

Health PEI's Vision: Completing the Island's E-health Bridge to Healthcare Delivery Integration

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Abstract

Branded as "One Island Community, One Island Future, One Island Health System," the recently renewed primary care-focused vision for PEI's integrated healthcare delivery requires changes in clinical practices across the island-wide continuum of services and facilities. Critical to effecting changes in the clinical environment is completion of the provincial interoperable electronic health record (iEHR). The heart of the EHR is its Clinical Information System (CIS), with the planned implementation to be completed in three phases. Health PEI will then implement an EMR solution in physician offices and integrate it with the Island's hospitals. For Health PEI's seven acute care facilities, the mean 2009 HIMSS Analytics EMRAM score was 2.0727. From the pan-Canadian perspective, Health PEI currently ranks fifth among 13 provinces and territories for mean EMRAM score.

On July 6, 2010, Health PEI assumed responsibility from Prince Edward Island's (PEI) Department of Health and Wellness for the newly created One Island Health System, which currently oversees 4,122 nurses, physicians and other healthcare personnel who deliver comprehensive health services to the Island's 141,000 residents (Legislative Counsel Office April 2010a). As a largely rural jurisdiction, Health PEI's main objective is to refocus "...

the care delivery system on primary health care and services that can appropriately and safely be provided locally" (Department of Health and JRS Partners, November 2009a). Three additional dimensions of healthcare delivery that the new health system seeks to address, which support the renewed emphasis on primary healthcare, are:

- An enhanced system of delivery for home-based care
- Focused integration of acute and facility-based care
- Investment in system enablers including processes, services and functions supporting effective management of the system

These four dimensions of renewed healthcare delivery for PEI are to be integrated within a new patient-centric, rather than hospital-centric, model of care that places patients and families at the centre of the care team (Department of Health 2009c).

Branded as "One Island Community, One Island Future, One Island Health System," the recently renewed primary care-focused vision for integrated healthcare delivery requires essential changes in clinical practices across the island-wide continuum of services and facilities (Department of Health 2009b). Critical to effecting changes in the clinical environment is completion of the provincial interoperable electronic health record (iEHR) that is intended to provide the seamless exchange of patient information between all practitioners, facilities and services. Changes in the

Island's clinical practices require the transformation and evolution of practitioner workflow processes from a more isolated silo work methodology to an essentially integrated team approach to healthcare delivery (Department of Health 2009c). Completion of the iEHR demands multiple implementations, which were laid out in a white paper prepared for the Department of Health and Wellness in November 2009 (Department of Health and JRS Partners, November 2009a). The first and foremost recommendation was that the ongoing implementation of the existing in-patient Clinical Information System (CIS), the largest clinical software implementation sub-project under the scope of the iEHR, be completed in a timely and thorough fashion. Table 1 lists all recommendations for the iEHR initiative.

Table 1. PEI iEHR initiative recommendations

1	Complete the implementation of CIS
2	Consolidate and simplify interfaces to client registry
3	Implement centralized primary healthcare solution
4	Implement clinical document-sharing services
5	Integrate the Deltaware Medigent Drug Information System with CIS
6	Implement data warehousing services
7	Implement single sign-on services
8	Upgrade client registry functionality
9	Implement privacy and security recommendations
10	Implement iEHR program governance

Source: Department of Health and JRS Partners 2009

The Clinical Information System Implementation – Background

The heart of the Island's EHR is its CIS, with the planned implementation to be completed in three phases. In 2005, PEI opted for Cerner Millennium as the vendor and product for the CIS, with 23 solutions to be installed for clinical services at the Island's seven acute care hospitals and one sub-acute facility (Table 2).

The primary factor favouring the Cerner selection was its unified architecture approach centering on a single repository for all patient healthcare information from diverse departments. PEI required that a single-suite CIS solution facilitate the exchange and integration of all patient data across the entire province, beginning with multiple hospitals. Eventually,

Table 2. Health PEI hospitals

Hospitals	Number of beds
Acute care referral	
Queen Elizabeth Hospital	261
Prince County Hospital	106
General acute care	
Community Hospital	13
Kings County Memorial Hospital	30
Souris Hospital	17
Stewart Memorial Hospital	4
Western Hospital	27
Sub-acute psychiatric	
Hillsborough Hospital	75

all sub-acute, ambulatory and other services will be integrated with the CIS by means of an as-yet-to-be-determined non-acute care software solution. An equally important necessity was that supplemental non-CIS electronic healthcare solutions – such

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as Client Registry, Provider Registry, Radiology Information System (which is integrated with the provincial Picture Archiving and Communications system) and a physician office Electronic Medical Record (EMR) – had to be easily interfaced with the core in-patient CIS (Department of Health and JRS Partners 2009d). Especially vital to all Island stakeholders was the requirement that the new CIS be conducive to enhancing clinically efficient and cost-effective healthcare delivery for a very small jurisdiction with a modest population that is accustomed to personalized and easily accessible healthcare services. All parties to the Island's CIS implementation process recognized that implementation of an advanced and complex electronic CIS for the sake of improving clinical and safety outcomes had to support residents' long-established expectations for direct, immediate and local healthcare delivery in a simple and seamless way.

An initially aggressive project plan for implementing the major CIS modules of Cerner Millennium quickly encour-

tered growing stress among clinical staff whose workflow processes were being revamped based on unrealistic time frames and a lack of integration with the broader organizational goals and personnel of the umbrella EHR project. The challenges confronting the CIS implementation strategy were compounded by concurrent governmental reorganizations of health authorities and provincial IT services, all of which engendered a significant degree of province-wide confusion, rather than clarity, about the newly designed road to a better healthcare future for the Island's residents (Dewar 2010b).

The province's Information Technology Shared Services continues to be responsible for all IT service-related work for all provincial departments and Health PEI. Two IT architects from ITSS will serve as liaisons to the Health Information Management Unit within Health PEI.

In mid-2007, remedial steps were taken to divide the CIS project into phases, extend the time frames, hire a project manager skilled in large and complex healthcare IT projects and significantly expand the project budget (Dewar 2010b).

The Clinical Information System Implementation – Phases One and Two

Phase One of the reorganized Cerner CIS solutions implementation process, sometimes referred to as the “Modified Big Bang,” occurred in April 2008 and involved every Cerner solution procured by PEI except three (Office of the CIS Project, Health Information Management Division, Health PEI, personal communication, July 2010). The major clinical functionality that went live and operational at eight hospitals included PathNet (four laboratory solutions), PharmaNet, Clinical Supply Chain (pharmacy), Enterprise Registration Management, Enterprise Scheduling Management, PowerChart (clinical data repository viewing functionality) and CareNet (clinical documentation of vitals only). Additionally, Cerner's Foreign Systems Interface (FSI) was implemented to receive and send patient information from the provincial client registry (provincial health number and associated demographic information), the General Electric Healthcare – IDX RIS and the Nuance dictation solutions, as well as Oracle patient financial and drug cost information. Not implemented in 2008 were the higher-order Cerner clinical solutions, including expanded CareNet clinical documentation capabilities for nurses and physicians at any facility, FirstNet for emergency departments at four of the Island's seven acute care hospitals, SurgiNet (pre-, peri- and post-operative and scheduling at Queen Elizabeth Hospital and Prince County Hospital) and Cerner CPOE (computerized provider order entry) at any facility.

Phase Two, sometimes known as the “Post Modified Big Bang” and which is currently under way, has been marked by rolling implementations for three of the aforementioned clinical solutions. CareNet clinical documentation functionality (including standardized assessment forms and general progress notes for nursing, physicians and allied health professionals) is live and operational at all seven in-patient sites. Three of four SurgiNet capabilities (excepting peri-operative) have been implemented at Queen Elizabeth Hospital (QEH) and Prince County Hospital (PCH); and SurgiNet's peri-operative module will be rolled out in fall 2010 at both sites. At three of the four acute care sites with emergency departments (ED) – PCH, Kings County Memorial Hospital and Western Hospital – all functionality of the FirstNet ED solution is live and operational. At the fourth site, QEH, only the ED's tracking board is currently live and operational. FirstNet's Power Note and triaging functionality will go live and operational at QEH in fall 2010.

The three-year span for completing Phase Two and the decision to consign implementation of CPOE to Phase Three has been justified by issues encountered since 2008. Prominent among the challenges were insufficient funds and personnel at the project level; competing priorities in facilities for limited resources including monies, staff and time; absence of standardization, especially in order sets; and staffing stability. Not uncommon in large projects, from the IT perspective there were recurring local issues of reliability and performance, especially around wireless connectivity and single sign-on. Additional issues involving the operating platform have been resolved by adopting Cerner's Managed Technology Service solution. While the revised extended schedule has made implementation more manageable, all facilities and staff have been subjected to living indefinitely with ongoing change and a hybrid patient record. The combined effect of these issues challenged end-user confidence, thus increasing pressures on the implementation team to achieve measurable and satisfactory outcomes.

The Final Phase – Computerized Provider Order Entry

The payback for adopting any CIS is to effect improvements in clinical and safety outcomes. Crucial to achieving these patient-centric results is implementing a closed loop Electronic Medication Administration Record (eMAR). Initially, this clinical solution entails implementing physician order entry functionality that is tied to a Clinical Decision Support System (CDSS) providing guidance for clinician activities related to protocols and outcomes in the form of patient variance and compliance alerts. Subsequent steps in the eMAR process include pharmacy verification of the medication order via product bar coding, nursing verification at the point of care via bar coding of both product and patient, and verification that the five rights of medication administration have been followed. The neces-

sary condition for securing full patient benefits of the eMAR environment is implementation of a fully functioning CPOE. Because Health PEI consigned implementation of CPOE to the final phase of the CIS project, the most important clinical and safety benefits of developing a single iEHR for all PEI residents remain as yet unrealized.

Health PEI's decision to defer CPOE implementation to the last phase was based on several considerations (Office of the CIS Project, Health Information Management Division, Health PEI, personal communications, July 2010):

- The cost of CPOE implementation is substantial for any health system, but especially so for such a small jurisdiction as Health PEI, where there are limited opportunities for economies of scale.
- Experience of other jurisdictions with the workflow changes required for CPOE adoption argues for a tiered rollout starting with nurses and moving to physicians.
- CPOE implementation transforms, standardizes and integrates long-established clinical practitioner work processes that have been essentially autonomous and not IT-based. Given that CPOE implementation transforms the workflow of all stakeholders in the healthcare delivery environment, and not just that of physicians, failure with CPOE is not an option, as dissatisfaction by any user group negatively impacts all potential users.
- The absence of a provincial physician office EMR solution handicaps the effectiveness of any CPOE implementation that is confined to the in-patient environment.

As the precondition for going live with the CPOE solution, Health PEI is implementing a staged approach to order entry. Currently, orders are attached to departments rather than to practitioners, including nurses and physicians. For example, a physician can write a paper order for pharmacy, laboratory or diagnostic imaging. But the orders are currently entered by the department, not by a nurse or physician. CPOE functionality allowing nurses, ward clerks or physicians to enter orders is in the process of being built off the various department order sets. Starting in spring 2011, nurses and ward clerks will become the first practitioners able to enter orders independently of departments. If this phase goes well, then CPOE is scheduled to be extended to physicians in the near future.

Physician Office EMR Environment – The Next Challenge

The next goal of PEI's drive to implement an integrated health system across the full continuum of healthcare delivery is an EMR solution in physician offices and the associated integration that links it to the Cerner Millennium solution at the Island's hospitals (Office of Medical Affairs, Health PEI, personal communi-

cation, July, 2010). A consultant report is expected in early fall 2010, outlining what components of an EMR are most suited to the Island's healthcare environment and are most attractive to the physician community. Health PEI is considering applying for funds from Canada Health Infoway's recently announced physician EMR initiative. Under the best of circumstances, if the funding request is approved, PEI would expect to begin implementing a physician office EMR solution in early 2011, with the goal of achieving full participation over the next several years.

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The small number and composition of physicians on the Island – 237, who account for 222 full-time-equivalent practitioners – should contribute to a speedy implementation of an ambulatory EMR solution. Unlike most other provinces, where the great majority of physicians are compensated on a fee-for-service basis, 70% of the Island's physicians are on alternate pay models, including salary, hourly sessional rates or contracts. This percentage includes nearly all primary care physicians, who account for half of the Island's physicians, and approximately 20% of specialists. Island physicians' preference for alternative pay models stems from the primary care focus of the Island's healthcare delivery system. As family physicians, most of the Island's doctors spend substantial time in non-clinical consultations with nurses, dieticians or social workers – activities that are not conducive to maximizing physician pay cheques based on the number of patient consultations. Additionally, given the rural character of the Island, combined with its small population, primary care physicians find that working on alternate pay models contributes to enjoying a more balanced professional and personal life.

By contrast, fewer PEI surgical specialists work under the alternate pay model. Specialists are concentrated at the Island's two acute care referral facilities: 70% of all specialists (or approximately 77 specialists) are located at QEH in Charlottetown, with the remaining 30% (or approximately 33 specialists) practicing at PCH in nearby Summerside. Island residents' preference for receiving advanced care near home provides specialists with a patient base sufficiently large to practice on a fee-for-service basis. It remains to be seen how the primary care and specialist composition of the Island's physician community will impact their respective willingness to incorporate an EMR environment in their workflow.

Health PEI has an advantage as it begins the process of implementing an EMR in the physician office environment. On a daily basis, physicians who have hospital admitting privileges – approximately 200 out of 227 physicians – access and use the Cerner integrated CIS in hospitals for treating their patients. As part of their workflow at the hospital, the vast majority of the Island's physicians have become used to working with their patients' integrated records, which currently combine nearly all relevant patient information including laboratory and diagnostic imaging results, drug dispensing information available in the hospitals and in-patient encounters.

A very significant component of patient history that is currently missing from the in-hospital Cerner patient record is the doctor's notes on patient encounters in the physician office. Capturing this clinical information and linking it to the existing Cerner patient record is the objective of implementing an Island-wide physician office EMR solution. At that point, any physician using an office EMR would have access to all encounter information between a patient and his or her regular primary care physician, as well as all specialists, in real time and from any healthcare site on the Island. Beyond the physician's patient notes, the other piece of patient information not currently linked to the Cerner CIS solution is data from the province's Drug Information System (Deltaware's Medigent solution), which captures all patient data on drug dispensing in the ambulatory or outpatient environment.

Health PEI is hopeful that Island physicians' working familiarity with the Cerner CIS in the hospital setting will quickly translate into acceptance of the physician office EMR environment. The key to encouraging physician acceptance is for Health PEI to make a vendor product choice that minimizes workflow changes and maximizes physician IT preferences. The latter would include functionality such as easy sign-on, infrequent application shut down and quick access to the programs physicians use for daily treatment of a patient. Health PEI has an additional major advantage over other jurisdictions. All physicians on alternative pay models, who constitute the majority of the Island's physicians, will have the EMR solution provided as part of their contractual obligations. Because fee-for-service physicians are far fewer, one would expect that given the right financial incentives, these doctors would want to embrace the EMR solution, which 70% of their colleagues are employing, in order to access the Island's fully integrated patient record system.

HIMSS Analytics' EMRAM Scores for Hospitals and Ambulatory Settings

While Canadian interest in measuring the degree of e-health clinical systems implementations – and possible correlations with patient clinical and safety improvements – is beginning to draw the attention of healthcare research organizations including the Canadian Institute for Health Information, such

efforts are already under way in the United States through the efforts of HIMSS Analytics and others.

In March 2010 at HIMSS10 – Annual Conference and Exhibition, HIMSS Analytics and Premier, an alliance of more than 2,300 US hospitals and 66,000-plus other health-care sites, examined the relationship between the adoption of health information technology (HIT) and various indicators of hospital quality and efficiency (Kroch and Park 2010c). The study was based on merging Premier hospital administrative data from approximately 500 hospitals across the United States with the HIMSS HIT survey data on the same hospitals. The first objective was to show how the HIMSS Analytics' EMR Adoption ModelSM (EMRAM) score measures HIT penetration across American hospitals and over time. The second objective was to understand the relationship between EMRAM scores and hospital clinical performance using a variety of metrics, including rates of adverse outcomes, efficiency and readmissions. Provisional conclusions of the study indicate that acute care hospitals with higher EMRAM scores also register shorter patient stays and fewer readmissions.

Canadian regional organizations and their hospitals, which complete the annual HIMSS Analytics ICT Study, have easy web-based access to combined 76 benchmarking reports, including 47 at the hospital level and 29 at the regional level. Each of these reports allows them to compare their organization against 10 de-identified or blinded peers selected on the basis of 33 hospital or 13 regional factors including bed size, adjusted patient days, facility type, total operating expense, system installed, location, and so forth. Benchmarking comparisons include IS department operating statistics such as full-time equivalents, operating budget and salary expense, in addition to HIMSS Analytics EMRAM score comparisons.

What is the HIMSS Analytics EMRAM score? It is important to note that in US terms, EMR refers equally to an in-patient hospital or outpatient ambulatory environment. In Canadian terms, EMR refers most often, as for Health PEI, to the ambulatory environment of physician offices, health centres or outpatient clinics, while electronic patient record (EPR) refers, as for Health PEI, to the in-patient hospital environment. The acute care EMRAM score measures levels of acute care EMR/EPR capabilities ranging from limited ancillary department systems to a fully electronic environment on a continuum of eight stages from zero to seven. Stage 7 allows clinical information to be readily shared via electronic transactions or exchange of electronic records within a health information exchange, including other healthcare organizations, government entities and patients in Canada or the US.¹

Why is the HIMSS Analytics EMRAM score a valuable tool for Canadian healthcare delivery organizations to use in measuring their clinical E-health progress? The methodology and algorithms of the hospital EMRAM score are currently used to automatically score more than 5,000 hospitals in the US database and more than 650 Canadian acute care facilities that participated in the 2009 Canada ICT (Canada Information and Technology) Study. In particular, the annual survey targets detailed information about an acute care facility's EMR/EPR environment. Of the 76 benchmarking reports that HIMSS Analytics makes available to participating regional healthcare organizations and their hospitals, 33 compare their EMRAM scores to factors such as IS Department Operating Budget, Nurse FTEs, IS Department FTEs and other hospitals' EMRAM scores.

Since 2007, HIMSS Analytics has conducted an annual survey of ICT systems at acute care hospitals in Canada. Currently, HIMSS Analytics publishes quarterly EMRAM scores for Canadian hospitals, based on the most recent data collection for the acute care environment across the ten provinces and three territories. The state of Canada's progress at implementing a comprehensive E-health strategy for acute care facilities in ten provinces and three territories is documented quarterly in the HIMSS Analytics Canada EMR Adoption ModelSM scores. Figure 1 shows the 2010 Q1–2010 Q2 scores for Canada, which are based on the comprehensive results of the 2009 ICT Study for acute care hospitals and early results of the 2010 Canada ICT acute care study.

In late 2009, an annual survey of ICT systems at Canadian ambulatory health centres and outpatient clinics was initiated. After two quarters of 2010 data collection, early results confirm widespread Canadian interest across the provinces in providing the data necessary to establish a robust evaluation of IT implementation in the ambulatory or outpatient environ-

ment. HIMSS Analytics will publish an Ambulatory EMR Adoption ModelSM score in the near future, based on the US and Canadian data collection for physician offices, health centres and outpatient clinics. The future Ambulatory EMRAM score will measure levels of an EMR environment at physician offices, health centres or outpatient clinics ranging from an entirely paper environment to a fully electronic environment on a continuum of six stages from zero to five (Figure 2).²

Figure 1. Canada EMR Adoption ModelSM Q1 2010 – Q2 2010

		2010 Q1	2010 Q2
Stage 7	Complete EMR; CCD transactions to share data; data warehousing; data continuity with ED, ambulatory, OP	0.0%	0.0%
Stage 6	Physician documentation (structured templates), full CDSS (variance and compliance), full R-PACS	0.2%	0.2%
Stage 5	Closed loop medication administration	0.0%	0.0%
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	1.1%	1.2%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	30.0%	30.6%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have document imaging; HIE capable	23.2%	23.3%
Stage 1	Ancillaries – Lab, Rad, Pharmacy – all installed	11.4%	10.8%
Stage 0	All three ancillaries not installed	34.2%	33.9%

Data from HIMSS Analytics™ Database.

N=660/660 © 2010 HIMSS Analytics

Figure 2. Ambulatory EMR Adoption Model

Stage 5	Preventive care, chronic disease management, hie participation, clinical data analysis
Stage 4	Advanced CDSS, PHR provided, summary pt. data reports, links to pt. registries, interoperable orders
Stage 3	EMR becomes chart, all orders electronic, medication management & reconciliation, structured data capture
Stage 2	CDR, e-Prescribing, problem list, hospital data access via the web, secure email - patients and consults
Stage 1	Initial linkages for diagnostic results and web information access; initial digital information storage
Stage 0	Physician orders and notes handwritten; information exchange via fax and phone

Data from HIMSS Analytics™ Database

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Table 3. Ambulatory EMRAM score – Stage 5 indicators

Proactive and automated outreach to patients for preventive care and chronic disease management
Proactive searching for patients with particular conditions and medications as new clinical evidence (including recalls) develops
Interconnected regional community of physicians and healthcare organizations to easily share and exchange information, and collaborate, for improved patient care
Ability to mine data for clinical research

The major indicator of Stage 5 is participation by a physician office in an interconnected regional community of physicians, hospitals, lab companies, the pharmaceutical industry, imaging companies and patients, allowing easy sharing and exchange of information and collaboration for improved patient care and development of evidence-based medicine protocols (see Table 3 for Stage 5 indicators).

Measuring Health PEI's Acute Care Clinical Capabilities by the HIMSS Analytics EMRAM Methodology

A first step for Health PEI, as for all Canadian provincial and territorial health authorities, at assessing correlations of clinical IT and E-health implementation levels with patient clinical and safety outcomes, is to begin trending the province or territory's progress toward achieving levels of advanced clinical IT based on employing the HIMSS Analytics EMRAM scoring system.

EMRAM results from HIMSS Analytics' ICT 2009 complete study of Health PEI's combined seven acute care facilities reflect only the current live and operational state of the province's existing E-health clinical capability (HIMSS Analytics 2009 Health PEI ICT Study, July 2009d). The province's EMRAM scores do not measure the extent to which installations of advanced clinical systems for the acute care environment that contribute to the province's developing iEHR are already in process, or contracted but not yet installed, in various hospitals, with projected dates for going live and operational in the next 12 to 24 months. Nor do the province's EMRAM scores reflect the extent to which Health PEI is substantially prepared to implement more advanced E-health functionality, as soon as fiscal and personnel resources permit.

For Health PEI's seven acute care facilities, the mean 2009 HIMSS Analytics EMRAM score was 2.0727, with the highest score of 2.1310 belonging to Queen Elizabeth Hospital, followed closely by the Island's other six acute care hospitals with similar

scores of 2.0790. With the implementation of nursing documentation fully under way at all the Island's acute care facilities, the mean EMRAM score for the province should soon meet the requirements for all facilities to move up to Stage 3, after Health PEI's forthcoming submission of seven updated acute care studies. However, the province's EMRAM score will remain below Stage 4 as long as Health PEI does not implement CPOE.

From the pan-Canadian perspective, Health PEI currently ranks fifth among 13 provinces and territories for mean HIMSS Analytics EMRAM score.³ Once again, in the wake of the province's forthcoming submission of seven updated acute care studies including verification of nursing documentation implementation, Health PEI's pan-Canadian EMRAM ranking should climb higher. In particular, given the degree of standardized implementation of the same highly integrated clinical and financial/administrative IT solutions across the Island's entire in-patient environment, EMRAM scores and stages for Health PEI's seven acute care facilities should be substantially similar.

The future IT challenge for Health PEI will be to advance to Stage 4 of the EMRAM scoring system and beyond. To receive credit for attaining Stage 4, CPOE must be in use by any clinician, along with the second level of CDSS capabilities related to evidence-based medicine protocols. If one patient service area has implemented CPOE, with physicians entering orders and the previous stages having been achieved, then Stage 4 is attained. Currently, implementation of CPOE by Health PEI is slated to be completed on a rolling schedule of one facility at a time, commencing in fall 2012 and extending into 2013.

Beyond achieving Stage 4 with CPOE, it is important for Health PEI to plan for eventual implementation of additional advanced clinical applications, such as eMAR, that are required to enhance the capacities of QEH and PCH for improved patient clinical and safety outcomes as measured by Stages 5 and 6 of the EMRAM scoring model. After four years of scoring some 5,000 American hospitals and three years of scoring some 660 Canadian acute care facilities, HIMSS Analytics has accumulated significant evidence testifying that health systems only begin to show measurable return on investment in IT and E-health systems once they reach Stages 5 and 6.

Once having achieved compliance with EMRAM Stages 5 and 6, Health PEI would then be well positioned to evaluate the extent and kind of benefits realized from the Island's comprehensive healthcare system realignment inaugurated in July 2010. This realignment was undertaken precisely to realize the promises of the iEHR and its major component, the CIS, which was initiated starting in 2006. The expectation of all stakeholders in the newly created One Island Health System is that at some point soon, the concerted efforts of Health PEI will provide measurable confirmation that the promises for the province's iEHR and CIS are being realized for the Island's residents.

Conclusion: Challenges Facing Health PEI's E-health Vision

The PEI Health System Strategic Plan 2009–2012 outlines three major challenges threatening the Island's ability to provide first-rate healthcare delivery for all residents (Department of Health 2009):

- Islanders have some of the highest rates of chronic illness in Canada, coupled with a growing percentage of residents close to or over the age of 65.
- Due to declining health human resources worldwide and the Island's lack of competitive advantages in attracting competent healthcare personnel, the Island may soon be unable to staff sufficient positions to service its growing healthcare needs.
- Though the Island currently spends the lowest amount on healthcare among all provinces as a percentage of its overall provincial budget, the high cost associated with completing the iEHR project threatens to trigger an upward spiral of healthcare spending at a time when the provincial treasury is not growing.

The Health PEI Business Plan for fiscal year 2010–2011 addresses these strategic issues by focusing on four health system operational goals of quality, equity, efficiency and sustainability of healthcare delivery (Health PEI 2010e). Specific performance measures and targets for the next two fiscal years include:

- **Quality:** reduce unplanned hospital readmissions for same condition, and reduce hospital admissions for ambulatory care-sensitive conditions
- **Equity:** ensure timely access to key services in targeted areas such as radiation therapy, CT Scans and MRI, as well as hip and knee replacements
- **Efficiency:** ensure efficient use of health human resources or hours per patient day in 11 service areas such as ICU/CCU, medical and surgical units, palliative care and so forth
- **Sustainability:** ensure operational sustainability within assigned resources, such as preserving the health budget as an appropriate percentage of the provincial operational budget or of the budgeted minus actual expenditures.

Each of these performance measures and targets is geared to achieving increased patient safety and clinical outcomes combined with decreased, or at least steady-state, expenditures.

It remains to be seen whether the Health PEI strategy for implementing a fully operational iEHR in the near future can effect a genuine convergence between these clinical and fiscal objectives that is both clinically effective and cost-efficient for a small jurisdiction. On the one hand, PEI's small size in territory, population and healthcare delivery services is a major

advantage for implementing advanced, complex and integrated clinical and financial healthcare solutions. On the other hand, these same factors limit the extent of the province's financial and personnel resources available for acquiring and operating advanced, complex and integrated clinical and financial healthcare solutions. Unlike larger jurisdictions, PEI cannot muster the critical mass of funding, personnel and patients required to realize economies of scale from healthcare delivery secured with costly clinical and financial HIT solutions.

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There is much riding on the success of Health PEI's efforts to deliver on the promise of summer 2010 to refocus the province's healthcare mission on a renewal of primary health-care and services. Not only will Health PEI's success benefit all Islanders; it would benefit all Canadian healthcare. If Health PEI's strategy can be shown to be operationally successful, then its iEHR and CIS will serve as a pan-Canadian model of how to build an entirely integrated health system. Such a system would deliver evidence-based patient care by employing a truly comprehensive single electronic patient record that is easily accessible to all healthcare providers on PEI or in any provincial and territorial jurisdiction. Through its One Island Health System, Health PEI hopes to demonstrate that, despite the Island's small size, the difficult work of balancing the competing demands on its healthcare delivery system can, over time, generate sufficient energy, cooperation and productivity to lead the way to improved patient-centric health care for all 141,000 Islanders.

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Endnotes

1. For a full description of the eight stages of the EMRAM score for hospitals, see HIMSS Analytics EMR Adoption Model, <http://www.himssanalytics.org/hc_providers/emr_adoption.asp>.
2. For a full description of the six stages of the future Ambulatory EMRAM score, see HIMSS Analytics EMR Adoption Model, <http://www.himssanalytics.org/hc_providers/emr_adoption.asp>.
3. For EMR Scores by State/Province, 2nd Quarter 2010, see HIMSS Analytics EMR Adoption Model, <http://www.himssanalytics.org/hc_providers/emr_adoption.asp>.

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