Smarter Healthcare: Perspectives on Innovation

Canadian solutions for delivering collaborative care, achieving quality outcomes and improving operational effectiveness
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A Smarter Approach to Dealing with the Healthcare Crisis

By Barry Burk  Vice-President, Healthcare Industry, IBM Canada

As the Canadian population ages, demand for healthcare services will only increase. Yet we all recognize on some level that Canadian healthcare is on an increasingly unsustainable trajectory. Growth on healthcare spending has outstripped growth in GDP in practically every province, every year for the past 10 years.

When you view this disturbing historic trend against the current backdrop of a global economic crisis, it’s easy to become pessimistic about the outlook for healthcare in Canada.

Clearly, we need to re-examine the way we deliver healthcare. We need to find ways to provide better care at lower costs. But I am confident that we will emerge from the current situation into a world that is fast becoming smarter, and that healthcare – of any industry – offers some of the best opportunities to apply smarter thinking in ways that will both drive cost efficiencies and herald improvements in quality of care.

Let me explain why. For the first time in history, digital and physical infrastructures are converging, and almost anything can become digitally networked at a low cost. It’s now easy to embed sensors in all sorts of systems, in hospitals, in department stores, to even natural systems like rivers. In the future, the world will have a trillion connected and intelligent things – cars, airports, roadways, pipelines, manufacturers – and even infusion pumps or surgical sponges.

These technology developments are making it possible to capture information across many systems, share it securely and privately, and make it available via a variety of devices. In a situation where having the right information at the right time can literally make the difference between life and death, technology is essential to building a system that links patients with providers, researchers and others.

Advocating – to this audience – for the development of an electronic health record is a little like preaching to the choir. We all recognize once paper-based records are digitized, a whole world of opportunity opens up. Patient information can be securely shared between medical institutions, benefiting both patients and providers. Digital files can be mined to uncover correlations between symptoms and genetic predispositions. The resulting data would expedite an era of individualized medicine, when drugs and other treatments will be customized for each patient.

And advancements in healthcare IT would also serve as a catalyst for the use of Web 2.0 technologies in interesting ways, including health information portals, personal health records, and related social networking.

My optimism lies in the fact that we are seeing an unprecedented move toward having the capability to transform the healthcare system so that it actually begins to operate like a system, where information is captured using intelligent devices, shared across the complete spectrum of healthcare practitioners through the integration of secure networks, and available on-demand to patients, families, clinicians, researchers and other stakeholders.

In Canada, examples abound. Consider recent advances in the way doctors monitor premature babies. Technologies under development at the University of Ontario will enable incubators to capture and analyze a constant stream of hundreds of biomedical parameters. These systems alert doctors to the development of potentially life-threatening conditions long before staff could detect them through routine monitoring.

Or think of the way mobile devices are increasingly being used to help busy doctors record symptoms, analyze their severity against a database of clinical information, and then search for and review treatment recommendations or courses of action. The Victorian Order of Nurses is undertaking work that will see nurses equipped with mobile wireless hand-held devices, so they can schedule appointments, consult with practitioners and colleagues, or collect, share and access patient information in real-time, right from the patient’s home.

Finally, while the SARS crisis shed light on the fact the healthcare system lacked a coordinated way to capture and share information, one of the responses has been a new information solution called Panorama. The disease surveillance system will provide public health officials with vital tools such as outbreak identification and vaccine inventory management so they can launch a better, more coordinated response to communicable disease outbreaks such as H1N1.

These are just three examples of how technologies can enable smarter healthcare delivery. Let’s take advantage of the move toward a smarter world to help address some of the challenges our healthcare system faces. Let’s build an efficient and sustainable healthcare system that actually meets the definition of a ‘system’. The payoff will be measurable, not only in dollars, but in lives.

For more information, please visit: ibm.com/healthcare/ca
In Greek mythology, Artemis played several important roles, including goddess of the hunt and goddess of fertility and childbirth. According to one story, her role as a guardian of young children and women in childbirth started the day she was born, when Artemis aided her mother Leto across the straits between Ortygia and Delos and then helped Leto give birth to her twin brother Apollo. Pretty impressive for a newborn.

Of course, human newborns are not so ready for the world, and that helplessness is all the more serious when babies are born prematurely. The health-care challenges for these patients are so severe that professionals in the Neonatal Intensive Care Unit (NICU) can use all the help they can get. So, how about a guardian to watch over their fragile charges?

That, put simply, is the idea behind Artemis, a collaborative project involving Toronto’s Hospital for Sick Children, the University of Ontario Institute of Technology (UOIT) in Oshawa, Ont., and IBM Canada. The goal of the project is to capture and analyze vast amounts of physiological data from premature babies and then present that information to physicians and nurses.

**Too much information**

The Artemis project addresses a couple of significant challenges caregivers face in NICU environments. Dr. Carolyn McGregor, Canada Research Chair (CRC) in Health Informatics at UOIT, said the first challenge is that monitoring machines generate much more data than a caregiver can absorb. “Data is coming out of those machines at a rate of a thousand readings per second, and we’re taking that down to make a note of a single reading every 30 or 60 minutes,” she said. “There’s an enormous amount of data loss.”

The second problem is near real-time monitoring. Even if humans could interpret that huge data stream, they’d rarely get the chance in the NICU environment. “There are frequent disruptions,” said Dr. Andrew James, associate professor in the Department of Paediatrics at the University of Toronto and a neonatologist in the Neonatology Department at the Hospital for Sick Children. “We might be trying to make sense of a big chunk of information but then we’re called away to something urgent. That goes on continuously throughout the day.”

**Canada calling**

McGregor is a native of Australia and started her research there after experience working on informatics systems for the financial and retail sectors. Early on in her research, she met the founding dean of UOIT at a conference in Singapore, and soon found herself packing for a move to Ontario, lured by $500,000 in funding through the CRC program plus a $250,000 injection to establish her lab, courtesy of the Canada Foundation for Innovation, Ontario’s Ministry of Research and Innovation, and the university.

McGregor said the support has been invaluable. “The laboratory I’ve set up here is the first of its kind, anywhere in the world, where we have medical devices from all different makers that we can use for computer science and research,” she said, adding that work to digitize health records through the Canada Health Infoway program contributes to a remarkable environment for her research. “There are unique models of innovation in Canada in terms of the electronic health record, very strong support through the Canada Research Chair program and a very good team of people I’m collaborating with, as well as the University of Ontario, which has been incredibly supportive.”

**IBM signs on**

That collaboration includes a team from IBM, which came on board about two years ago following a presentation by McGregor at the company’s Thomas J. Watson Research Centre in Yorktown Heights, N.Y. “We were about three or four years into developing a whole new class of software that we referred to as System S, which handles streaming data,” said Don Aldridge, general manager of Research and Life Sciences at IBM Canada. “One thing we don’t have as a company is access to hospitals. We don’t have patients. We look to our partners for access to data in many cases and the combination of Dr. McGregor’s informatics skills and Dr. James, with access to the kids, seemed to be a really good marriage.”

**Babysteps**

As a first step, McGregor, James and the IBM team are exploring ways to use the wealth of data from patient monitoring machines to enable earlier detection of nosocomial infections in the NICU (see sidebar). This could
help reduce infant mortality and even improve the overall ongoing health of the patient. The Artemis project is still at a relatively early stage. Over the past year, the team has accomplished fundamental development work, from fleshing out the theory to building the technical framework necessary to capture and analyze data, and creating some rules to get the team started. The team has run data from another study through the system, offline, to test and refine these rules, worked with the hospital’s IT department to ensure its gear won’t interfere with other critical information systems, and applied to the hospital’s research ethics board for permission to proceed with data collection in near real-time from actual patients. This phase, which is about to proceed, allows researchers to confirm data is being streamed without distortion and to further refine the rules used to search for nosocomial infections.

It will be a few more years before all clinical trials have been completed and the system is ready to be put to regular use, but James is confident that their work is going to give clinicians a new tool to hunt down and eradicate infections. “The direction of this research is incredibly exciting and this collaborative partnership is phenomenal,” he said.

As an engineer, McGregor is equally excited by the potential for those with technology skills to make a difference. “It’s not only about saving lives, but also about giving these babies the best, healthiest start we can,” she said. “This is a very good example of where—rather than the one-to-one relationship that doctors have—we have the potential to help thousands.”

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Why nosocomial infections?
Nosocomial infections are more commonly known as hospital-acquired infections, and they are a serious issue for the health-care sector. Patients in a neonatal intensive care unit (NICU) are at particular risk for nosocomial infections for a number of reasons. First, many have tubes entering their bodies in several locations, each presenting a potential gateway for infection. Second, premature babies have immune systems that are both immature and inexperienced. In other words, not only are the body’s defence mechanisms still developing, they’re also learning what they need to defend against, and how.

Dr. Andrew James describes a model for the progress of nosocomial infections this way:

**Phase zero:** there is no infection

**Phase one:** the infection is present, but there are currently no means of detecting it

**Phase two:** the infection is present, as are some very soft, subtle, nonspecific clinical signs of infection that could mean anything

**Phase three:** the infection is present and the signs are more obvious

**Phase four:** the infection is present and the signs are very obvious

James admits that even in phase two, the signs are so subtle that currently it’s difficult to diagnose an infection. He hopes Artemis will enable NICU clinicians to do much better, and even identify infections in phase one. “If we can detect changes in heart rate, breathing and blood pressure in that phase then we can act earlier,” he said. “If our research yields positive results then the benefit to our patient population could be huge.”

Combined with clinical investigation and treatment regimens, James hopes Artemis will allow caregivers to meet nosocomial infections head on. “We hope we could either prevent the infection from becoming obvious or reduce the severity of it,” he said. “That would be good for the kids.”
Analytics are a powerful tool for empowering patients to make more informed decisions about their own care or lifestyle.
Smarter Healthcare through Analytics

Today’s hospitals face a daunting mission: to improve standards of patient care and ensure quality operations while also improving their bottom line. Added to that are the challenges of changing demographics, more informed consumers of healthcare services, rising costs, changing reimbursement models, and the prevalence of chronic disease.

A smarter healthcare system starts with better connections for faster, more detailed analysis of data. Many of the current problems – rising costs, limited access, high error rates, poor response to chronic disease and the lengthy development cycle for new medicines – could be improved if better linkages were made between diagnosis, drug discovery, healthcare providers, patients, payers, and communities.

Unfortunately, today’s healthcare IT systems are typically designed for speed and performance to assist physicians in treating patients – not to integrate and aggregate data for analysis, query and reporting. To respond to that need, disparate systems must be systematically integrated, analyzed and broadly available to answer important questions such as: How is the organization performing? What clinical results are being achieved? And, are patient needs being satisfied? The answer is Healthcare Analytics.

Smarter healthcare converts patient and clinical information into actionable insights to improve the quality of care while optimizing operational efficiency. By offering integrated data from multiple sources in one central location, Healthcare Analytics can help enable more informed decision-making within and across clinical, business and research domains, leading to higher-quality care, enhanced patient safety and more efficient clinical and business operations. Doctors, patients and payers can all share information seamlessly and efficiently, applying advanced analytics to improve research, diagnosis and treatment.

Analytics are a powerful tool for empowering patients to make more informed decisions about their own care or lifestyle. Additionally, pharmaceutical companies, medical device manufacturers and health insurance providers can use analytics to derive new intelligence from their data to help reduce risk, predict trends and improve patient satisfaction.

IBM’s InfoSphere Clinical Analytics (ICA) solution transforms rich data into rich information. ICA takes information from many sources within the healthcare enterprise to create a single-source repository of trusted medical information. ICA unlocks the clinical, business and research value of information by combining a clinical data model with custom medical informatics dashboards, a data warehouse platform, and a business intelligence front end such as Cognos. Data is securely managed behind the IT firewall and accessed through secure, web-based management applications.

ICA provides a comprehensive informatics strategy across the organization, and the technological and organizational framework to:

- Create and support a highly secure, longitudinal patient record, giving clinicians and researchers a 360-degree view of a patient's clinical treatment patterns and outcomes
- Enable the consolidation of clinical data, providing a local to national view to support clinical research analysis and quality initiatives
- Extract, validate and load data from a variety of clinical, operational and financial systems, including billing, lab, pharmacy and electronic medical records. This data is then standardized and integrated to provide a common medical nomenclature and a common patient identifier.

With this framework, analytics offers comparative analysis, clinical decisions support, chronic disease management, benchmarking, clinical research analysis, reveals trends in clinical errors and investigates patient safety initiatives.

IBM is currently working with a number of leading health systems in Canada and around the world to advance health analytics technology. In addition, IBM Health Analytics Solution Centers bring IBM’s depth of experience into one location, offering demonstrations of analytics and solutions for all healthcare stakeholders.

If healthcare providers were offered a way to better understand their data that would result in improvements to care and their bottom line, wouldn’t they choose it? With Healthcare Analytics from IBM, smarter healthcare is efficient, interconnected and intelligent, and focused where it belongs – on the patient.
Using Emerging Technology to Make Chronic Disease a Thing of the Past

Today, more than half of all adult Canadians suffer from a chronic disease such as asthma, depression, diabetes, COPD, and heart or liver problems. For the elderly, the statistics are even worse.

In fact, chronic diseases drive the majority of Canada’s healthcare expenditures and are the leading cause of death and disability worldwide. According to the Federal Ministry of Health, chronic disease costs the Canadian economy $80 billion a year through illness and disability. Acute care centres bear the brunt of these costs.

What’s going on? Longer life spans, sedentary lifestyles, lack of exercise, stress are the main factors contributing to higher incidence of chronic disease. Costs are growing because traditional treatment is reactive rather than proactive.

A chronic disease management (CDM) program is a preventive and proactive approach by healthcare systems to avoiding complications and acute episodes by managing the patient to clinical guidelines, sharing information on status and interventions with the care team, and supporting the patient in healthy behaviours and self-management. Corresponding behavioural changes are encouraged including better diet, increased exercise and smoking cessation.

Improving outcomes for patients with chronic disease and lowering costs for providers is the name of the game, and IBM is uniquely positioned to support health system managers in this objective, with proven tools and methods including the design and development of provincial and national CDM information systems. IBM Canada’s CDM consulting and CDM tools support several key areas of activity:

- Decision-support tools give physicians better information to treat individual patients at the point of care for better outcomes according to evidence-based, best practices outlined in Clinical Guidelines.
- Care team coordination tools are used to proactively organize the activities of the care team around preventive approach to patient care. Driven by the medical office assistant, these tools encompass physicians, RNs, specialists, dieticians, pharmacists, and more.
- Business intelligence tools provide statistical feedback to help physicians evaluate their own practice against clinical guidelines as well as cohort, care team and population performance.
- Patient self-management tools help patients change behaviour to improve their condition or stop its progression. Information and support such as meal planners exercise guides is provided through portals, and using existing technologies such as Web 2.0 social networking tools.

Already, IBM decision support tools can provide the infrastructure for the information gathering and alerts needed in Remote Patient Monitoring – mobile technology enabling remote monitoring of high-risk patients. These tools could help chronic disease patients manage their condition from home by sending up-to-date information readings through a technology chain via the web to their care provider.

Every year, up to 200,000 deaths result from chronic disease in Canada. Costs to health systems are skyrocketing. With prevention and proactive treatment as the goal, there has never been a better time to apply medical technology know-how to improve outcomes and save lives.

CDM Toolkit

Developed collaboratively by IBM and the BC Ministry of Health, the IBM CDM Toolkit is being now used by physicians in BC, Saskatchewan and Manitoba and the Yukon to treat thousands of patients. A secure web application designed by physicians to support them in treating patients to guidelines to improve outcomes, the CDM Toolkit provides ready access to information on individual patients as well as populations.
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Especially useful for practices that do not have an electronic medical record system, the toolkit makes it easy for care team members to proactively:

- Know which patients have which disease(s)
- Know which patients require tests, check-ups or educational visits, based on the clinical guidelines in a province or region
- Call patients in for schedules visits
- Generate clinical and administrative reports based on patient flow sheets
A non-resident, out-of-province patient arrives by ambulance in the emergency room (ER) of a major Canadian city hospital. She is unconscious and unable to provide any form of medical history. There are no family members present to consult and her vitals are beginning to fluctuate alarmingly.

Using her driver’s license for information, the doctors sign into a medical database, and search her identity. The care team is able to quickly view all the pertinent information on the patient and finds she has chronic liver failure as well as secondary issues including Hepatitis C.

A diagnosis of hepatic coma follows. Medications are quickly prescribed and administered to lower the patient’s life-threatening ammonia levels. In addition, despite a policy of “universal precautions,” standard for most ER situations, the care team is made aware of the patient’s blood-borne pathogen status.

In this scenario, the life-saving outcome was achieved thanks to an Electronic Health Record (EHR) system. EHRs provide secure, easy and instant access to pertinent information for authorized healthcare providers.

Information about the health of an individual is typically spread across a variety of information sources which may be found in hospitals, clinics, laboratories, diagnostic imaging centres, and provincial registries and databases. An EHR system aggregates all of that information and provides the clinician with a more complete view of a patient’s key health history. The EHR will also provide a variety of different views of the information (a specific lab result or a trend over time, for example) to assist with the clinical decision-making process and ultimately provide better patient care.

A network of interoperable EHR (iEHR) solutions – one that integrates information across multiple points of service and multiple caregivers – is a very complex task requiring broad skills across numerous technology components. IBM has a proven track record for successfully integrating such large-scale and complex solutions.

IBM Canada is currently working with the province of Manitoba to implement an EHR solution from dbMotion, a proven e-health software application that is successfully used in Israel and at large healthcare facilities in the U.S.

Successfully developing an EHR improves patient safety by allowing providers to arrive more quickly at an accurate diagnosis and improving treatment considerations in areas such as immunizations, medical histories, lab results, allergies, and much more. Besides improving overall care, EHRs will also lead to:

- Fewer repeat tests and faster test results, thereby improving the patient experience
- New tools to manage chronic diseases
- Safer drug prescribing because physicians and pharmacists will have complete patient information
- Better infectious disease outbreak control through national surveillance tools such as Panorama.

IBM and its business partners possess highly specialized healthcare expertise, which ensures the success of new projects such as the dbMotion solution with the Province of Manitoba. This solution will ensure cross-discipline integration of information to allow clinicians access to real-time, integrated clinical information from a variety of sources, removing barriers that currently exist.

After all, information is power – and in the case of an EHR system, it may very well deliver the power to save lives.
Manitoba: A Single EHR Solution

The Government of Manitoba recently engaged IBM to build smarter healthcare throughout the province with the implementation of an interoperable electronic healthcare records (iEHR) system. This technology will offer healthcare providers secure and instant access to pertinent patient information, improving the efficiency and quality of patient care while reducing healthcare costs.

Once implemented, electronic health records will enable secure sharing of information about a patient’s health to authorized healthcare professionals across Manitoba. For example, electronic health records will allow physicians of a patient in Brandon to have immediate electronic access to tests performed in Winnipeg, and vice versa. With this tool, continuity of care for patients will be maintained regardless of the number of healthcare providers a patient visits. This will reduce the chance of medication errors, duplication of testing and unnecessary treatments – issues that are very costly to the province each year.

“Most of us have a health record on paper, but electronic health records will allow health-care providers reliable access to current and relevant medical and individual patient records, making it easier to deliver timely and effective health-care services,” says Manitoba Health Minister Theresa Oswald. “Since 2007, Manitoba eHealth has been working to computerize medical records in hospitals and specific program areas, like diagnostics and laboratory testing. Now, we are moving forward on our commitment to implement a record that will pull all this information together in a secure health record.”

Implementation of the $22.5 million deal is expected to begin in 2010. Funding for the development of the Manitoba iEHR was provided by both the Province of Manitoba and Canada Health Infoway.
Interoperability is not an option – it is a must for better health systems. Interoperability is the ability to share and act on data and knowledge across jurisdictional, facility, and system boundaries. Although it is the goal of many health system implementations, interoperability has proven notoriously difficult to achieve. Even as Canada successfully marches towards Electronic Health Record (EHR) implementations, there is a need for additional and complementary interoperability solutions.

After several years of research and development, IBM launched its Health Information Exchange (HIE) Solution. HIE is a solution aimed at the sharing of medical documents and images – either as a standalone system or as part of a broader EHR. In support of HIE globally, IBM operates a Centre of Excellence in Quebec.

As an early advocate for healthcare interoperability, IBM is actively engaged with the Integrating the Healthcare Enterprise (IHE) initiative. IHE is an international initiative created by healthcare professionals to promote the coordinated use of existing standards to improve interoperability in Healthcare. The IBM HIE solution grew out of IBM’s initial research efforts in solutions based on IHE profiles. The solution has now grown to support the profile for Cross Enterprise Document Sharing (XDS), which defines a framework for managing document sharing between healthcare enterprises ranging from private physicians to clinics and in-patient facilities. The HIE solution also now supports the XCA, XUA, ATNA, and XDS-I profiles.

The importance of sharing medical documents and images is an important step towards full implementation of an EHR and one that is attainable now because:

- the document paradigm so closely matches existing work patterns, and
- numerous health system vendors have already adopted the standards necessary for implementing systems based on IHE profiles.

Because these IHE profiles are international in nature, vendor adoption has been growing annually and implementations continue to increase. Capitalizing on this momentum in the vendor community is important for jurisdictions implementing healthcare IT systems because it ensures implementations will enhance interoperability.
The HIE solution targets the sharing of both medical documents and medical images. One of the profiles implemented by the IBM HIE solution is XDS for Imaging, called XDS-I. XDS-I extends XDS to the imaging domain so clinicians can access medical images using the same infrastructure that is used for medical documents. This reusability and adaptability of a base XDS implementation is what makes it so powerful.

In an XDS implementation, the infrastructure and messaging is neutral to the document content, which means it can be used to share all documents from any domain. It can even be easily adapted for image sharing. Instead of focusing on different infrastructure and messages, the focus is on document content and metadata. This lowers overall costs and accelerates implementations.

The IBM HIE solution is built in a Service Oriented Architecture and utilizes several types of persistence layers including file system, content management and relational databases. To increase flexibility and ease of use, IBM went a step further by adding features that were not defined by the IHE profiles. These features include:

- advanced administration and configuration functions;
- multi-platform support;
- multi-database support; and
- full high availability and disaster recovery capability.

Recognizing that for most implementations, a transition from legacy systems is required, IBM also provides additional software components to facilitate inclusion of legacy systems into an XDS or XDS-I implementation. This additional software includes DICOM and HL7 adapters.

IBM continues to do research in healthcare interoperability to create new capabilities and enhance existing solutions while maintaining conformance to IHE profiles. Recently, the HIE solution has been enhanced to also support the XCA and XUA profiles.

Interoperability is an imperative for better health systems – and the guiding principle for IBM as it creates and implements improved healthcare offerings.
Portals: Gateway to a World of Information

A typical visit to the doctor hasn’t changed much since the early 20th century. Information is exchanged, resulting in a diagnosis or recommendations to the patient. Yet behind the scenes, entirely new ways of managing patient information are transforming the delivery and efficiency of clinical care.

In the 21st century, better health will come through better management of clinical information. The key will be our ability to harness the power of the Internet, one of the greatest untapped resources currently available to health care, allowing us to access and use that clinical information. Serving as a secure and personal gateway to relevant resources through a secure sign-on, a portal not only provides personalized information to the right people at the right time, it allows users to interact with those knowledge and human assets quickly and efficiently.

Using the Internet to ‘e-enable’ healthcare processes can reduce administrative costs while empowering patients. Healthcare professionals can work together more effectively and respond to patient issues more quickly. Medical information shared on the Internet can be secured, ensuring privacy issues are respected.

Hospitals and clinics are discovering the benefits of portals, which:

- Increase quality and safety of patient care by providing consistent and timely access to information
- Enable improved chronic disease management by empowering the patient within self-management models, providing indicators of progress against a target care plan
- Promote compliance to guidelines and protocols through patient and provider score cards and compliance indicators
- Provide a fast, complete view of the patient’s health care history, to time-challenged clinicians, within their clinics, in the emergency department, or at other remote locations
- Provide operational efficiency and reduction in administrative costs by promoting online self-service to a range of administrative tasks, as well as patient self-care
- Increase patient satisfaction and ability to navigate the health system, through a convenient online experience

IBM is a global leader in enabling portals to provide a single interface that allows for secure, personalized interaction with healthcare applications, content, processes, and people. IBM Portals are built on open standards and a service oriented architecture (SOA) with built-in flexibility.

Portals based on IBM technology and services can be found at several health care organizations across Canada, North America and globally – targeted to a range of communities including employee staff portals (intranets), a clinical portal for partner providers, research staff portals, and consumer or patient portals. Each is tailored to the specific needs of a user community:

- **Staff or employee portals** (Intranets) provide secure access to all clinical and business systems through single sign-on, as well as corporate and clinical knowledge content. Self-service access to human resource applications, training content, corporate communications and departmental updates are supported. They enable streamlined processes within the organization.

**Trillium Health Centre:**

A leader in Web portals

“Portals are all about doing, not just viewing,” says Benoit Long, Vice President and CIO, Credit Valley Hospital and Trillium Health Centre. “Our portals are transactional, making it possible for people to come together to communicate, collaborate and share knowledge. And, our employees are more productive because they can quickly find the right information. Portals streamline processes within the organization.”

In 2004, Trillium Health Centre implemented their Intranet portal for employees, built on the IBM WebSphere platform and using IBM services.
access to clinical business information within the organization. Employee portals improve efficiencies at hospital or clinic sites.

- **Patient portals** offer new ways for patients to access health information, manage appointments, pay bills, and receive needed information and recommendations from providers, drastically reducing administrative costs of healthcare. They can even alert providers to a potential healthcare issue through remote, home-based diagnostic tools such as wireless glucometers and weight scales.

- **Clinical portals** can offer secure, remote access by community provider partners to a complete, consolidated view of needed patient information, helping to expedite effective treatments, and enabling the collaborative exchange of clinical data. Many administrative aspects of referrals or booking of clinic or operating room time are reduced and streamlined, leveraging the information already gathered by the referring partner.

IBM’s approach does not just focus on portals, but to focus on “process” e-enabled across multiple channels, gained through extensive experience with airline and travel industry portals and kiosks. In this context, portals are just one channel, and are complemented by interactive kiosks and personal phones that allow the “Digital Hospital” to stay open around the clock through all channels. Available as free-standing, wall mounted or desktop units, kiosks at hospitals or clinics are promoting consumer-directed healthcare by offering patients self-registration on arrival, billing transaction management, printing of appointment lists, and with directions via “way-finding” – while allowing providers to push appropriate clinical content to the patient prior to their appointment.

Kiosks operate seamlessly with portals within a given process. For example, a patient may begin to self-register via the portal from home, and then continue via the kiosk at the hospital – to “arrive” themselves, all with a common look and feel, and experience. This unique design allows multiple processes to be supported on each channel. Staff can also use in-hospital kiosks to access human resource and other staff administrative functions. Because IBM kiosks are also “smart,” they provide alerts when printing supplies are running low, or use GPS to automatically adjust “way-finding” directions if the kiosk is relocated to another area.

Cost-saving portals, kiosks and other point-of-care channels are seamlessly supporting both clinical and administrative processes, contributing to decreased wait times, enhanced triage support, improved accuracy of patient data, and reduced administrative costs.

Thanks to channels – portals, kiosks and personal phones, a brand new way of sharing healthcare information is here – promising to transform the way clinical care is delivered across health communities.

Today, a healthcare provider portal is also in use, and a patient portal is set to launch in 2010. A community portal is next.

Long says choosing the right platform is essential, calling the IBM WebSphere platform highly capable of accommodating Trillium’s ever-expanding requirements.

“I would highly recommend that hospitals look deep into their long-term strategy to identify what transactions and services they need,” Long says. “How do they expect stakeholders, patients, the community, and providers to use their portals? As soon as they examine that, they will come to the clear realization that they may need broader applications suites and portal technologies, rather than healthcare applications with portal-like qualities.”
Today, most would agree that a trip to a hospital emergency room is not pleasant. Apart from the medical aspect of the visit, the dreaded wait times for diagnosis and treatment are only getting longer – up to 10 hours in some cases. Once seen, communication problems can surface because of language, terminology or age-related barriers.

In contrast, the “Smarter Hospital of the Future” runs at peak efficiency. Clinical information is available anytime and anywhere within the healthcare campus. Technology is linked with processes to save time, money and effort while greatly improving outcomes and the patient experience. The good news? It’s not only possible – it’s already happening.

Today, more patients, fewer staff and fewer beds are testing the very limits of Canadian health systems. Moving patients more efficiently through the system while improving outcomes is the goal for all involved. Hospitals are seeking to streamline processes, and finding new, improved ways to deliver this care.

Fast forward to the Smarter Hospital of the Future, and we can see how very simple solutions can greatly improve administrative processes associated with arrival.

- You check in from home via the Hospital’s Patient Portal available through the Internet or, at the hospital, via a Patient Care Station (kiosk), updating your address, emergency contact information, and your family physician.

- If this is an emergency visit, in the language of your choice, you provide preliminary triage information such as presence of allergies, pain, its location and how long you’ve been experiencing it.

- You receive an RFID tag from either the kiosk or the reception staff at the Hospital – the tag identifies both your identity and location (using GPS) allowing staff to easily locate you.

- On departure, you are able to finalize payment of any outstanding charges for incidentals at the Patient Care Station, or pay from home via the Hospital Portal.

- He or she has already reviewed your integrated health and meds history, and has a treatment plan in place. You are on your way in less than two hours.

In the Smarter Hospital of the Future, secure “smart” supply cabinets or rooms will be used to manage controlled medications and other expensive supplies. Secure access to these supplies will be managed by biometrics – such as fingerprint or retinal – controlling the cabinet doors or entrance to storage areas. The “smart” shelves will alert nurses or physicians when supplies are running low, notify staff to replenish needed supplies, and even automatically place orders to suppliers if hospital-main stocks are running low.

IBM leads the way in integrating emerging technologies with hospital infrastructure. IBM wireless solutions integrate a range of communication and paging devices – such as Vocera hand-held communicators, personal phones such as Blackberry or iPhone, or paging devices – creating a seamless network, connecting staff across these devices. The integrated communication network allows a nurse to use a Vocera communicator to call clinicians directly on their mobile phones, which also acts as their pagers, and also operates ‘no-charge’ on the internal hospital wireless network.

Successful Vocera implementations at Toronto East General Hospital (TEGH) and Kingston General Hospital have addressed nursing shortages while delivering improved patient care and better staff communication. Nurses and other staff wear small Vocera communicators around their necks that, through voice prompts, put them in immediate touch with security, patient transport, or any other staff member for instant consultation or help, by connecting to either the staff member’s Vocera tag, or by automatically dialing the staff member’s local or remote telephone.

Thanks to Vocera, “nursing efficiencies are enhanced, direct care time has climbed and responsiveness improved,” says Ann Gay, Consultant of Workload and Systems at Kingston General Hospital.

Vocera is now a must-have communications tool for staff at TEGH. “I expect that if we were to have downtime with Vocera, there would be a revolution,” says Rob Devitt, president and CEO, TEGH. “Having a device that
gives you immediate access to the person you want to communicate with ensures the message is clear. We’re expecting to see a significant reduction in adverse events.

Wireless infrastructure has many other uses, integrating nurse call solutions and other hospital communications such as fire and safety. In addition, the wireless network also enables wireless tags such as RFID or ultrasound devices, providing real-time location services (RTLS) for patients and resources, which are already transforming the healthcare environment. RTLS tracks medical assets, equipment, patients, and staff to help improve asset utilization and improve overall patient safety and quality of care.

In the future, wireless sensor solutions will evolve to support remote patient monitoring – either for intensive care settings, general medical units, long term care settings, and in fact – the patient’s home, enabling increased levels of self care. IBM Research is working with the University of Ontario Institute of Technology to monitor infants in the Hospital for Sick Children’s NICU. A nursing home in Denmark allows elderly patients to have their routine tests values to be automatically uploaded to a network that monitors their status.

The benefit and potential for wireless sensor solutions are significant. These solutions enable scarce expert clinical skills to be centralized while allowing patients to be monitored more safely, in other facilities or closer to home. IBM has initiated the Connected Health program, and is working within the Continua Alliance to enable more device manufactures to connect under a open standards framework.

IBM Canada’s proven methodology helps hospitals transform so they can deliver more efficient and smarter healthcare.

- **Technology Fusion:** Merging technology and operational processes to support knowledge transfer along the care path. Sensors can be embedded in physical objects. Systems and infrastructures can be measured to provide real-time information.

- **Workplace Transformation:** Achieving change and best practice through governance, leadership and knowledge management, aligned with organization culture.

- **Clinical Process Optimization:** Reducing variation, improving efficiency and optimizing utilization in care delivery, and administration processes. Intelligent systems can turn mountains of data into actual decisions and actions that make the world work better – and smarter.

- **Clinician Integration:** Engaging physicians and other clinicians as part of the care path in the development, adoption, acceptance and accountability for care delivery processes.

The Smarter Hospital of the Future is all about letting clinicians and staff do what they do best – treat patients safely – while bringing costs down dramatically through information systems that streamline communication, transform most administrative aspects of care delivery, automatically control high cost supplies at time of dispensing, and increase safety via patient locating and remote monitoring of patients, with real-time alerts for clinicians, staff, caregivers and family.

IBM is working hard at Smarter Hospital of the Future projects across Canada and around the world that can be shared with our customers. They promise to transform the Canadian healthcare system so that hospitals can deliver better patient care – for less.
IBM works closely with a large network of business partners to help them grow their business, while helping IBM deliver a total solution to the client.
Whether trying to increase patient safety, reduce wait times, or provide real-time access to information for better decision-making, IBM Canada works with best-of-breed partners to provide care delivery organizations with innovative, real-world solutions.

IBM’s dedication to solving the many challenges facing the healthcare industry today depends upon the shared efforts of our vast network of business partners. Through relationships with major ISVs, consultants, clinicians, integrators and resellers, IBM and its partners plan, execute and learn together. Working side by side, we provide comprehensive solutions that can improve the quality care.

IBM brings its strengths as a solution provider in the healthcare industry by partnering with other healthcare organizations to advanced solutions that meet our clients’ business objectives. For example, when an organization is looking for a multi-channel strategy, IBM and its Business Partners examine the impact to workflow and make recommendations that really transform and improve processes before bringing in proven technologies with measurable ROI. IBM strives to leverage current client infrastructure and investments as much as possible, while building a solution that will meet their future needs as well.

IBM works closely with a large network of Business Partners to help them grow their business, while helping IBM delivers a comprehensive solution to the client. IBM Business Partners receive easy access to technical support, education, marketing campaigns, sales tools, and more to help develop new solutions and grow their business. In turn, they contribute millions of dollars to Canada’s economy every year.

Through IBM PartnerWorld, IBM Healthcare business partners can:

- Utilize tools and resources to get their products and solutions to market faster, decrease the sales cycle, and win more profitable business.
- Work with industry experts to build customer-driven technologies, while receiving assistance in expanding into new markets.
- Access leading edge support from the first encounter with the customer to post-sales support.

Whatever a client’s challenge is, IBM can quickly find the right solution using a combination of in-house capabilities and that of our partner community. As a result, IBM Healthcare clients enjoy one-stop shopping for the most current and effective healthcare solutions available today.
Panorama: Preparing Canada for a Pandemic

If ever there was a wakeup call to Canadian health officials, it was the severe acute respiratory syndrome (SARS) outbreak of 2003. More than 400 probable cases of SARS were reported across Canada and 43 deaths occurred before the disease was finally under control. Canada’s healthcare systems struggled to limit the outbreak while the economic impact to Canada due to the travel advisories issued by the World Health Organization rose to well over $1 billion.

SARS magnified the shortcomings in the existing information channels and automated management systems and illustrated the real need for a better information management solution to manage public health outbreaks. A post-SARS study - the Naylor report - showed that there was a marked inability to get at related data quickly, and to assemble, share and analyze it for swift action.

The Pan-Canadian Communicable Disease Surveillance & Management System (Panorama) project was born from the Naylor Report. Its mandate was to build a set of consistent, bilingual public health surveillance system components that would be available to all Canadian healthcare jurisdictions for implementation within their own IT infrastructures. Designed in close consultation with healthcare professionals across Canada, Panorama will use the latest technology and standards to ensure integration with a variety of healthcare systems used by provinces and territories.

After a rigorous RFP process, IBM Canada was awarded the contract to build the Panorama solution. With a deep understanding of the EHR environment as well as other Canadian healthcare systems and processes, IBM offered the skills, expertise, resources, and existing relationships with specialized IBM Business Partners to ensure that the customized needs of the pan-Canadian project would be met. Canada Health Infoway has funded the development of this industry-leading public health solution and is also funding up to 75 percent of eligible jurisdictional implementation costs.

The H1N1 outbreak of 2009 underscored the need for a comprehensive information management system. During an outbreak where early detection, intervention and tracking is required, Panorama will give public health officials the tools they need to quickly collect and communicate information, treatments and containment efforts – including vaccine inventories and immunization efforts.

The BC Ministry of Health holds the IBM contract and acts as central focal point for overall project coordination with all Canadian jurisdictions. Final testing of the solution is underway and implementation plans and activities are advancing in multiple provinces and territories across the country.

Dr. Perry Kendall, Provincial Health Officer for the province of British Columbia believes Panorama will make a real difference. “Having an application like this will be significantly important to us if we run into another SARS-type outbreak where the World Health Organization critically needs to know what’s happening, when and with confidence, that the data they are getting is real and reliable data,” he says.¹

Although it is a highly functional, comprehensive, public health communicable disease surveillance and management system, Panorama will also be highly configurable and scalable, enabling it to work across a range of large or small jurisdictions – local, provincial or national.

Tony Clement was Ontario’s Minister of Health during the SARS outbreak and is currently Canada’s Minister of Industry. He believes Canadian jurisdictions using Panorama in the future will be much better prepared for any pandemic or outbreak.

“We want to have the ability to know that if there’s something happening at a hospital somewhere,” he says, “that information gets fed through the system, all public health officials are notified immediately, all political leaders are notified, and we can respond a lot earlier.”²
Components of Panorama

An integrated system, Panorama features custom-developed code and integration software that is modular in nature and will allow jurisdictions to install the functions they need and enable these components to integrate or interface with their other new or legacy systems. The key solution components are:

- **Communicable Disease Case Management** identifies and monitors cases, traces exposures and contacts.
- **Outbreak Management** investigates outbreaks and manages interventions.
- **Immunization Management** forecasts and records immunization information.
- **Vaccine Inventory Management** manages the supplies of vaccines and related supplies.
- **Work Management** manages tasks and time scheduling by resource, and
- **Notifications Management** facilitates emergency and routine notifications to users and others, establishes threshold notifications for disease reports or essential inventory and services client warnings specific to care delivery.

Designed in close consultation with healthcare professionals across Canada, Panorama will use the latest technology and standards to ensure integration with a variety of healthcare systems used by provinces and territories.

1, 2 Taken from the Canada Health Infoway video on the new Panorama public health surveillance and management system, produced in September 2008.
To successfully transform their health care systems, countries will focus on value, develop better and create better options for promoting health and providing care.
Around the world, healthcare is in crisis. Studies show that costs are rising, quality is suffering and access or choice in many countries is inadequate.

The IBM Institute for Business Value report entitled “Healthcare 2015: Win-win or lose-lose?” suggests that the current paths of many health systems around the world will become unsustainable by 2015. Those that fail to transform will likely "hit the wall" and require immediate and major forced restructuring – a "lose-lose" scenario for all stakeholders.

Consider the facts. In Canada, inflation-adjusted healthcare costs have grown by almost five percent per year since 1996, greatly outstripping the growth in our economy. Canadian healthcare is on an increasingly unsustainable trajectory. For example:

- Alberta's provincial healthcare spending has been increasing at an average annual rate of 10.3 percent over the last ten years.
- Ontario is currently spending 43 percent of available provincial revenues on healthcare. By 2026, 100 percent. These findings are supported by a Conference Board of Canada study which indicate that the Ontario government could be spending 70% of its total revenues on healthcare by 2022.
- British Columbia's ministry of finance projected that the province is on track to be spending 71% of its revenue on healthcare by 2017.

Furthermore, if British Columbia succeeds in holding education spending to its current 27% level, there would by 2017 be virtually nothing left for other areas of provincial responsibility.

Yet in spite of this growth in health spending, Canadian emergency room wait times continue to grow, and access to diagnostics and treatment regimes continue to present challenges. In fact, 24 percent of Canadians visiting the hospital emergency department wait more than 4 hours to be seen and 36 percent of Canadians find it takes six or more days to get an appointment to see a doctor. And the list goes on.

However, according to Healthcare 2015, there is a more positive, "win-win" scenario. Creating a health system that is value-based, affordable and sustainable will require new levels of accountability, tough decisions and collaborative, hard work on the part of all stakeholders. To successfully transform their health care systems, countries will focus on value, develop better and create better options for promoting health and providing care. Included in the paper’s recommendations:

- Healthcare providers should expand their current focus on episodic, acute care to encompass the enhanced management of chronic diseases and the life-long prediction and prevention of illness.
- Governments and funders can help consumers remain healthy, get more value from the healthcare system and assist care delivery organizations and clinicians in delivering higher value healthcare.
- Suppliers should work collaboratively with care delivery organizations, clinicians, and patients to produce products that improve outcomes or provide equivalent outcomes at lower costs.
- Societies must make realistic, rational decisions regarding lifestyle expectations, acceptable behaviors, and how much healthcare will be a societal right versus a market service.
- Political leaders need to address the sustainability of their current systems by providing the leadership and political willpower needed to remove obstacles, encourage innovation, and guide their nations to sustainable solutions.

Managing healthcare to deliver the greatest value for the investments made requires open minds and new approaches. If stakeholders can act with accountability and demonstrate the willingness and ability to change, they can better harness the drivers of change and achieve a win-win transformation.
IBM is creating a smarter, more connected healthcare system that can deliver better care with fewer mistakes, predicts and prevents diseases, and empowers people to make better choices. Applying deep clinical, business and technology expertise to create solutions that integrate clinical expertise with information technology. For more information on IBM solutions for healthcare, visit www.ibm.com/healthcare/ca

To contact us, please email cahealth@ca.ibm.com to reach an IBM Healthcare representative.