

Diagnostic Imaging: The Canadian Picture





Overview

- Canada Health Infloway
- The Canadian diagnostic imaging landscape
- *Infloway's* approach
- Addressing the challenges
- Diagnosing the benefits
- The way forward

Canada Health Infoway

- Created in 2001
- \$2.1 billion in federal funding to date
- Independent, not-for-profit corporation
- Equally accountable to 14 federal/provincial/territorial governments

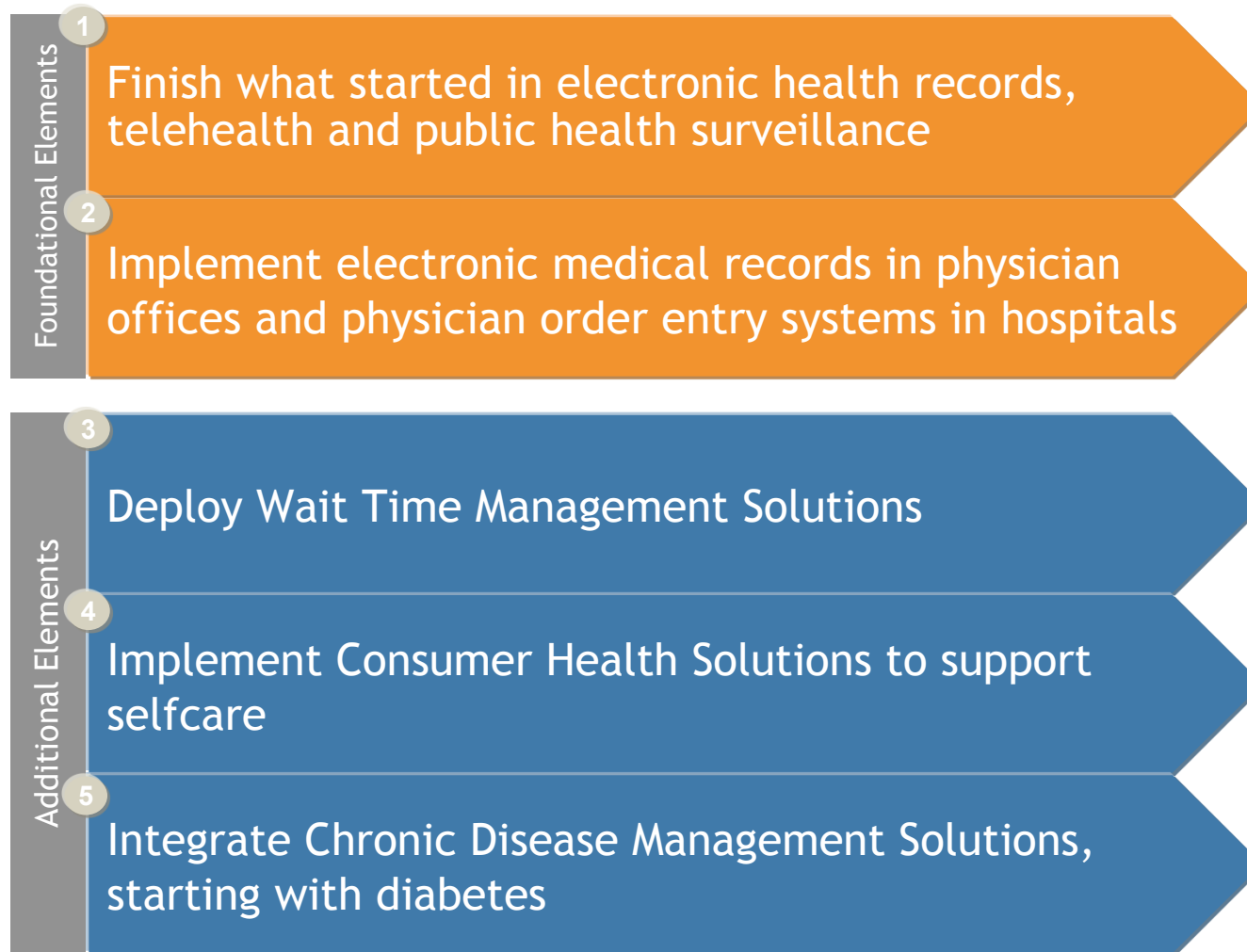
Mission:

To foster and accelerate the development and adoption of electronic health information systems with compatible standards and communications technologies on a pan-Canadian basis with tangible benefits to Canadians.

Goal:

By 2010, every province and territory and the populations they serve will benefit from new health information systems that will help modernize their healthcare system. Further, 50 per cent of Canadians will have their electronic health record readily available to their authorized professionals who provide their health care services.

Vision 2015



What is an Electronic Health Record?



An electronic health record (EHR) provides each individual in Canada with a secure and private lifetime record of their key health history and care within the healthcare system. The record is available electronically to authorized healthcare providers and the individual anywhere, anytime in support of high quality care.

One patient, one record: access to detailed patient information

Results and images

Patient information

Medical alerts

Medication history

Problem list

Immunization

Interactions

Patient Record

- Summary
- Lab Results
- Diagnostic Images
- Details
- Notes or Comments

Alerts

- Allergies – Sulfa Drugs
- Pap smear due
- Td due
- A1C above target

Diagnosis

| Diagnosis | Date | Status |
|-------------------------|---------|----------|
| Hypertension | 11/1989 | Ongoing |
| Diabetes | 05/1996 | Ongoing |
| Coronary Artery Disease | 02/2002 | Ongoing |
| Fasting lipids | 12/2005 | |
| Exercise stress test | 1/2005 | |
| Coronary angiogram / | | |
| Cellulitis | 02/2005 | Resolved |
| Cholecystectomy | 05/1981 | Resolved |
| Cesarian section | 01/1967 | Resolved |

Healthcare Providers

| Name | Disp. | Last Encounter | Encounter | Right of Access |
|------------------|-------------|----------------|-----------|-----------------|
| Diaz, Ellen | Cardiology | 01/2006 | 01/2006 | Y |
| Fournier, Janice | RN | 08/2005 | | N |
| Cohen, Richard | Dermatology | 07/2005 | | N |

Medications

| Date | Medication | Prescriptions | Last Filled |
|---------|---------------------------|----------------------|-------------|
| 11/1989 | Hydrochlorothiazide 25 mg | One tab at breakfast | 12/2005 |
| 03/1999 | Glipizide 5 mg | One tab twice daily | 12/2005 |
| 01/2001 | Metformin 500 mg | Two tabs twice daily | 12/2005 |
| 03/2005 | Atorvastatin 20 mg | One tab at supper | 12/2005 |
| 09/2002 | Atenolol 50 mg | One tab at breakfast | 12/2005 |
| 02/2002 | ECASA 325 mg | One tab at breakfast | 12/2005 |
| 02/2006 | Ramipril 10mg | One tab at supper | 02/2006 |
| 06/2005 | Cloxacillin 500 mg | Discontinued | |
| 05/2004 | Beclomethasone Cream | Discontinued | |

Encounter History

| Date | Facility | Speciality | Clinician | Diagnosis | Setting |
|---------|--------------|-------------|--------------|-------------------|------------|
| 02/2006 | GP | | | CAD | Outpatient |
| 01/2006 | Cardio Assoc | Cardiology | Diaz, E. | Diabetes | - |
| 12/2005 | GP | | | Diabetes teaching | Outpatient |
| 10/2005 | General Hosp | Dietician | Johnson, H. | Diabetes | - |
| 08/2005 | GP | | | Cellulitis | - |
| 08/2005 | GP | | | Cellulitis | - |
| 08/2005 | Home Visit | RN | Fournier, J. | Cellulitis | - |
| 08/2005 | GP | | | Cellulitis | - |
| 07/2005 | Polyclinic | Dermatology | Cohen, R. | Stasis dermatitis | Outpatient |

Immunizations

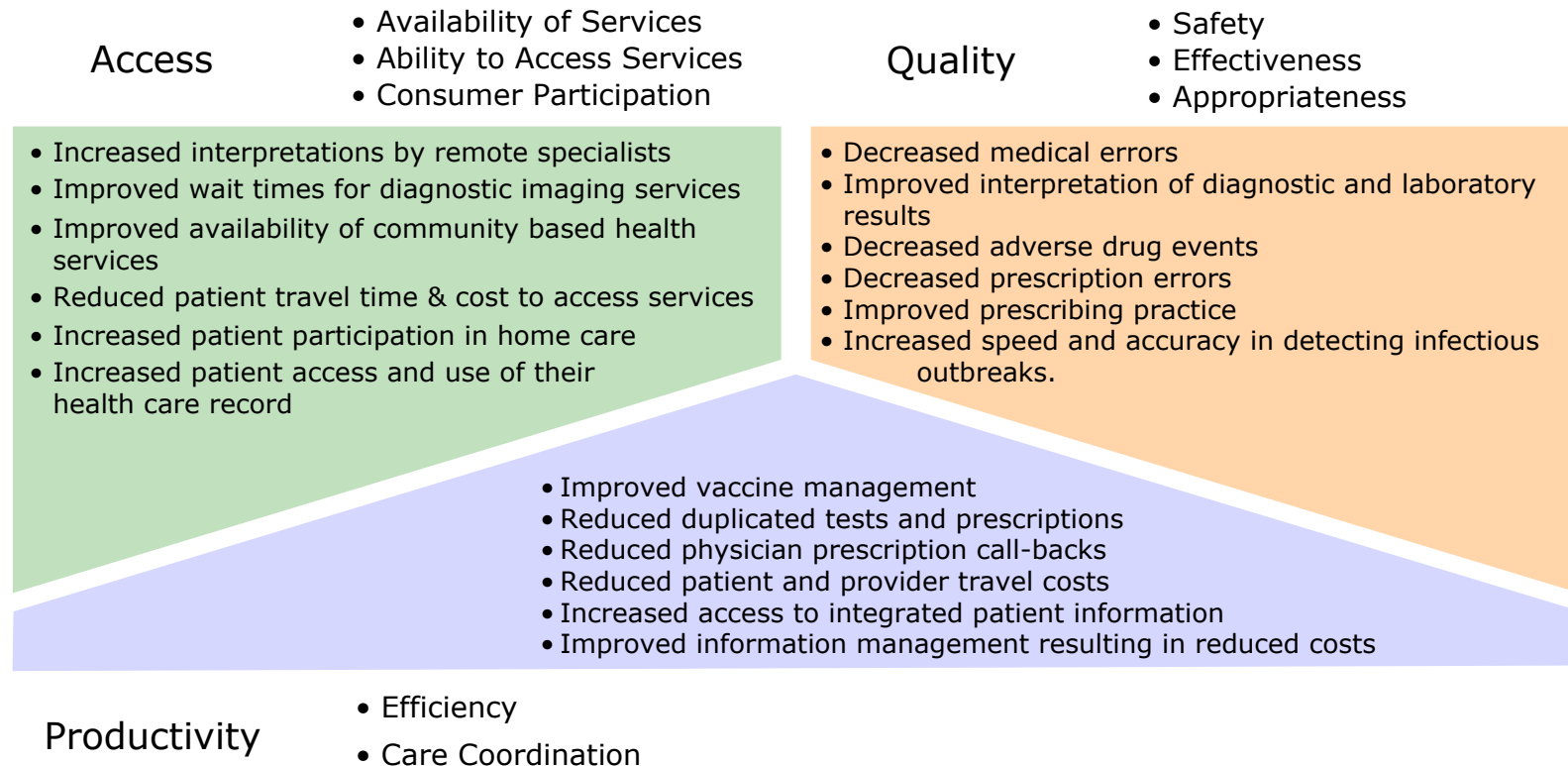
| Type | Most Recent | Number Received |
|-----------|-------------|-----------------|
| Influenza | 11/2005 | 7 |
| Pneumovax | 03/2005 | 1 |
| Twinrix | 08/2002 | 3 |
| Td | 04/1996 | 1 |

Diabetic Indices

| Type | Value | Most Recent |
|---------------------|--------|-------------|
| A1C | 0.071 | 01/2005 |
| LDL | 2.41 | |
| BP | 135/75 | |
| Urine Microalb | 0.02 | 08/2005 |
| Eye Exam | | 05/2005 |
| Home Gluc (average) | 7.4 | 01/2006 |

Benefits of Electronic Health Records

McKinsey & Co. have identified benefits exceeding \$6 billion annually in Canada that could be realized by the complete deployment of electronic health records.





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The Canadian DI Landscape

DI service delivery – the facts

- Numerous Canadian health care facilities are small and located in rural communities
- Canada's approximately 1,900 radiologists located mainly in urban centres and large regional hospitals
- Radiologist workloads exceed recommended standards
- 7 to 15 percent of all exams are unnecessary duplications because pre-existing images are unavailable
- Shortage of radiologists and technologists; full time vacancies in radiology: 150 in 2000, 500 in 2006
- Report turn-around measured in days for facilities with no full-time radiologist

What this means for Canadians

- Shortage of radiologists has meant longer wait times for diagnosis and treatment
- Difficulty in gaining access to timely diagnosis and treatment for people living in Canada's remote communities
- Costly inefficiencies drain resources that could otherwise be deployed effectively



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Infoway's DI Program

The DI situation in Canada before *Infoway*

- In 2003, use of Picture Archiving and Communication Systems (PACS) was less than 27 per cent
 - 15 per cent growth in annual procedure volume due to new CT and MRI services was anticipated
- Limited exchange of images across facilities due to lack of technology

DI program vision

- Filmless DI operations across Canada
- Seamless sharing of DI data among authorized users within the EHR solution through consolidation of data in domain repositories (DI Repository = DI-r)
- Conformance to standards as a means to achieve cost effective interoperability

Program objectives

- Implement digital storage of diagnostic images (MR, CT, X-ray, ultrasound, fluoroscopy, nuclear medicine) that permit clinicians to access and view images regardless of where they are located or where the test was conducted
- Adoption of pan-Canadian standards such as XDS-I and related IHE integration profiles to provide a solution for sharing (publishing, discovery and retrieval) of imaging documents across affiliated healthcare organizations
- Provide access to digital images in approximately 80% of Canada's acute care hospitals by 2010 and 100% by 2016.

What is a Diagnostic imaging repository (DI-r)

- Centralized infrastructure serving as:
 - Storage repository for DI information
 - Shared operational PACS for green field sites (not filmless)
- Purpose:
 - Reliably maintain and deliver DI information to consumers within EHR
 - Facilitate seamless sharing of DI information within the EHR
- Requirements:
 - Maintain a lifetime of 'relevant' DI data, including reports, images, key image notes, image processing results, overlay information, presentation states and other evidence documents
 - Support 1.5 to 3 million exams per year (varies by jurisdiction)
 - Provide high performance delivery of DI information over a network
 - Provide reliable/uninterrupted access to DI information
 - Maintain quality and integrity of data
 - Comply with the EHRS Blueprint Architecture
 - Conform to pan-Canadian Standards to achieve interoperability



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Addressing the challenges

PACS implementation in all facilities

Challenge:

- Deliver PACS functionality to smaller facilities
 - 80% of Canadian facilities have fewer than 250 beds
- Standalone PACS installation not financially feasible for small facilities or clinics
 - Therefore, very limited in small hospitals and standalone DI clinics
- PACS installation primarily in large urban facilities

Approach: Shared services provides PACS functionality which is financially viable and can be quickly deployed

Shared services model – Thames Valley Hospitals

- Initially joined eight facilities (two major hospitals with 500,000 procedures annually, plus six smaller facilities with 160,000 procedures annually.)
- Optimized use of scarce human resources. Cost-effective and highly accessible solution for providing DI services.
- Uses Hub and Spoke Architecture (hub is repository for storing and maintaining all diagnostic images and supporting information, spokes are locations where data acquired or generated, and accessed for decision making.)

This project is expanding to a total of 38 sites in southwestern Ontario using a variety of vendor platforms.

File compression

Challenge: Addressing data storage costs and transmission efficiency (sending and receiving of images, download times)

Approach: *Infoway* invested in a study on Irreversible Compression of DI to determine:

- The level of acceptance of irreversible compression as a standard of practice in Canada; and
- The economic benefits

Lossy compression

In 2008, the report concluded:

- Irreversible compression does not impact diagnostic quality
- Potential savings using diagnostic images irreversible compression
 - Storage savings
 - Retrieval time savings for remote access
- Calculated average study size 28.23MB (@2:1 compression)

Radiologist average daily productivity increase by 5 per cent.

Irreversible compression was approved as a standard by the Canadian Association of Radiologists (CAR)

Addressing PACS costs

Challenge: Reduce cost of PACS installation as well as utilization costs such as storage, distribution, workstation

Approach:

- Disparate buyers come together to negotiate a better per-unit price.
- Joint procurement enables individual jurisdictions across Canada to take part in a joint Request for Proposals (RFP) for the purchase of equipment.
- Objective is to obtain better solutions at a lower price per unit than any single jurisdiction could have achieved by buying on its own.

Procurement

- Joint procurement drives down hardware and software costs by 35%
 - Savings potential of \$31 million accrued to Infoway
 - Additional \$34 million savings accrued to the jurisdictions participating in the initial joint procurement



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Diagnosing the benefits

The DI program's envelope has been fully invested: progress to date



- About 77% complete (filmless). Several provinces and health regions are now 100% digital
- 19 Diagnostic Imaging Repositories have been created. Northern territories are leveraging infrastructure from southern provincial partners
- Major vendors include AGFA, GE, Philips, McKesson – over \$60M in savings via joint procurements and national pricing
- Benefits evaluations have indicated \$850M to \$1B per year in savings via: reduced patient transfers, improved turnaround times, improved productivity & capacity creation, reduced film costs, reduced duplicate tests

Improving access to care and boosting productivity DI across Canada

- Clinicians in urban centres can review images of patients in rural areas instantly, reducing lag time for diagnosis, need for travel and lowering costs
- On average, DI delivers 25-30% improvement in radiologists' productivity
- More than half of referring physicians indicate DI improved efficiency of clinical decision-making by 30 to 90 minutes per week; capacity increase equivalent of up to 500 additional specialists across Canada
- 39% of radiologists now reporting for new remote sites; improved remote reporting enables radiologists to support care delivery and improve access for remote geographies and populations
- 30-40% improvement in turnaround times (clinical decisions and subsequent treatment of patients now occurs 10-24 hours sooner)
- Eliminates 10,000-17,000 patient transfers each year



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The way forward

DI emerging issues

- **Architectural**
 - Seamless sharing of DI results in the context of the EHR (e.g., local workflow and systems)
 - Key issues that require solutions:
 - Lack of DI related standards (e.g., structured terminology and reporting)
 - Foreign data ingestion
 - Registry and indexing
 - Image information synchronization
 - Implementation guidance to EHR
- **Operations**
 - Long term ownership of DI data. There is a need to evaluate alternate approaches to managing DI data over time (e.g., compression, purging, hierarchical storage, etc.)

Moving forward

Recapitalization of \$500 million to:

- Support goal of having 50 per cent of Canadians with an electronic health record by end of 2010
- Accelerate implementation of electronic medical record systems for physicians and integrated points of service for hospitals, pharmacies, community care facilities and patients

For the Diagnostic Imaging Program:

- Complete investments in Diagnostic Imaging Program over the next 12–24 months
- Ensure appropriate standards for DI integration into EHR
- Encourage vendor adoption of pan Canadian standards

The journey is far from complete

- Leverage the existing DI infrastructure to:
 - Integrate IHF volumes
 - Expand to other diagnostic modalities (e.g., cardiology, mammography, etc.)
 - Expand to other clinical services (e.g., pathology)
- Integrate DI systems with points of service solutions including hospital information systems and EMRs in physician offices to provide seamless data flows in support of patient care activities
 - Providing quality information for clinical decision making within and outside of the DI domain
 - Improving communication among service providers (e.g., through the use of key image notes and presentation profiles)
 - DI text data into iEHR viewer so that all authorized providers can access
- Consumer health solutions (e.g., portals)



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Thank you