New Brunswick's E-health Strategy and the Evolution of Regionalization

Patrick Powers

Introduction – The Provincial Health Plan 2008–2012

On April 1, 2008, the Government of New Brunswick announced The Provincial Health Plan 2008–2012, *Transforming New Brunswick's Health-care* (Government of New Brunswick 2008). The health plan included an ambitious province-wide reorientation and restructuring of healthcare delivery, governance and funding under the direction of the health ministry. The major focus of the four-year plan was – and remains in its third year – to shift New Brunswick's healthcare delivery from, in the words of then–Health Minister Michael Murphy, "a system-centred health system to one that's patient-centred" (Michael Murphy 2008).

The health plan's 12 major initiatives, which aim at enabling a patient-centred healthcare system, include nine projects directly impacting healthcare delivery and three involving IT, legislative and governance support for reorienting healthcare access and delivery. The plan also announced that four new governance and/or organizational entities would be established (Government of New Brunswick 2008):

- Eight Regional Health Authorities (RHAs) would be consolidated into two, initially named RHA A and RHA B (RHA B was subsequently renamed Horizon Health Network), and organized to provide a single, efficient, provincially integrated healthcare system in two administrative divisions.
- Delivery of certain RHA non-clinical services would be consolidated under a new, public sector, shared service provider organization – subsequently named FacilicorpNB – to gain efficiencies and significantly reduce the cost of healthcare delivery.
- The New Brunswick Health Council would be established to provide a more effective mechanism for citizen involvement in healthcare system planning, monitoring and accountability.
- The NB Health Research and Innovation Council would be established to direct, promote and support health research in New Brunswick.

The rationale for the consolidations was twofold. They would reduce duplication of services and expenses in order

to achieve parity of healthcare access and delivery for all New Brunswickers, and the millions of dollars saved would be reinvested in healthcare improvements, especially in advancing information technology (IT)-enabled healthcare delivery. The primary objectives for establishing the two Councils were to directly engage the province's citizens in improving the quality, effectiveness and efficiency of the province's healthcare system, and to target healthcare improvements through research in areas important to the health of New Brunswickers. These included rural health, clinical trials management and cancer research.

The Provincial Health Plan 2008–2012 has two years left to show progress on its ambitious strategic plan. However, the deadline for assessment may occur as early as this September, when a provincial election for the Legislative Assembly is required by law. At that time, the Liberal Government, which authored the health plan in 2008, is up for re-election. Many observers anticipate that taking stock of the promise and progress of the government's grand overhaul of provincial healthcare will emerge as an issue in the electoral campaign over the coming summer.

Many observers anticipate that taking stock of the promise and progress of the government's grand overhaul of provincial healthcare will emerge as an issue in the electoral campaign over the coming summer.

On the Way to 2012 – New Brunswick's Healthcare Standards and Achievements

Regional consolidation of healthcare across Canada has been evolving for some 15 years. Since healthcare is a provincial rather than a federal responsibility, the face and pace of regionalization continues to differ from province to province. Prince Edward Island (PEI) and Alberta are the first to replace all regional authorities with a provincial health authority directly accountable to their respective health ministries. As well, several provinces and territories have established shared service provider organizations centred around government-wide IT services or specifically in healthcare. These include Alberta, Manitoba, Ontario, PEI, Yukon, Northwest Territories, Nunavut and, most recently, British Columbia.

New Brunswick stands out for having embraced a comprehensive strategy of simultaneously tackling consolidation of regional authorities and creation of a shared-services provider organization, in tandem with other province-wide healthcare governance and organizational reformations. The aim of the province's comprehensive restructuring effort was to redistribute the business and clinical functions of healthcare delivery across newly constituted entities in ways that would be more patient-centred, efficient and cost-effective. These new healthcare entities were constituted in ways that require ongoing collaboration and integration of all stakeholders. This is essential if any one organization is to achieve its specific mandated goals, which contribute to securing the province-wide strategic objectives of the Health Plan 2008–2012.

New Brunswick's health plan established six pillars against which all provincial healthcare stakeholders must benchmark their goals and strategic initiatives (Government of New Brunswick 2008). These healthcare pillars aim to achieve better balance, enhance access, improve efficiency, harness innovation, make quality count and engage partners. Starting with the 2008–2009 fiscal year (FY), the organizations created through the 2008 restructuring have begun the process of annually assessing their accomplishments in light of The Health Plan 2008–2012. Among their achievements during 2009 and early 2010, the following stand out:

- RHA A signed an education affiliation agreement with the Université de Moncton. One of the goals was to provide a wide range of services meeting the needs of French-speaking communities in New Brunswick. This involved quality French training programs to meet the needs of health professionals and a health promotion and disease prevention program responsive to the needs of francophones in New Brunswick (Regional Health Authority 2010a).
- Horizon Health Network (formerly RHA B), in collaboration with FacilicorpNB, rolled out major modules of the Eclipsys Sunrise Clinical Manager suite at acute care facilities in the Saint John Zone. Horizon also announced a Strategic Framework 2010–2013, with emphasis on collaborating with other provincial stakeholders to develop budgeting, financial, workload measurement and human resource IT systems (Horizon Health Network 2010).
- FacilicorpNB achieved savings over the first two years through important non-clinical services and IT consolidation (see below).
- The New Brunswick Health Council released the first New Brunswick Health System Report Card and also the first Population Health Snapshot, both in early 2010 (New Brunswick Health Council 2010).
- Health Services Research priorities for New Brunswick were identified by the Conference of Deputy Ministers to include developing models of alternative primary care delivery and models to assist in using health professionals differently, as well as assessing the impact of new devices and therapeutic opportunities on the cost and outcome of health services (Department of Health 2010).

Additionally, the Department of Health, which works in close collaboration with RHA A, Horizon Health Network and FacilicorpNB, will deploy the first components of its electronic

health record (EHR) across all zones of the two RHAs by fall 2010 (see below for details).

Regionalization, FacilicorpNB – A New Governance Structure

The most visible piece of the new provincial approach to healthcare was the consolidation of the eight RHAs – originally created in 1992 from the existing 51 hospital and community health services centre boards – into the two new RHAs, each encompassing four zones (see Table 1).

- RHA A encompasses the north/southeast sectors and is headquartered in Bathurst. It serves a population of approximately 250,000 in four zones, with eight acute care hospitals, more than 470 physicians and 45 community health centres, public health/mental health offices and extra mural program offices (Regional Health Authority A 2010b).
- Horizon Health Network encompasses the extensive central sector and headquartered in Miramichi. It serves a population of approximately 600,000 in four zones, with 12 acute care hospitals, more than 900 physicians and more than 80 community health clinics, public health/mental health services and extra mural programs (Horizon Health Network 2009).

Table 1. New Brunswick RHAs and zones

RHA A	
Zone 1A	Beauséjour
Zone 4	Northwest
Zone 5	Restigouche
Zone 6	Acadie–Bathurst
HORIZON HEALTH NETWORK	
Zone 1B	Moncton
Zone 2	Saint John
Zone 3	Fredericton/Upper River Valley
Zone 7	Miramichi

According to the original 2008 announcement by the Minister of Health, RHA consolidation was divided between two RHAs, rather than established as a single provincial health authority similar to Alberta's, to protect the province's constitutional language rights. New Brunswick is Canada's only bilingual province, with RHA A encompassing the majority of francophones and Horizon encompassing largely anglophones.

On April 7, 2010, the government announced that the Legislative Assembly would make changes to the province's healthcare governance structure in order to rectify issues that had emerged in an ongoing debate since 2008 about francophone healthcare services. The legislative changes follow up on the release in March 2010 of the government-commissioned independent report *Toward an Improved Health System in French in New Brunswick*. The report proposed 14 recommendations, including enhancing the language-based rights of RHA A. Additionally, Recommendation 13 proposed that

> FacilicorpNB's shareholders consist of the Minister, Regional Health Authority A and Regional Health Authority B (Horizon) and that the members of the board of directors of this agency also be chosen by the new shareholders in accordance with the customary rules of corporate law (Government of New Brunswick 2010c: 34).

The independent report was commissioned by the government largely in response to a lawsuit filed by Égalité Santé en français NB, arguing that the 2008 healthcare restructuring violated language rights in the province's healthcare system (Government of New Brunswick 2010a, 2010b).

The transfer to and consolidation by FacilicorpNB of all IT and IT support services for all healthcare delivery organizations is the most radical change effected by the 2008 restructuring of the way New Brunswick does healthcare business.

The innovative dimension of the RHA restructuring was the creation of FacilicorpNB, a shared services provider (SSP) that works in tandem with the RHAs as its primary customers. FacilicorpNB has a twofold provincial mandate. It is to reduce costs and increase efficiency in specific non-clinical services of the province's RHAs, including materials management and hospital laundries, as well as IT and telecommunications. In turn, FacilicorpNB is to invest realized surplus funds in investments required to achieve operational efficiencies within the lines of business transferred to it. FacilicorpNB is then to reinvest in health-related technologies supporting the clinical and non-clinical services of the RHAs, as well as the provincial EHR – the One Patient One Record (OPOR). FacilicorpNB has a legislative-mandated target of realizing annual savings of $20 million by the end of five years, on a graduated scale of $8 million in 2010–2011 and $15 million in 2011–2012. Funding

for FacilicorpNB was transferred to the SSP at the time operational responsibilities were transferred for IT, telecommunications and also materials management, among other services. In FY 2009–2010, this amount equalled approximately $49.3 million, or 1% of the RHAs' overall support services budget (Gordon Gilman 2009).

FacilicorpNB and IT Services Consolidation

The transfer to and consolidation by FacilicorpNB of all IT and IT support services for all healthcare delivery organizations is the most radical change effected by the 2008 restructuring of the way New Brunswick does healthcare business. In short, FacilicorpNB is now the IT shop for the province's two RHAs, which comprise eight zones, 20 acute care hospitals and more than 95 non–acute care facilities. The RHAs develop a strategic IT plan in consultation with FacilicorpNB, and they are responsible for planning and prioritizing the information management of the data needed to deliver healthcare services to their populations. FacilicorpNB has responsibility for providing the IT and operational information services infrastructure required by the RHAs and their facilities to deliver IT-enabled healthcare. FacilicorpNB's primary IT focus is to consolidate and standardize the footprint of applications and the technology infrastructure used to support the delivery of care across the province.

The FacilicorpNB 2010–2013 Strategic Plan was developed through consultations with RHA A, Horizon Health Network and the Department of Health. The SSP's three-year Strategic Plan is organized around four priorities:

- Establish strong relationships with the RHAs
- Generate efficiencies through operational excellence, by consolidating, standardizing and improving procedures within the consolidated services
- Be accountable to the different stakeholders in the province's health system and to its own shareholder, the Government of New Brunswick, by developing reporting systems to monitor its corporate performance
- Become an employer of choice by recruiting, training and maintaining a highly skilled and motivated workforce (FacilicorpNB 2010a)

Among many instances of efficient and cost-saving IT consolidations and implementations effected by FacilicorpNB in the two RHAs and its own shop since 2008 are:

- Design and implementation of a single Intranet solution with three views for the three collaborating organizations and 18,000 users. Previously, Horizon had four different solutions, RHA A had two and FacilicorpNB had none
- Implementation of standardized software and processes for all service desks
- Implementation of a payroll system at FacilicorpNB that reduced RHA responsibility for payroll and human resource management for 700+ employees
- Implementation of the Eclipsys Sunrise Clinical Manager registration and clinical information system – I3 (integrated interdisciplinary information) – for essential clinical functions at acute care facilities in Saint John Zone 2, especially Saint John Regional Hospital Facility and St. Joseph's Hospital – Saint John (FacilicorpNB 2010b)
- Initiation of 12 projects to consolidate the technology infrastructure and address an aging infrastructure. These projects range from server virtualization of 700 of the 1,000 servers used in the healthcare delivery environment to the consolidation of storage, and other strategies around end-user computing and printing that will reduce costs and provide a more reliable computing environment

In 2009, the province's materials management, IT and telecommunications functions were transitioned to the services provided by FacilicorpNB. Fundy Linen Services and Clinical Engineering were added to FacilicorpNB on January 1 and April 1, 2010, respectively.

Given the demanding timeline for FacilicorpNB to achieve its mandated priorities, the major IT task of implementing greater standardization of the clinical software solutions in place across the eight zones will be looked at over time as planning evolves with the RHAs. Some years back, the province's major healthcare stakeholders developed a working framework for such province-wide clinical integration. Those preliminary discussions will eventually need to be revisited in light of the province's evolving business plan since 2008 for IT-enabled healthcare delivery. Currently, Meditech is the vendor of choice in seven zones, with six zones using the Magic product and one zone, Moncton, relying on Client Server. As mentioned above and outlined below, Zone 2 – Saint John, just recently completed implementation of the major clinical modules of the Eclipsys Sunrise Manager solution.

A third partner of FacilicorpNB, in addition to the two RHAs, is the Department of Health (DOH), especially its E-health division. While the DOH is responsible for setting the provincial strategy for OPOR – the provincial EHR – as the province's shared service provider, FacilicorpNB is also responsible for supporting the integration of the clinical and business IT applications implementing OPOR. Additionally, the DOH works closely with FacilicorpNB to prioritize the IT projects in the two regional authorities that impact implementation of the provincial EHR. For example, should one RHA or one zone seek implementation of an emergency department information system (EDIS), it becomes more efficient to secure economies of scale by implementing the same system across both RHAs. At that point, the DOH becomes involved in the decision process

in order to ensure integration of the new EDIS in the provincial IT architecture structure.

Going forward, collaboration between the four main organizations responsible for provincial healthcare delivery and services – two RHAs, FacilicorpNB and the DOH – will intensify. FacilicorpNB will undertake more IT initiatives for the RHAs, involving implementation of more application and service components crucial to maturing OPOR.

New Brunswick's E-health Agenda, OPOR and the iEHR

The vision of New Brunswick's OPOR is to link "patient information from across the entire healthcare system, including hospitals, doctors' offices, public health, mental health, allied health, pharmacies, laboratories, and diagnostic imaging…" (Department of Health 2010a: 3).The integration of all patient information from these sources in a single and integrated EHR will enable authorized healthcare providers to access "timely, accurate, comprehensive, province-wide patient information at anytime and from anywhere" (Department of Health 2010a: 3). The expectation is that a comprehensive EHR will improve patient outcomes, achieve fiscal and personnel efficiencies and, in turn, increase capacity and safety in the health system.

The most important component of New Brunswick's OPOR strategy for integrated patient information is the interoperable EHR (iEHR), the viewer providing access to the lifetime record of each patient's key healthcare history and care within the provincial health system. Development of the iEHR has been under way since September 2007, with funding from Canada Health Infoway. Oversight responsibility for the iEHR resides with the DOH and its innovation, E-health and sustainability branch. By fall 2010, the iEHR viewer, client registry, provider index and clinical data repository (CDR) will be live and operational in all eight zones. The vendor of choice for the client registry is Initiate, as is the case in many other provinces; Orion solutions support the other three elements of the iEHR.

By fall 2010, the iEHR viewer, client registry, provider index and clinical data repository (CDR) will be live and operational in all eight zones.

Once these foundational components of OPOR are live and operational, authorized providers throughout the province will be able to view patient admission and discharge data, laboratory reports and diagnostic imaging (DI) reports that are fed to the CDR. This data will be accessed on the iEHR viewer at all hospitals and other facilities in the two RHAs via a web portal. Other clinical data will be accessed from existing Meditech and Eclipsys systems as well as other supporting ancillary patient care systems. DI images generated by Agfa's picture archiving and communications system (PACS) product will be fed into the Meditech and Eclipsys (Saint John Zone only) systems and will pass to the viewer and provide access by these same clinical application solutions. DI images will be accessible provincially from a central DI repository. Additionally, in late summer 2011, the DOH will implement a drug information system using DeltaWare's Medigent solution to feed drug information from the community pharmacies to the iEHR viewer.

At present, similar patient data from physician offices cannot be fed to the CDR or viewed with the iEHR, as the province does not currently sponsor a live and operational physician office electronic medical record (EMR) solution. (Several other provinces have initiatives under way in collaboration with approved vendors to expand the number of physicians able to integrate their office EMRs with the provincial iEHR).

As the functionality of OPOR matures over the next few years, a greater interdependency of the two RHAs, FacilicorpNB and the DOH will develop. Healthcare providers and facilities will rely increasingly on IT and E-health to secure improved patient outcomes and safety. At that point, there will be a need to develop a measurement tool for undertaking a cost and benefit analysis of the province's 2008 grand plan for restructuring and consolidating healthcare services.

New Brunswick, in collaboration with Nova Scotia and Newfoundland & Labrador, already has a head start on evaluating the benefits of investments in an EHR. The project is being led by Newfoundland & Labrador, with funding from Canada Health Infoway (Department of Health 2010b). It is focused on measuring the benefits and outcomes of IT investments in the areas of laboratory information systems and an iEHR. Using an evidence-based approach to outcomes measurements, the cross-jurisdictional approach to iEHR benefits analysis has three objectives:

- Demonstrate the value of investments in a broad range of stakeholder groups
- Encourage end-user adoption through documentation and dissemination of benefits
- Highlight challenges, opportunities and lessons learned that would support current and future projects and investment strategies

Measuring the Clinical Impact of IT and E-health Investments – the New Brunswick Health Council

The third important innovation announced in March 2008 was the establishment of the 16-citizen-member New Brunswick Health Council (NBHC), which is invested with four mandates:

- Engage citizens in a meaningful dialogue
- Measure, monitor and evaluate population health and health service quality
- Inform citizens on the health system's performance
- Recommend improvements to the health system partners

Taken together, the general responsibility of the NBHC is to exercise citizen oversight of the province's healthcare system for the purpose of holding it accountable for efficiency of expenditures correlated with levels of patient outcomes and extent of patient safety. NBHC took the first step toward trending clinical outcomes, especially in the acute care in-patient environment, with its release of the New Brunswick Health System Report Card 2010. Four sectors of healthcare delivery – primary health, acute care, supportive/specialty, and palliative and end-of-life care – were measured against national averages or benchmarks in terms of quality of healthcare accessibility, appropriateness, effectiveness, efficiency, equity and safety.

Specifically, the NBHC began to tackle the important task of measuring the effectiveness of in-patient acute care with its report on the incidence of adverse medical conditions such as low-weight babies, risk-adjusted rates of acute myocardial infarction readmission and in-hospital mortality, in-hospital hip fracture, asthma readmission, and five-year survival estimates for primary sites of cancer (New Brunswick Health Council 2010).

The NBHC Report Card 2010 does not attempt any further correlation between the incidence of adverse medical conditions and the level of IT-enabled clinical systems implementations serving patients with these conditions. Currently, NBHC's four mandates do not specifically require establishing and measuring correlations between levels of IT-enabled healthcare delivery and general levels of population health and health service quality or specific levels of patient outcomes and safety. Nonetheless, given the Province's 2008 commitment to restructure healthcare governance and delivery and employ IT and e-Health to enable quality healthcare delivery, the NBHC can be expected to develop such measurements of IT impact on clinical healthcare delivery. It will need to do so in order to fulfill its overall mandate of holding the provincial government accountable for its healthcare investments and outcomes.

HIMSS Analytics' EMRAM Scores for Hospitals and Ambulatory Settings

While Canadian interest in measuring correlations between clinical outcomes improvements and levels of clinical IT and e-Health systems implementations is drawing the attention of healthcare research organizations (including the Canadian Institute for Health Information), such efforts are already under way in the United States (US) 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 healthcare sites, examined the relationship between the adoption of health information technology (HIT) and various indicators of hospital quality and efficiency (HIMSS 2010). The study was based on merging Premier hospital administrative data from approximately 500 hospitals across the US with the HIMSS survey data. The first objective was to show how the HIMSS Analytics' EMR Adoption Model[SM] (EMRAM) score measures HIT penetration across US hospitals and over time. The second objective was to understand the relationship between EMRAM scores and hospital clinical performance, using a variety of metrics. These included rates of adverse outcomes, efficiency and readmissions. The 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 (Canada Information and Technology) 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 ten 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 others. Benchmarking comparisons include IS department operating statistics such as full-time equivalents, operating budget and salary expense, in addition to EMRAM score comparisons.

What is the HIMSS Analytics EMRAM score? 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] 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 in New Brunswick, to the ambulatory environment of physician offices, health centres or outpatient clinics, while electronic patient record (EPR) refers, as in New Brunswick, to the in-patient hospital environment.

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

Figure 1. Canada EMR Adoption Model℠ Q4 2009–Q1 2010

		2009 Final	2009 Q1
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 & 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%	1.1%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	28.8%	30.0%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have document imaging; HIE capable	22.7%	23.2%
Stage 1	Ancillaries – Lab, Rad, Pharmacy – all installed	11.7%	11.4%
Stage 0	All three ancillaries not installed	35.6%	34.2%

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 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. © 2010 HIMSS Analytics

that participated in the 2009 Canada ICT 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 Model℠ scores. Figure 1 shows the 2009 Q4–2010 Q1 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. An Ambulatory EMR Adoption Model℠ score will be published in the near future, based on the American 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 one, on a continuum of six stages from zero to five.[2]

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 (Figure 2).

Measuring New Brunswick Acute Care Clinical Capabilities by the HIMSS Analytics EMRAM Methodology

A first step for New Brunswick, as for all Canadian provinces and territories, at assessing correlations of patient outcomes and safety with levels of clinical IT and e-Health is to begin trending

Table 2. 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 Province's progress toward levels of advanced clinical IT based on employing the HIMSS Analytics EMRAM scoring system.

EMRAM results from HIMSS Analytics' ICT 2009 Complete Study of New Brunswick's two RHAs and their combined 20 acute care facilities reflect only the current live and operational state of the Province's existing e-Health clinical capability. 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 OPOR 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 New Brunswick – at the RHA, FacilicorpNB and DOH levels – is substantially prepared to implement more advanced e-Health functionality, as soon as fiscal and personnel resources permit.

Saint John Zone's Saint John Regional Hospital Facility and St. Joseph Hospital – Saint John … will emerge this year with the Province's leading EMRAM scores, in the vicinity of 4.000.

For 15 of New Brunswick's 20 general or full services acute care hospitals in two RHAs, excluding for the moment the five facilities of Horizon – Saint John Zone, the Province's acute care environment EMRAM scores for 2009 Q4–2010 Q1 ranged, on a scale of 0 to 7, between 3.1560 on the high end for Dr. Everett Chalmers Hospital – Fredericton Zone and 2.0630 on the low end for the three acute care hospitals of RHA A – Northwest Zone. For 2009 Q4–2010 Q1, the mean EMRAM score for 15 of New Brunswick's 20 general acute care hospitals was 2.9270, compared to a pan-Canada mean EMRAM score for all Canadian hospitals of 1.5609.

For 2009, the EMRAM scores for the five hospitals of the Horizon – Saint John Zone were artificially depressed, because the extensive Eclipsys Sunrise Clinical Manger initiative had the status of "installation in process," rather than "live and operational." With the completion of the Eclipsys implementation in late 2009 and the submission in late spring 2010 of five updated studies for the five hospitals of Saint John Zone, their EMRAM scores will increase significantly. In fact, given that Saint John Zone's Saint John Regional Hospital Facility and St. Joseph Hospital – Saint John are the only New Brunswick hospitals to have implemented some degree of computerized physician order entry (CPOE) – a clinical IT application advance beyond the basic order entry already installed at the province's other facilities – these two hospitals will emerge this year with the Province's leading EMRAM scores, in the vicinity of 4.000.

In the aggregate, 15 of New Brunswick's 20 acute care hospitals, which are all Meditech clinical application facilities (13 on the Magic platform and two on Client Server) have reached at least Stage 2. This means that the three major ancillary clinical systems feed patient data to a CDR, which provides physician access for retrieving and reviewing patient results. The CDR contains a controlled medical vocabulary, and the clinical decision support/rules engine (CDSS) is live and operational for rudimentary conflict checking.

As well, in the aggregate, 12 of the same 15 hospitals have reached Stage 3. Nursing documentation (e.g., vital signs, flow sheets) is live and operational, and the first level of CDSS is implemented to conduct error checking with order entry (i.e., drug/drug and drug/dosing interactions). Medical imaging access from PACS is available by physicians outside the Radiology department via the hospital's Intranet, in ICU, CCU, ER and OR.

In addition to the 15 hospitals mentioned above, two of Horizon – Saint John Zone's five facilities (Saint John Regional Hospital facility and St. Joseph's Hospital – Saint John) have reached Stage 3. Moreover, after the recent implementation of Eclipsys Sunrise Clinical Manager, including the CPOE module, both facilities are approaching Stage 4. Once CPOE is live and operational in one patient service area and the second level of CDSS capabilities has been activated involving evidence-based medicine protocols, then a facility has reached Stage 4.

The challenge for New Brunswick hospitals will be to advance into Stage 5 of the EMRAM scoring system and beyond. Stage 5 requires full implementation of an integrated closed-loop medication environment relying on an electronic medication administration record (EMAR). This includes all procedural and safety steps beginning with physician order entry and culminating in medication administration, in accordance with the five rights of patient safety, at the point of care. Stage 6 requires full physician documentation and charting using structured templates that capture discrete data for at least

one patient care service area. Level three of CDSS is activated, which provides protocols and outcomes guidance for the clinician in the form of variance and compliance alerts. Finally, a full complement of PACS systems, providing medical images to physicians via an Intranet, has replaced all film-based imaging.

It is important for New Brunswick to plan for eventual implementation of the clinical applications required to advance its leading academic medical and tertiary care hospitals to Stages 5 and 6 of the EMRAM scoring system. 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 that health systems only begin to show measurable return on investment in IT and e-Health systems once they reach Stages 5 and 6. Having done so, New Brunswick would then be well positioned to evaluate the extent and kind of benefits realized from the comprehensive healthcare consolidations outlined in The Provincial Health Plan 2008–2012 and instituted in 2008.

Conclusion: Challenges Facing New Brunswick's e-Health Strategy

Observers agree that New Brunswick's Provincial Health Plan 2008–2012 is innovative and ambitious. The province's strategy for reconfiguring how to do the business of healthcare – in a way that serves the patient first, is cost-effective and improves patient outcomes and safety – makes business and clinical sense. To be determined is what challenges lie ahead that will influence whether the objectives of The Provincial Health Plan 2008–2012 can be achieved within a reasonable length of time. The challenges facing New Brunswick's healthcare agenda for implementing OPOR and realizing the benefits of using IT and e-Health to enable and improve healthcare delivery are largely typical of those facing all the provinces (though in most instances with a distinctly New Brunswick flavour). The major healthcare tasks facing the Province are the following:

- Developing a robust EHR depends on enhancing patient data fed from hospitals with data transmitted by physicians from office-based EMRs. Sooner or later, the Province will need to develop a strategy for encouraging physician adoption of office EMRs. New Brunswick's challenges are the high cost of EMR solutions, the low level of technology usage in physician practices and the absence of a provincial plan for integrating physician office EMRs with the provincial EHR. Physician resistance to the workflow changes required by EMRs is less of a challenge.
- Enhancing standardization of data and work practices is essential to ensuring that patient information from diverse sources is actually "interoperable" across different healthcare settings.
- Improving outcomes from the 2008 restructuring of regionalization and introduction of a shared services provider, all of which take time to effect substantial change management, is a prerequisite for achieving closer alignment of the Province's healthcare strategy and goals with the operations of the new governance and organization structure.
- Preparing to sustain the Province's entire healthcare system in the face of aging patient and provider populations, coupled with diminishing resources of qualified personnel and funding to address the changing healthcare environment, requires aggressive and successful recruiting of qualified health professionals. This relates especially to nurses and physicians, and new strategies for maximizing their competencies are also needed.
- Grappling with the funding difficulty of finding renewable monies to provide ongoing operational support for e-Health projects originally developed with federal Canada Health Infoway dollars is a looming issue in an age of reduced economic resources. It requires creative approaches to securing economies of scale and doing more with less.
- Shifting the emphasis from dependence on hospital-centred healthcare to a full continuum of patient-centred care that places a premium on patient wellness, primary healthcare and chronic disease management requires reorienting much of the province's healthcare to the outpatient settings of community health clinics, public health and extra-mural program offices.
- Focusing on publicizing the cost savings from the new shared services approach to healthcare delivery and the fiscal benefits of IT and e-Health advances for improving patient outcomes and safety is imperative in order to counteract the pessimistic Canada-wide public perception of doubts about the meaningful use or return on investment of healthcare IT.

Whether or not these healthcare challenges surface as issues in the coming fall electoral campaign for the Legislative Assembly remains to be seen. Yet, even if The Provincial Health Plan 2008–2012 does not come to the forefront of the election debate between the Liberal, Progressive Conservative and New Democrat parties, predictions of a repeat of the close results in the last 2006 election – when the Liberals won a slight majority in the Legislative Assembly but lost the popular vote – raise the specter of post-election governing challenges for the party in power. In such a tight electoral situation, the tenure of whichever party secures power would likely be marked by legislative and administrative uncertainties about the future of the province's strategy on many fronts, perhaps including healthcare. It is not beyond the realm of possibility that in the legislative aftermath of the coming election, reconsideration of the 2010–2011 budget, not to mention planning for the 2011–2012 budget, would affect the structure of healthcare governance and operations that have been under way in New Brunswick since March 2008. EH

Endnotes

1. For a full description of the eight stages of the EMRAM score for hospitals, see HIMSS Analytics' EMR Adoption Model[SM], <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[SM], <http://www.himssanalytics.org/hc_providers/emr_adoption.asp>.

References

Department of Health. 2010a, April 30. *E-Health Projects Business Plan: 2009–2010.* Unpublished document.

Department of Health. 2010b. *Health Services Research Priorities for New Brunswick.* Retrieved May 7, 2010. <http://www.gnb.ca/0391/Priorities-e.asp>.

FacilicorpNB. 2010a. "A 3-Year Strategic Plan for FacilicorpNB." INFOEvolution 2(4). Retrieved May 12, 2010. <http://www.facilicorpnb.ca/documents/INFOEvolutionMarch2010.pdf>.

FacilicorpNB. 2010b. *FacilicorpNB Benefits – Building a Leading Shared Services Provider.* Unpublished Report.

Gordon Gilman. 2009, June 23. *Presentation to Shared Services in Healthcare: Kelowna, BC, Reboot Conference.* Retrieved May 4, 2010. <http://www.rebootconference.com/health2009/presentations/>.

Government of New Brunswick. 2008. *Transforming New Brunswick's Health-care System: The Provincial Health Plan 2008–2012.* Retrieved May 5, 2010. <http://www.gnb.ca/cnb/promos/php/PHP-e.pdf>.

Government of New Brunswick. 2010a, April 7. "Premier Releases Report on Francophone Health Services" [News Release]. Retrieved May 1, 2010. http://www.gnb.ca/cnb/news/pre/2010e0486pr.htm>.

Government of New Brunswick. 2010b, April 8. "Administrative, Legislative Changes to Improve Health-care System" [News Release]. Retrieved May 1, 2010. <http://www.gnb.ca/cnb/news/he/2010e0494he.htm>.

Government of New Brunswick. 2010c, March. *Toward an Improved Health System in French in New Brunswick*. Retrieved May 4, 2010. <http://www.gnb.ca/cnb/news/he/2010e0494he.htm>.

Health Minister Michael Murphy. 2008, April 1. *Statement in the New Brunswick Legislature.* Retrieved May 5, 2010. <http://www.gnb.ca/cnb/promos/php/Statement-e.pdf>

HIMSS 2010. 2010, March 4. Eugene Kroch and Roger Park. *Correlating EMR Capabilities with Quality and Efficiency Metrics: An Update.* Unpublished presentation.

Horizon Health Network. 2009. Retrieved May 1, 2010. *2008–2009 Annual Report.* Retrieved May 1, 2010. < http://www.rhab-rrsb.ca/pdfs/annualreport_2008-2009.pdf>.

Horizon Health Network. 2010, February 19. *2010–2013 Strategic Framework.* Retrieved May 5, 2010. <http://www.rhab-rrsb.ca/pdfs/final_mission_brochure.pdf>.

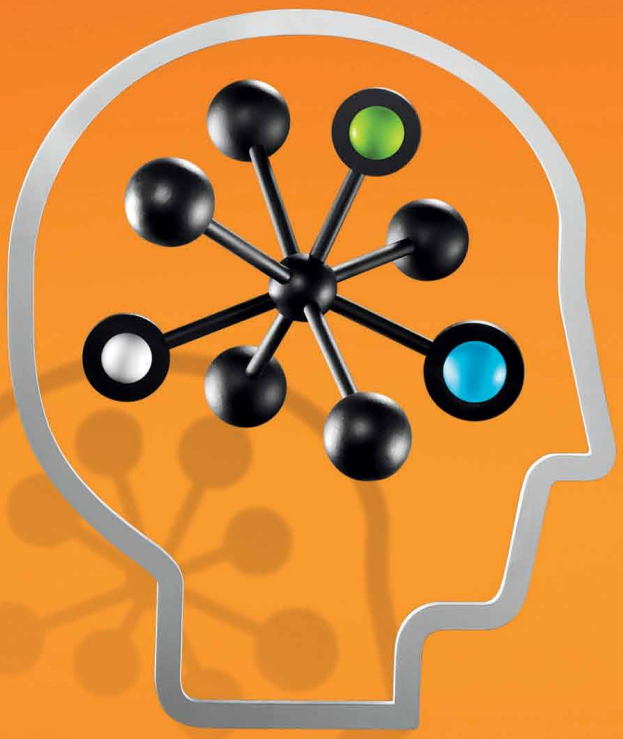
New Brunswick Health Council. 2010. *New Brunswick Health System Report Card 2010.* Retrieved May 6, 2010. <http://www.nbhc.ca/care_experience.cfm >.

Regional Health Authority A. 2010a, February 28. *Signing of the Affiliation Agreement with the Université de Moncton.* Retrieved May 5, 2010. <http://www.rrsa-rhaa.ca/en/NewsItem.aspx?NewsID=251>.

Regional Health Authority A. 2010b. *Our Organization.* Retrieved May 1, 2010. <http://www.rrsa-rhaa.ca/en/Our-Organization.aspx>.

About the Author

Patrick Powers, PhD, is a Senior Research Manager at HIMSS Analytics with oversight responsibility for the Canada ICT database and research, and a visiting professor in humanities, philosophy and government at several American colleges and universities.



ALTERNATIVE THINKING ABOUT HEALTH INFORMATION MANAGEMENT:

Connect People, Not Just Systems.

Alternative thinking is looking at the entire healthcare ecosystem to drive change and achieve critical outcomes, such as improved care, greater efficiency and lower costs. (Getting people, processes and technology all working together.)

It's turning data into the knowledge that links patients, doctors, long-term care, clinics, government agencies and hospitals, helping them achieve the best care possible at the lowest cost. (A virtual group hug.)

It's meeting patient expectations for responsive, collaborative healthcare—without abandoning their security and privacy needs. (More care, less red tape.)

It's working with HP, the world's Number One provider of health and life sciences IT services. We bring innovative ideas, vast industry knowledge, and an unmatched portfolio of services to help connect your organization to healthier results.

Contact the Canadian healthcare services team at outsourcing@hp.com for more information.

Technology for better business outcomes. hp.com/go/enterprise-services