Today's health care information systems are far from empowering for health practitioners. Often, they are cumbersome, unconnected, not interoperable and not user friendly. The future, however, holds great potential for Canada to strengthen and streamline its health care system and improve the quality of care for all Canadians. One of key priorities of the Advisory Committee on Health Infostructure[1] (ACHI) is Integrated Provider Solutions, which will focus on health care providers and the automated tools and information resources they need to improve health delivery to their patients.

Imagine a health care provider's office just a few years from now — an office that relies on information and communications technologies to give the provider the latest information on health issues, treatments and therapies; clinical practice guidelines and decision support tools; immediate access to complete and up-to-date electronic health records; and on-line access to colleagues, hospitals, laboratories, pharmacies and other health facilities, using an integrated suite of easy-to-use tools. Imagine harnessing the power of technology to plan, coordinate and track a patient's care across the continuum of health care settings. And using technology to help educate patients on health matters and establish a more robust relationship with them.

A not-so-distant scenario...

Marie is a family physician practising in Calgary, Alberta in 2007. She is excited about the successes in the development of electronic health records, including a secure provincial health network and key infrastructure pieces supporting the electronic health record, such as drug and laboratory information systems which allow her to access the most current prescriptions and lab test results. Marie has recently installed a comprehensive and integrated office system that enables her to access the provincial networks, care for her patients using the best information and evidence available, and improve many aspects of her office practice.

In fact, technology has the potential to revolutionize practice. First and foremost, it will allow health professionals to provide better care for their patients. It will help them make more informed decisions, reduce medical errors and choose optimal solutions. It will streamline office routines, make continuing education and self-development more readily available, and foster improved communication with colleagues and patients. Moreover, it will introduce an ability to protect personal health information throughout the health system.

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[1] The Advisory Committee on Health Infostructure was established in June 1999. The ACHI, which includes representation from all federal, provincial and territorial (F/P/T) governments, reports to the Conference of F/P/T Deputy Ministers of Health. The ACHI's Blueprint and Tactical Plan for a pan-Canadian Infostructure of 2000 set out the strategic and tactical directions for developing the health infostructure. The 2001 update to the Tactical Plan recommends specific actions that governments should take to move forward on the three priority initiatives which were recommended in the Blueprint — namely: Electronic Health Records and Telehealth; Integrated Provider Solutions; and Health Information for the Public.

- WILLIAM J. PASCAL -

INTEGRATED PROVIDER SOLUTIONS:
Unleashing the Power of Technology for Canada's Health Care Providers

Bill Pascal, P.Eng, C.M.A, is the Director General, Office of Health and the Information Highway, Information, Analysis and Connectivity Branch of Health Canada in Ottawa.

www.hc-sc.gc.ca/ohih-bsi/

> *"The journey to Integrated Provider Solutions — and the benefits they will bring to Canada's providers and patients — has just begun. Tangible progress is being made towards development of the Electronic Health Record, including standards, rules for privacy, and government health networks and infrastructures — some of the foundation pieces for provider solutions. It is on this front that the federal, provincial and territorial governments are concentrating their efforts."*

One of the most important foundation pieces for provider systems is the electronic health record because so much of what providers do revolves around their patients and information about their patients. The Electronic Health Record initiative will ensure that the essential elements are put in place to support the development and use of electronic health records. Some of these elements include standards for health data, images, messaging and security; electronic health record architectures: secure and interoperable government health networks for transmission of electronic health records and other health information; legislation, policies and approaches to ensure the privacy of Canadians' health information; data repositories for patient information; registries to ensure unique identification of individuals, health care providers and health facilities; and laboratory and pharmacy information systems. The ACHI will ensure that development of this foundation is coordinated to bring about an integrated pan-Canadian health infostructure.

Integrated Provider Solutions will build from the Electronic Health Record initiative and other foundation elements such as knowledge repositories and databases. The objective of Integrated Provider Solutions is to give health care providers the information resources and electronic services they need to provide the best possible health care.

Let's examine Integrated Provider Solutions in more detail. When we say "providers," who do we mean? Providers include physicians, nurses, pharmacists, dentists, dental hygienists, dieticians, optometrists, chiropractors, laboratory technologists, radiation technologists, therapists, psychologists and others — the people who provide direct health services to the Canadian public. When you think of the many kinds of health providers and the multiplicity of health care settings, you can begin to realize the challenge in developing systems that will meet all their needs.

What do we mean by "provider solutions?" These are the systems and applications designed for use by providers. These systems will typically be developed by hospitals, pharmacies and the like for use by their providers, or purchased by providers such as physicians and dentists in private practice. They will give providers access to clinical practice guidelines, the latest health information and health news, medical libraries, journals and databases, and so on. Electronic services could include telehealth services, electronic patient records, electronic order entry of tests and prescriptions, decision support tools, quick access to test results, surveillance alerts, electronic links to colleagues, patients, hospitals and other health facilities, a variety of business and workflow tools, and more.

How will these provider solutions be integrated? Some provider systems will be centred around the patient visit, and integrate all the information and services that the provider would need during the visit. Many provider systems will be integrated with institutional systems (e.g. systems for providers in hospitals will be interfaced to the hospital system). Most systems will be integrated either directly or indirectly with secure government health networks and infrastructures, so providers can gain access to electronic health record repositories, pharmacy and laboratory systems. Most provider systems will also be integrated with Internet sites and other sources of on-line health information.

This is the vision, and many paths can be chosen to bring it into being. However, one thing is clear. In this pioneering effort, providers and other stakeholders must shape the meaning and scope of what provider solutions could eventually entail and must participate in the development of these solutions. As emphasized in *Canada Health Infoway: Paths to Better Health*, "The professionals and providers who actually deliver care are central to health care. Without their active support and use of the new tools offered by the Canada Health Infoway or its provincial and territorial counterparts, little will change and evidence-based decision making will remain more a promise than a reality."

A not-so-distant scenario...

It is time for Pierre's regular annual check-up. When he arrives at Marie's office, the receptionist notes his arrival on the office computer. This informs Marie that Pierre has arrived and automatically brings up Pierre's electronic health record on the doctor's computer. This record contains all the information from Pierre's previous visits and his hospital in-patient procedure, plus the results of his recent laboratory tests. Following the examination, Marie updates Pierre's records by going through an electronic questionnaire designed especially for Pierre's condition, and considers a new medication for Pierre. On her system, she checks to see if there any contraindications for this medication and notes the evidence from a recent clinical trial. Seeing that this medication is most appropriate, Marie sends an electronic prescription to a downtown pharmacy so it will be ready for Pierre on his way home. At the same time, Marie's assistant contacts the hospital to schedule a second hospital in-patient procedure for Pierre at a time that is convenient for everyone.

After the procedure, a hospital dietitian visits Pierre in his room. Using a hand-held wireless device, she is able to view Pierre's patient record, including the reports of the hospital staff. She enters instructions, including a special diet for Pierre for the remainder of his hospital stay.

Where We Are Now

The journey to Integrated Provider Solutions — and the benefits they will bring to Canada's providers and patients — has just begun. Tangible progress is being made towards development of the Electronic Health Record, including standards, rules for privacy and government health networks and infrastructures — some of the foundation pieces for provider solutions. It is on this front that the federal, provincial and territorial governments are concentrating their efforts.

Work on standards is taking place, coordinated through the ACHI and the Canadian Institute for Health Information. In addition, work is being done to establish a common framework for the protection of personal health information. The ACHI has identified four key building blocks of the Electronic Health Record for immediate action: registries of common identifiers for health care providers and clients, and systems for laboratory and pharmacy data.

In support of the commitment of First Ministers, in September 2000, to work together to strengthen a Canada-wide health infostructure, the Government of Canada invested $500 million in an independent corporation. This corporation, named Canada Health Infoway, Inc., has been mandated to accelerate the development and adoption of modern systems of information technology, such as Electronic Health Records, to provide better health care.

The federal government and most of the provinces and territories are currently developing secure health networks for use by health care providers, health facilities and other interested parties. For example, the federal government is developing a secure health network to support care of First Nations and Inuit people. Alberta is developing a secure health network through **alberta we*ll*net**. Ontario is developing a secure health network through its Smart Systems for Health initiative, and Quebec is developing its Réseau de télécommunications sociosanitaire.

Let's take a closer look at a couple of the many provincial initiatives under way. For example, Alberta Health and Wellness (AHW) and the Alberta Medical Association (AMA) have established a Physician Office System Program (POSP). In their guidelines document, POSP is described as "a fundamental part of a journey to transition physician offices in Alberta from their current information systems, which may be paper-based, to electronic information systems." POSP calls for the development of physician office systems that support patient care, professional development/knowledge management and practice management. Its vision is "to establish a physician office information infrastructure that is integrated with the health information system." The increasing amounts of information that are required by all health providers for safe practice spurred Alberta to implement the initiative.

POSP will reduce barriers associated with incorporating technology in the physician office by offering financial assistance to eligible physicians for office automation. In addition, the necessary change management support to enable the integration of new technologies in office practice will be offered to these physicians before, during and after implementation so that they can optimize the benefits from office automation.

A second example is MOXXI-COMPETE — a collaboration of teams from Quebec and Ontario — which is sponsored under the Canada Health Infostructure Partnerships Program (CHIPP). The objective of the project is to determine whether technology-based, integrated delivery systems among primary care physicians, specialists, pharmacists and other community-based health providers will improve access to and quality of care, and health outcomes for Canadians.

Using diabetes as the disease focus, investigators will electronically network clinical practices with specialists, patients and pharmacies using individual monitoring information linked directly to best evidence in diabetes care. They will also pilot test an electronic prescription transmission and stop order function that will allow prescriptions and stop orders to be e-mailed to a prescription repository where it can be retrieved by the dispensing pharmacy.

MOXXI-COMPETE is just one of several projects developing Electronic Health Records, Integrated Provider Solutions and telehealth solutions under CHIPP. Many other pioneering efforts are being developed and pilot tested across the country by other stakeholder groups as well.

Meanwhile, health institutions are forging ahead to develop automated systems and tools for physicians, nurses, pharmacists and other providers. Hospital systems typically link health care providers throughout the institution, but occasionally these systems are going much further. For example, Nova Scotia is building a system that will link providers in 34 hospitals across the province. And, as many of us have seen first hand, pharmacy systems often track patient histories of drug usage, provide knowledge resources and decision support tools to pharmacists, and provide educational materials on prescription drugs that pharmacists can give to their clients.

A not-so-distant scenario...

Marie has been asked by 54-year-old Paul whether he should take an arthritis medication for his hip pain. One of his colleagues has been taking a particular medication that helps, but he is uncertain about the risks. Marie takes a detailed history to assess his risks and tells Paul that she will review the most current research findings in medical information databases and then enter his information into a risk assessment program that will calculate the risks and benefits of his taking the medication for given periods of time. Between them, they will then be able to decide whether he should take the medication and for what period of time. Marie is satisfied that she will be able to give this patient the best advice possible and that she will have increased her competence in this area to the benefit of her other patients. Paul will have the benefit of the latest information from well-conducted studies and know that the information has been converted to meet his individual needs.

> *"Developers of provider solutions will need to ensure that their applications conform to standards so that they can connect to secure government health networks, giving providers full access to the health system — hospitals, laboratories, pharmacies, community health care programs, long-term care facilities, and so on. Working closely with all these stakeholder enterprises will be extremely important to ensure that provider systems can be integrated with government networks and infrastructure and that government systems meet provider needs."*

Professional associations and colleges, universities, medical libraries and business partnerships are actively developing Internet portals for use by health care providers. These portals offer many resources, such as access to on-line journals, databases, health libraries, clinical practice guidelines, drug advisories, continuing education, and practice websites. Many resources are being developed across Canada and around the world for health care providers. Access to these resources will be an essential element of provider solutions, and provider systems may eventually integrate these resources right into the workflow. For example, as a provider takes a patient's history and diagnoses a certain condition, the application could be triggered to locate and provide access to the latest information on that condition.

Outside the spheres of government, education and health institutions, etc., private sector developers, technology, pharmaceutical and financial enterprises are entering the health care technology market either singly or in partnership with other companies to offer a variety of solutions.

Even with the large number of stakeholders and parties actively working to realize the Integrated Provider Solutions "vision," solutions have so far proven to be difficult to develop and implement, partly because the infrastructure for the Electronic Health Record — and all applications that flow from the health record — are not yet in place. Developers of provider solutions will need to ensure that their applications conform to standards so that they can connect to secure government health networks, giving providers full access to the health system — hospitals, laboratories, pharmacies, community health care programs, long-term care facilities, and so on. Working closely with all these stakeholder enterprises will be extremely important to ensure that provider systems can be integrated with government networks and infrastructure and that government systems meet provider needs.

Issues and Challenges

The development and implementation of Integrated Provider Solutions across Canada raises a number of important issues and challenges. For example:

Fully involving the health care provider community is essential to ensure that these systems will eventually be adopted and embraced by providers. **Through what types of partnerships with health care providers and other stakeholders will we be able to advance this priority?**

Development of integrated provider solutions needs to be coordinated with the broader work taking place on the electronic health record initiative and the infrastructure. **How will integrated provider solutions be coordinated with the development of electronic health records?**

Provider solutions need to add value for providers and for their patients. **How do you ensure that they meet provider needs and add value?**

The implementation of integrated provider solutions will involve re-engineering the way providers practice — in most cases, from a paper-based environment to an automated one. **How do you ensure that health care providers are supported in coping with the changes?**

Stimulating discussion among the health care community is a vital accompaniment to advancing the Integrated Provider Solution initiative and ensuring that the end products — the information and communications technologies — will meet the needs of the end users — the health care providers themselves.

Where Do We Go from Here?

To evolve provider solutions in an integrated manner, while supporting the implementation of electronic health records, the ACHI, in its *Blueprint and Tactical Plan for a pan-Canadian Infostructure, 2001 Update*, has identified the following action items as next steps:

- Complete an integrated provider solution needs assessment to review currently available Integrated Provider Solutions to assess experience to date.

- Identify Integrated Provider Solution strategies and high-level strategies to foster the implementation of integrated provider solutions, initially for physicians, nurses and pharmacists, and to ensure a linkage to Electronic Health Record development work.

Beyond these initial steps, development and implementation will not be easy. They will require a committed partnership of the provider community — all governments, hospitals, pharmacies, laboratories and other health institutions, system managers, universities, health libraries and professional bodies, health care consumers and others.

The influence that Integrated Provider Solutions can wield in the health care community can be potentially far-reaching. Integrated solutions can forever change and reshape how providers and other stakeholders capture, aggregate, view, distribute, manage and use health care information.

The future holds great promise. When the solutions being developed meet providers' diverse needs, when they are adapted to the wide variety of health care settings, and when they give providers the information resources to better serve their patients, Integrated Provider Solutions will have come of age, and be well on its way to enhancing health care for all Canadians.