



# FROM RESEARCH TO PRACTICE: IMPROVING USABILITY, SAFETY AND PATIENT OUTCOMES WITH HEALTH INFORMATION TECHNOLOGY

February 14 – 17, 2019 Delta Ocean Pointe Resort, Victoria, BC, Canada

An international conference addressing *Information Technology and Communications in Health* (ITCH)

## WORKSHOPS

9:00 – 10:30 am

### A: Patient Engagement – What, Why & How

#### Description

Patients and the public have vital perspectives as key stakeholders in the health system. The value of engaging patients and the public is increasingly being recognized by health system planning and delivery organizations and by health researchers. We invite you to come and learn about this dynamic and evolving field and consider how it applies to your role in digital health.

The workshop will begin with a primer outlining the various interpretations of the term “patient engagement”. It will then feature *Greg’s Story: Falling through the Cracks*. Greg Price died from a highly treatable form of cancer when gaps in communication resulted in delays in diagnosis, referrals and ultimately treatment. Greg’s sister, Teri, will share her family’s experience of working with the Health Quality Council of Alberta to analyze the gaps and to make recommendations for system change. Dr. Kendall Ho and one of his patient partners, Colleen McGavin, will then describe how patient engagement is tightly integrated into research and brings great benefits to the TEC4Home clinical project, a 4-year randomized-controlled trial to determine if home health monitoring can safely support heart failure patients transitioning from acute care to the community and avoid re-admission to hospital. Dr. Kim McGrail, Scientific Director of Population Data BC and the Data Director for the BC SUPPORT Unit will discuss a research project using public deliberation methods to determine appropriate governance for uses of data sets that link many different sources; for example, hospital, physician, genomic, early childhood, workplace and patient-reported information. The workshop will include a description of the framework used by the BC SUPPORT Unit<sup>1</sup> to coach health researchers who wish to engage patient partners. Plenty of time will be allowed for audience questions and discussion.

#### Learning Objectives

- Understand the different ways patients, families and the public can be engaged
- Understand the value-add of engaging patients, families and the public in research and health policy
- Understand four key factors that should be considered for successful engagement: building relationships, training, support and evaluation.
- Gain insight to inform your engagement efforts: what works and pitfalls to avoid

#### Presenters

- Dr. Kendall Ho, Director, Digital Emergency Medicine, University of British Columbia, Canada
- Colleen McGavin, Patient Engagement Lead, BC SUPPORT Unit, Canada
- Dr. Kim McGrail, Scientific Director, Population Data BC and Data Director, BC SUPPORT Unit, Canada
- Teri Price, Greg’s Wings Projects, Canada

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<sup>1</sup> BC SUPPORT (Support for People and Patient-Oriented Research and Trials) Unit: Part of Canada’s Strategy for Patient-Oriented Research (SPOR) led by the Canadian Institutes of Health Research (CIHR)

# **B: Organizational Approaches to Health Information Technology Quality and Safety**

## **Description**

Technology-induced errors are a significant and important issue to address when designing, developing, implementing and maintaining health information technologies. For organizations, this is a complex process and is characterized by the need to fully map out and understand how and where current technologies are introducing errors, including where there is a potential for new types of errors to emerge (as in when a new technology is introduced into the care environment or software is updated to include new features, functions and workflows). Here, organizations must understand their own strengths and weaknesses and apply techniques and approaches that can prevent and mitigate technology-induced errors. These approaches can draw on current accepted approaches and need to be tailored to the technologies used in the organization from a safety and from a corporate governance perspective. This workshop will introduce participants to quality and safety issues (involving technology-induced errors) and will help individuals develop their own organizational strategies for addressing these quality and safety issues.

## **Learning Objectives**

Participants will:

1. List out the common types of technology-induced errors that arise from user interface, workflow and interfacing of systems issues within and across organizations.
2. Describe the most commonly used approaches (to preventing and mitigating technology-induced errors) that are used internationally.
3. Contextualize their organizations' approach to error management and situate it within an international context.
4. Consider the strengths, weaknesses, opportunities and gaps of their organizations' current safety approaches.
5. Develop a plan to extend existing organizational approaches and fill in gaps that are present in their organization strategy towards technology safety.

## **Presenters**

- Elizabeth Borycki RN PhD, University of Victoria, British Columbia, Canada
- Andre Kushniruk PhD, University of Victoria, British Columbia, Canada
- Yalini Senathirajah PhD, University of Pittsburgh, United States of America

# C: Improving Patient Outcomes with Big Data: Privacy and Ethical Issues

## Learning objectives

Participants will be able to:

1. Understand the misalignment between Big Data and privacy legislation.
2. Be aware of the limitations of research ethics in Big Data analytics.
3. Examine the concept of digital ethics and its potential application in Big Data analytics.

## Intended Audience

This workshop will be of interest to researchers, data analytics professionals, epidemiologists and others in healthcare that understand the value of Big Data in improving patient/ population health and wellness outcomes.

## Workshop Description

Big data is a complex phenomenon of technical advances in storage capacity, computational speed, the low cost of data collection and predictive analytics. Artificial Intelligence (AI) is a key to unlocking the value of big data, and machine learning underpins and facilitates AI. All three concepts combine to result in big data analytics, the properties of which challenge compliance with information privacy principles that have led to recent significant legislative changes in data protection. Further, the use of profiling and automated decision-making made possible by machine learning and AI go well beyond privacy protections. There is rising consensus that a digital ethics framework is needed to provide modern terms for identifying, analyzing and communicating new human realities with existing and foreseeable technological changes.

The workshop will progress as follows:

1. Presentations
  - Big Data challenges the right to privacy: Review of private and public body privacy legislation including the EU General Data Protection Regulation (GDPR) - Caitlin
  - Big Data challenges ethics in human-related research: Ethical Review Boards – Paulette
2. Case study – One example being considered is Cambridge Analytica: What we learned
3. Presentation
  - Will a new ethical framework work with Big Data? Introducing Digital Ethics - Michael
4. Discussion of how applied digital ethics could protect human rights and support Big Data analytics in a health and social context.
5. Wrap-up & adjourn

## Presenters

- Paulette Lacroix, Privacy Consultant, PC Lacroix Consulting), Canada
- Caitlin Lemiski, Senior Policy Analyst, Office of the Information and Privacy Commissioner for BC, Canada
- Eike Kluge, University of Victoria, Canada

# D: Building a Provincial Home Health Monitoring (HHM) Service

## Purpose & Key Audience

Virtual care solutions such as Home Health Monitoring are demonstrating improved patient outcomes through user-friendly health information technology. In this workshop we aim to share knowledge and information about the implementation of a provincial virtual care service in Canada and to engage local and global clinical, operational and academic leaders in the compilation of recommended strategies for widespread adoption and expansion of a virtual care service.

## Workshop Format

This workshop will be organized as follows: an overview of HHM and the provincial common evaluation framework, technical demonstration, interactive group activity including crowd polling (i.e. word cloud), round table brainstorming discussion and group presentation of the recommended adoption and expansion strategies. Workshop participants will need to bring an internet-enabled smart phone, tablet, or laptop.

## Learning Objectives

1. Summarize challenges and lessons learned about successful delivery of a provincial home health monitoring (HHM) program in multi-party partnership.
2. Collaborate on evaluation methodology concerning technology-enabled health care.
3. Identify opportunities for expansion and strategies for organizational adoption of HHM.

## Description

Through a tri-partnership, the British Columbia (BC) Ministry of Health, BC Health Authorities, and TELUS set out to improve population health, enhance patient and provider experience of care and reduce health system costs through the provision of virtual care. HHM in BC targets specific populations with chronic health conditions, and allows healthcare providers to remotely monitor patients to identify issues and changes, and to intervene in a timely manner. HHM enabled care engages clients and their families by educating them about their chronic conditions and symptoms, helping patients to avoid unnecessary emergency department visits and lengthy hospitalizations. A clinical monitoring protocol comprises the care model, workflows, HHM monitoring interview (patient biometric and non-biometric health assessment questions), evaluation and technology. Through an online interactive screen, these monitors also can “ask” patients simple questions about their health and healthcare needs and can provide basic education about illness, treatment, health, and wellness. A clinician accesses the data through a web-based interface. HHM implementations in BC have demonstrated the following results<sup>2</sup>:

- 85% reduction in ED visits
- 93% reduction in hospital admissions
- 94% reduction in hospital length of stay
- 93% patient satisfaction with the HHM service
- \$12,500 (approx.) in cost avoidance per patient from reduced inpatient, emergency and other provincially-insured services 3 months pre/post HHM (for heart failure)
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## Presenters

- May Tuason, Clinical Lead, TELUS Health, Canada
- Natasha Thambirajah, Director, Virtual Care Strategy, Ministry of Health, BC

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<sup>2</sup> 2017 Island Health HHM Evaluation

## E: Changing App “Behavior” to Change Health Behaviors

### Description

Health intervention research has used a number of approaches to try to influence user health behaviors. The Behavior Change Technique Taxonomy (BCTT) is one method to classify the behavior change techniques (Michie et al., 2013). The BCTT includes 93 distinct behavior change techniques. The BCTT has been found to be successful in identifying the critical techniques that are present within interventions (Michie, et al., 2013). Most of the studies that have applied this taxonomy have focused on in-person interventions.

Our team has been applying the taxonomy to telehealth and mobile health applications. Mobile health applications offer unique opportunities for the delivery of behavior change techniques that may not be possible with live in-person interventions. Our preliminary findings indicate many health apps have been developed with little attention to the successful techniques for behavior change. Findings such as these may be contributing to low sustained use of health apps and the limited evidence of health outcome improvement. Our team has developed prototype health apps incorporating behavior change techniques to explore if this improves willingness to use and perceived usefulness.

This workshop will expose participants to the BCTT. Participants will identify behavior change techniques in existing interventions and explore how the BCTT can be used in intervention development. The workshop will offer participants the opportunity to develop low-fidelity prototypes of health app intervention using the BCTT. Participants will receive information on BCTT training resources and mobile app prototyping software. This workshop would be of interest to mobile health app developers and health intervention researchers.

### Learning Objectives

1. Describe the Behavior Change Technique Taxonomy (BCTT)
2. Distinguish individual Behavior Change Techniques used in example interventions
3. Apply the BCTT in intervention designs
4. Discuss the unique opportunities and limitations of mobile health applications using the BCTT
5. Design a prototype mobile health intervention using BCTT

### Presenters

- Marcy Antonio, BS, MPH, PhD(c); University of Victoria, Victoria, BC, Canada
- Ashley Garnett, undergraduate student, University of Victoria, Victoria, BC, Canada
- Karen Courtney, PhD, RN, University of Victoria, Victoria, BC, Canada

### Reference

Michie, S., et al., *The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions*. *Annals of Behavioral Medicine*, 2013. **46**(1): p. 81-95.

### Acknowledgement

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# F: Usability of Hospital Information Systems - Challenges for the Future

## Description

To get the audience acquainted with the topic, the presenters will demonstrate how usability aspects can be investigated on a national level. The presenters will show examples from four countries (Finland, Germany, Denmark and Canada) and present results from recent questionnaires on the usability of hospital information systems (HIS) from a user perspective. The results will be compared and similarities as well as differences will be worked out: what is country-specific, what seems to be an issue anywhere?

The importance of usability aspects in selecting, developing and improving a hospital information system will be discussed with the participants.

## Learning objectives

Upon completion of this workshop, participants have gained further knowledge of the importance of usability issues in HIS. The participants will learn what aspects are especially important to the users and should be carefully considered in selecting, developing and / or improving a hospital information system.

## Related literature

Kaipio, J., Lääveri, T., Hyppönen, H., Vainiomäki, S., Reponen, J., Kushniruk, A., Borycki, E. & Vänskä, J. (2017) Usability problems do not heal by themselves: National survey on physicians' experiences with EHRs in Finland. *International Journal of Medical Informatics*, vol 97, pp. 266-281. DOI: 10.1016/j.ijmedinf.2016.10.010

Kushniruk, A., Kaipio, J., Nieminen, M., Hyppönen, H., Lääveri, T., Nøhr, C., Kanstrup, A.N., Christiansen, M.B., Kuo, M-H., Borycki, E.M. (2014) Human Factors in the Large: Experiences from Denmark, Finland and Canada in Moving Towards Regional and National Evaluations of Health Information System Usability. Contribution of the IMIA Human Factors. 2014 Yearbook of Medical Informatics.

## Presenters

- Christian Juhra, MBA, University Hospital Münster, Münster, Germany
- Johanna Kaipio, D. Sc. (Tech), Aalto University, Finland
- Christian Nøhr, PhD, The Maersk Mc-Kinney Moller Institute, University of Southern Denmark

# G: AI and Machine Learning in Healthcare: From Hype to Impact

## Description

AI and machine learning offer great promises for healthcare and many health organizations are eager to adopt such technologies. However, to realize the promises of AI and create real impact is no easy task. What is hype and what is the real potential of AI for healthcare? How can AI adoption be an integral part of organizational transformation, helping physicians, nurses, and hospital administrators improve their performance without adding workload? What can AI do for patients? How to use AI to transform the existing Electronic Health Records (EHR)? How to assess the costs, benefits, and feasibility of AI adoption?

This workshop is intended to address these issues. The main topics include:

1. **The state of AI and AI-related technologies:** Machine learning, machine image recognition, natural language processing, AI conversational agents, etc.
2. **AI and AI-related technologies in healthcare**
  - Machine learning on medical images;
  - Diagnostic and predictive analytics;
  - next EHR: AI-powered EHR--From “systems of records” to “systems of intelligence” and “systems of engagement”;
  - Natural language processing of descriptive health data (e.g., physician’s notes);
  - AI for productive patient engagement (e.g., mHealth, AI health assistants);
  - AI for medical genomics and drug development.
3. **Showcase of AI integration in health organizations**
4. **Existing AI tools, platforms, and services:** AI platform APIs, Machine Learning as a Service, EHR vendor’s machine learning add-ons, etc.;
5. **Security, safety, and ethics of AI in healthcare**
6. **Challenges and lessons learned:** The requirements for successful AI adoption in healthcare.
7. **Hands-on experience with two approaches to machine learning** (deep learning and rule-based semantic analysis).
8. **Case discussion:** Participants are encouraged to bring their own AI plans and projects for discussion, sharing experiences and lessons learned.

## Learning Objectives

This is an introduction to AI and machine learning for health-related professionals and organizations. The target audience is health Informatics specialists, health IT professionals, healthcare administrators and leaders. The main learning objects of the workshop are:

1. To understand the variety of AI and related technologies, particularly their benefits and limitations, as well as the context of proper use.
2. To gain insights on how to evaluate, adopt, and integrate AI and related technologies into healthcare systems for improving hospital performance and patient care.

## Presenters

- Mei Chen, Ph.D., Chief Scientist, Cogilex R&D Inc, Quebec, Canada
- Michel Décary, Chief Software Engineer, Cogilex R&D Inc., Quebec, Canada

# H: Influencing Public Policy: Individual Citizens Can Promote Usable Health Information Technology Safety

## Learning objectives

Participants will be able to:

1. Summarize impact of the recently enacted General Data Protection Regulation (GDPR) as a game-changer;
2. Understand the use of formal Freedom Of Information and other informal ways to request public documents that trace the development of governance body decisions;
3. Discuss strategies to engender public support by working with the media; and
4. Analyze real-life case studies.

## Intended Audience

This workshop will be of interest to those who need access to the information that will help them understand how large-scale decisions were made that affect people's lives, and how to use that information to shape public opinion into political movements.

## Workshop Description

In 2015 at ITCH, we identified reasons that laws and regulations governing access to health information restrict access to public health information, and to emerging risks of breaching privacy. In 2017 we revisited the privacy protection side of information privacy and access to identify reasons for slow progress in improving privacy protection. For 2019, we propose to address the access side. The workshop will progress as follows:

1. Brief presentations
  - GDPR as a game-changer: what it changes and what it does not change - Paulette.
  - FOI: how to apply it, what to expect in return, and what to do with that information (how to attract media attention and work with journalists) – Kathryn.
  - Public health informatics as a focal point, and the power of presenting stories (stories trump data, tribalism trumps stories) – David.
2. Illustration with a completed case study
  - Example to be determined from the book "Social Policy, Public Policy: From Problem to Practice"
3. Discussion of a current issue as second case study
4. Wrap-up & adjourn

## Presenters:

- Paulette Lacroix, PC Lacroix Consulting, British Columbia, Canada
- Kathryn Gretsinger, (UBC Graduate School of Journalism, British Columbia, Canada
- David Birnbaum, UBC School of Population & Public Health, British Columbia, Canada



## **I: Evaluating Patient Access to eServices and Health Information – Leading examples informing a national measurement strategy**

### **Description**

Internationally, patients increasingly have the opportunity to view their own health information and engage the health system virtually through eServices like messaging, eBooking and virtual visits. Online access to health information is increasingly available in Canada, but the extent and type of access varies across provinces. Access to eServices remains sparse. Evaluations of the implementation and impact of patient's access to their health information and use of eServices suggest improvements in value-based outcomes for Canadians and the health system. Evidence also suggests great variability in value depending on the solutions used, patients targeted and contexts in which they are implemented. There also remains notable gaps in evidence across specific settings of care and a need for greater rigor in methods used for these evaluations.

The inevitable expansion of these kinds of services demands a more structured approach to deploying availability across the health system, measuring citizen and clinician uptake, and evaluating effects on health care services use and outcomes. The breadth and complexity of the needed research and evaluation requires collaboration across stakeholder groups and across Canada. This workshop will bring together expert presenters to provide a view of the current state, and will seek to engage participants around establishing a national framework and defined measurement approaches applicable to current and future initiatives nationwide.

### **Learning Objectives**

- Gain an understanding of the current evidence base and gaps related to patient access to their information and eServices, with a focus on outcomes for Canadians and the Health System
- Learn about a few leading Canadian examples of completed evaluations, with a focus on methodology and implications for measurement going forward
- Engage in a discussion about the priority areas for investigation and ideal characteristics of a national measurement strategy to monitor progress towards outcomes
- Explore opportunities to accelerate this work, including networking with researchers, leveraging existing/ongoing measurement or data sets, natural experiments, etc.

### **Presenters**

- Simon Hagens, MBA. Group Director, Performance Analytics | Canada Health Infoway
- Chad Leaver, MSc, MBA. Director – Applied Research, Performance Analytics | Canada Health Infoway
- Kim McGrail, PhD. Faculty, Centre for Health Services and Policy Research; Scientific Director, Population Data BC; Data Director, BC Academic Health Sciences Network; Associate Professor | University of British Columbia (UBC) School of Population and Public Health

# **J: Increasing Usage and Safety of Medication Alerting System by Improving Their Usability**

## **Description**

Medication alerting systems (e.g., drug-drug interactions pop-up alerts) can change prescribers' behavior by helping them avoid errors and ultimately, improve the quality of the medication management process. Nonetheless, despite great improvements during the last decade, these tools still suffer from usability defects. Usability issues have the potential to create consequences such as incorrect clinical decisions, decreasing patient safety, and users rejecting the alerting systems. Therefore, the usability of medication alerting systems warrants special scrutiny, with the aim of avoiding usability-induced use errors.

This workshop aims to present and discuss with the attendees the knowledge and the methods available to design new medication alerting systems with as few usability defects as possible or identify usability defects in existing systems so that they can be resolved, and the systems improved. First, a short introduction will depict issues related to the usability of medication alerting systems. Second, the fundamentals of usability and of the user-centered design process will be explained. Third, the usability knowledge relevant to design medication alerting systems (usability criteria and evidence-based usability design principles) will be presented. Fourth, participants will be introduced to the heuristic evaluation method. Finally, the attendees will practice heuristic evaluation by assessing screenshots of actual alerting systems [provided by the attendees] and/or fictitious mockups.

## **Learning objectives**

The workshop will provide the attendees with knowledge and methods to help them identify usability defects in medication alerting systems, explain why they are problematic, and generate recommendations to fix them.

## **Targeted audience**

Mainly: students or professionals computer scientists, clinicians, and decision makers.

Ergonomists are welcome even if they are already familiar with these topics.

## **Presenters**

- Romaric Marcilly, PhD, Univ. Lille, INSERM, CHU Lille, CIC-IT / Evalab 1403 - Centre d'Investigation clinique, EA 2694, F-59000 Lille, France
- Helen Monkman, PhD (c) University of Victoria, British Columbia, Canada
- Sylvia Pelayo, PhD, Univ. Lille, INSERM, CHU Lille, CIC-IT / Evalab 1403 - Centre d'Investigation clinique, EA 2694, F-59000 Lille, France

## **K: Linking Knowledge Sources and Patient Records, Using Clinical Coding**

Linking sources of clinical knowledge with the Electronic Health Record, is a relatively 'quick win' for improving the usability of the EHR and supporting clinical decision making, with associated benefits for clinical safety and patient outcomes. This workshop provides hands-on experience with the open source cityEHR, a structured electronic health record, in which all clinical information is stored as HL7 CDA (XML) documents.

Using a structured record allows clinical coding to be applied at any level of clinical detail, either as the information is gathered (pre-coordinated) or after it has been stored in the record (post-coordinated). The structured, coded XML record can then be linked to knowledge sources using the Resource Description Framework (RDF), an established XML-based meta data standard. RDF allows any accessible knowledge source to be annotated with clinical codes, so that the link can be made between coded clinical information for an individual patient and coded clinical knowledge.

The workshop will be a mixture of presentation, discussion and hands-on exercises with the cityEHR. Attendees can participate in the hands-on elements in one of three ways:

- Download and install cityEHR on their own laptop or PC
- Access a local cityEHR server through a web browser on their laptop or PC
- Follow the demonstration by the workshop leader

### **Learning Objectives**

By participating in this workshop, attendees will:

- gain hands-on experience with an open source, structured EHR
- understand the relationship between ISO-13606, HL7 CDA and SNOMED CT
- create or modify their own clinical information models (ISO-13606/HL7 CDA)
- apply clinical coding (SNOMED-CT) to the models
- locate relevant clinical knowledge sources on the web
- learn about RDF and its role in Linked Data and reasoning systems
- apply clinical coding to the knowledge sources, using RDF
- create sample records to observe the linkage of clinical information and knowledge

### **Presenter**

- Dr John Chelsom, Seven Informatics, United Kingdom

# L: The State of Science in Health Information Exchange

## Description

According to the Office of National Coordinator for Health Information Technology in the United States, “health information exchange (HIE) allows doctors, nurses, pharmacists and other care providers and patients to appropriately access and securely share patient’s vital medical information electronically, [thus] improving the speed, quality, safety and cost of patient care.”<sup>3</sup> Similarly, the pan-Canadian Clinical Interoperability Steering Committee recently published an action plan to accelerate the interoperability of digital health solutions in Canada, with the vision to “improve the quality of patient care through the effective sharing of clinical information among health care organizations, clinicians and their patients.”<sup>4</sup> While the need to share health information across organizational boundaries seems obvious, the current state of evidence on HIE adoption, use, and impact is less clear. Since HIEs are expensive sociotechnical endeavors that require an enormous amount of time and resources, it is prudent to demonstrate the value of HIE to justify the investments.

## Learning Objectives

In this workshop, we will discuss what we know, do not know, and want to know about health information exchange (HIE). To do so, we will examine current HIE approaches, use, impact and lessons. This will include a review of published evidence on HIE to date, comparison of HIE status in Canadian jurisdictions, HIE best practice examples, outstanding issues and future work ahead.

The target audience for this workshop include policy/decision makers, care providers and eHealth practitioners who are involved in HIE planning, implementation, support and evaluation. The workshop should also be of interest to researchers, educators, students, patients and the public at large who wish to learn more about HIE. The format of this workshop will be interactive in nature, with plenty of opportunities for the audience to share their questions, ideas and experiences regarding HIE within and outside of their surroundings.

## Presenters

- Francis Lau PhD, FCAHS, School of Health Information Science, University of Victoria, Canada
- Jeff Barnett MSc, FCSHP, School of Health Information Science, University of Victoria, Canada

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<sup>3</sup> HealthIT.gov. What is HIE? n.d. URL: <https://www.healthit.gov/topic/health-it-and-health-information-exchange-basics/what-hie> ; Jun 20, 2018

<sup>4</sup> Pan-Canadian Clinical Interoperability Steering Committee. *Clinical Interoperability Action Plan*, May 2015. URL: [http://www.nelhin.on.ca/~media/sites/ne/IHSP/Enabling%20Technologies%20eHealth/Advisory%20Council/4\\_Clinical%20Interoperability%20Action%20Plan.pdf](http://www.nelhin.on.ca/~media/sites/ne/IHSP/Enabling%20Technologies%20eHealth/Advisory%20Council/4_Clinical%20Interoperability%20Action%20Plan.pdf) ; Jun 20, 2018.