The DPC database can also be used for large-scale multi-central post-marketing clinical studies as shown in Figure 4. In 2008, the DPC research programme has clinical studies for several disorders, including chemotherapy for lung and breast cancer.

With limited resources available in the health sector, not all medical innovations can be covered by the public medical insurance scheme. In order to make the Japanese health system sustainable, evidence for the rational distribution of resources is needed. This requires information about medical procedures and their outcomes.

As the English National Health Service experience has shown, under-financing of the health sector can damage the health system. On the other hand, over-financing the health system can damage the general economy, because the Japanese health system depends on contributions from the general economy. Thus, there needs to be a balance between the health spending and the needs of the broader economy.

The new DPC system can help provide detailed situation analysis of the use of health care interventions among regions, in-patient and out-patient services, as well as between acute and chronic care. At its heart are the concepts of transparency and accountability. By using this framework, researchers will in future be able to evaluate the quality of the health system from both micro and macro perspectives.

**REFERENCES**


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**e-Health in Canada:**

**Lessons for European health systems**

Denis Protti

**Summary:** This paper provides a status report of health information technology and electronic health record (EHR) initiatives in Canada. It also candidly discusses the difficulties Canada is facing in moving the EHR agenda forward. Particular emphasis is placed on describing the unique role of Canada Health Infoway, a unique, federally-funded, independent, not-for-profit organisation whose members are Canada’s fourteen federal, provincial and territorial Deputy Ministers of Health. The interesting lesson learned is about a national organisation being successful in an environment whereby health care is a provincial responsibility.

**Key words:** Electronic Health Records, Funding Health IT, National Oversight, Electronic Medical Records, Canada

Perhaps the single most potent lesson for other countries to learn from Canada is its unique, federally-funded, independent, not-for-profit organisation called Canada Health Infoway (Infoway) whose members are Canada’s fourteen federal, provincial and territorial Deputy Ministers of Health. Created in 2001, Infoway invests in a common, pan-Canadian framework of electronic health record systems where best practices and successful projects in one region can be shared or replicated in another. Infoway is Canada’s catalyst for collaborative change to accelerate the use of electronic health information systems and electronic health records (EHRs) across the country. It recognises and has to function in an environment whereby health care is a provincial responsibility.

As in many countries, though the health care sector depends upon accurate, up-to-date information, it has been slow to exploit information technology (IT) — mainly because of cost and resistance to change. For years, IT was a low priority in health care and it is only recently that governments have begun to realise that technology can improve the quality of care and actually save money in the long run.

As a strategic investor, Infoway works in collaboration with health ministries, regional authorities, other health care organisations and information system vendors to best align Infoway’s investments with jurisdictional plans and to leverage existing solutions. Once investment decisions are made, public sector partners lead the development and implementation of EHR solutions. Infoway views an EHR as a secure and private lifetime record of an individual’s health and care history. Available electronically, it provides authorised health care professionals with immediate access to their patients’ accurate health histories, including laboratory and radiology test results, past treatments, prescription drug profiles and immunisations, while protecting privacy and confidentiality. The EHR supports improved clinical decision-making leading to more effective diagnosis and treatment, greater patient safety, increased efficiency and improved access to services.

It is worth noting that in Canada, a distinction is made between the above
defined EHR and an electronic medical record (EMR). An EMR generally refers to computer-based clinical data of an individual that is location specific and kept by a single physician office or practice, community health centre, or possibly an ambulatory clinic. Ideally, the two work together, with doctors’ EMRs connected to wider EHR systems. Infoway’s goal is that by 2010, 50% of Canadians (and 100% by 2016) will have their electronic health record available to those authorised professionals who provide their health care services.

### The good news
Working with its federal, provincial and territorial partners, Infoway is attempting to hasten the pace of development and implementation of electronic health records. During 2007–08, Infoway approved $311.5 million in new projects, bringing the total cumulative value of its investments to $1,457 billion or 89% of Infoway’s $1.6 billion in capitalisation by the federal government. This capitalisation includes an injection of $400 million that Infoway was allocated by the Government of Canada in the March 2007 Budget for investment in electronic health information and communications technology.

The investments have brought the total number of projects underway to 254, representing a four-fold increase from the fifty-three projects that were underway in 2004. For instance, in terms of infrastructure, there are twenty-four pan-Canadian projects of which fourteen have been completed and ten are active while in terms of provincial client and provider registries, twelve have been completed and seventeen are active. It should be noted however that the information in Table 1 is not an account of all the projects underway in Canada but only those that have received Infoway funding.

<table>
<thead>
<tr>
<th>Area</th>
<th>Completed projects</th>
<th>Active projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Provincial client and provider registries</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Provincial drug information systems</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Provincial laboratory information systems</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Regional diagnostic imaging systems</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Telehealth</td>
<td>30</td>
<td>41</td>
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<tr>
<td>Public health surveillance</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Interoperable EHRs</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>Innovation and adoption</td>
<td>9</td>
<td>26</td>
</tr>
</tbody>
</table>

Source: Canada Health Infoway, 2007.

As in most countries, Canada can point to its centres of excellence and its crown jewels so to speak. A few of many examples at the provincial level are British Columbia’s PharmaNet system which since 1995, have connected all the pharmacies in the province to a centralised medication profile database. As a result, any pharmacy and hospital emergency department in the province has 24/7 access to all the medications any patient has received in the previous fourteen months. An Infoway sponsored project will soon give that same access to physicians who have EMR systems in their offices.

At a hospital level, the University Health Network (UHN), a large teaching hospital on three sites in Toronto has successfully implemented CPOE (computerised physician order entry) including over 50,000 medication orders a month – an application most hospitals in North America have been unable to address at this point in time. As a result, UHN has been able to demonstrate a reduction in medication errors and adverse drug events.

At a local level, patients at the Group Health Centre’s in Sault Ste. Marie, Ontario have been invited to participate in EMRxtra, a project supported by a $2 million investment by Infoway. With the patients’ consent, EMRxtra extends the centre’s electronic medical records to local pharmacists and members of the larger, multi-disciplinary team of care providers. Access to lab results, allergies and other vital information contained in the electronic medical record helps pharmacists avoid dangerous drug interactions and provide sound advice to the patient with the confidence that comes from being fully informed about the patient’s medical history. Just as importantly, the pharmacist’s expertise becomes an important element in the circle of care provided to the patient.

### The less good news
The absence of additional funding in the Government of Canada’s 2008 Budget puts the 2010 goal of providing 50% of Canadians with an EHR at risk. Infoway will need significant additional capital to provide the benefits of EHRs to all Canadians and across the continuum of care as recommended in the 2006 Health Council of Canada Annual Report to Canadians. Two studies estimated the ten year total cost of ownership for the pan-Canadian interoperable EHRs at approximately $10 billion, with a return of $6 to $7 billion a year in efficiencies when fully implemented. An estimated investment of $350 per person, spread over ten years, is needed. This is consistent with what other developed countries have invested.

In addition to the funding issue, a 2006 study by the Commonwealth Fund found that only 23% per cent of Canadian doctors use electronic medical records, compared with 98% in the Netherlands, 92% in New Zealand and 89% in the United Kingdom. The seven-country survey revealed strikingly different country rates of primary care practice use of IT and the range of functions supported...
by office systems. Primary care doctors in Australia, the Netherlands, New Zealand and the United Kingdom have the most widespread and multifunctional systems; Canadian and US doctors lag well behind. Some progress has been made since the 2006 study, particularly in the province of Alberta due to the government's early decision to provide financial support to its physicians.

It seems a key problem is that the cost of EMRs in a Canadian doctor's office falls mostly on the physician, while the benefit goes to the health care system as a whole; this is especially true for the many single handed practices and small clinics that do not have the IT expertise to help them implement and maintain technology. A June 2007 survey identified lack of willpower and cost as the two reasons that account for approximately 80% of the barriers to EMR adoption in the province of Ontario.

A further complication has been the provincial governments’ inconsistent and differential approaches to EMR funding which has de facto created two tier primary care systems. Physicians who agree to work under particular funding formulas have their EMR costs covered by the province, whereas those doctors attached to other funding schemes must draw from their own resources in order to have EMR in their practice.

Another common problem in most provinces is ‘data stewardship’, i.e., who shall keep the records and who shall own them. Ownership brings with it an expectation of granting privileges to others to contribute to or gain access to the information. Concern about privacy and access (by both physicians and patients) seem to be among the major reasons why Canada has not adopted electronic records to the same extent as many other countries have. Nevertheless, the Canadian Medical Association believes that the benefits of electronic records clearly outweigh the risks. As Flegel so aptly put it, “it has become clinically counterproductive to allow the risks to continue to delay the necessary development and implementation of technologies. If we can handle the myriad privacy concerns involved in electronic banking, what is holding up electronic medical records? We have the e-technology; all we need is the e-will.”

Conclusion
As strategic investor, Infoway has successfully worked collaboratively with jurisdictional partners to develop and share the long-term health infrastructure vision for Canada. They have facilitated national collaboration to ensure that public and private sector stakeholders jointly plan, share best practices and continually improve the deployment of the pan-Canadian health infrastructure. Effective alliances with the private sector have helped Infoway better leverage its investment dollars, and better align the information technology industry’s business directions with their goals. Infoway’s emphasis on interoperability and vendor-neutral architecture and standards generates interest from many potential IT partners, and has allowed Canada’s health care jurisdictions to reduce costs and obtain upfront financing from vendors and suppliers.

To protect future investments, Infoway and the jurisdictions have implemented a collaborative risk assessment approach where project and jurisdiction risks are clearly identified for risk mitigation and reporting purposes. In addition, a Quality Assurance Framework was developed and will be applied to all Infoway investment projects.

In closing, a 2007 Conference Board of Canada study estimated that electronic health record spending will have created 37,000 new jobs by 2010, translating to $2 billion in new labour income for Canadians. And every dollar invested by Infoway and the provinces adds $1.34 (on average) to Canada’s gross domestic product. More investment, exports and employment bring more tax revenues for federal and provincial governments — about $0.36 for each dollar invested. In short, beyond better health care, all provinces and territories are reaping economic benefits from their EHR projects.

References

NEW PUBLICATION
Caring for People with Chronic Conditions
Edited by Ellen Nolte and Martin McKee
Open University Press, December 2008, 265 pages
This new book systematically examines some of the key issues involved in the care of those with chronic diseases.
Taking an international perspective, it synthesises the evidence on what we know works (or does not) in different circumstances.

Taking a whole systems approach, the book:
• Analyses the prerequisites for effective policies for chronic care
• Examines systems for financing chronic care
• Describes the burden of chronic disease in Europe
• Explores the economic case for investing in chronic disease management
• Examines key challenges posed by the growing complexity in health care including prevention, the role of self-management, the health care workforce, and decision support