: Add the functionality to alter scope for trending and comparing results (for example, by practice, region, clinical care group/speciality).

3.5 Indicators

3.5.1 Introduction

As mentioned in the Project Overview/Indicators section of this report, indicators were chosen for inclusion in the Dashboard PoC to demonstrate value in the Dashboard Framework, as well as demonstrate clinical value from indicators chosen from provincial indicator frameworks (HQO, AFHTO and CIHI). The identification, prioritization, and definition of indicators was guided by physicians and indicator framework representatives from the BRWG. Several observations emerged regarding the selection of indicators from the frameworks and the development of indicator definitions that could be implemented by each EMR vendor. Vendor feedback on definitions resulted in further refinements before definitions were translated into EMR queries.

Throughout the Dashboard PoC, physicians provided feedback to identify discrepancies in indicator metrics and drill-down results, based on in-depth knowledge of their patient population or comparison to results obtained from similar reports or searches run in their practice. Physicians also gave feedback on indicator refinements or enhancements that they would find valuable, along with ideas for new indicators that they would like to have available in the Dashboard.

The opportunity to add new indicators was built into the Dashboard PoC. In one instance, an indicator request from a specialty care group resulted in a vendor developing and implementing the indicator in their Dashboard. In another case, a physician demonstrated a modification to an existing indicator. These two approaches to indicator development and deployment provided valuable insight into the relative merits and risks of each.

3.5.2 Lessons Learned

#	Description	Explanation
LL-5.1	Many published indicator definitions from indicator framework organizations are dated.	• Clinical guidelines and standards have changed in some instances from the last published definitions. • Obsolete guidelines in published definitions decrease the clinical value of indicators to physicians.
LL-5.2	Existing indicator definitions from indicator framework organizations lacking some details necessary for EMR vendors to develop queries.	• Indicators defined for use in the Dashboard must use the EMR Core Data Set to ensure attributes are available in the EMR. All EMRs must comply with the Core Data Set. • Need to know **where** data is expected to be captured in the EMR for the indicator, e.g., active problem list, risk factors, lab results. • Need to know **how** data is expected to be captured in the EMR for the indicator, e.g., text or code values used to identify patients with chronic conditions like diabetes.

#	Description	Explanation
		• Need to know specific details regarding exclusion criteria. • Need more details on how to identify physician patient population for indicators: For example, does 'patients over 40' mean active patients where the physician is the primary provider, or patients rostered to the physician?
LL-5.3	Indicator definitions are inconsistent across indicator frameworks.	• Similar indicator definitions exist within different indicator frameworks (HQO, AFHTO, CIHI). The Dashboard needs to determine which indicator framework will be used as the basis for a Dashboard indicator definition. • Cancer screening definitions vary between indicator frameworks with regards to exclusion criteria. • Age guidelines vary between indicator frameworks for smoking and obesity indicators.
LL-5.4	Physician feedback identified errors or omissions in some implemented indicator queries.	• Incorrect or unexpected metrics or drill-down results based on indicator definitions or comparisons to similar queries run by physicians. • Some commonly acceptable ways of coding chronic diseases were not captured by queries. • Other standard data capture practices by the EMR are not included in the queries.
LL-5.5	Physician feedback identified variations or enhancements to provide more clinical value to existing indicators.	• Need to relay feedback to the indicator framework organization that provided the definition. • Mechanism required for approving, prioritizing and implementing enhancements.
LL-5.6	Physician feedback identified new indicators that would provide additional clinical value to the Dashboard.	• Need to relay feedback to indicator framework organizations and see if a definition exists. • Mechanism required for approving, prioritizing, defining, and implementing new indicators.

#	Description	Explanation
LL-5.7	There is an ongoing need to evolve the current set of provincial indicators.	• Indicators need to evolve based on: ▪ changing clinical standards or guidelines ▪ errors or omissions to current queries ▪ physician requests for indicator enhancements or new indicators
LL-5.8	Governance is required to manage the evolution of provincial indicators.	• Management of input from indicator framework representatives and the physician community regarding changes to existing indicators and identification of new indicators for use in the Dashboard. • Management of feedback to indicator frameworks on published definitions. • Establishment of provincial standards for defining indicators for each EMR offering's indicator query development and implementation. • Versioning control and naming of provincial indicators.
LL-5.9	Dashboards that prohibit physicians from adding or modifying indicators without vendor support increase control over provincial indicators, but decrease agility in evolving indicators.	• Changes to Dashboard indicators and queries are implemented by vendors in the appropriate release cycle, not on demand. • Indicator criteria and definition standards must be maintained across EMRs through appropriate governance. • Evidence for new and evolving provincial indicator opportunities is limited when under vendor control for development and implementation.
LL-5.10	Dashboards that allow physicians to add or customize indicators without vendor support increases agility in evolving provincial indicators.	• Learnings from physicians creating or customizing indicators can be used in the indicator governance process and the deployment of new or evolving indicators.

#	Description	Explanation
LL-5.11	Modifications to provincial indicators in the Local Dashboard that allow physicians to customize or add indicators without support must be restricted.	• Provincial indicators deployed and used in the Dashboard must maintain the integrity of the provincial definition. • Trend and compare results may not be reliable if provincial indicators are modified at the physician level and metrics are shared. • Improvements to the provincial indicator definition standards must be communicated for provincial deployment planning.

3.5.3 Key Findings and Recommendations

Indicators
1. Further clinical engagement is needed to translate clinical terms used in provincial indicator definitions across indicator frameworks (HQO, AFHTO, CIHI) into technical data queries that can be standardized across EMRs (e.g., define patients with diabetes, define acceptable range of lab values).
2. The Dashboard PoC revealed a need to continually evolve indicators due to: • evolution of clinical guidelines and standards that impact the indicator definitions over time • identification of errors, omissions, or revisions in existing indicator technical data queries • physician requests for indicator enhancements or new indicators
Recommendation: Establish a governance structure to manage the evolution of provincial indicators: • Selection of new provincial indicators and definition of queries with guidance from indicator framework representatives, clinicians, and OntarioMD • Revision of existing indicators due to changing guidelines • Indicator implementation and change management standards across EMRs • Establish roles and responsibilities of OntarioMD as the sponsor of provincial indicators used in the Dashboard • OntarioMD should provide a key role in facilitating development and evolution of indicator definitions for indicators used in the Dashboard

3.6 Access to Data

3.6.1 Introduction

Access to data refers to the different ways physician data can be accessed through the Dashboard. For the Common Dashboard, data is currently provided on a nightly basis to a metrics warehouse that receives the clinic name, physician name, and set of metrics (counts) for all indicators belonging to each physician. The metrics warehouse populates the Common Dashboard with metrics belonging to the physician. No PHI is stored in the metrics warehouse or revealed in the Common Dashboard. The physician viewing their Dashboard metrics can drill down on a graphic to access a patient list from a query executed in the physician's EMR. The patient list information is displayed in the EMR, not in the Common Dashboard. Actionable functionality is performed on the patient list and is internal to the EMR.

Physicians who opt in to share their metrics with OntarioMD were granted the ability to trend and compare their indicator metrics with a de-identified aggregate of all physicians in the Dashboard PoC who have also opted to share their metrics. As the project sponsor, OntarioMD has view access to physician indicator metrics or aggregate indicator metrics. Signed physician agreements outlined which data would be shared with OntarioMD and how the data would be used in the Dashboard PoC. The Common Dashboard also allows physicians to opt in and out of sharing their metrics with OntarioMD.

No PHI leaves the physician's EMR or is aggregated externally.

3.6.2 Lessons Learned

#	Description	Explanation
LL-6.1	Physicians must be informed of any data that is shared, aggregated, or leaves their EMR.	• As custodians of patient data, physicians require explicit knowledge of what data is transmitted or shared outside of the EMR. • Data-sharing agreements are needed for each organization with whom physicians share data.
LL-6.2	PHI never leaves the physician's EMR.	• PHI is only accessible to EMR users from the physician practice who have been granted access to patient data or reports through standard EMR authorization and security permissions. • PHI is not present in the Dashboard graphical display and is only accessible through the drill-down functionality which operates in the physician's EMR. • PHI is not submitted to the metrics warehouse.

LL-6.3	Metrics displayed in the Local and Common Dashboard will only identify physicians within the same practice where applicable EMR permissions and authorization have been granted.	• Physicians and admin staff may view metrics for other physicians in the practice under standard EMR permissions and authorization. • Non-clinical providers will not be able to view physician-identifiable metrics unless permissions have been granted. • Physician-identifiable metrics will not be accessible to other practices through the Common Dashboard.
LL-6.4	Other organizations or stakeholders may wish to leverage Dashboard indicators on their dashboards.	• Indicators developed by OntarioMD may be of interest to other organizations for use in other types of dashboards (e.g., disease-specific dashboards).
LL-6.5	Other organizations or stakeholders may wish to receive de-identified aggregate reports of the Dashboard indicators.	• Data-sharing agreements are needed for each organization with whom physicians share reports.

3.6.3 Key Findings and Recommendations

Access to Data
1. No PHI ever leaves the physician practice. Only physician-level indicator metrics (statistics, percentages) are aggregated in the Dashboard.
2. Physicians are eager to see peer-level comparisons on physician-level indicator metrics. However, there is sensitivity around access to non-anonymized results from aggregated physician-level metrics beyond the clinic.
3. The opportunity for OntarioMD to view metrics provided considerable value to QI efforts by: • facilitating personalized change management plans for individual physicians • revealing aggregate changes and trends over time, e.g., % of patients with smoking status recorded, # of patients with coded entries for diabetes diagnosis, % of eligible patients receiving cervical cancer screening
Recommendation: Establish data-sharing agreements to define terms and conditions and to gain physicians' consent to share physician-level indicator metrics with multiple sponsors or stakeholders.

3.7 Scalability

3.7.1 Introduction

Scalability in the Dashboard PoC refers to the ability to deploy the Dashboard within and across EMR offerings to additional physician practices, as well as the ability to expand and update the set of provincial indicators across all Dashboard users.

Cross-EMR scalability requires that each EMR vendor can implement a Local or Common Dashboard and provincial indicators for their user base.

Physician scalability is accomplished through the collaborative efforts of OntarioMD and the EMR vendors to deploy a Local and/or Common Dashboard to an individual physician or practice.

Expandability of indicators is achieved through a process involving OntarioMD, physicians, indicator framework organizations, and EMR vendors to:

i.) identify new provincial indicators or updates to existing indicators for inclusion in the Dashboard

ii.) define indicator details and supporting queries

iii.) implement new or updated indicators and queries within the Dashboard

iv.) communicate information about new or updated indicators and queries to physicians

To demonstrate the Dashboard PoC scalability objective, the Dashboard was deployed across three different EMRs to more than 100 physicians and two new indicators were identified and implemented.

Deployment of the Dashboard to participating physicians included:

i.) communication with physicians for potential implementation

ii.) implementation of the Dashboard to physicians by EMR vendors

iii.) physician orientation and training on the Dashboard use, provided collaboratively by OntarioMD and EMR vendors

3.7.2 Lessons Learned

#	Description	Explanation
LL-7.1	It is easier to scale the Common Dashboard across EMR offerings than it is to develop a Local Dashboard within each EMR offering.	• The Dashboard PoC revealed that it is quicker and easier for a vendor to integrate a Common Dashboard into their EMR than to develop and support new dashboard functionality in their EMR.
LL-7.2	Efforts required for development and implementation of queries that support indicators are equivalent across both the Local and Common Dashboard.	• Queries for both the Local and Common Dashboard are created and will execute in the physician's EMR. • Drill-down functionality in the Common Dashboard executes queries and accesses functionality in the physician's EMR.

LL-7.3	Physician communication must be managed throughout the deployment process to ensure scalability.	• Communication is required to initially reach out to physicians, collect agreements relating to Dashboard use, and coordinate implementation and training dates. • Deployment oversight is required to ensure timely responses from physician practices and timely collection of physician agreements.
LL-7.4	Resource or capacity planning is required to implement the Dashboard and deliver training and support across multiple sites.	• Efficient strategies are required in implementation and delivery of training to scale for provincial deployment (e.g., train-the-trainer, remote training / support through Skype). • Sufficient resources are required to ensure training and change management support are available.
LL-7.5	Development and implementation of new Dashboard indicators or modification of existing Dashboard indicators is heavily dependent on vendor support.	• Vendor support is required to assign new indicators to tiles within the Common Dashboard. • Vendors are required to develop or update and test queries for new or modified indicators. • Vendors are required to schedule indicator and query updates for the next appropriate release cycle.
LL-7.6	Indicator expandability is dependent on EMR capacity to accommodate additional indicators and to support new queries and searches to send metrics and to run drill-down reports.	• Without advance capacity planning, the impact of running additional queries and searches on EMR performance is unknown.

3.7.3 Key Findings and Recommendations

Scalability
1. Indicator scalability is dependent on EMR vendor capacity to implement additional indicators and to support additional queries and searches for sending metrics and running drill-down reports.
2. Cross-EMR scalability is most readily achieved through deployment of a Common Dashboard.
Recommendation: Support provincial deployment to a significantly greater number of physicians through streamlined processes / additional resources for collecting agreements, communicating with physicians, delivering training, and providing OntarioMD-led change management support.

3.8 Data Quality

3.8.1 Introduction

Data quality refers to the degree to which:

- data associated with indicator definition is being collected in the EMR;
- information is captured in the right location in the EMR; and
- data for key clinical measurements is recorded in a standardized manner for easy measurement.

Data quality must be addressed at the point-of-care so physicians can rely on Dashboard indicator metrics and drill-down patient lists. Quality of data in the EMR is essential before aggregated data can be reliably used for health system trending or comparison across practices, regions, specialties, etc.

3.8.2 Lessons Learned

#	Description	Explanation
LL-8.1	Dashboards that include a chronic disease 'prospects' tile allow physicians to identify missing data or non-standard data capture for identifying and verifying patients with chronic conditions.	• Each tile category can drill-down into a list of patients to assess and verify whether the condition exists. • Tile categories include different non-standard ways of entering data that may identify a chronic condition: patients with specific text values in diagnosis field, patients with specific billing codes entered, and patients with medications or lab results related to a chronic condition.
LL-8.2	Dashboards that include a 'patient status' indicator allow physicians to clean up patient status, which impacts other indicators.	• Indicator categories include 'active and seen in past year', 'active and seen in past 1-2 years', 'active and not seen in 3 or more years', 'not active', 'deceased'. • An up-to-date patient status will ensure more reliable denominator counts on 'Active' patients. • Most indicators include all active patients as part of the denominator.
LL-8.3	Inclusion of rostering information in patient status indicator would help identify patient demographic clean-up, which is required for care bonus indicators.	• Care bonus indicator queries are based on rostered patients. • Ability to view and clean up rostering status of patients would help ensure patient lists are accurate for care bonus indicators.

LL-8.4	Drill-down on indicator segment reveals to physician how patients are identified as missing or overdue for intervention.	• Patient drill-down lists display criteria for identifying a patient as missing or overdue for preventive care or intervention. • Physician can determine systemic issues for patients appearing as overdue, such as data not entered properly or entered in an unanticipated location within the EMR. • Some issues may include lab results manually entered incorrectly, hospital reports named incorrectly, or smoking status information in an unexpected location within the EMR.
LL-8.5	Indicator data quality is subject to distortion by queries that are incomplete or do not accurately reflect the indicator framework definition.	• Incomplete or inaccurate indicator queries may incorrectly identify patients overdue or in need of intervention, or may not flag patients who do need preventive care or clinical intervention.
LL-8.6	Consistency in data queries across EMR vendors is fundamental in supporting standard data capture throughout the province.	• Queries within each EMR need to reflect indicator framework definitions. • Standards in disease recording (coded/registry) support consistent indicator definitions for use across multiple EMRs. • Consistency required in what chronic disease coding values are permitted. • Data elements in queries should represent elements that can be captured and represented across all EMRs.
LL-8.7	Improvements in physician data capture behaviour are motivated by the physician's ability to visualize clinical and practice outcome improvement through indicator metrics.	• Improvements in data capture ensure outcomes accurately reflect their patient population.
LL-8.8	Realization of data quality and data capture improvements across EMRs is dependent on each EMR's functionality to allow data clean-up or standardization of data capture.	• EMR functionality that reduces the amount of manual work for data clean-up or standardizing data capture enables physicians to more readily realize improvements.

3.8.3 Key Findings and Recommendations

Data Quality
1. Access to key data elements revealed through indicator drill-down patient lists identified inconsistencies in terms being used, where diagnosis coding has not been applied, and where patient interactions could support timely data updates. The ability to realize clinical and practice outcome improvements from Dashboard use motivates physicians to improve the quality of their existing data and to improve data capture practices.
Recommendation: Support physicians with training and change management activities that focus on clinical and practice outcome improvements which can be realized by improving data capture and data quality.

3.9 Change Management and Deployment

3.9.1 Introduction

Change management within the Dashboard PoC relates to the process of helping physicians manage changes to their practice workflows during Dashboard adoption. Dashboard deployment describes the process used by each EMR vendor to implement a Local or Common Dashboard to one or more physicians in a practice.

Each participating EMR vendor provided a Dashboard implementation and change management strategy document to OntarioMD during the Dashboard PoC. The document described that vendor's approach to Dashboard deployment, initial training and orientation on Dashboard use, and how physicians would be supported throughout the Dashboard PoC. OntarioMD collaborated with the vendors to deliver each of these activities.

The Dashboard PoC provided opportunities to provide deployment, training and support to physicians in a wide variety of practice settings and with differing levels of EMR maturity and existing availability of practice support. Learnings from the Dashboard PoC inform approaches and strategies to consider in supporting physicians in the subsequent phase of this initiative.

3.9.2 Lessons Learned

#	Description	Explanation
LL-9.1	Dashboard deployment may impact only individual physicians or all physicians at a clinic based on the implementation and change management strategy.	• All physicians in clinics where the Dashboard is deployed need to be made aware of any configuration changes that could potentially impact their EMR use or workflows.
LL-9.2	The approach to deployment and adoption must take into consideration other activities or initiatives impacting the practice or individual physicians.	• Support or training for physicians involved in other QI initiatives may require a different approach than support or training for physicians without involvement in other initiatives. • Deployment to a clinic involved in using other dashboards or involved in other initiatives may need to take into consideration resource and time constraints that could impact successful deployment and/or adoption.
LL-9.3	Change management or practice supports required to improve data quality or clinical and practice outcomes will vary by practice model or clinical care group.	• Individual physicians or group practices with a higher level of EMR maturity around data quality and chronic disease management or preventive care outcomes will require less support than physicians or practices with a lower level of EMR maturity.

		• Physicians with more practice support may require less change management or practice support from outside sources to realize improvements in EMR data quality or clinical and practice outcomes. • Physicians with limited clinic support may not realize data quality improvements in a timely manner.
LL-9.4	Varied approaches to the delivery of change management and practice support should be considered for future deployment across different practice types.	• Support should align with OntarioMD or provincial objectives for improvements to key data elements and improvements in clinical and practice outcomes.
LL-9.5	Central oversight is required to address issues related to Dashboard use.	• Coordinated province-wide oversight would standardize resolution approaches and effectively address issues that span multiple EMRs.

3.9.3 Key Findings and Recommendations

Change Management and Deployment
1. Change management support is fundamental to physician adoption of the Dashboard and QI efforts. OntarioMD has extensive experience and has developed a comprehensive set of associated change management tools and approaches across EMRs to help support physicians in their understanding and adoption of the Dashboard.
2. Primary users of the Dashboard will vary based on practice model, size and available staff. Available supports should consider all types of practice users, including physicians, specialists, nurses, admin/clerk, practice leads.
Recommendation: OntarioMD should lead efforts to support the Dashboard, including training, support, and follow-up, in partnership with other stakeholders as needed.
Recommendation: Make OntarioMD training and support services available to physicians using the Dashboard.

3.10 Stakeholder Engagement and Collaboration

3.10.1 Introduction

The approach taken in this initiative investigates the value a real-time dashboard can bring to the clinical community at the point-of-care, and seeks to understand how revealing key data elements of dashboard indicators to physicians can impact data quality. In the Dashboard PoC planning phase, workshops with physicians and indicator framework representatives were conducted to define Dashboard requirements and an initial set of indicators. In the development phase, EMR vendors were selected to build Dashboard functionality and an initial set of indicators into their EMRs. In the demonstration phase, physicians were selected to demonstrate the objectives of the Dashboard PoC through adoption and use of the Dashboard in their EMR.

Engagement and collaboration with stakeholders – including physicians, indicator framework representatives and EMR vendors – was fundamental to the success of every phase in this initiative.

Physicians were involved in two aspects of the Dashboard PoC:

- As members of the BRWG, to provide a clinical perspective into the identification and definition of business requirements for the Dashboard, as well as an initial set of provincial indicators.
- To demonstrate key objectives through the use of the Dashboard during the Dashboard PoC**.** Physicians also provided input to a Benefits Evaluation, through feedback provided at training sessions and through Baseline and Final Surveys.

Indicator framework representatives from HQO, AFHTO, CIHI, and the AOHC were invited to BRWG sessions to help identify and define an introductory set of indicators. The clinical indicators considered for inclusion originated from HQO, AFHTO and CIHI indicator frameworks.

EMR vendors were selected through an RFS process to build the required Dashboard functionality and initial set of indicators queries into their EMRs. TELUS Health (PS Suite and Med Access) and OSCAR EMR (OSCAR 15) were selected. The integration of a Common Dashboard across selected EMRs was the result of a three-way collaboration between OntarioMD and the two participating vendors.

3.10.2 Lessons Learned

#	Description	Explanation
LL-10.1	Direction from physician advisors to establish Dashboard requirements and introductory indicators is fundamental for ensuring the Dashboard provides clinical value to physicians.	• Physician advisory input is critical in providing credibility to the wider clinical community that the Dashboard is built on solid clinical foundation. • Physician advisors can provide up-to-date information on current clinical standards and guidelines.

LL-10.2	Input from physicians across different practice models and clinical care groups is essential for building the requirements and anticipating the support needed for Dashboard adoption and use across different physician groups.	• Workflows and data capture across different physician groups require a nuanced adoption and change management approach. • Support levels available to different physician groups also inform a varied adoption and change management approach across different practice groups.
LL-10.3	Indicator framework organizations need to update indicator definitions more regularly to reflect current clinical guidelines, standards and best practices.	• Indicator definitions used from the most recent indicator frameworks published do not all reflect current clinical guidelines and standards. • Feedback from physicians in the BRWG and physicians participating in the Dashboard PoC has provided updated criteria, guidelines, and standards information that should be reviewed and considered by indicator framework organizations for modification to the indicator definition.
LL-10.4	Neither the Local or Common Dashboard met all the fundamental Dashboard requirements identified by the BRWG.	• A limited Dashboard PoC development timeframe resulted in some gaps and partial fits in required functionality as identified through a Gap/Fit analysis. • Physician engagement through surveys and orientation or training sessions resulted in feedback on the importance of features not fully implemented or missing from the Dashboard PoC.
LL-10.5	Some indicators and associated queries could not be implemented by vendors due to current EMR constraints.	• Physician engagement through surveys and orientation or training sessions resulted in feedback on the value of current Dashboard indicators and suggestions for additional indicators not currently seen in the Dashboard.
LL-10.6	Requirements and indicators may need to be revisited because of Dashboard PoC findings.	• Review of requirements will determine what further work may be required by vendors to meet physician expectations.
LL-10.7	Vendors exhibited a high level of cooperation and collaboration with each other and OntarioMD on integrating and implementing a Common Dashboard to physicians.	• Successful integration of a Common Dashboard into multiple EMRs was demonstrated. • Open communication between vendors helped overcome integration or individual physician implementation challenges.

3.10.3 Key Findings and Recommendations

Stakeholder Engagement and Collaboration
1. Cooperation and collaboration between EMR vendors is achievable, and can result in implementation of common functionality across different product offerings.
2. Dashboard Framework development was greatly enhanced by enabling physicians to drive the process of defining the Dashboard requirements and qualifying indicator definitions with relevant EMR criteria to enhance the definition of provincial indicators.
Recommendation: Continue to involve physicians in driving the evolution of the Dashboard functionality and provincial indicators to ensure clinical value is fully realized.

Appendix A - Existing EMR Dashboards & Data Reporting Frameworks Identified by Environment Scan

A.1 CPCSSN

The Canadian Primary Care Sentinel Surveillance Network (CPCSSN) has collected and reported on data from EMRs in the offices of participating primary care providers (sentinels). CPCSSN's focus is to improve the quality of care relating to five chronic and mental health conditions (hypertension, osteoarthritis, diabetes, COPD and depression), as well as three neurologic conditions (Alzheimer's and related dementias, epilepsy and Parkinson's disease). Data is cleaned and de-identified as it is extracted from individual provider EMRs. CPCSSN can extract data from physicians across several different EMRs.

Participating providers have received reports to better understand their chronic disease patients, and gained access to results that can aid research on chronic disease management.

A.2 Data Presentation Tool (DPT)

DPT is a reporting tool provided to some sentinels involved with CPCSSN. DPT is an external reporting tool using cleaned and de-identified chronic disease data that has been extracted from the primary care provider's EMR.

A.3 EMRALD

EMRALD is an acronym for EMR Administrative Linked Database. It is populated with data extracted and cleaned from participating physicians and used for research purposes. Participating physicians have received summarized reports allowing them to monitor the quality of clinical care provided by their practice. EMRALD merges data extracted from EMRs with data obtained from other administrative sources such as OHIP billing data to provide physicians with a more comprehensive view of their practice. EMRALD uses data extracted from physicians across a subset of OntarioMD-certified EMRs.

A.4 HQO Primary Care Practice Reports (PCPR)

Participating Family Health Teams (FHTs) or Community Health Centres (CHCs) can receive practice reports consisting of cross-sectional and longitudinal data on: practice demographics and case mix; patterns of service use (emergency department visits, hospital admissions, and specialist referrals); chronic disease prevention and management; and the health status of the practice population. Reports are generated annually and provide information at the practice, regional and provincial levels. Report data is compiled by the Institute for Clinical Evaluative Sciences (ICES).

A.5 AFHTO D2D Interactive Reports

AFHTO provides member FHTs that contribute practice data through its Data to Decisions (D2D) initiative with reports displaying practice and clinical indicators compiled from several sources. Some indicators are based on EMR data extracted by Quality Improvement Decision Support Specialists (QIDSS) using standardized queries. Other indicators are based on administrative data, patient surveys, and data from HQO's PCPR, MOHLTC and Cancer Care Ontario reports.

A.6 Association of Ontario Health Centres Business Intelligence Reporting Tool (BIRT)

The AOHC built a centrally-managed data warehouse and business intelligence platform for EMR data, which is extracted nightly from its Community Health Centre (CHC), Nurse Practitioner-Led Clinic (NPLC) and Aboriginal Health Access Centre (AHAC) member sites. BIRT is a front-end decision support tool used by analysts, health planners, and executive directors at member sites to report on indicators of value to the CHC sector.

A.7 Hamilton Health Sciences (HHS) Integrated Decision Support (IDS) Tool

The IDS was originally developed by HHS as a business intelligence solution operating against a data warehouse containing data from hospitals, CHCs, and Community Care Access Centres. Geographic data from StatsCan is also incorporated to support mapping of various data elements. This tool was originally intended to serve the Hamilton Niagara Haldimand Brant LHIN.

A.8 IntelliDASH Dashboard

IntelliDASH is a dashboard displaying primary health care indicators based on CIHI's Primary Health Care Indicator Update Report. Indicators are derived from data extracted from the EMR and refreshed in the dashboard on a nightly basis. IntelliDASH is accessed from outside the EMR, and was originally developed to work with OSCAR EMR.

A.9 TELUS Health Outcomes Dashboard

TELUS Health Outcomes Dashboard is an EMR-embedded dashboard intended to integrate into all TELUS Health EMR products. The dashboard is based on a QI methodology that provides physicians with a set of tools to meet specific QI objectives defined by an organizational host or sponsor. EMR data populates the dashboard and refreshes on a nightly basis.

A.10 Objective Meaningful Use Data Dashboard (Province of British Columbia)

This dashboard, originally funded by British Columbia's Physician Information Technology Office, was embedded into physicians' EMRs throughout the province, and was intended to focus on metrics measuring EMR data quality rather than clinical outcomes. Physicians could generate and submit reports which would determine whether they were eligible to be incented by the province for achieving Meaningful Use 3, or "Full EMR" use.

A.11 The Health Data Coalition (HDC) of British Columbia

HDC is a physician-led data-sharing initiative designed to aggregate patient-level data from physician practices across EMR products. It provides a platform to support physician QI, as well as provincial projects, system planning, and population metrics.