Towards an Evaluation Framework for Electronic Health Records: An Inventory of Electronic Health Records Initiatives Across Canada

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Towards an Evaluation Framework for Electronic Health Records Initiatives:
A Review and Assessment of Methods used to Measure the Impact of
Health Information Systems Projects

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INTRODUCTION

Background

An Electronic Health Record (EHR) provides each individual with a secure and private lifetime record of their key health history and care within a health system. The record is available electronically to authorized health care providers and the individual anywhere, anytime, in support of high quality care. Recognizing the importance of the EHR in improving the quality and efficiency of health care, the federal government of Canada, in 2001, established Canada Health Infoway to support and accelerate the development and adoption of interoperable electronic health records solutions across the country. Four core components have been identified as the key building blocks of an EHR by Infoway and the Newfoundland and Labrador Centre for Health Information (NLCHI): (1) a unique personal identifier/client registry; (2) a pharmacy network; (3) a laboratory network; and (4) a diagnostic imaging network.

Towards an Evaluation Framework for Electronic Health Records Initiatives: A Review and Assessment of Methods used to Measure the Impact of Health Information Systems Projects, a project funded by Health Canada, Office of Health and the Information Highway, was carried out between May 2002 and December 2003. The goals of the project were to: (a) review current approaches to evaluating the impact of health information systems (particularly those leading to an EHR); and (b) develop an evaluation framework which addresses the information needs of key stakeholders and the identified best practices in the evaluation of such initiatives. Three deliverables were produced from the project and released as separate (but complementary) documents:

1. **Towards an Evaluation Framework for Electronic Health Records: An Inventory of Electronic Health Records Initiatives Across Canada;**
2. Towards an Evaluation Framework for Electronic Health Records: An Annotated Bibliography and Systematic Assessment of the Published Literature and Project Reports;
3. Towards an Evaluation Framework for Electronic Health Records: A Proposal for an Evaluation Framework.

This report presents the Inventory of Electronic Health Records Initiatives Across Canada as of May 2003. The project was guided by an advisory committee comprised of key personnel who are leading the work of NLCHI around the development of EHRs, including the Chief Executive Officer, the Health Information Network Project Leader, the Director of Research and Development, the Director of Standards Development, the Director of Communications and Privacy, and the project's principal research investigator.

Process

The multi-step process used to compile the inventory of major Electronic Health Record (EHR) projects across Canada was as follows:

Step 1: An initial search was conducted using an internet search engine, where each province/territory was used in combination with the term Electronic Health Record and variations thereof (e.g. Health Information System).

Step 2: The Health Canada website was searched for information related to the development of an electronic health record for each province/territory.

Step 3: Relevant websites identified through the initial internet search (e.g. Western Health Information Collaborative, Newfoundland and Labrador Centre for Health Information, etc.) were searched for documents related to health information system projects.

Step 4: A list of key contacts for each province/territory was compiled based on knowledge of titles of individuals that are involved in the development of the provincial Health Information Network (HIN) in Newfoundland and Labrador. Key contacts included, but were not limited to, Assistant Deputy Minister of Health and Community Services equivalents, Secretary to Treasury Board equivalents, Assistant Secretary to Treasury Board equivalents and key individuals at various institutions (e.g. SHIN, NLCHI, etc.). The list of key contacts included some of the individuals that were initially identified as having an interest in the development of health information systems and invited to participate in the project. All individuals were contacted via e-mail (and in some instances telephone) and asked for their help in the development of an inventory of Electronic Health Record (EHR) projects across Canada. In some cases, the individual that was contacted suggested that they would not be helpful in this project and suggested another individual as a more appropriate contact. A revised list of key contacts was compiled.

Step 5: Based on input from the key contacts and the multi-phase internet search, a draft document highlighting the major EHR projects across Canada was compiled. Each contact received his or her respective provincial component for review and revision.

Step 6: Based on feedback received from key contacts, a second draft document was compiled. The draft document was sent to all key contacts with the information relevant to their province/territory highlighted. Each individual was asked to advise where information was missing or incorrect.

Step 7: After final input was received from key contacts, the final document was completed. A special acknowledgement is due to Donald MacDonald and Kayla Gates, whose graduate work helped inform the review of the Pharmacy and Laboratory Networks initiatives.

SUMMARY OF MAJOR ELECTRONIC HEALTH RECORD (EHR) INITIATIVES ACROSS CANADA

Unique Personal Identifier/Client Registry

The unique personal identifier/client registry has been recognized as the basic building block for the creation of province-wide electronic health records. While specific functions vary from project to project, ideal functionality includes the ability to cross-reference multiple, person-specific, medical record numbers from multiple health information systems (systems that contain information and data needed to compile a comprehensive electronic health record).

In December of 2000, the province of Newfoundland and Labrador implemented the first *province-wide* information system that links all regional health information systems into the initial phase of the provincial Electronic Health Record; the Unique Person Identifier/Client Registry System. This system connects all health regions into a common master client index via a sophisticated HL7 compatible integration engine.

Canada Health Infoway recently announced a partnership with NLCHI to further develop the current UPI/Client Registry system into a model that can be adopted by other regional and provincial jurisdictions. The Newfoundland and Labrador client registry has been designated the lead provincial Common Client Registry System project and will be used to develop national standards and proof of concept projects related to the Pan-Canadian Electronic Health Record. This project is underway and is expected to be completed by early 2004.

Client registries are a major focus for the short-term investment strategy of Canada Health Infoway. Another key initiative, at the sub-provincial level, is underway in the Capital Health Region, Edmonton, Alberta. British Columbia, New Brunswick and Ontario are in varying stages of implementing systems very similar to models implemented in Newfoundland and Labrador and Alberta.

Pharmacy Networks

Information systems developed to capture data related to prescription medications are variable in function across Canada. In the past, these systems were developed to process claims for government-funded drug programs. Technological advances in the last 10 years now allow for more enhanced functionality of medication systems (Pharmacy Networks). These systems now provide an opportunity to capture real-time medication data, which can lead to health, economic and financial benefits for both governments and individual patients (Benefits Driven Business Case, NLCHI, 1998).

Nine of the ten provinces currently have some form of Pharmacy Network. Most of these networks provide an interface between community pharmacists and provincially funded drug programs, for adjudication purposes. The most advanced networks include the ability to provide complete drug profiles to pharmacists at the point of distribution. Such systems have been implemented in four provinces: Alberta (WellNet), Prince Edward Island (Pharmacy Network), British Columbia (PharmNet) and Manitoba (DPIN). Each of these provinces, to varying degrees, have incorporated the following functions in designing their Pharmacy Network: on-line real-time adjudication, checks for duplication and double-doctoring, drug utilization reviews, checks for patient eligibility, drug profiles, connection to hospitals and physician offices, and electronic prescribing. A comparative listing of these functions is provided in Table 1, followed by a brief description of the four networks.

Five provinces, Newfoundland and Labrador, Prince Edward Island, Manitoba, Alberta and British Columbia, have implemented (or are planning to implement) systems with more comprehensive functional capability. One of the major enhancements found in these systems is the ability to provide real-time patient drug profiles at the time the prescription is filled by the pharmacist.

Table 1

Functions of Selected Provincial Pharmacy Networks

Function	Alberta (2002)	British Columbia (1995)	Manitoba (1994)	PEI (1999)
On-line real time adjudication and transmission	✓	✓	✓	✓
Checks for duplication	✓	✓	✓	✓
Checks for double-doctoring	✓	✓	✓	✓
Provides full retrospective drug use evaluation/review on patient profile	✓	✓	✓	✓
Tracks patient's deductible on co-pay	✓	✓	✓	✓
Patient eligibility checked	✓	✓	✓	✓
Immediately identifies what is and is not a benefit	✓	✓	✓	✓
Pharmacare Status	✓	✓	✓	✓
Drug Profiles	✓	✓	✓	✓
Drug Profiles history on each patient	✓	✓	✓	✓
Records Rx dispensed for all or select group of patients	Will record all prescriptions	All prescriptions are recorded	All prescriptions are recorded. Note: not mandatory for aboriginals, but most are recorded.	Will report all prescriptions
Ability to record non-dispensing events	✓			
Connected with hospitals	✓	✓		
Connected with physician offices/desk top prescribing	✓			
Other Notes	Currently in a 6 month pilot stage.		Five year plan.	In the development stage.

Source: Pharmacy Scoping Project Briefing Note, 2002, Newfoundland and Labrador Centre for Health Information.

Manitoba

In 1994, the province of Manitoba implemented the Drug Programs Information Network (DPIN). The DPIN system was the first system in Canada that connected all community pharmacies. There are currently no linkages of community physicians to hospitals, although these connections are part of Manitoba's five-year business plan for the DPIN. The DPIN was originally developed to provide complete prescription profiles to pharmacists at the time of dispensing, as well as enhanced drug utilization reviews. The functions of the DPIN system are similar to other provinces with Pharmacy Networks (see Table 1), although in Manitoba it is not mandatory for pharmacists to record prescriptions filled by the treaty status/Registered Indian population (Kozyrskyj, Brown and Mustard, 1998).

British Columbia

The British Columbia PharmaNet initiative was implemented in 1995 in an attempt to contain escalating costs to the government drug program, and to improve the health of the population through the provision of drug therapy decision tools. The network allows for the exchange of medication information between pharmacists and hospital emergency rooms, however there are no linkages to community physicians**.**

An additional function of the PharmaNet system is the Pharmacare Trial Prescription Program. This module was developed to reduce expenditures for patients who are put on a new medication and for some reason must discontinue its use. A patient is given only a portion of the new drug, and their health care provider then monitors their progress. If for some reason the drug must be discontinued, the full prescription has not been wasted.

Alberta

The Pharmaceutical Information Network (PIN) is being developed in the Province of Alberta as part of the Alberta Wellnet initiative. The objective of the PIN project is to provide health care professionals with the information necessary to make optimal decisions on drug therapy. The network will not only provide adjudication functions for Alberta's government drug plan, it will also connect community pharmacists, physicians and hospitals to allow for the exchange of patient information. This will allow a physician to monitor a patient's current, as well as, historical drug profile, create/modify prescriptions through Computerized Physician Order Entry (CPOE), and access decision support tools to assist in drug therapy decisions. The PIN project in Alberta was approved for implementation based on the estimated $69 million the province would save annually as a result of a reduction of adverse drug events (Pharmaceutical Information Network – Medication Information Strategy (White Paper), Western Health Information Collaborative, April 2002).

Prince Edward Island

Prince Edward Island is the latest province to begin developing a Pharmacy Network. At present this system is still in the implementation stage and much of the system development documentation is classified as proprietary. It is known that in 1997 the province implemented a Pharmaceutical Informatics Project (PhIP) system, which provided province-wide networking for the submission of pharmacists' claims to the government drug program. In 1999, this system was enhanced to allow fee-for-service physicians to submit medical claims to government for payment. Recently, the province has started a process towards developing a Pharmacy Network that would enhance the role of the pharmacist by providing comprehensive functionality. It is not unreasonable to assume this system would include similar functions found in the three provinces with established Pharmacy Networks.

Laboratory Networks

Electronic sharing of laboratory information has been identified as high priority by several Canadian provinces and territories. Nine of the thirteen jurisdictions have indicated that they have plans to implement one or more aspects of an integrated laboratory network and five jurisdictions, including Newfoundland and Labrador, Manitoba, Saskatchewan, Alberta and British Columbia, have major implementation initiatives currently underway. In some jurisdictions, the initial focus is on electronic exchange of laboratory orders and results. Other jurisdictions are focusing on enabling immediate access to a patient's lab test history. For most jurisdictions, the ultimate goal is to have province wide integration of laboratory information that will support both the electronic exchange of orders and results between geographically dispersed sites as well as immediate access to a patient's longitudinal history of laboratory services from any site in the province. Direct Provider/Physician Order Entry (POE) has been identified as a long-term goal by some jurisdictions, but has not been the focus of any major initiatives to date.

Since the majority of the jurisdictions are in their planning and pilot implementation stages, detailed documentation is often unavailable. However, an overview of what is known about electronic exchange of laboratory information in Canada is provided below.

British Columbia

In 1998, the HealthNet/BC Project formed the Lab Test Standard Task Group (LTSTG) with representatives from HealthNet/BC working groups, the BC Health Information Standards Council and private sector and provincial labs. In 1999, the BC Lab Test Standard (LTS) was developed to enhance the quality of patient care through the timely exchange of consistent lab data, and to reduce the cost of managing the exchange of laboratory information. Version 1.3 of the Lab Test Standard (LTS) is now available. The standard defines the business and technical requirements for the electronic exchange of lab test data and accounts for all information exchanges that occur from the time an order is issued until the time a final result is received. The Lab Test Standard is based on a set of standard identifiers including the Personal Health Number (PHN), which is the provincial standard for personal identification; the Provider Data Standard (including Provider ID), BC Test Order Codes (BCTOC), the standard for test orders; and LOINC, the standard for reporting of test results. The LTS also provides a comprehensive set of rules regarding ordering lab tests, referring/redirecting orders, requesting order status, reporting results, accessing a patients' lab test history and privacy and confidentiality issues.

A number of BC laboratory systems are currently using the Lab Test Standard. Among these is a private sector province-wide initiative called PathNet. PathNet is a web-based electronic laboratory reporting system that integrates patient laboratory information from multiple participating laboratories, within and across regional boundaries. It allows physicians to access up-to-date laboratory test results, in real-time, for any patient that has had a test completed at any participating laboratory. In addition, PathNet will flag any abnormal test result(s) and allow access to a patient's laboratory test history. Other laboratory systems using the Lab Test Standard include BC Communicable Disease Control (BCCDC) in providing lab test results to the Population Health Information System (PHIS), the federal Canadian Integrated Public Health Surveillance initiative and the BC Cancer Agency (Western Health Information Collaborative, 2002).

Alberta. The primary focus for laboratory information exchange in Alberta has been on results reporting and providing a longitudinal history of lab test results. A joint initiative between the Capital Health Authority (CHA), the Physician Office System Program (POSP), Dynacare Kasper Medical Laboratories (DKML) and Alberta Wellnet has created a laboratory test results repository that will allow physicians to electronically receive and file lab results directly into a patient's record. Presently, the system is for reporting test results only and still requires paper forms to be used for lab requisitions. While physician order entry has been identified as a component of the provincial electronic health record initiative, there is still significant work remaining.

The Capital Health Authority Electronic Lab Results Reporting Project was launched in Northern Alberta in June, 2002 and is anticipated to expand to include other health authorities. Currently, physician office systems can electronically receive requested lab test results and a pilot implementation of the lab results history system is being prepared. With full implementation, it is proposed that access to a patient's lab test history will be available along with the Alberta Wellnet Pharmaceutical Information Network (PIN).

Manitoba

Manitoba is currently developing an integrated multi-site organization known as Diagnostic Services of Manitoba (DSM), which will undertake all provincial laboratory services. The goal of DSM is to avoid future costs through economies of scale in material costs and test utilization.

An integrated province-wide Laboratory and Rural and Northern Imaging Information System (LIS/RIS) is the key infrastructure component required for full functioning of the DSM. The system of interlocking laboratories will use a common set of standards for all associated laboratory procedures. With full implementation, specimens can be collected and prepared in one location, transported to another site for testing, and results will automatically be returned to the originating site in real-time. Only laboratory personnel will have authorized access to the LIS/RIS. All hospital and physician access will be through a data repository or a hospital results reporting capability (Western Health Information Collaborative, 2002).

The initial implementation phase of the DSM will not include automated computer order entry. As order entry capabilities become more available in the province, the LIS/RIS will be expanded to facilitate automated Physician Order Entry. Laboratory and imaging results will be the initial building block for Manitoba's Electronic Health Record. The initial phase of the DSM is expected to be complete by 2004 (Western Health Information Collaborative, 2002).

Saskatchewan

As a component of the Saskatchewan Health Information Network (SHIN), Saskatchewan is planning a province wide web-based capability for laboratory test orders and results reporting, based on the storage and extraction of laboratory data from a central repository. Since the fall of 2000, work has been underway on a multi-regional integrated clinical system project that will integrate applications from several areas including registration, lab, pharmacy and operating room scheduling. All regions involved in the project are implementing a common Laboratory Information System that will help automate the process of ordering, performing and reporting laboratory tests. Systems are being configured to generate HL7 messages to enable information flow between applications into a common view once it has been installed (Western Health Information Collaborative, 2002).

Newfoundland and Labrador

The laboratory information system (LIS) that is currently used by all clinical laboratories within Newfoundland and Labrador is the MEDITECH laboratory information system. The Meditech LIS is a computerized information system that manages laboratory test data throughout the testing process and generates laboratory reports. Within health care institutions in Newfoundland and Labrador, the Meditech LIS is interfaced with the Meditech Hospital Information System (HIS). Each of the Province's Institutional and Integrated Health Boards share a common laboratory coding system and LIS network. In addition, any clinic that has established a connection to the Meditech system within the region can access the laboratory information. However, laboratory information exchange across regions or between the regions and the provincial reference laboratories in St. John's occurs by fax, telephone, postal service and courier.

Medinet is an interface that enables communication between two heterogeneous laboratory information systems (LIS) where one LIS must be a Meditech system. As a first step towards the province wide integration of laboratory information, the implementation of Medinet will enable real-time electronic exchange of laboratory test orders and results between all institutions within the province's

institutional/integrated health boards and the provinces' two largest reference laboratories in St. John's. The initial connection was established between the Public Health Laboratory and the provinces largest institutional health board in May 2003.

Diagnostic Imaging Networks

In recent years, the Canadian health care environment has witnessed significant investment in Picture Archiving and Communications Systems (PACS). Many institutions are implementing these systems as attachments to already installed diagnostic imaging systems. Diagnostic imaging systems provide the written report associated with images, whether images are electronic or film. Drivers for these systems include reduced cost of film and associated storage, as well as the ability to provide remote diagnosis on images taken from remote locations where imaging equipment is available but a radiologist is not.

With the exception of Manitoba, who indicated that they were in the process of creating an integrated, multi-site diagnostic services network, no other jurisdiction identified diagnostic imaging as the focus of a major initiative during the development of this document. One province, Newfoundland and Labrador, has identified on-line ordering and immediate access to a patient's longitudinal history of diagnostic services from any site in the province as a later phase of the provincial Electronic Health Record.

OVERVIEW OF MAJOR INITIATIVES

Newfoundland & Labrador

Unique Person Identifier/Common Client Registry

The basic building block for the development a provincial electronic health record is a system that enables the collection of information from installed feeder and legacy systems. The province of Newfoundland and Labrador has implemented the first province-wide information system that links all regional health information systems into the first phase of the provincial electronic health record; the Unique Person Identifier/Client Registry System.

The Newfoundland and Labrador Centre for Health Information (NLCHI) recently completed the implementation of a province wide client registry system. This project began in early 2000 and went live in December of that same year. This system connects all health regions into a common master client index via a sophisticated HL7 compatible integration engine. NLCHI sees further development of this system in the short run as a key to the consolidation and provision of clinical information that already exists electronically to health providers throughout the province.

The functionality of the registry includes, but is not limited to:

1. Directory of all people who receive services delivered through the health system (by a registered organization and by a registered provider).

2. The registry provides services:

    a. Across multiple care settings
    b. Across multiple locations
    c. In real time.

3. Uniquely identifies an individual in order to:

    a. Link and cross-reference organizational, regional, and jurisdictional identifiers;
    b. Provide consistent and accurate identification of a unique person at point of contact with the health system;
    c. Help authenticate a service recipient at the appropriate jurisdiction/organization;
    d. Share identification data across jurisdictions/organizations; and
    e. Facilitates the sharing of personal health information among authorized organizations and stakeholders.

4. Governs and coordinates the information (i.e. message) flow among the jurisdictional and organizational Client Registries through a detailed message specification in order to:

    a. Synchronize and reconcile data with the envisioned Pan-Canada EHR and other organizational/jurisdictional registries;
    b. Integrate with a Pan-Canadian EHR.

5. The Registry has the following basic required functionality:
    a. Search and display client information;
    b. Addition of new clients;
    c. Verification of client information;
    d. Update client information;
    e. Management of duplicate records; and
    f. Communication of changes to stakeholders.

Canada Health Infoway recently announced a partnership with NLCHI to further develop the current UPI/Client Registry system into a model that can be adopted by other regional and provincial jurisdictions. The Newfoundland and Labrador client registry has been designated the lead provincial Common Client Registry System project and will be used to develop national standards and proof of concept projects related to the Pan-Canadian Electronic Health Record. This project is underway and is expected to be completed by early 2004. Once complete, the province will be ideally positioned to consolidate patient information from multiple regional systems for the purposes of compiling the provincial electronic health record.

Pharmacy Network

NLCHI has completed a detailed project scope for the development of a province-wide comprehensive pharmacy network. This system is phase two of the provincial Electronic Health Record. The Unique Person Identifier/Client Registry was the first phase of this initiative.

The Newfoundland and Labrador Pharmacy Network (Pharmacy Network) will offer on-line, comprehensive, active medication profiles, as well as drug information and drug interaction databases. The network will provide tools and processes to support prescribing, dispensing, compliance monitoring, research and the formulation of policy regarding prescription medications. Increased access to appropriate medication information will enhance the quality of care, facilitate accountability, and promote cost effective usage of medications.

Functionality

The NPN will link doctors, hospitals, pharmacists and other authorized health stakeholders together into an electronic data network. The proposed functionality includes:

- On-line comprehensive active medication profile
- Prescription monitoring program supported on-line
- Adverse drug reaction recording
- On-line provider lookup
- Compliance monitoring
- Recording of non-dispensing events
- Electronic Prescribing
- Drug interaction check
- Contra-indication check
- Best choice drug suggestions
- On-line drug monographs
- On-line patient lookup

Stakeholder Input Process

The NLCHI Pharmacy Team consulted with the following stakeholders:

- Pharmacists
- Nurse Practitioners
- Consumer Health Groups
- Department of Health and Community Services
- Newfoundland and Labrador Prescription Drug Program
- Pharmacy software vendors
- National Organizations (i.e. CPA)
- Physicians
- Dentists
- Health Boards
- Department of Human Resources and Employment
- Third party payers
- Research Community

Project Scope Deliverables

The project scope is now complete and project deliverables were presented to the Project Steering Committee of NLCHI in late March, 2003. These deliverables and work products will support the development of the Pharmacy Network and are:

- Conceptual Solution
- Report on other jurisdictions
- Newfoundland and Labrador Prescription Drug Program Analysis
- Legislative review
- Standards review
- Review of benefits
- Architectural Model
- Operations and Maintenance Strategy
- Governance Model
- Implementation Strategy
- Workflow report
- Change Management Strategy
- Privacy Considerations
- Cost Estimates
- Funding Approach
- Request for Information (RFI) findings

Laboratory and Diagnostic Imaging Network

In Newfoundland and Labrador there are a total of eight institutional and/or integrated Health Boards. Each Board has implemented a regional Meditech Hospital Information System (HIS) which includes a regional Laboratory Information System (LIS). In January 2002, the Department of Health and Community Services implemented the Meditech Laboratory Information System (LIS) at the Public Health Laboratory, a Provincial Reference Laboratory, which completes the computerization of clinical laboratories province-wide.

In this province, the conventional system for exchanging laboratory information between ordering site and reference laboratory forces duplicate entry of information at each site and is dependant on courier and/or postal service for results delivery. There is an initiative currently underway that will enable the seamless flow of laboratory information between the regional laboratory information systems and the Province's two main reference laboratories - the laboratory department at the Health Care Corporation of St. John's and the Public Health Laboratory. This will be enabled through the implementation of Medinet. Medinet is an interface that enables communication between two heterogeneous laboratory information systems (LIS) where one LIS must be a Meditech system. By enabling real-time electronic exchange of laboratory orders and results between sites, Medinet will eliminate duplicate data entry and will no longer depend on the courier/postal service for results delivery. This initiative is the first step towards province-wide integration of laboratory information. The initial connection was established between the Public Health Laboratory and the provinces largest institutional health board in May 2003.

In a later phase of the provincial EHR, the Unique Personal Identifier (UPI) will enable further consolidation of laboratory information at a provincial level. As a component of the provincial EHR, physicians will be able to electronically order laboratory and other diagnostic services on-line, receive online decision support at the time of request and have immediate access to a patient's longitudinal history of diagnostic services from any site in the province.

Nova Scotia

Unique Patient Identifier

In Nova Scotia, a Unique Provincial Health Identifier (UPHI) has been established using the provincial Health Card Number (HCN). The HCN is collected at the time of service registration for all health service recipients. For non-eligible individuals (e.g., RCMP, out-of-province, etc.) a new HCN is assigned. Implementation of the UPHI has started with the acute care sector by providing online access to the provincial HCN Master File for hospital registrations. Specifically, the Nova Scotia Hospital Information System (NShIS), which serves all hospitals outside the Capital District Health Authority (CDHA), has HCN access integrated into the registration process.

Common Client Registry

A Common Client Registry is being planned which will:

- build on the UPHI infostructure, and its integration with the provincial NShIS;
- utilize work done on standards and interoperability for the NShIS and Canadian Health infostructure Partnership Program (CHIPP) projects; and
- fully integrate with acute care registration (NShIS, CDHA and IWK Health Centre) and other health service registration points.

Pharmacy Network

A pharmacy/medication order-entry-results system with clinical decision support within hospitals has been identified as a common opportunity with other Atlantic Provinces to:

- conduct an environmental scan;
- do a technology assessment;
- define common requirements;
- develop a stakeholder communication strategy;
- develop a stakeholder engagement strategy;
- develop common information, technology and data exchange standards;
- create a governance structure; and
- recognise policy issues surrounding requirements.

Laboratory Network

An end-to-end, all-in lab information system is planned for Nova Scotia hospitals (all labs in Nova Scotia are in-hospital). The laboratory information system will include scheduling and order entry/results reporting and will be available within institutions and physician offices.

New Brunswick

Client Registry

In New Brunswick, the Client Service Delivery System (CSDS) is a strategic initiative supporting the management and delivery of services to clients across a large number of community based program areas offered by the Department of Health and Community Services (newly restructured into two Departments; the Department of Health and Wellness, and the Department of Family and Community Services).

The CSDS is a comprehensive, integrated software system shared by Family and Community Services, Mental Health and Public Health, Financial Services and Partners for administering and efficiently delivering services to clients. It will also provide professional workers with a sophisticated system for assessing client needs and eligibility, and for planning and delivering services and ensuring regular follow up. Client services can be managed across programs, divisions and partner organizations. The standards incorporated into the CSDS allows for future and additional sharing of information across multiple data stores.

Scope

The CSDS supports case management activities of front line professionals in assessing client needs and planning, providing and monitoring services delivered to clients in various programs. Incorporated into the CSDS is the Common Individual Registry which provides a unique identifier and basic demographic data on all residents of New Brunswick. The Common Individual Registry is available to all professionals accessing the CSDS.

The case management processes supported by CSDS include:

- Common Individual Registry
- Case and Service Planning and Court/Legal Activities
- Financial Management activities
- Intake and Assessment activities
- Resource Management activities

The programs supported by CSDS include but are not limited to: Early Childhood Initiative, Immunization Programs, Well Child Clinics, (Public Health), Child Protection, Child Care, Adoption, Community Based Services for Disabled Children, Adult Protection, Long Term Care Program and Family and Community Social Services and Mental Health's Acute and Long Term Programs for Adults and Children. The CSDS will provide a common automated infrastructure for the various programs and can be tailored to satisfy the unique requirements of the various service delivery areas. This system will be bilingual and available 24/7. It will provide on line access to program standards, policies, procedures, and help features. It will also provide portable assessment tools through the use of laptop computers.

Current / Prior Initiatives

The restructuring of New Brunswick's Department of Health and Community Services may impact the remaining development and implementation of the CSDS. The primary stakeholders will now reside in two different departments.

Existing Infrastructure

To support this initiative, new infrastructures were implemented province-wide to be used by approximately 2,000 workers.

Key Stakeholders

Family and Community Social Services, Public Health Services, Mental Health Services and Financial Service Divisions are the primary stakeholders for this system. The CSDS will also be used by VON nurses and partners from Extra-Mural Services.

Constraints

Restructuring of New Brunswick's Departments, with the Family and Community Social Services moving to another new Department, may affect the continuation and the scope of this project.

Business Case

The CSDS was one of the Corporate Technology Initiatives identified in the Department's Strategic Information Plan completed a few years ago. The purpose of this project was to develop an integrated computer system that would support the case management activities of all departmental professionals providing services to clients, regardless of the program area. It will also replace five legacy systems having different technologies and data stores.

Current State of Readiness

The CSDS Project is developed and implemented by components called releases. Eleven releases are planned. Nine releases are currently developed and partially implemented. Development of the last two releases is underway.

Effect on Patient Care

This new system will provide a single source of information for the registration of clients and provide faster response to clients at risk. It will reduce the amount of time to conduct an in-home assessment and reduce inefficiencies and redundancy in the collection of data. It will also provide improved coordination of service planning and delivery to clients across programs and between partners. It will provide improved matching of client needs to available services. Overall, this system will provide the ability to coordinate and track client activities and services over time as well as across program areas.

Prince Edward Island

Unique Personal Identifier

In Prince Edward Island (PEI), the Provincial Health Number (PHN) uniquely identifies a person entitled to receive health and social services and is assigned under the authority of the Minister of Health and Social Services. PEI has enabling health number legislation - the Provincial Health Number Act. Under the terms of this Act, no person shall require the production of another persons health card, collect or use another person's health number; except, where authorized by the Minister or for administration, planning or research as prescribed in the regulations for the health and community services Ministry. The PHN has been implemented across the province.

Common Client Registry

The Common Client Registry (CCR), a foundation piece for the electronic health record, was implemented in April 2002. The CCR uses the PHN as the key for the registry. The CCR is a central registry of identification, contact, demographic, certain filtered eligibilities and certain filtered encounter information for the clients/patients of the health system, including:

- A PHN (unique identifier), for each individual resident and non-resident client/patient;
- Legal name and names by repute;
- Gender;
- Date of birth, age (calculated), date of death;
- Other ID numbers;
- Addresses (multiple current addresses if applicable), address history;
- Home and business mailing address, phone, fax;
- The household of which the client/patient is a member and name of the primary contact for the household;
- Program eligibility (health services programs, eligibility indicators, eligibility/ineligibility dates, full history);
- Encounter history (health services/locations, encounter dates); and
- Access controls, access audit trails, user profiles.

Business Case

The business objectives of the CCR are:

- identify clients uniquely throughout the health information systems by generating a unique PHN;
- provide cross-referencing capability between health information systems;
- provide a history of client encounters with the health system;
- establish a centrally maintained database of basic client demographic information; and
- reduce redundant data maintained by various information systems within the health system.

Scope

The CCR is a database of common client/patient information used by the following health and social services applications:

- Vital Statistics System
- Claims Processing System (CPS)
- Admission/Discharge/Transfer System (ADT)
- Pharmaceutical Informatics Project (PhIP)
- Case Management System (CM)

These applications may have other applications linked to the CCR through them (e.g. ADT links to other hospital systems). The CPS will remain responsible for all information related to Medicare eligibility. The Vital Statistics System will remain the legal repository of all information covered by their current legislation relating to births, legal names and marriage registration. All birth identities of adopted persons within this system will be filtered and only accessible with designated persons with Adoption Services and Vital Statistics with access rights to the encrypted cross references. The CCR will be the central data repository for demographic data on all clients receiving service from the PEI Health and Social Services system. Other applications/data repositories will be integrated over time.

Current / Prior Initiatives

The Client Services Delivery Network (CSDN), developed for Veterans Affairs Canada by Electronic Data Systems (EDS Canada), was used as a basis for the CCR in PEI.

Existing Infrastructure

The CCR was initially populated with converted data from the CPS and then further populated with data from the Vital Statistics System.

Key Stakeholders

The PEI Department of Health and Social Services, EDS Canada and DeltaWare have signed a contract for the adaptation of the CSDN. Other stakeholders include the stakeholders of the above health and social services applications.

Current State of Readiness

This application went live April 2002.

Effect on Patient Care

It is anticipated that the CCR will improve health and social services management in PEI by:

- elimination of data variances/errors in common data among satellite systems;
- integration of the satellite systems via shared eligibility and encounter data, resulting in more efficient and effective operation of each satellite application and the overall system; and
- establishing a unique identifier for each individual client/patient, resulting in improved operations and helping eliminate the errors (and potential fraud) resulting from multiple identities for the same person.

Pharmacy Network

The Pharmaceutical Informatics Project (PhIP) will link physician offices, pharmacies and other health stakeholders into an electronic data network. The PhIP will provide the tools and processes to support prescribing, dispensing, compliance monitoring, research and the formulation of policy regarding prescription medications, thus capturing all drugs for all people. All patient information would be instantly updated as the system will access the CCR.

Scope

This project will be implemented in three phases:

Phase 1: implemented in 1997, a Province-wide Pharmaceutical Informatics Project system to connect all retail pharmacies for the electronic submission of claims administered through the Provincial Pharmacy Program to a central repository.

Phase II: currently underway, will be implemented in spring 2003, and involves replacing the current technology with an enhanced claims processing system. The new system will also perform drug utilization reviews, access the CCR and include functionality to receive claims for “All Drugs-All People", and will include the availability of the drug profile through an URL.

Phase III: will include the deployment of the URL to hospital pharmacies, emergency rooms, retail pharmacies and physician offices. This phase will include the implementation of “All Drugs – All People” capturing all drugs dispensed by all pharmacies within the province. It will also include the integration with physician and pharmacy vendor products. This system will form the basis for electronic transmission of prescriptions from the physician to the pharmacist. The physician will have the ability to register prescriptions from their offices and retail pharmacies will provide dispensing information of all prescriptions filled.

Current / Prior Initiatives

In 1999, the Department of Health and Social Services implemented a generic web-based Claims Processing System (CPS) with the Medicare Office for physician’s claims being the first program to use the CPS System.

Functionality

The PEI Pharmacy Network, once fully implemented, will link physician offices, emergency rooms, acute care and retail pharmacies. The specific functionality will include:

- Electronic submission of prescriptions to pharmacies
- Drug utilization reviews
- Drug to drug interactions
- Drug allergy interactions
- Step therapy
- Co-ordination of benefits
- Network enabled electronic fax submission of prescriptions to pharmacies
- Physician access to on-line drug profile for patients from office/community
- Retail pharmacist access to on-line drug profile for patients
- Hospital access to on-line drug profile for patients
- Pharmacist and physician oriented decision support

Key Stakeholders

The main stakeholder groups are patients, retail and hospital pharmacists, pharmacy vendors, physicians and the Medical Programs Division of the Department of Health and Social Services.

Effect on Patient Care

The Pharmaceutical Informatics Project system will benefit clients and providers by:

- assisting pharmacists and physicians in monitoring patients with multiple prescriptions;
- alerting pharmacists and physicians to potential drug interactions;
- preventing over prescribing of drugs;
- facilitating quick access to information required in emergency situations;
- improving access to government drug benefits plans; and
- improving access to information on the medication use of residents and the effects of these medications on their health.

Quebec

Client Register

A unique identifier for each citizen of Quebec is provided by the Régie de l'assurance maladie du Québec (RAMQ). Established in 1969, the RAMQ was assigned the task of implementing the provinces Health Insurance Plan, administering it, and providing universal access to healthcare services. Over the years, RAMQ has evolved considerably and today, administers many different programs in the area of health insurance. Under the authority of the Minister of Health and Social Services (Sante et Services Sociaux), the RAMQ administers the Health Insurance Plan, the Public Prescription Drug Insurance Plan, and over 40 programs entrusted to it by the government. In addition, the RAMQ's databases contain a wealth of information on health and social services programs. All public institutions in the health and social domain are connected to the Reseau de télécommunication sociosanitaire (RTSS), a dedicated and secured network that allows the exchange of information between participating institutions.

Pharmacy Network

Every pharmacy is connected to a dedicated network linked to the RAMQ.

Laboratory Network

A computerized system is being implemented in every public laboratory.

Ontario

Background

The Ontario Health Insurance Plan (OHIP) is an individual-based registration system. A unique ten-digit health number is assigned to an insured person (within the meaning of the *Health Insurance Act,* i.e., a health number is only issued to an individual that is registered for provincial health insurance).

The Ministry of Health and Long-Term Care's (MOHLTC) Registration and Claims Branch manages the client registry. This registry contains personal health registration information such as the individual's legal name, date of birth, gender, address, telephone number, language preference and Canadian citizenship/immigration status. The Registration and Claims Branch also processes claims for insured services.

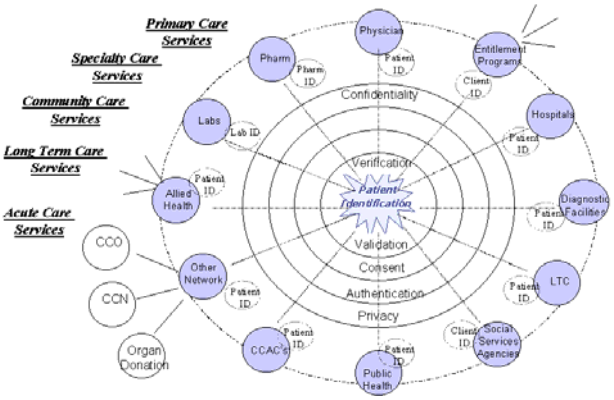
Ontario has recognized that integrated care can only be fully supported through an integrated, electronic health information system. This system must be able to match information from multiple care environments to the correct patient. Because an individual receives a range of health care services from multiple providers, multiple identifiers such as hospital cards are often generated. These facts, together with the need for relevant, integrated information, form part of the compelling argument for a unique patient identifier (UPI) common to the health care system.

The government established the Smart Systems for Health Agency (SSHA) in 2002. One aspect of SSHA's mandate is to provide the information technology infrastructure that will permit the approved sharing of information, such as patient health care data, in a secure and confidential environment. It is expected that the Smart Systems for Health (SSH) will be Ontario's health information network.

Unique Patient Identification

Unique patient identification is a cornerstone of Ontario's e-Health initiatives. Examples of these initiatives in Ontario include: SSHA secure infrastructure, Ontario Family Health Network and e-Physician Project, voluntary Emergency Health Record, Ontario Laboratory Information System, Community Care Connects, Integrated Services for Children, Ontario Drug Network, Telehealth/Telemedicine and Point-of-Service Verification.

The MOHLTC is considering a unique patient identification system for use across the continuum of care. The diagram below illustrates the conceptual model of the Ontario UPI.



The MOHLTC is looking at design considerations that would be required to complete the development phase for the UPI. These include:

- reviewing business processes and supporting information technology infrastructures for the creation, assignment and maintenance of a provincial unique patient identifier, regardless of funding/payment models (i.e. direct patient payment or health insurance plan);
- reviewing current policy and legislative requirements for a provincial unique patient identifier and recommending the preferred approach to achieving the necessary policy and legislative framework. Privacy and consent will be important aspects of this framework;
- collaborating, communicating and coordinating with key stakeholders, both internal and external to the Ministry, who have an interest in, or are impacted by, a provincial UPI infrastructure;
- determining best practices, levering existing opportunities and building on what currently exists (including re-use) will be important operating principles; and
- recommending conceptual and logical designs for a UPI, a governance and management structure, a policy and legislative framework, and a development and implementation plan.

Provider Registry

Provider Identification

Each health care provider registered with the MOHLTC in Ontario is assigned a unique identifier called a Stakeholder Number (SN). The SN is a ten digit number and is randomly generated by the provider registration system. A SN is assigned to an individual stakeholder only once; this is of particular importance given that an individual may be licensed in more than one health profession (e.g., medicine and dentistry), and the SN is the means by which two licenses within the same SN are linked.

A billing number for the submission of claims or service encounter data for payment purposes may be given to a stakeholder (either an individual or organization) upon registration on the corporate registration database. An individual stakeholder can have more than one billing number.

Corporate Provider Database

The Provider Registry is a relational integrated repository of provider information. The registry contains information about Ontario health care providers and is used for operational and planning purposes. These providers include, but are not limited to, physicians, physiotherapists, optometrists, chiropractors, nurse practitioners, midwives, private medical laboratories and hospital groups. The database includes providers from fee-for-service practitioners, family health networks/groups and alternate payment programs.

Pharmacy Network

The Ontario Drug Benefit (ODB) Health Network System (HNS) is a province-wide network that connects prescribing physicians, retail pharmacies, hospital outpatient dispensaries and selected long-term care dispensaries. The ODB network allows for drug utilization reviews and review of drug-to-drug interactions, with its primary purpose being the adjudication of claims for eligible recipients.

Physicians and pharmacists are assigned a unique identifier. Providers' license numbers are also recorded on the system. Dispensing locations are uniquely identified through known addresses and

cross-referenced to system identifiers. Eligible recipients are identified by their health number or by a temporary eligibility number in the case of some social assistance recipients.

Claim record histories are maintained on the HNS and are used for claim adjudication and reporting purposes. Access to claim information and data extracts are governed by the Freedom of Information and Protection of Privacy Act (FIPPA). Pharmacists only have access to claims information submitted at their own pharmacy. The collection of ODB claim information is administered under the Ontario Drug Benefit Act. Currently, only prescribing physicians have access to the ODB Network.

At present, the ODB network operates on an X.25 network. Data are stored in an MOHLTC data centre. With the implementation of SSHA, this application will move to the secure managed SSHA network. The technical operation of the network will convert to the SSHA-managed private network, while the application will remain under the control of the MOHLTC.

Over the next 18 months the ODB network is being converted to use the SSHA Transfer Control Protocol/Internet Protocol (TCP/IP) managed network. This will improve reliability, availability and security. It also puts the ODB application onto a network that will be connected to 150,000 health care providers over the next 5 years.

Ontario anticipates deploying a Primary Care IT Program directed at family physicians in a primary care renewal group (e.g. Family Health Networks) later this year. These physicians will likely be future users of the information contained on the ODB network. The target in the next two years is to have 300 Family Health Networks, averaging 10 physicians each, plus other primary care providers (e.g., nurse practitioners) participating. Family Health Networks will be located across the province.

Another important group of users will be physicians working in hospital emergency rooms. These hospitals are currently connected to the secure SSHA network and access to ODB recipient drug histories has been identified as a top priority for rollout to these locations. A principal benefit is enhanced patient care and safety.

Over the longer term, Ontario's strategic directions include expanding the ODB network to include all prescription drugs for all clients receiving services in Ontario.

Laboratory Network

The Ontario Laboratories Information System (OLIS) project is sponsored by the Laboratories Branch within the MOHLTC and SSHA. The objective of OLIS is to implement a single integrated provincial laboratory information system that would allow all laboratory information to be electronically exchanged between practitioners and laboratory providers and provide the Ministry with program management information.

Since the OLIS is one of several SSHA initiatives to link all health care providers, it will use SSHA infrastructure such as central data centres, secure network, public key infrastructure (PKI), registration, and Tier-1 help desk services.

Once fully implemented, practitioners (e.g., physicians, nurse practitioners, midwives and dentists) will be able to order laboratory tests electronically for patients. Specimen collection centres will be able to retrieve orders and enter specimen information. Laboratory service providers (e.g., community labs, hospital labs, public health labs and practitioners) will be able to enter test results information and ordering practitioners will be able to retrieve results electronically. With a patient's explicit consent, a practitioner will also be able to view test results ordered by other practitioners.

Through central repositories, the OLIS will capture and make available information about test orders, specimen information and test results to authorized practitioners and laboratories. This data will be

communicated to and from the OLIS by authorized client systems using HL7 format standard OLIS transactions. The OLIS standards for HL7 will be compatible with versions 2.X and 3.X of HL7.

OLIS will create interface specifications that developers of external client software will use to interface their systems with the OLIS. These specifications shall describe the HL7 messages for ordering tests, entering specimen and results information and for inquiring about results. It will also include specifications regarding connectivity to the OLIS using the secure SSHA network.

It is expected that practitioners and laboratory service providers will use either their CMS or LIS software to communicate with the OLIS using an OLTP interface or a web-based interface that will be developed.

The OLIS will support all business functions related to exchanging laboratory test information, including:

1. Order Information - The ability of a practitioner, specimen collection centre, or a laboratory to enter, amend, cancel, view, or retrieve an order. Data required for this includes patient and practitioner identification information, and tests requested.

2. Consent Information - The ability for a practitioner to indicate a patient's consent to view results of tests ordered by other practitioners.

3. Specimen Information - The ability of a practitioner, specimen collection centre, or a laboratory to enter, amend, view or retrieve specimen information. Data required for this includes the collection date and time, and destination lab information.

4. Results Information - The ability of a laboratory service provider or practitioner to enter and view information about a test result.

5. Results Retrieval - The ability of a practitioner to retrieve results of completed tests. A practitioner may retrieve results for a single patient or all results for tests ordered over a period of time.

6. Inquiries - The ability for a stakeholder to inquire about information on an order, patient, or test. Examples of inquires that a practitioner may submit include: all results for a patient, a specific test ordered or status of tests submitted for all patients. Examples of inquiries that a laboratory may submit include: list of tests to be completed and results not yet retrieved by submitting practitioners.

The OLIS will develop a web based facility for exchanging health knowledge and education information. This includes code table updates (e.g. LOINC, order nomenclature), information and educational material. To make effective use of the OLIS and to avoid unnecessary error messages, code table updates will also be available for use and reference by practitioners and laboratories.

Manitoba

Unique Identifier

Person Identifiers

Manitoba implemented the Personal Health Identification Number (PHIN) in 1984. The PHIN is the personal health identification number assigned to an individual by the Ministry of Health to uniquely identify an individual for health care purposes. At the present time, PHINs are only issued to those who are eligible for health care benefits. The collection, use and disclosure of the PHIN and other personal health information is regulated by Manitoba's Personal Health Information Act.

Manitoba Health's Information Systems Branch has been participating in the Canadian Institute for Health Information's (CIHI) Unique Identifier Roadmap Project, which encompasses client, facility and jurisdiction unique identifiers. In the context of this initiative, a jurisdiction refers to the 19 organizations that uniquely identify clients of health services in Canada. These include the ten provinces, three territories and the six groups whose public health care responsibilities fall under the federal government.

Provider Identifiers

Manitoba is participating in the Western Health Information Collaborative (WHIC) Provider Registry System project, a standards-based repository of core provider data that is supplied by regulatory or recognized health care organizations and made available to authorized consumers to facilitate controlled exchange of health information.

Location (Delivery Site) Identifiers

A key infrastructure component of an Electronic Health Record will be the ability to uniquely identify the place or places which a client received, is receiving, or is planning to receive health services. As a first step to the development of a Delivery Site Registry, Manitoba Health participates in the Delivery Site Identifiers Initiative being lead by the CIHI. This initiative is looking at a standards-based approach which will result in the classification, definition and unique identification of health services "places".

Comments

Manitoba Health provides extensive feedback to CIHI on this concept and requirements. Based on information distributed by CIHI for review and subsequent feedback, it is anticipated that the Unique Identifiers Initiative will encompass the classification, definition and identification of all types of places that provide health services.

Client Registry

Manitoba Health's Registration System is used to maintain a registry of all Manitobans who may be eligible for health insurance benefits, and some non-Manitoba residents who may have received health services in Manitoba. This registry is extensively used by various claim-processing systems to verify eligibility requirements. In this registry, every family in Manitoba is assigned a family number and every resident a personal health identification number. As more and more claim processing and health information systems go on-line, this registry is being extensively used as the "hub" of patient identification across these systems and thus helps insure health systems integration.

No regional client registries exist at present. Manitoba is planning a comprehensive provincial client registry for use at the regional and provincial level, which will include:

- Direct access with validation
- Full enterprise master patient index
- Centralised identifier
- Registration, admission/transfer/discharge
- Integration capability
- Messaging exchange
- Link to legacy systems

This project is planned to proceed to development and implementation this year.

Pharmacy Network

Overview

The Drug Programs Information Network (DPIN) was introduced in 1994 to provide better service and to connect all pharmacies in Manitoba to a central database. Pharmacies record information on prescription drugs dispensed in all Manitoba pharmacies by sending the information to the DPIN. The DPIN processes all Pharmacare claims and provides pharmacists with an instant calculation of the payment required by the patient.

The DPIN is connected through a virtual private network (VPN) to over 275 retail pharmacies throughout the province. Pharmacy software management systems communicate with the DPIN via an expanded CPhA version 3 message standard. Though not legislated in Manitoba, 95% of all retail prescription drug medications are entered into DPIN for Manitoba residents. At the time of filling the prescription in the pharmacy, the pharmacist is made aware of adverse drug event information and whether the individual or the drug program is responsible for payment on the prescription. The DPIN process approximately 15 million transactions per year.

Current Status

Manitoba has four Drug Programs in operation within the DPIN:

i.) Pharmacare Drug Plan - for all Manitoba residents, income based. The family or individual must complete an application form and provide all income information. This drug plan pays 100% of the cost on formulary drugs after reaching the deductible.

ii.) Personal Care Home Residents Drug Plan - 100% coverage on formulary drugs.

iii.) Family Services Social Assistance Drug Plan - 100% coverage on formulary drugs.

iv.) Home Palliative Care Drug Plan - 100% coverage on extended drug formulary. This plan started in December, 2002.

Drug Programs Information Network - Emergency Rooms (DPIN-ER):

Based on the prescription drug data from the DPIN application, Manitoba Health provides patient drug medication views to hospital emergency rooms (DPIN-ER) (and also to a small number of hospital general admissions areas). DPIN-ER went live in 1997 and is a web-based interactive information system connected through the Provincial Data Network (PDN) to 81 hospitals throughout the province. User access is authenticated through a security database and all transactions are encrypted. At the time of patient presentation to the hospital emergency room, authorized hospital personnel use the system to verify patient drug utilization. DPIN-ER processes approximately 231,000 transactions per year.

Provincial Data Network (PDN):

The PDN is a single Wide Area Network (WAN) connecting Government Departments, Agencies and the Health Care Sector. It is a hybrid of frame relay, broadband, and satellite communication technologies and is operated as a service by Manitoba Telecommunications & Network Services department. This WAN provides the capacity for existing systems and is designed with expansion capability as systems are added. This is an IP network that provides each site with an access device (i.e. router/switch), some fault tolerance, redundancy and network management.

WHIC Pharmaceutical Management Strategy:

Manitoba is participating in the WHIC Pharmaceutical Management Strategy which aims to improve quality of patient care for clinical pharmacy management by adding clinical pharmaceutical management functions – dispensing (and eventually prescribing) to existing claims adjudication and administration.

Manitoba's existing Drug Program Information Network currently provides dispensing and notification of adverse drug interactions at the retail pharmacies including claims adjudication and administration. Manitoba will explore opportunities for collaborative efforts on the WHIC Pharmaceutical Management Strategy and the potential to leverage the order entry/prescribing component of the Alberta DPIN project as part of an overall integrated provider solutions strategy for primary health care physicians.

Provider Access Demonstration Projects:

Manitoba is looking to pilot patient drug medication viewing in physicians offices as part of the Provider Access Demonstration Projects which are being undertaken through the Primary Health Care Transition Program.

Laboratory and Diagnostic Imaging Network

Overview

The Laboratory Information System (LIS) is a comprehensive, electronic information system that computerizes clinical, clerical and administrative functions within the Lab site. The Radiology Information System (RIS) is a comprehensive electronic information system that computerizes clinical, clerical and administrative functions within the imaging (e.g., X-ray, CT scan, MRI) site.

Both the LIS and RIS are integral parts of a comprehensive Electronic Health Record. The vision for these systems is that they will be integrated with the Admission-Discharge-Transfer (ADT) systems in Manitoba, as well as with other core registries (e.g., Provider, Location and Client). Eventually, the information contained in LIS/RIS systems will be available to providers from all levels of care, allowing for seamless healthcare delivery as patients receive services from a variety of service channels throughout their lifetime. The longitudinal aggregation of the information contained in these systems will form the basis for decision support systems that support evidence based policy decisions concerning utilization of healthcare services, resource allocation and other aspects of health system planning.

Current Status

Manitoba is in the process of creating a single integrated, multi-site, publicly owned organization to be known as Diagnostic Services of Manitoba (DSM). This organization will undertake all provincial laboratory services, including rural and northern imaging services. DSM will be created from elements of existing public sector laboratories and related systems. It will include all Winnipeg public hospital laboratories, Brandon Westman Laboratory, all Rural and Northern laboratory and imaging services and

Cadham Provincial Laboratory Services. The organization will consolidate operations and staff, establish the necessary facilities and reorganize equipment to run the operation. The goal is to avoid future costs through economies of scale in material costs and test utilization.

A system of interlocking laboratories will be formed throughout the province. These laboratories will use one set of standard operating procedures, common analyzer platforms, integrated test ranges, a province-wide integrated transportation system and a province-wide integrated Laboratory and Rural and Northern Imaging Information System. High-volume and complex tests performed manually will be carried out at three main sites (two in Winnipeg and one in Brandon). Second-level laboratories will operate in the Winnipeg community hospitals and at the larger rural sites, while a base-level laboratory system will be in place at all hospitals in the province.

The presence (or absence) of a type of testing at a particular site will continue to be determined by the Regional Health Authority's (RHAs) when they set their clinical requirements. As a matter of principle, DSM will not unilaterally change the availability of clinical services by removing access to testing.

An integrated Manitoba-wide laboratory and rural and Northern Imaging Information System (LIS/RIS) is the key infrastructure component required to enable the formation and function of DSM.

Although Manitoba will be well down the road to having standard results reporting within their Provincial LIS, there is still the issue of private labs that needs to be accommodated within the local scene. Further, the vision of DSM is that access to the LIS repository of information will be limited to laboratory personnel only. Physician and hospital access will be directed to a data repository or through a hospital results reporting capability. The most promising tool for individual physician offices is web access to that repository.

Privacy and confidentiality are of utmost importance and Manitoba will currently be relying on audit and logging capabilities within the software applications as well as encryption, user profiles associated with registries of authorized individuals, etc.

In the initial days of the LIS, results will be transmitted by any available means. This will include auto faxing, secure e-mail, system-to-system reporting through an interface with a hospital information system, telephone or mail. This only applies to initial results reporting from the lab to the requestor and those designated on the test requisition. All others will be directed to the data repository.

It should be noted that the first iteration of the LIS will not include automated order entry. At present none of the acute care facilities in the province utilize automated order entry for lab testing. When this capability becomes available, the LIS will be interfaced to facilitate this capability. The standards that are being developed for test nomenclature will form the basis for these interfaces.

Saskatchewan

The Saskatchewan Health Information Network (SHIN) is a Treasury Board crown corporation that works closely with Saskatchewan Health and the 12 Saskatchewan Health regions, but also operates at arms length from government.

SHIN was created in 1997 to facilitate the flow of patient information between authorized health providers and to develop an electronic patient record. Since then, SHIN has worked with health regions on identifying, purchasing and implementing application specific feeder systems required to build the Electronic Health Record.

As currently envisioned, patient health information would continue to be "owned" by the regions. Therefore the electronic patient records would be regionally based. At some point in the future small key pieces of these records could be pulled into a provincial Electronic Health Record. There are many issues (e.g., privacy legislation, ownership of data in a provincially-based record etc.) that will need to be addressed prior to any such development taking place.

Unique Patient Identifier/Client Registry

SHIN is currently working with five of Saskatchewan's mid-sized regions on a project called the Integrated Clinical Systems (ICS) project. The project envisions the deployment of home care, central patient index/registration and laboratory and pharmacy systems for these five health regions. In addition, a Common View system will be deployed in these districts which will enable a patient's information to be viewed in one file. This is the first phase in the deployment of an Electronic Health Record for health regions. These systems will upgrade existing systems and in some cases, will automate manual processes. The new systems will be hosted at SHIN's data centre and connected to users through CommunityNet (CNET). CNET is a broadband, high-speed, province-wide telecommunications network that will connect more than 800 educational facilities, 310 health facilities and 256 government offices in 366 Saskatchewan communities. Working Groups made up of subject matter experts in each area are working on developing a common configuration for the specific system and the applicable health information. In the final step of this project, all of these applications will feed into a common view application which will enable authorized health providers to view information from these three applications in a secure manner.

Eventually, the integrated system will result in more patient information being available to authorized care providers when and where they need it. It will also mean that within a health region, patients moving across the continuum of care will only need to give their registration information once, rather than having to register with each system individually.

Pharmacy Network

Drug Plan Network

More than 360 urban pharmacies are now connected to Saskatchewan Health's Drug Plan application via the SHIN network. Legislation was recently passed authorizing the collection by Saskatchewan Health of data on all prescriptions, not just those insured by the Department. Work is now proceeding on a systems solution to collect data on all prescriptions provided by pharmacies in order to support improved clinical decision-making.

To date, the claims side is in place and the clinical dispensing side is anticipated within 12 months. SHIN is working closely with pharmacies and pharmacy vendors on this component of the Electronic Health Record.

Drug Utilization Review (DUR) Hosting

SHIN is hosting this program database for the College of Physicians and Surgeons (formerly called the Triplicate Drug Plan). This database is only accessible by the College and is used to scan for evidence of patients receiving concurrent narcotic or controlled drugs from three different physicians over a 30 day period. Currently, Saskatchewan Health can only scan a small portion of the claims. Once the Drug Plan Network system is fully implemented, the ability of the College of Physicians and Surgeons to scan for drug misuse and improve patient safety will be greatly enhanced.

Laboratory Network

The Laboratory Information System will help to automate the process of ordering, performing and reporting on tests. Currently, test orders from physicians are sent to the lab in a paper format. This paper test order is then given to a lab technician, who performs the test. That individual prints out the results of the test and gives the paper back to the receptionist who compiles the results with the orders and mails them back to the physician. The new system will allow lab personnel to receive patient demographic information electronically and manage test result data and generate reports electronically. Initially, the reports will be mailed back to physicians; eventually physicians will be able to receive these reports electronically.

The system allows lab results from areas including core lab, haematology, urinalysis, microbiology, blood bank and others to be transmitted into other departmental systems. This means that a patient's lab results could be transmitted into a system that captures a range of patient information (e.g., lab, home care, pharmacy, radiology etc.). This is the first step in the creation of an electronic patient file. The system was implemented in Cypress Regional Health Authority in 2002/2003, and is poised to begin operating in Prince Albert-Parkland early in the 2003/2004 fiscal year.

All regions involved in the project have agreed to a common implementation of the application. As the systems are implemented they are being configured to generate HL7 messages that will enable information flow between the applications and into a common view application once it has been installed.

Alberta

Unique Identifier

The Alberta Provincial Personal Health Identifier (PPHI) initiative is a key development in providing timely and accurate personal demographic information and current Alberta Health Care Insurance Plan (AHCIP) eligibility information to all parts of the health system. The initiative promotes the use of a standard identifier which is the Unique Lifetime Identifier (ULI) assigned by Alberta Health and Wellness. The initiative also promotes the sharing of consistent Person Information (PI) data and is a key foundation in the development of an Electronic Health Record.

The PPHI will be implemented in two releases:

1. Person Directory Release 1: provides web browser access to search and display individually identifiable registration information (including current basic AHCIP eligibility information) as well as displaying, adding and maintaining consent information. The personal information displayed in the Person Directory (PD) application is a replica of registration information in the Central Stakeholder Registry (CSR). CSR contains demographic information on individuals who have a vested interest in the Alberta health system, and as such is the foundation for province-wide unique identification.

2. Person Directory Release 2: provides a web browser and system to system messaging interface to support, add and update functionality to the CSR. Release 2 functionality will include the ability to:

    - Search for a person
    - Display personal demographic information
    - Add a person (e.g. new-born, new Alberta resident, visitor)
    - Add and maintain personal demographic information
    - Display consent information
    - Record and maintain consent decision
    - View current and historical basic AHCIP eligibility

Strict security safeguards are in place as per the Alberta WellNet security administration. Each user will have individual user identification and access will be restricted based on role. All users will be logged and audited.

Recently, the Capital Health Region in Edmonton, in partnership with Canada Health Infoway, commenced development of an Enterprise Master Person Index (EMPI) that will support the unique identification and linking of client information from disparate sites. It will also support the identification of clients who are from other jurisdictions.

Pharmacy Network

The Pharmaceutical Information Network (PIN) aims to improve the quality and cost-effectiveness of drug therapies delivered to Albertans. It links together physicians in the community, pharmacists, hospitals and other authorized health care providers, giving them confidential access to patient medication histories, equipping them with decision-support tools for prescribing and dispensing and enabling electronic prescriptions. Specific objectives include:

- to support communication among doctors, pharmacists and patients to help improve the overall quality of care for patients;

- to reduce hospitalizations and admissions to long-term care facilities by reducing adverse drug reactions and improving patient compliance with prescribed drugs;

- to enable health service providers to make better drug choices based on the best available evidence and access to patient medication profiles; and

- to protect the privacy, confidentiality and rights of the patient**.**

The PIN also provides tools and processes to support prescribing, dispensing, compliance monitoring, research and the formulation of legislation and policy regarding prescription medications.

Laboratory Network

The purpose of the laboratory component of the initiative is to deliver a history of a patient's laboratory test results, in a secure manner, to health care providers who are making care decisions regarding that patient. This will enable providers to more quickly and accurately diagnose and treat a patient and avoid additional tests. This project is a joint initiative between Capital Health Authority, Dynacare Kasper Medical Laboratories (DKML) and Alberta Wellnet, and will provide significant coverage for residents of northern Alberta. Similar initiatives for southern Alberta labs are under discussion.

Progress to Date

- Capital Health Authority completed the development of the repository of lab data and started to load historical data which has been in storage.

- Development of the web solution for user access to the lab repository has been completed.

Next Steps

- Capital Health will continue to populate the lab repository.

- Development of user training and implementation materials will be completed.

- Preparation for a pilot implementation of the Lab Result History system will commence.

British Columbia

Unique Identifier/Client Registry

In British Columbia (BC), the Personal Health Number (PHN) is a unique alphanumeric lifetime identifier used in the specific identification of an individual client or patient who has an interaction with the health system. It is assigned only to one person and may not be assigned to any other person at any time. As well as existing as an independent standard, the PHN is also an Embedded Standard, contained within the Health Registry Standard. PHN is used as the primary means of person identification on the Health Registry. The Personal Health Number became mandatory for all inpatient and day care surgical admissions commencing April 1, 1991.

Provider Registry

The Provider Registry is a standards-based repository of core provider data supplied by authorized sources that will facilitate the formal exchange of health information and is available to authorized consumers. Uniquely identifying providers will facilitate the transmission of health information between participating organizations and is one of the fundamental building blocks towards the realization of the pan-Canadian Electronic Health Record (EHR). The project is a Western Health Information Collaborative (WHIC) initiative, led by the BC Ministries of Health Planning and Health Services.

The Provider Registry System (PRS) has been designed with the potential to be implemented by any Canadian province or territory and expanded as a model for national data standards. Each participating province (British Columbia, Alberta, Saskatchewan and Manitoba) is implementing the common Provider Registry product within their existing technical infrastructure (e.g. servers, message routing) and initially populating it with data from their respective key Colleges. The PRS will ensure the security of patient health information by employing or enabling proven security and privacy techniques.

This project has successfully demonstrated that collaboration across regional and provincial domains can work and yield benefits. From the initial discussions to the development/build stage, the Provider Registry project has led the way for other collaborative projects in Canada. As a fundamental building block, the Provider Registry will serve as a valuable model towards the evolution of the Electronic Health Record.

Pharmacy Network

PharmaNet is a province-wide network linking all pharmacies to a central set of data systems. These systems significantly improve data and services in support of drug dispensing, drug monitoring and claims processing. PharmaNet connects all community pharmacies, with additional clients including emergency departments, hospital admitting, medical practice offices and clinics, the College of Pharmacists and the College of Physicians and Surgeons.

Scope

A network linking provincial pharmacies, many emergency departments and the College of Pharmacists has been in place since 1996. It will eventually be expanded to include physicians' offices. A pilot with 100 physician offices has been underway for some time and evaluated regarding expansion. Planning for expansion is currently underway.

Technology

High availability RISC/6000 computing complex HL/7 messaging via a TCP/IP secure network. Capacity to replace/enhance existing procedures or technologies has replaced claims submission batch processing, with an on-line point of sale system. IBM Canada and Systems Xcellence are the suppliers.

Impact on Patient Care

PharmaNet is reducing the number of negative drug interactions by keeping medical profiles of clients. The network is also helping to reduce prescription fraud and drug abuse by giving pharmacists better access to information.

Collaboration/Stakeholders

- B.C. Ministry of Health Services
- College of Pharmacists of British Columbia
- College of Physicians and Surgeons of British Columbia, and
- BC Pharmacy Association.

Laboratory Network

Lab Test Standard (LTS)

The BC Lab Test Standard defines the business and technical requirements for the electronic exchange of lab test data. This standard expands beyond the traditional point-to-point exchange of information and accounts for all information exchanges from the time an order is issued until the time a final result is received. Completion of a lab test may involve a number of participants. Participants in this standard are public and private labs, agencies which perform lab tests and authorized providers.

The purpose of this provincial standard for the transmission of lab test data is to:

- facilitate the exchange of lab test information between a "network" of participants (potentially all licensed individual providers and all laboratories);
- enhance the quality of patient care through the exchange of consistent lab test information in a more timely and secure manner;
- reduce the cost of managing the exchange of lab test information; and
- reduce the costs associated with developing proprietary solutions.

The standard will be used in health system facilities where licensed individual providers communicate electronically with public and private labs that provide laboratory services to patients in BC. The standard is used by:

- authorized providers and employees in practice, public labs and private labs; and
- any Software Support Organization (SSO) intending to provide LTS software to participants. SSOs include commercial software vendors and organizations that perform their own software development.

The standard has been adopted and implemented by PathNET, a commercial organization established by the major laboratory companies in BC to distribute lab test results to physicians.

Yukon

Unique Identifier

Yukon has a unique identifier for each person registered on the Yukon Health Care Insurance Plan. This has been in place for more than 20 years.

Client Registry

At present, all persons registered in the health care system are included on the registration database. However, due to limitations in the software, this database cannot be used to link to other components of the health care system at present. The Yukon will be developing a client registry that can be linked to other health care information systems within the next one to two years.

Pharmacy Network

Yukon will be developing a pharmacy network within the next one to two years.

Laboratory Network

There are currently no private labs within Yukon. The hospital lab uses Meditech software to track results. Neither physician offices nor nursing stations are linked to this system at present, but the feasibility of linking will be investigated.

Northwest Territories

Unique Patient Identifier / Client Registry

There is no Unique Patient Identifier/Client Registry available in the Northwest Territories (NWT). The system currently in place is a resident registry component of the Northern Health Information Management (NHIM) system. The resident registry relies on the health care number of the individual. If, however, an individual enters a health care facility in the NWT without a health care number, that individual will be assigned a temporary NWT health care number which will identify the individual within that hospital. This process will be repeated if the same individual goes to a different hospital within the NWT (i.e. he or she will be assigned a new temporary NWT health care number).

The intention of the Government of the Northwest Territories is to inter-connect the registry modules of operational and central registry systems so that a person can be positively identified by using the person's healthcare number. This will be implemented through the new central registry module of a new application system to replace the aging NHIM system. Deltaware Systems was recently awarded this replacement project. It includes a Vital Statistics module and a Medical Travel module.

The registry of the new system will become the trusted-source of registration information (central registry) for clients, providers and facilities. It is targeted to be operational in the summer of 2004. Starting in late 2004 or early 2005, the registry modules of various feeder systems will be integrated to the central registry of the new system. Furthermore, each registrant will be assigned a NWT unique lifetime number (ULN) in the new central registry system. This ULN will be forwarded to each operational system for the purposes of positively synchronizing records. This number will also be used for extracting and reporting person-level information, for example, extracting to a data warehouse or reporting to CIHI.

Pharmacy Network

There are currently three different pharmacy systems in place to support the internal pharmacies within the four NWT hospitals. The existing systems are at different levels of sophistication. In 2004/2005, the Government of the Northwest Territories plans to upgrade or replace these pharmacy systems with MediPharm, a module of the MediPatient Plus system from MediSolution. The MediPatient Plus system is used by all the NWT hospitals for patient registration and admission, discharge and transfer. A number of the hospitals have additional MediPatient Plus modules in operation. Utilizing the same supplier for pharmacy will permit an easier interaction between systems that will help facilitate:

- easier updating of, and access to, a patient's health record,
- support for electronic orders within the hospital,
- support for drug interaction assessments,
- interaction between hospital and health centre pharmacies which, in turn, will help make possible:

    a. a more global management of drug and prescription dispersal, and
    b. access from remote community sites to manage local inventories.

The new pharmacy system will not link with retail pharmacy settings. A review is underway to assess options on how best to link the retail pharmacies for the purposes of order management, drug interactions, prescription management and updating the patient's health record.

Laboratory Network

At present, the laboratory system in place at each of the four NWT hospitals utilizes older software from TripleG. Starting in 2004/2005, the Government of the NWT will be replacing this older software with an updated software version from the supplier. Starting in 2005/2006, it is proposed that the current multiple lab systems be inter-connected to form one logical system.

Goals include:

1) to be able to enter local laboratory results for access by all authorized users, including those outside the local area;

2) to grant access directly from the patient's health record; and

3) to facilitate the electronic capture of lab results from third party laboratories. The new system will also permit broader access for authorized health care providers such as doctors and nurses.

Nunavut

Client Registry

Several components of a client registry have been introduced.

These include:

- a Community Health Reporting System which collects information on services provided on a patient basis in the Community Health Centers is currently being tested.
- a Communicable Disease Module for tracking of communicable diseases and producing statistical reports was implemented in March 2001.
- a new homecare module which collects information on home services by client type was implemented in October 2002.
- a Pap database is being started.
- the Cancer registry is presently being updated.
- a new vital statistics database is planned for implementation April 2003.
- a new medical travel database is under development and due for implementation later in 2003.

Contact Persons for Each Jurisdiction

The following individuals were consulted during the development of this document:

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Related Documents and Reports

The following documents were retrieved and utilized during the development of this report:

British Columbia Centre for Disease Control (BCCDC) Information Management, October 2000. *PHIS: Public Health Information System Overview*. Prepared by Corinne Cook. http://dev.bccdc.org/downloads/pdf/im/reports/phis_overview.pdf

British Columbia Health Chief Information Officers Council. *Framework for an Electronic Health Record for British Columbians*, January 2003. http://healthnet.hnet.bc.ca/pub_reports/ehr_framework.pdf

Buckeridge, D. *Health Informatics in Canada: Definitions, Education, and the Path Ahead*. November 1999. http://hiru.mcmaster.ca/nce/about/workshop/HIiC.PDF

Canadian Institute for Health Information. *Navigating the Swirl: An Overview of Canadian Health Informatics Initiatives*, October 1998. http://secure.cihi.ca/cihiweb/en/downloads/partner_docs_e_swirl.pdf

EU – Canada Expert Meeting on E-health within the Northern Dimension, July 2001. http://www.hc-sc.gc.ca (accessed 12/12/2002).

Gates, K. *Evaluation of a System for Electronic Exchange of Laboratory Information: A Pre-Implementation Study*. A Thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements of the degree of Master of Science, Faculty of Medicine, Memorial University of Newfoundland, March 2004.

Health Canada, Office of Health and the Information Highway, January 2001.*Toward Electronic Health Records*. http://www.hc-sc.gc.ca/ohih-bsi/pubs/2001_ehr_dse/ehr_dse_e.html (accessed 08/17/2003).

Healthnet/BC Provider Data Standard. British Columbia Ministry of Health and Ministry Responsible for Seniors, October 2001.

Kozyrskyj A, Brown T, Mustard C. Community Pharmacist perceptions of a provincial drug utilization database. Canadian Pharmaceutical Journal 1998; 131:24-29

Lau, F. and Hebert, M. *Experiences from health information system implementation projects reported in Canada between 1991 and 1997*. Journal of End User Computing 2001; 13(4): 17-25

MacDonald, D. *Pharmacists' Expectations of a Pharmacy Network: A Baseline Evaluation*. A Thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements of the degree of Master of Science, Faculty of Medicine, Memorial University of Newfoundland, March 2004.

National Steering Committee on Patient Safety. *Building a Safer System. A National Integrated Strategy for Improving Patient Safety in Canadian Health* Care, September 2002. http:/www./rcpsc.medical.org/english/publications/

Newfoundland and Labrador Centre for Health Information, *Information Systems Strategic Plan, 1998* http://www.nlchi.nf.ca/pdf/iisp.pdf

Newfoundland and Labrador Health Information Network, *NLCHI Benefits Driven Business Case (BDBC*), November 1998. http://www.nlchi.nf.ca/pdf/bdbc.pdf

Newfoundland and Labrador Centre for Health Information, *UPI/Client Registry Project Scope*. February 2000. http://www.nlchi.nf.ca/pdf/upi.pdf

Newfoundland and Labrador Centre for Health Information. *Pharmacy Scoping Project Briefing Note, 2002.*

Ontario Hospital eHealth Council *(March 2002). eHealth Update*, March 2002. http://www.oha.com/info/ehealth

Report to Health Infostructure Atlantic. Report on Common Vision and Workshop Findings, July 2000. http://www.gov.ns.ca/heal/hia/default.htm

Saskatchewan Pharmaceutical Association *.A Framework for a Comprehensive and Integrated Drug use Management Strategy for Saskatchewan (Discussion Paper), June 1999.*

Western Health Information Collaborative. *Client Registries (White Paper*), March 2002. http://www.whic.ca

Western Health Information Collaborative. *Laboratory Information Strategies and Standards (White Paper)*, March 2002. http://www.whic.ca

Western Health Information Collaborative. *Provider Registry (White Paper), April 2002*. http://www.whic.ca

Western Health Information Collaborative. *Pharmaceutical Information Network. Medication Information Strategy (White Paper), May 2002*. http://www.whic.ca