Monitoring the Effects of Health Information Systems in Canada

- UVic eHealth Observatory
- Evaluation Frameworks and Approaches
- Selected Evaluation Findings
- Next Steps

What is the UVic eHealth Observatory?

- Overall Aim
  - Monitor effects of HIS deployment and use in Canada

- Specific Objectives
  - Employ models/methods/metrics to evaluate HIS adoption/use/impact
  - Engage eHealth community in KT to synthesize/share/use knowledge
  - Build research capacity in HIS implementation/evaluation

- Program Scope
  - Medication management, EMR/EHR integration; care providers ...
  - Secondary use in performance management

- Contexts
  - System related: eDrug, EMR, lab and EHR in BC and elsewhere
  - Social/healthcare related: communities, organizations, domains
Evaluation Frameworks and Approaches – Benefits Evaluation

- **Quality**
  - Patient safety
  - Appropriateness/effectiveness
  - Health outcomes

- **Access**
  - Ability of patients/providers to access services
  - Patient and caregiver participation

- **Productivity**
  - Efficiency
  - Care coordination
  - Net cost

- **System quality**
  - Functionality
  - Performance
  - Security

- **Information quality**
  - Content
  - Availability

- **Service quality**
  - Responsiveness

Use
- Use Behavior/Pattern
- Self Reported Use
- Intention to Use

User Satisfaction
- Competency
- User Satisfaction
- Ease of Use

**NET BENEFITS**

**Evaluation Frameworks and Approaches – Maturity Stages**

- Metric "Saturation"
- Metric expected low
- Go Live
- Time
- Measure Baseline Analysis Design
- Measure Data Accessibility
- Measure System Use
- Measure Clinical Behaviors
- Measure Clinical Outcomes
Evaluation Frameworks and Approaches

- **Rapid Response Evaluation Methodologies (RREM)**

Assembling an HIS evaluation methodology toolkit

**HIS Users**
- Early Adopters
- Advanced-users
- Intermediate-users
- Basic-users
- Non-users
- Late Adopters

**HIS Lifecycle**
- Telescopic Views

**HIS Effects**
- Requirements
- Deployment
- Use
- Adaptation

**Usability Engineering**
- Process Evaluation
- Impact Evaluation
- Meta-analysis
- And Review

**Evaluation Frameworks and Approaches**

- **Physician Office EMR Systems**

<table>
<thead>
<tr>
<th>HIMSS Levels</th>
<th>IOM Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Health Information &amp; Data</td>
</tr>
<tr>
<td>4</td>
<td>Results Management</td>
</tr>
<tr>
<td>3</td>
<td>Order Entry / Order Management</td>
</tr>
<tr>
<td>2</td>
<td>Decision Support</td>
</tr>
<tr>
<td>1</td>
<td>Electronic Communication</td>
</tr>
<tr>
<td>0</td>
<td>Patient Support</td>
</tr>
<tr>
<td></td>
<td>Administrative Processes</td>
</tr>
<tr>
<td>6</td>
<td>Reporting &amp; Population Health</td>
</tr>
</tbody>
</table>
Evaluation Frameworks and Approaches
- Physician Office EMR Systems, Benchmarking

![Bar chart showing different categories of evaluation frameworks and approaches](chart.png)

- Infoway Clinical Adoption Forum
  - Jurisdictional forums for sharing ideas, approaches and lessons
  - Change management, benefits evaluation, peer-to-peer network
  - Commissioned studies, e.g. eDrug, privacy, public health surveillance

- Jurisdictions and Healthcare Agencies
  - Provincial/territorial jurisdictions eHealth programs, benefits evaluation
  - Canadian Institute for Health Information: health system performance
  - Canadian Institutes for Health Research, eHealth related research initiatives
  - Canadian Patient Safety Institute, Public Health Agency of Canada

- Auditor General Offices
  - Performance audit of eHealth programs by federal/provincial auditors
Selection Evaluation Findings Emerging Evidence?

- Canadian Contexts
- Pan-Canadian Diagnostic Imaging systems
- Cancer Care Ontario – CPOE for systemic chemotherapy
- Federal/Provincial eHealth/EHR Audit reports

Selected Evaluation Findings Emerging Evidence? Canadian Contexts

- Canada Health Infoway, 2001 - present
  - Non-profit, $2.1 billion, 50% EHR available by 2010 and 100% by 2016
Progress
(Dec 31, 2009)

294 active and completed projects with an estimated value of $1.600 billion as at December 31, 2009

Selected Evaluation Findings
Emerging Evidence? Dx Imaging, pan-Canadian

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Description</th>
<th>Annual Value</th>
<th>Resources</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technologist productivity</td>
<td>25-30% improvement in technologists' productivity</td>
<td>$122-148M</td>
<td>2,400-2,900 equivalent technologists</td>
<td>8-10M exams</td>
</tr>
<tr>
<td>Radiologist productivity</td>
<td>25-30% improvement in radiologists' productivity</td>
<td>$169-203M</td>
<td>450-540 equivalent radiologists</td>
<td>9-11M exams</td>
</tr>
<tr>
<td>Duplicate exams</td>
<td>2-3% reduction in unnecessary duplicate exams</td>
<td>$47-71M</td>
<td>43-63 radiologists 240-358 technologists</td>
<td>0.8-1.3M exams</td>
</tr>
<tr>
<td>Film costs</td>
<td>Elimination of film-related cost of materials and operations</td>
<td>$350-390M</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

We’ve seen a significant reduction in repeated exams: we have one PACS for three distinct geographic areas—sites no longer have to remember to transfer films with patients (either acute transfer or follow-up with specialist in another city)...images are now available (with PACS) for review at any time, at any location in the region...

Nancy Davis, Mgr. DI, Peterborough, ON
Selection Evaluation Findings
Emerging Evidence? Cancer Care Ontario

Computerized Physician Order Entry (CPOE) solution for systemic chemotherapy

- Methods:
  - Incident reports, nurse/pharmacist log, system data, surveys

- Findings:
  - 60% reduction in the number of incidents per medication order
  - 50% reduction in the number of transcription errors
  - 66% reduction in unclear or ambiguous orders

![Graph showing number of adverse drug events from 1997 to 2017]

Selection Evaluation Findings
Emerging Evidence? Audit Reports ...

- Concurrent performance audits (6 provinces + federal)
- Planning and implementing EHRs
  - Strategic plans: from comprehensive to none, need updating and linking of individual projects to strategic plan lacking
  - Ensure compatibility, good project management, governance/oversight
- Reporting on progress
  - Performance measures, reporting standards, costs and baselines
- Meeting challenges
  - Achieving goals, realizing benefits, upgrading systems, physician office EMRs, consumer health, sharing personal health information, demonstrating “value for money”
Next Steps
National, Jurisdictional and Local Levels

- Infoway Vision 2015
  - EHR, telehealth, public health surveillance, doctor office EMR, CPOE
  - Wait-time management, consumer health, CDM integration
  - Clinical adoption forum: BE, change management, peer-to-peer networks

- Jurisdictions, ongoing
  - Auditors’ recommendations: linkages, project management, reporting, baseline measures, value for money
  - Primary health care EMR integration with EHR systems
  - Benefits evaluation efforts: PEI drug information system studies, Ontario drug profile viewer for patient safety, Alberta personal health record

- UVic eHealth Observatory
  - Evaluation: drug info system, office EMR, personal health record
  - EMR review, SNOMED CT implementation, end-of-life care surveillance