Investing in Health IT: A Stimulus for a Healthier Canada

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Information technology (IT) is widely acknowledged to be a critical component of improving healthcare in Canada. Across the country a great deal of work has already been accomplished in this area, and Canadians have repeatedly proven themselves to be global leaders in the health IT field: from pioneering initiatives, such as the Ontario Telemedicine Network and Prince Edward Island's Drug Information System (DIS) to the national-level investment agency Canada Health Infoway, which has, among other goals, set as an "infostructure" priority the availability of a baseline electronic health record (EHR) for all Canadians by 2012 (Canada Health Infoway 2008).

One of the fundamental principles of health IT – in Canada and much of the industrialized world – is the creation of a totally connected, patient-centred healthcare system. In this article, I put forward a vision of what such an ecosystem might comprise, and I explain how technology can bring it about by encouraging better outcomes and innovation, linking patient data and empowering individuals to be stewards of their own health. I then outline ways in which the public and private sectors can work together to create an efficient, data-driven system – one that benefits patients, healthcare providers and the overall Canadian economy. I conclude by illuminating some of Microsoft's investments in health IT.

The Future: Canada's Health System Transformed by Technology

Real-time, unified data is the asset that drives an efficient, high-quality, value-based, evidence-focused future for medicine. Adhering to this principle, at Microsoft we envision a dynamic, patient-centred healthcare system that transforms the way physicians provide care and individuals manage their own health – a totally connected network that delivers predictive, preventive and personalized care in an accessible, affordable and accountable way. Specifically, we see

- Patients experiencing more control, more convenience and better service;
- Physicians getting the right data in the right format at the right time to provide the best care;
- New interactions among the key members of the healthcare ecosystem: physicians, patients, pharmacists, allied health professionals, researchers, health ministries, regional health authorities, hospital administrators, insurance providers and others benefiting from a new flow of data to make better, faster decisions;
- Healthcare extended to the virtual space: patients getting care when they want it, wherever they need it, thanks to virtual medical clinics, virtual doctor visits, virtual lab results, medical homes and personalized medicine based on genomic data;
- A learning healthcare system that measures everything, identifies errors, and makes improvements in order to deliver value (on this objective, see Institute of Medicine [IOM] Roundtable 2008).

In this rapidly emerging world, everyone in the health ecosystem will have the right information at the right time, along with

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computer-assisted decision support and the ability to seamlessly exchange and reuse data.

The Blueprint: Building a Scalable, Patient-Centred Health IT System

While IT is vital for improving Canada's healthcare system, simply spending more money on it, without considering all the factors driving behaviour (e.g., of physicians, nurses and patients), is unlikely to lead to the premier goal: better health outcomes. History is strewn with investments in technology that did not lead to better health outcomes, let alone increased access or lower costs.

Across the healthcare sector today, however, there are many examples of successful technology investments. On behalf of Ontario's Ministry of Health and Long-Term Care, for instance, Cancer Care Ontario (CCO) developed the Wait Time Information System (WTIS), an Internet-based system that, since its deployment in 2007, has helped shorten patients' waiting time by up to 62% (CCO 2008). Canada Health Infoway (2008), meanwhile, cites various exemplary instances: in British Columbia, Fraser Health's hospital-based digital diagnostic imaging system; in Saskatchewan, a computerized registry for tracking and monitoring patients who need surgery; and, in Ontario, Grand River Hospital's portal for cancer patients. The leaders of the organizations responsible for these health IT innovations thought about clear outcomes and embraced technology on many different levels in order to drive improved care quality and efficiency as well as, in several cases, cost reductions. In essence, they created patient-centred systems – precisely the kinds of successes that need to be scaled nationally.

Driving the Right Health Outcomes and Payments to Encourage Innovation

An industry focused on lifelong wellness and healthy outcomes would reward caregivers when diseases and conditions do not develop.

For the most part, however, Canada's healthcare system – like most others around the globe – is designed to care for people who are ill, not to keep people healthy. Take, for example, diabetes; currently the major emphases are on episodic treatment and medication, instead of on asking how we can raise awareness of risk factors and prevent people from developing diabetes in the first place. The system is this way because there is no means of rewarding physicians who provide preventive care.

The majority of private-practice family physicians are remunerated on a fee-for-service basis. These fees are negotiated between provincial/territorial governments and medical associations, and physicians bill their provincial/territorial health insurance plans for each patient service they deliver, regardless of the quality of care they provide. In this system, there are few incentives for providers to improve satisfaction. Physicians who attempt to innovate – for example, by investing in IT to collect data from patients remotely – end up delivering better care but making less money.

In health-related areas where prices are set by the market, such as veterinary medicine, dentistry and non-essential cosmetic surgery, providers do a much better job of investing in services that attract consumers. For example, pet owners willingly pay for veterinarians who make house calls, maintain electronic medical records (EMRs), remind owners to bring their pets in for scheduled vaccinations, call to make sure the pets are taking their pills and are available for e-mail or telephone consultations. Because veterinarians compete on price and quality, they are constantly looking for innovations that allow them to provide better service and to improve customer satisfaction. And because technology is often a source of innovation, veterinarians are quick to embrace new technologies that fuel better service and patient care. I do not advise simply replicating these examples for human healthcare, but I believe we ought to learn from them.

Connecting and Sharing Data among and between Health Entities

The first step is to connect the many medication lists, laboratory test results and diagnostic images that are already maintained electronically. Eventually, Canadian jurisdictions can build a lifetime record of treatments, prescriptions and tests that allows individuals and healthcare providers to improve medical decisions, reduce wasteful spending and increase the quality of care.

Canada's healthcare system is built around the idea of a specific provider prescribing specific treatment for a specific condition. Patients' health data is frequently confined to individual providers' information systems (whether electronic or paper-based); consequently, physicians must often make treatment and prescription decisions without all available clinical data, or else waste time and resources attempting to aggregate data. Graphic evidence of this problem came to light in a study conducted among elderly people in Quebec of the merits of computerized decision-making support for drug management. During the course of their study, researchers found that, on average, patients received prescriptions from at least three physicians in addition to their primary care doctors (Tamblyn et al. 2003).

One of the leading benefits cited in the 2006 pan-Canadian EHR policy conference report *Beyond Good Intentions* was "improved communication between providers, and between providers and patients" (Canada Health Infoway and Health Council of Canada 2006: 4). The right investments in health IT can improve care by offering patients and their physicians a comprehensive picture of a patient's health history. According to a 2007 cross-Canada survey, nearly 30% of physicians used electronic means to consult with each other about their patients'

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shared treatment plans and health needs (Canadian Institute for Health Information 2008). This finding is heartening and points us in the direction the system as a whole needs to travel.

Consider, for example, the benefits that would accrue in the area of chronic diseases. In the US, around 40% of the population suffers from chronic diseases, and these people consume approximately two thirds of all healthcare spending (Shine 2002; IOM 2001). Health service researchers view these proportions as transportable to Canada and have crunched the numbers accordingly: in 2007, they calculate, the cost of caring for the 12–14 million Canadians with chronic diseases amounted to about $100 billion each year, out of a total healthcare budget of $150 billion (Leonard et al. 2008b). Even though most care for chronic diseases occurs at home, data from at-home care is not integrated with information available at the hospital or at the doctor's office. Individuals and providers would all benefit if, for example, patients with diabetes could upload their blood glucose readings to a website that offered personalized advice and guidance, receive information alerts regarding changes in recommended treatment or behaviour, share their results with a supportive community of fellow patients and securely transmit readings to their clinician. Patients would have more information on how to manage their conditions, would be in a better position to prevent acute incidents and would need to make fewer trips to the doctor. Treating physicians would have a greater ability to understand their patients' health over time, allowing them to identify the best treatment for existing patients and to help people who are at risk of developing the disease in the future.

Empowering Consumers to Be Stewards of Their Own Health Data

Finally, we need to empower people to manage their health data. Just as credit scores represent a lifetime of active and passive financial decisions and transactions, so should health data. We must help individuals to start building their health data into a lifelong asset, to manage it over time and to share it with those who support them in making key decisions both within and outside of the health system.

Today, in order to manage their health, people must deal with both paper documents and electronic files. They fill out form after form, calling multiple doctors' offices for appointments. Few have the resources to keep track of medication lists, vaccination histories, appointment calendars, lab results, diet plans, exercise schedules and all the other components of health data. Many have little knowledge of how to prevent disease and slim, if any, support for managing their healthcare. "Without detailed information (or results)," experts have recently argued, "it is difficult for patients to enter into a dialogue with their doctor about treatment because the healthcare provider is the only one with the information" (Leonard et al. 2008).

Now, imagine if people could, instead, connect all their health and wellness data electronically, share it securely from provider to provider and keep it in one place over time, no matter the health practitioner or the province/territory in which they lived and received care. They could share data with their support systems and make better health decisions for themselves and their families.

Technology can make this vision a reality. The Internet and online social networks have already become everyday resources for people seeking information in order to make health decisions. Missing, however, is a way to link this information back to an individual's personal health history. Canadians, though, are poised to close that gap:

- Canada ranks among the top 15 countries in terms of e-readiness[1] (Economist Intelligence Unit 2007).
- In 2005, the Canadian Internet Use Survey found over a third of all adults – approximately 8.7 million – used the Internet to search for medical or health-related information (Underhill and McKeown 2008).
- Nearly 90% of Canadians support the development of EHRs (EKOS 2007).
- 87% believe EHRs will enhance the speed and accuracy of diagnoses (EKOS 2007).
- 84% endorse the potential of being able to access their medical records electronically (EKOS 2007).

As a first step toward consumer empowerment, we could enable providers to give patients electronic copies of any data that is already available in electronic format. Offering consumers access to their healthcare data in a secure and private way, and allowing them to keep their data in one place over time and share them from provider to provider, will permit consumers to make better decisions about their health (for an example, see Earnest et al. 2004). It will also enable healthcare professionals to deliver better care. And it could save the Canadian healthcare system as much as $5 billion per year (Leonard et al. 2008a).

The Next Steps: Recommendations for Moving Forward

Microsoft has learned a great deal over the past several years as we have worked to improve healthcare through IT. We know that just spending more money on health IT will not solve the healthcare system's problems. Instead, the right investments are those

[1] E-readiness is "the 'state of play' of a country's information and communications technology (ICT) infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit" (Economist Intelligence Unit 2007: 1).

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that focus on the right outcomes. It is therefore essential that data is connected and shared so that individuals and healthcare organizations can build their health data assets over time.

To achieve this vision will require that public- and private-sector organizations take several steps, including:

Encourage innovation in health IT by setting out objective goals and criteria, not by mandating specific technologies or development models. Hundreds of innovative health IT products and services are available on the market today, and many companies are investing large sums to develop new technologies and solutions. Even as they compete in this vibrant R&D space, however, companies are collaborating to enable their products to work together and share information regardless of their underlying development, licensing or business models. To take but one example, Microsoft's HealthVault – an Internet-based data storage and sharing platform for patients – can interface with other consumer health and healthcare information management systems.

As Canada's federal, provincial and territorial governments consider how best to spur the broad adoption of health IT systems, they should take care not to mandate or prescribe any particular technology or development model. Doing so could deprive healthcare providers of the best available solutions, exclude scores of companies and workers from competing to supply these solutions and weaken incentives for further private-sector investment and R&D. To the extent health ministries – as well as regional health authorities – seek to influence the development or adoption of health IT systems, they should set forth objective, technology-neutral goals and criteria that these systems should meet, such as those relating to security, privacy, interoperability and total cost of ownership. They should then open the door to all companies to compete for the opportunity to supply health IT solutions that satisfy these criteria.

Reward innovative doctors who make the Internet the foundation of the patient–physician connection. The Internet has created a society that has access to – and demands further access to – up-to-date information around the clock. Patients need information about their medical conditions, appropriate drugs or treatments, pre-procedure instructions and post-visit follow-ups. The Internet is the most efficient way for physicians to provide the trusted information patients want, and physicians should be encouraged to embrace basic Internet technologies that allow them to communicate more effectively and consistently with their patients. But the general nature of physician reimbursement means that innovative doctors have no incentive to deliver this kind of additional service. On this account, in a study of Toronto-based family physicians' responses to their patients' use of the Internet to learn more about their health issues, researchers counselled that "tangible incentives" (financial and other kinds) could potentially promote physician engagement with this new care modality (Ahmad et al. 2006).

Provide incentives for sharing data. It is critical to connect data seamlessly and to empower individuals to take control of their health and wellness. We hope that Canada's governments will facilitate the transformation of health data into a vital asset by removing barriers to data sharing and by providing incentives for data exchanges that reduce costs, increase value and improve care quality.

Focus on making data interoperable today, not waiting for standards tomorrow, and insist that vendors separate data from applications. Microsoft is committed to developing interoperability standards – something called for by Canadian political leaders as long ago as 2000 (Canada Health Infoway 2008) – and we are working diligently with the rest of the IT industry to reach a consensus on those standards. Currently, data is too often used for a single application or a single purpose and thrown away once that purpose is complete. We can, however, use metadata – the details that describe the data and how they have been captured – to ensure data is kept alive and made available for reuse, no matter what its original applications or purposes were. In this regard, the benefits associated with the use of Microsoft's Amalga in the US – including reduced errors, more efficient care and more effective ways to treat patients – underscore the urgent need for interoperable health IT. By insisting that vendors supply IT that allows data transfers to and from other non-vendor applications, we can get data moving better and faster between different systems today, without waiting for standards that might take years to complete.

Enable the private sector to develop an information infrastructure that connects data, systems and people. To move from today's fragmented delivery system to tomorrow's connected network, we need technology infrastructure – "plumbing" – that allows data to flow freely throughout the system and be reused. Without it, we will recreate our disconnected paper system in the virtual space. This infrastructure must satisfy four criteria:

- Flexibility – to enable many different players across the ecosystem to do what they need to do;
- Interoperability – to leverage existing standards and infrastructure investments that work toward more unified ways of organizing and sharing data;
- Scalability – to adapt to the rate of medical and technology advances;
- Security/privacy – to foster patients' trust.

And so EMRs should not be seen as a panacea; they are only one part of the solution. We must, instead, facilitate connecting and sharing of data by consumers and large health systems to help them build their health data assets.

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Moving Patient-Centred Health IT Forward

At Microsoft, we concur with the view that "the Canadian health care system is characterized by two trends: the emergence of e-health and a shift from paternalistic-type medicine to a consumer-based approach" (Urowitz et al. 2008). Looking toward the future, we foresee a dynamic technology R&D landscape in Canada that will create new knowledge, applications and jobs, as well as further investment, throughout the country's IT and healthcare sector. By collaborating on efforts to drive patient-centred change throughout the healthcare system, Canada's public- and private-sector healthcare planners, providers and innovators will, we are certain, develop a new generation of software and services that support and speed the move toward efficient, data-driven care.

Microsoft's Role in WTIS

- WTIS is a Microsoft .NET based solution. It utilizes SQL Server, BizTalk Server and BizTalk Server HL7 Adapter.
- The successful implementation of the solution under very aggressive timelines was a result of close cooperation of CCO, Accenture, Avanade, and Microsoft teams.
- WTIS is an example of how a consortium of complimentary companies working closely with a client can yield outstanding results.

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Editor's Note

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