Digital Health and Data Platforms: An Opportunity for Canadian Excellence in Evidence-Based Health Research

Rapid growth in the volume, speed of transmission, and variety of data, otherwise known as 'big data', challenges traditional approaches to data storage, management, and analysis. As the sharing and variety of health data continues to expand, insights that could change care for individuals, groups and even society as a whole are buried in these data.

Big data analytics, including predictive analytics and artificial intelligence applications, are the mechanisms used to gain insight from patterns in these data. Globally, use of big data analytics in the health sector is still relatively new, but the promise and potential are strong. Big data has the potential to transform the health sector, presenting new opportunities for innovators to create jobs and generate economic prosperity. Early adopters have identified rich opportunities for improving population health, patient care, research, and education. Currently, Health Canada is exploring the use of big data to enhance its surveillance of infectious disease and assess the safety of imported consumer products before they reach Canada.[1] At the same time, big data and big data analytics can raise important questions and challenges for health organizations. How can data be shared beyond institutional boundaries? What will the hospitals of the future look like?

National platforms need to be developed for data sharing

National digital health platforms that enable data sharing between institutions across Canada will improve health outcomes for Canadians, position Canada as a world-leader in evidence-based, data-driven health research, and attract investments in the health and life sciences industries to Canada. The development of common platforms to link and share health data across institutions and jurisdictions will assist researchers in answering key questions about health, risk factors and disease, and will support clinicians in delivering the best care in the most affordable way. Before we can achieve this, however, the silos in which health data currently exists need to be flattened.

> *In Canada, two-thirds of doctors say their primary means of communication with other physicians is by fax. Why, in this digital age, do health care providers continue to rely on this dated technology? The single biggest impediment is interoperability; our computer systems and electronic health records are rarely able to communicate, leaving us reliant on largely paper-based technology.* [2]

Linking to the future of Canada's competitiveness

As illustrated in a report from Canada's Health and Biosciences Economic Strategy Table, digital and data transformation will play an increasingly important role in diagnosing and treating previously incurable or difficult-to-cure diseases, and allow us to achieve greater success in targeting specific treatments to

[1] Health Canada, "2017–2018 Departmental Results Report". https://www.canada.ca/en/health-canada/corporate/transparency/corporate-management-reporting/departmental-performance-reports/2017-2018-departmental-results-report.html
[2] Globe and Mail, "Why are fax machines still the norm in 21st-century health care?" https://www.theglobeandmail.com/opinion/article-why-are-fax-machines-still-the-norm-in-21st-century-health-care/

individual patients. The result is a more personalized approach to health care through customized treatment plans, enabled by a strong digital technology ecosystem.[3]

Enhanced digital infrastructure is essential to spur innovation, increase economic growth, and increase Canada's global competitiveness. Interoperability of systems and a harmonized data and privacy framework are identified by Canada's Health and Biosciences Economic Strategy Table as key elements missing from Canada's digital health infrastructure.[4] High-performing, interoperable, digital health systems and platforms are seen as critical enablers of data-driven advances in health and medicine. Yet, Canada faces significant challenges in implementing and using digital health systems.

According to a 2016 Commonwealth Fund study, not only is Canada lagging behind its peers in the adoption of digital tools, there is considerable variation across the provinces and territories.[5] Siloed health systems, varying standards, inconsistent interpretation and application of privacy frameworks and legislation, and the lack of a modern data governance framework pose significant barriers to unlocking and leveraging data held in jurisdictional repositories and health delivery organizations. In their final report, an expert panel on Canada's Fundamental Science Review addresses the topic of digital research infrastructure. The panel recommends that the federal government initiate immediate action to show leadership in this area and provide a long-term funding commitment that would enhance the ability of researchers to manipulate large datasets and perform complex research and analyses.[6]

The benefits of investing in digital health platforms

The creation of an innovation ecosystem of researchers, industry, clinicians, and patients will strengthen Canada's international competitiveness. Innovation, Science and Economic Development Canada (ISED) encourages collaboration between key players in the Canadian health and life sciences community. Of the nine projects shortlisted for acceptance under Stream 4 of the ISED Strategic Innovation Fund, seven projects propose collaborations that would aim to improve health outcomes for Canadians, position Canada as a world-leader in evidence-based, data-driven health research, and attract investments in the health and life sciences industries to Canada.[7] Canada could be a leader, but we must invest in digital health platforms to ensure that we become more competitive in this dynamic field.

> *In the United Kingdom, following a £37.5 million government investment, between three and five 'Digital Innovation Hubs' will be established, which pull data from GP practices, hospitals, social and community care providers for research and development purposes. The new hubs will allow researchers to unlock new advances by harnessing the huge potential of data and provide a*

[3] Innovation, Science and Economic Development Canada, "Report from Canada's Economic Strategy Tables: Health and Biosciences". https://www.ic.gc.ca/eic/site/098.nsf/vwapj/ISEDC_HealthBioscience.pdf/$file/ISEDC_HealthBioscience.pdf
[4] Innovation, Science and Economic Development Canada, "Report from Canada's Economic Strategy Tables: Health and Biosciences". https://www.ic.gc.ca/eic/site/098.nsf/vwapj/ISEDC_HealthBioscience.pdf/$file/ISEDC_HealthBioscience.pdf
[5] Innovation, Science and Economic Development Canada, "Report from Canada's Economic Strategy Tables: Health and Biosciences". https://www.ic.gc.ca/eic/site/098.nsf/vwapj/ISEDC_HealthBioscience.pdf/$file/ISEDC_HealthBioscience.pdf
[6] Canada's Fundamental Science Review, "Investing in Canada's Future: Strengthening the Foundations of Canadian Research". 2017. http://www.sciencereview.ca/eic/site/059.nsf/vwapj/ExecSummary_April2017-EN.pdf/$file/ExecSummary_April2017-EN.pdf
[7] Innovation, Science and Economic Development Canada, "Stream 4—Collaborative Technology Development and Demonstration Stream". https://www.ic.gc.ca/eic/site/125.nsf/eng/00002.html

foundation for NHS clinicians, scientists and researchers to find new treatments for chronic diseases such as cancer, heart disease and asthma.[8]

Digital health solutions will improve access to care for Canadians and increase the efficiency of the health care system as a whole. Utilizing digital health solutions will deliver faster access to patients' test results, prescriptions and medical histories, and help contribute to better and safer patient care. A Canada Health Infoway report on digital health indicates that 70% of family physicians using electronic medical records and 90% of pharmacists using drug information systems report that the quality of patient care has improved since their implementation.[9] Through Canada Health Infoway, government recognizes that innovation should drive new models of care. Infoway is directly developing and deploying national digital health initiatives such as PrescribeIT™, Canada's electronic prescribing service. These initiatives are already establishing many of the concepts needed to create national digital health data platforms, including shared governance, interoperability standards, and harmonized privacy and data security frameworks. Through collaboration with Infoway, HealthCare*CAN* is committed to supporting interoperable national digital health data platforms that spur innovation, support economic growth, and increase Canada's global competitiveness.

By harnessing the potential of innovative digital health solutions, the Children's Hospital of Eastern Ontario (CHEO) has transformed care and improved health outcomes for patients.

As Canada's national children's hospital, CHEO has reached the Top 1% of technology enabled health care providers in the country. This foundation is allowing for exciting innovations that we could only imagine a few years ago.

- Genetics programs, such as Care4Rare, are analyzing terabytes of data to identify new rare diseases, and new disease genes; they are well on their way to identifying five hundred diseases we didn't know existed only five years ago.
- Through BORN (Better Outcomes Registry & Network), big data becomes a reality, as all births in Ontario are analyzed in near real-time to ensure appropriate care for the best possible outcomes for our next generation. BORN is Ontario's program for quality in maternal-child health led by CHEO, but this solution can be replicated in other jurisdictions, and also for other populations such as geriatrics, cancer or diabetes.
- A partnership with SickKids on a shared technology platform is allowing emerging AI programs to leverage deep clinical data on the sickest patients to inform research, quality improvement and direct care delivery
- Innovative physicians and researchers have the information they need to focus their expertise on solutions that can support care within their hospital, but also around the world. This has begun with companies such as ShoeBox and Privacy Analytics and will continue to grow in the years ahead.

[8] Health Data Research UK, "Digital Innovation Hub Programme". https://www.hdruk.ac.uk/research/digital-innovation-hubs/
[9] Canada Health Infoway, "Report on Digital Health: Canadians embracing digital health". https://www.infoway-inforoute.ca/en/component/edocman/2815-infographic-report-on-digital-health-canadians-embracing-digital-health/view-document?Itemid=0

In developing the precise structure of an investment in digital health data platforms for Canada's research hospitals and academic health sciences centres, HealthCare*CAN* will consult with Canada Health Infoway given its expertise in the development, adoption and effective use of digital health solutions across the country. An investment of this nature would enable research hospitals across Canada to recruit data scientists to examine the health data that currently exists and determine how enhanced data platforms might be developed to link and share data throughout the Canadian health system. Once developed, these digital health data platforms and applications would enable health researchers across Canada to ask new research questions, pursue novel approaches, and collaborate across geographic and disciplinary boundaries.

Enhanced investments in the health system of the future, particularly in the areas of digital health and data platforms, are required now. The development of common platforms to link and share health data will assist health researchers in answering key questions about health, risk factors and disease, and will support clinicians in delivering the best care in the most affordable way. Pan-Canadian digital health platforms that enable data sharing across institutions and jurisdictions will improve health outcomes for Canadians, attract investments in the health and life sciences industries to Canada, and position Canada as a world-leader in evidence-based, data-driven health research.

Our ask for Budget 2019

Further investments in the area of digital health and health data cannot be postponed. The Prime Minister of Canada identifies positioning Canada at the leading edge of the digital economy as a key priority in the mandate letter of the Minister of Innovation, Science and Economic Development. In the mandate letter of the Minister of Health, the adoption of digital health technology to improve access, increase efficiency, and improve outcomes for patients is identified as a top priority. For Canada's health system to take advantage of the ongoing progress in the field of big data analytics, HealthCare*CAN* strongly encourages the federal government to:

1. **Substantially invest over five years through Canada's research hospitals and academic health sciences centres in order to develop meaningful digital health data platforms and applications;**
2. **Work with industry, legislators, privacy commissioners, clinicians and patients;**
3. **Undertake evaluation of their clinical benefits, and advance their use through the rest of the health system.**[10]

[10] HealthCareCAN, "Unlocking the economic potential of the health and life sciences sector". http://www.healthcarecan.ca/wp-content/themes/camyno/assets/document/GovSubmissions/2018/EN/Pre-budget%20Submission%20for%202019%20budget_final.pdf