Reimagining the Future of Work

WHAT REINVENTING THE HEALTHCARE
WORKFORCE LOOKS LIKE FOR CANADA

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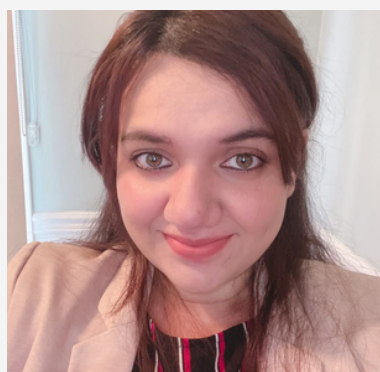
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Prologue: Looking Towards a Healthier Future

How to reinvent the workforce

In a post-pandemic world, society is now faced with the decision to simply keep up with the changing social landscape or take risks to be innovative and stay steps ahead of our emerging digital world. In the face of hybrid options, digital technology, and incoming Zoom calls, different workforces across the country are constantly evolving. Employers and employees alike are playing significant roles in reshaping the future of workforces ranging from small businesses to banks, schools, and hospitals. This report is focusing on how Canada can be a role model country when it comes to reimagining the healthcare workforce.

There is currently a healthcare crisis in Canada. Many hospitals are struggling to provide equitable access and treatment for patients and healthcare professionals are met with challenges regarding quality work conditions and wages. As a result, many clinical workplaces are facing a serious labour shortage causing even further strain on Canada's healthcare system. There are ways out of this crisis in the form of digital technology, telemedicine, and much more. There are innovative ways to reinvent our healthcare system and pave a stronger workforce for our doctors and nurses.

EXECUTIVE SUMMARY

This report explores the key considerations when it comes to digitizing healthcare in the Canadian context while looking to other jurisdictions and studies for critical insight. Three recommendations have been made based on evidence-based findings when it comes to redesigning our healthcare workforce and implementing an innovative healthcare ecosystem.

01 PURSUING NEW TECHNOLOGY

Capitalizing on Big Data Technology and AI innovations.

02 RE-DESIGNING THE ORGANIZATIONAL STRUCTURE

With a focus on health data sharing and mobilization.

03 RE-EDUCATING A SKILLS-ENABLED WORKFORCE

A newly trained workforce is the backbone of an innovative healthcare ecosystem.

Introduction

In light of the overwhelming attention the Canadian healthcare system has received due to the pandemic, long-standing challenges to providing equitable access to quality services have taken center stage. As the aging population in Canada increases, the Canadian healthcare system is under significant pressure to meet the growing medical needs of the influx of individuals requiring treatment. Despite this growing demand, the supply of workers to meet the needs of Canadians is still lacking. Provincial policymakers are faced with the challenge of identifying strategies to increase the number of workers by overcoming barriers of limited data, training, and employee dissatisfaction leading to industry exit.

With the emergence of Artificial Intelligence (AI) and Big Data technology, healthcare systems across Canada gradually integrated e-Health technological tools to combat supply issues and increase workforce productivity. There is also a social shift in increased preference for online services or technological software to increase efficiency.

With an increased willingness of the public to adapt to technological systems and the introduction of e-Health transitions, Canada is at the crossroads of reimagining a technology-forward healthcare ecosystem. To fully capitalize on this opportunity, several studies have indicated that increasing the capacity of technology to integrate a digitally enabled healthcare system is a potential solution to health workforce supply challenges. Identifying new technologies, and organizational systems that align with workforce capabilities will be required to build an integrated eco-system.

The healthcare system in Estonia is a prime example of advancing technological solutions to improve healthcare outcomes. Their intergovernmental data exchange and e-Health system have improved health communication within different regions as well as access to patient data. Telemedicine and AI-powered diagnosis have also reduced the burden on the healthcare workforce. By analyzing the principles and processes to integrate technological systems in Estonia's healthcare system, similar approaches to incorporating a digitally enabled healthcare system in Canada can be evaluated.

Jurisdictional Overview

Taking a closer look at the Canadian context

Ensuring Canadians have adequate healthcare across all provinces and territories is part of the commitment of Canadian Medicare as outlined in the Constitution Act of 1867 (Government of Canada, 2019). In Canada, the Federal Government sets the principles of administering healthcare within the Canada Health Act (Government of Canada, 2019). The Canada Health Act provides the legislative criteria and conditions for Canadian Medicare insurance plans for provinces and territories for them to receive federal cash transfers (Government of Canada, 2019). Public Administration, Comprehensiveness, Universality, Accessibility, and Portability are the five guiding principles that drive the Canadian healthcare system (Government of Canada, 2019).

Based on these principles, the provinces administer health insurance plans within their respective jurisdictions. Administering health insurance plans can include planning and funding for hospitals, services provided by doctors and other healthcare workers, and negotiation of fee schedules (Government of Canada, 2019). Although the provinces administer health insurance for the residents within their region, providing healthcare for Indigenous, northern, and remote populations is under the jurisdiction of the federal government (Government of Canada, 2019).

Policy Challenge: The Staffing Shortage

Addressing the supply-side of healthcare.

The Canadian healthcare system needs to be reimagined to keep up with the requirements of the current demographic and their medical concerns by providing an adequate supply of workers across Canada.

Due to an increasing and aging demographic, there is a greater demand for healthcare services. Despite the pressing need for more care, the healthcare workforce is already functioning at maximum capacity resulting in insufficient service delivery (Drummond et al., 2022). In 2022, throughout Canada wait times for necessary treatments, and various diagnostic technologies have continued to increase to a national average of 27.4 weeks (Moir & Barua, 2022). Provinces such as Ontario have patients waiting approximately 21.3 hours in emergency departments. The delay in services is a consequence of the lack of supply throughout the healthcare workforce (Health Quality Ontario, 2023).

In Canada, the overall job vacancy across healthcare, ambulatory, nursing, and residential care facilities has increased to 5.9% resulting in a need for approximately one million more workers (Drummond et al., 2022). Amongst the healthcare workforce, nursing, personal support workers, and physicians are in the highest demand (Drummond et al., 2022).

CONSEQUENCES OF NOT ADDRESSING SUPPLY SHORTAGES

01 POORER HEALTH OUTCOMES

Not addressing demand can compromise access to healthcare, leading to poorer health outcomes for Canadians such as an increase in chronic, irreversible conditions, permanent disability, increased pain, and suffering, as well as an increase in healthcare costs for families and individuals (Moir & Barua, 2022).

02 BURNOUT IN WORKERS

Existing workers experience a work overload leading to burnout. According to the Ontario Science Advisory, severe emotional exhaustion in health workers has increased by 60% since mid-2021 (Government of Canada, 2022). Existing employees are likely to pursue early retirement or exit the industry.

Key Considerations: Staffing Shortage Strategy

Poor Data Optimization

Advancing solutions to bridge the gap between the ratio of required healthcare workers and population demand is contingent on leveraging available data to produce informed decisions. Limited data can be an obstacle to improving the healthcare pipeline and strategically hiring workers.

Data Sharing Concerns

- **Lack of Data**: Although efforts have been made to increase pan-Canadian data, research is still fairly limited. Currently, there is scarce information on understanding population health and demographics as well as labor force indicators such as projected retirements, enrollment within educational institutions, and hiring needs (Canadian Medical Association, 2023).
- **Siloed Information**: Current data focuses on one profession within one region with minimal longitudinal analysis of the supply of workers for the given demand. When there is siloed information, identifying support or resource redistribution on a pan-Canadian level can be challenging (Canadian Medical Association, 2023).
- **Jurisdiction Barriers**: As the administration of healthcare is conducted at the provincial level, the sharing of information across provinces and territories can be limited, which can further impact the centralization of the health ecosystem (Government of Canada, 2019). With limited data available, it can become difficult to provide appropriate budgets for resource allocation and implementation.

Key Considerations: Equity Issues

An Intersectional & Regional Approach

Northern, rural, and Indigenous populations are disproportionately impacted by the limited supply of workers in the healthcare system. Thirteen hospitals in rural British Columbia shut down for about four months in 2022 because they were short-staffed (Kulkarni, 2022). Kashechewan First Nation tribes in northern remote communities only have three nurses to support a community of 1900 people (CBS News, 2022).

As a result, individuals within these communities need to travel long distances to have their medical needs met in a timely manner. Given these populations' geographic location, jurisdictional differences as well as cultural challenges, issues with maintaining the supply of healthcare workers become a more complex challenge to resolve.

Healthcare workers encompass a large input. It is crucial that action is taken through a data-driven approach to ensure investments increase workforce productivity.

Key Considerations: Education

Quality Education & Course Enrolment

To develop an adequate staffing strategy, there need to be available workers. However, due to current education, training, and requirements standards, institutions do not produce adequate graduate turnout rates to support the growing demand for healthcare workers.

For example, in Canada, we only have 7.6 Medical Graduates per 100,000 population (Canadian Medical Association, 2023). The Canadian graduate rates are 42% fewer than the OECD average of 13.2 (Canadian Medical Association, 2023). Current skills training programs are longer with broader curriculum requirements and have small enrollment capacities (Drummond et al., 2022). With these traditional pathways to accreditation, the required number of healthcare professionals at present and future would be difficult to meet (Drummond et al., 2022).
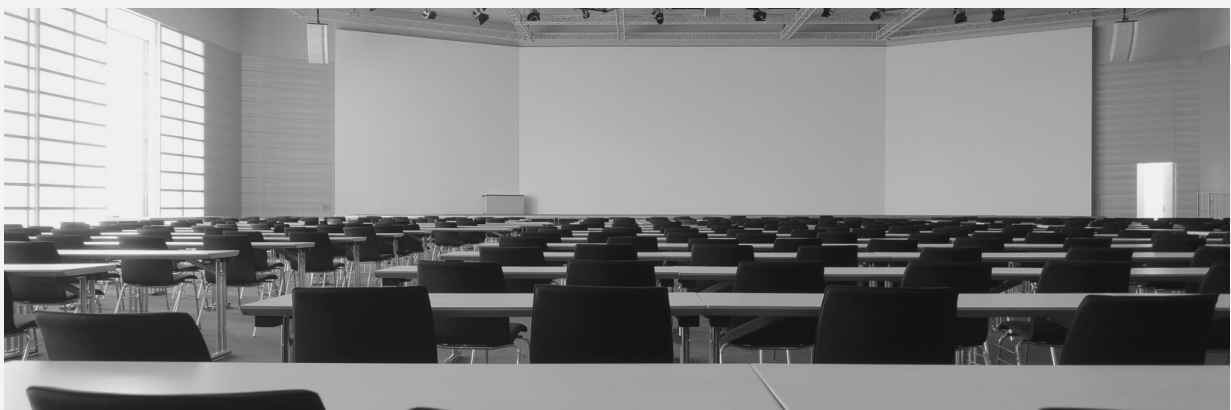
TRENDS & IMPLICATIONS IN A POST-PANDEMIC WORLD

01 INCREASED DEMAND FOR DIGITALIZATION

The pandemic has highlighted the need for the digital transformation of certain healthcare services such as family practitioner appointments, prescriptions, initial health consultations, etc. In a study conducted in 2020, 42% of Canadians who had received virtual care during the pandemic said they would prefer to initially contact their doctor virtually going forward.

Additionally, 82% of Canadians prefer electronic prescriptions, and nearly 80% are interested in accessing their personal health information online.

TRENDS & IMPLICATIONS IN A POST-PANDEMIC WORLD

02 MANY MEDICAL TREATMENTS ARE BECOMING AVAILABLE ONLINE

The field of digital health is expected to keep growing. A visit to the doctor for a minor illness can take half a day, but an online consultation service can write prescriptions for patients in just a few minutes.

For instance, there are many supporting technologies that are emerging along with telemedicine, which has forced us to rethink how we provide care. More tech-based initiatives are needed in order to follow the upcoming trends in healthcare such as Telehealth.

TRENDS & IMPLICATIONS IN A POST-PANDEMIC WORLD

03 CANADA'S FUTURE WORKFORCE IN HEALTHCARE SECTOR

The methods used to recruit, train, deploy, and manage our health staff will change over time. For a better and improved healthcare system, there is a need for efficient planning for the future workforce which goes beyond the traditional elements of supply, mix, and distribution.

Using digitally connected models of care will help healthcare systems increase efficiency through capacity-building. By 2030, it is predicted that up to 40% of healthcare tasks might be automated, freeing up more time for care (KPMG 2022).

Literature Review: Findings From Previous Studies

Digital Health & Its Promises

The aforementioned trends and implications are far from a uniquely Canadian experience. In fact, most healthcare systems in developed countries face three main challenges. First, there is a decreasing number of physicians. According to the Association of American Medical Colleges report, the US could lose as many as 100,000 doctors by 2025 (Finnegan, 2016). The pandemic further worsened the situation in many countries by putting demands on healthcare workers to work overtime thus creating demand surges that far exceed supply. Second, disregarding the pandemic, there has been an increasing number of patients mainly due to increased life expectancy.

Overall, there was a global increase of 5.0 years in life expectancy (WHO, 2016). Third, there is an increase in healthcare costs, especially in developed countries due to factors like expensive experimental treatments and comprehensive insurance. Even pre-pandemic, medical expenses have frequently seen an annual growth rate of 5% in recent years (PwC 2016).

In light of these challenges, a properly integrated and implemented digital health ecosystem promises to increase the efficiency of each healthcare professional and expand the industry of healthcare in order to increase supply while leveraging health monitoring and preventative care to slow down demand.

Literature Review

What is Digital Health?

Despite making waves on the news and being touted by some as a shiny new thing that signifies the future, broadly speaking, digital healthcare is already prevailing in our healthcare system. Take Metstres' (2017) definition of the emerging term, "digital health", as being "the use of information technology/electronic communication tools, services and processes to deliver health-care services or to facilitate better health". Compared to the current use of a computer, digital records, and various radiology information systems (such as x-rays) in many countries which suggests that we are firmly in the age of digital healthcare.

However, there is also a forward-looking dimension to digital healthcare which promises even better service delivery in the future centered around the use of e-Health (electronic health) services and m-Health (mobile health) services (Metstres, 2017). In conjunction, e-Health and m-Health promise increased efficiency and expanding coverage.

Moreover, the digitalization of healthcare holds the potential to integrate the broader ecosystem of health outcome generation including health monitoring and preventative care. Such a holistic approach to healthcare production is instrumental in managing the ever-growing demand for long-term healthcare generated by the aging society.

# The Three Dimensions of the Integrated Digital Healthcare System

In order to fully capitalize on the benefits of digital healthcare, an integrated and digitally-enabled healthcare system must be built. Designing a digitized healthcare ecosystem requires the ongoing collaboration of a multitude of stakeholders ranging from governments, private organizations, and the governing bodies in the Canadian healthcare system. together, these stakeholders hold the key to building an integrated system. Broadly speaking, three interconnected dimensions constitute such a system.

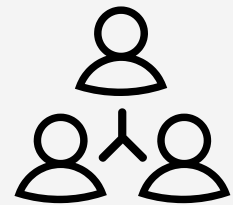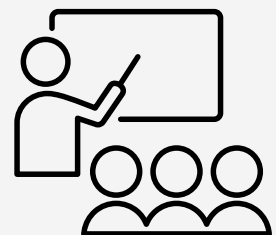# EXPLORING THE THREE DIMENSIONS OF A DIGITIZED HEALTHCARE ECOSYSTEM

01 NEW TECHNOLOGY
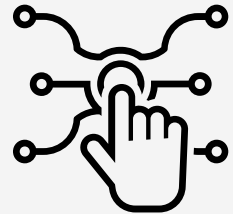
02 ORGANIZATIONAL STRUCTURE

03 SKILLS-ENABLED WORKFORCE

The Three Dimensions

New Technologies

First, a digital healthcare system hinges on digital technologies. For example, through expanding the digitization of healthcare records, waiting time may be cut down and more efficient collaboration between various healthcare providers becomes possible. In addition, new telecommunication technologies provide opportunities to overcome geographical barriers prevalent in traditional healthcare through m-Health (e.g. healthcare apps). In short, technological development has the potential to increase the efficiency of healthcare production.

Nonetheless, at least three potential challenges should be kept in mind. First, there may exist bottlenecks when applying new technologies to healthcare. Such bottlenecks often appear in the integration of technologies into existing systems and diminish the potential benefits of new technologies (Marques et al., 2017).

Secondly, healthcare technologies should undergo more stringent audits and prior social considerations as they have the potential to either rectify or further solidify existing social imbalances such as sexism, ageism, and racism in healthcare. Furthermore, common problems with digital technologies such as data ownership and privacy are more prominent in healthcare due to the significance and individually identifiable character of many health data (Despic, 2019).

New Technologies

Lastly, healthcare technologies should follow a demand-driven path in order to maximize social utility (Armstrong and Powell, 2008). For many, the major characteristic of our healthcare demand in the near future is a transition from sick-care to healthcare: due to chronic diseases becoming increasingly curable and the aging population in most developed countries, a large amount of long-term medical resources are demanded.

While such transitions put major monetary and resource pressure on society, new technologies can potentially alleviate some of the burdens through the development and integration of preventative healthcare such as health status monitoring through wearable tech, inducing adoption of healthier lifestyles through social media campaigns, and better early diagnosis technologies.

Organizational Structure

Consequently, new technologies will likely require corresponding changes in organizational systems in order to maximize their utility. Such changes will likely include how existing actors interact (e.g.patients and healthcare professionals may interact through video calls instead of in-person meetings), where and what kinds of positions are demanded, and the ratio of skills in demand.

Currently, healthcare data is divided into clinical, genetic, and exogenous. While our infrastructure does a relatively good job collecting clinical data, with most medical records digitized, such data represents only 10% of determinants of health. Collecting and integrating genetic data in addition to exogenous data will allow the possibility of individualized treatment (Offit, 2011).

One prominent area of potential organizational change is the structure and extent of data sharing. On the one hand, the value of data sharing is evident: aggregate data can translate into more accurate and timely public health decisions while sharable individual data can increase inefficiency and quality through more personalized healthcare solutions. On the other hand, extensive data sharing raises many organizational problems including the standardization of data structure, data security, data governance, and legislation to safeguard against misuse and abuse.

Organizational Structure

Organizational changes don't happen in a vacuum; they correspond to the technologies in use. As such, the changes will be an ongoing process that requires coordination among technology companies, healthcare providers, relevant government departments, and the public.

Prakash et.al. looked at experiences in the Center for Connected Care and highlighted the fact that with complex and rich lived experiences embodied by each patient, the optimal data collection process and the way such data should be integrated into the care services present a messy and nonlinear learning challenge for the organization (2021).

Skills-Enabled Workforce

Third, the proliferation of new technologies and corresponding organizational structures will require a skill-enabled workforce (Tsiknakis and Kouroubali, 2009). On one hand, the demand for these skills may reshape professional training in schools in order to better prepare future healthcare professionals. On the other hand, with the technology landscape changing rapidly, new organizational structures will enable more robust on-job training through scenario planning and reflection.

Furthermore, the expansion of the healthcare ecosystem which includes health monitoring and preventative care will demand more interdisciplinary skills. While the organic integration of technologies and organizational structures is crucial, the end goal is the better production of healthcare services through a skill-enabled workforce.

Skills-Enabled Workforce

As such, according to the WHO European Healthcare Policy Framework (2013), the four dimensions of the workforce should be examined when assessing new technologies and organizational structures.

- **First**, does the availability of healthcare improve, e.g., does the efficiency of each doctor improve?
- **Second**, does the acceptability of healthcare improve, e.g., does the technology enable easier communication and the possibility of more tailored solutions?
- **Third**, does the accessibility of healthcare improve, e.g., does the technology help break down spatial or economical barriers?
- **Fourth**, does the quality of healthcare improve, e.g., does the new technology enable rapid access to the latest research and guidelines which generate better healthcare outcomes?

Integration with the Workforce is Key

In short, while the digitalization of healthcare offers plenty of opportunities, its integration with other systems at large is the key to fully reaping its benefits. More specifically, even with new technologies, healthcare production is still generated mostly by healthcare professionals. As such, it is crucial to provide ongoing and sufficient training to the workforce in addition to having a matching organizational structure.
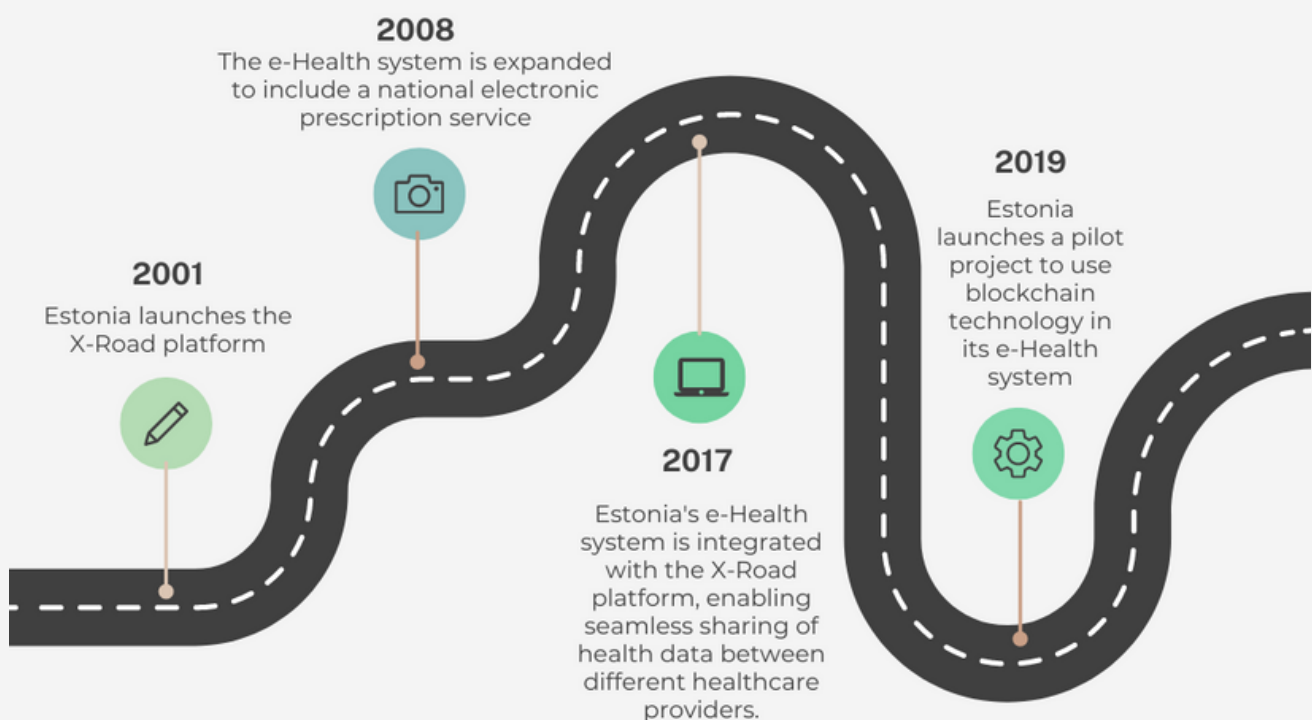
NEW TECHNOLOGIES

+

MATCHING ORGANIZATIONAL STRUCUTRES

+

SKILL ENABLED WORKFORCE

MORE EFFICIENT HEALTHCARE DELIVERY

HIGHER QUALITY HEALTHCARE DELIVERY
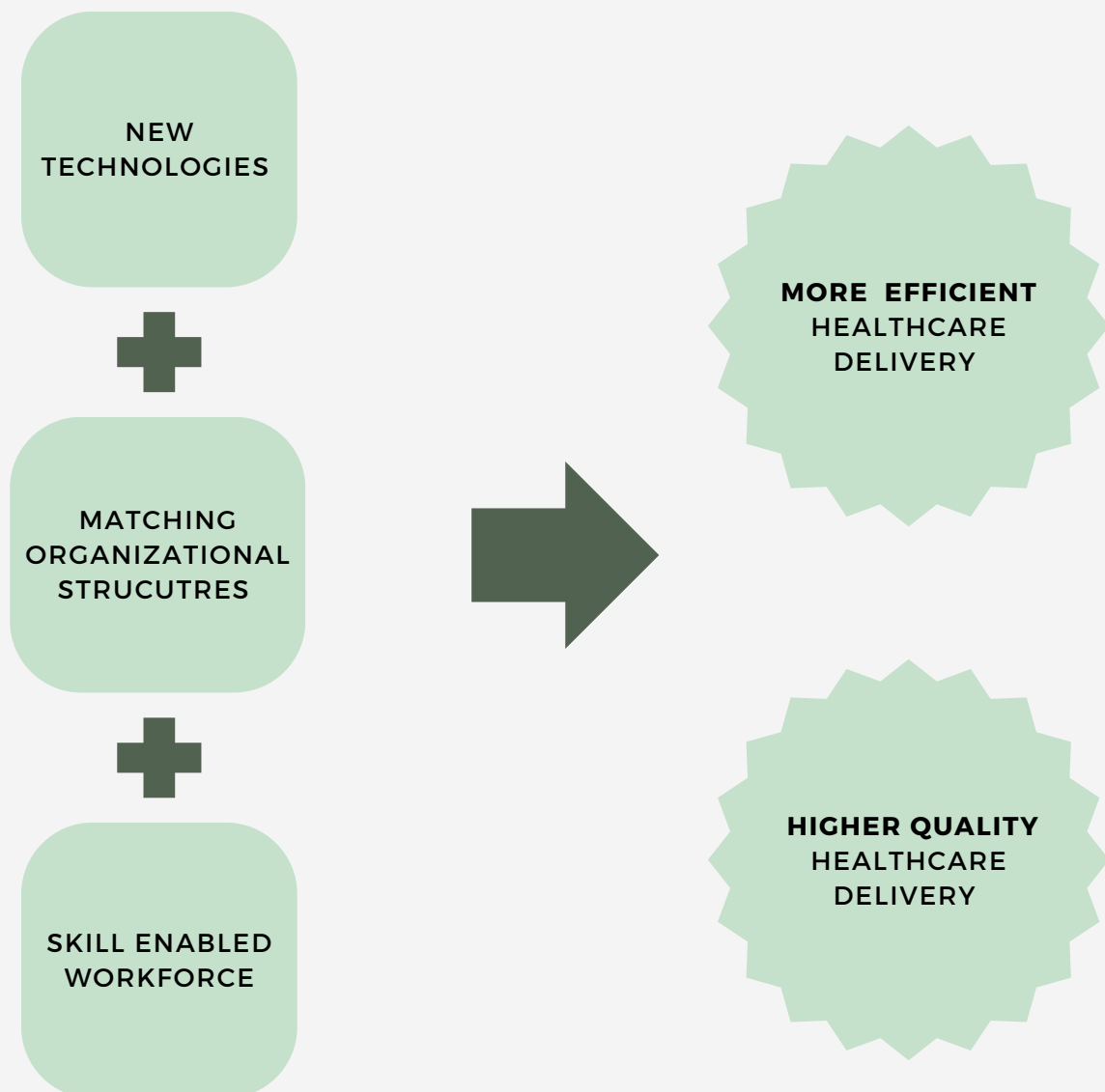
Case Study:
Estonia's X-Road Platform

Estonia has been at the forefront of healthcare innovation, leveraging technology to improve healthcare delivery and outcomes. The country has implemented the X-Road platform, an intergovernmental data exchange system, and developed an e-Health system that provides real-time access to patient data. These innovations have transformed the healthcare sector in Estonia, leading to improved healthcare delivery.

X-ROAD

2008
The e-Health system is expanded to include a national electronic prescription service

2019
Estonia launches a pilot project to use blockchain technology in its e-Health system

2001
Estonia launches the X-Road platform

2017
Estonia's e-Health system is integrated with the X-Road platform, enabling seamless sharing of health data between different healthcare providers.

Breaking Down X-Road & the e-Health System

Estonia's X-Road spans beyond healthcare and is a powerful tool that unifies the entire country through easily accessed government services. X-Road has significantly improved healthcare outcomes for Estonian citizens and continues to be a source of inspiration for other jurisdictions looking to digitize their government services. e-Health is but one of the innovative branches that exists within X-Road.

Estonia has transformed the healthcare workforce through the use of telemedicine and AI-powered diagnosis and decision support. Estonia stands as a role model country when it comes to the hugely successful design and implementation of an intergovernmental, digital healthcare system that benefits healthcare providers and patients alike (e-Estonia, 2023).

- There are more than 20 000 000 health documents in the e-Health system
- There are more than 300 000 000 events documented in the e-Health system
- 50% of doctors' referrals in Estonia are digital
- 99% of total prescriptions in Estonia are digital
- Close to 100% of patients have a countrywide digital record
- As of August 2022 e-Prescription is interoperable with Finland, Portugal, Croatia, and Poland

The X-Road Platform

What is it?

The X-Road platform was developed in 2001 as part of the Estonian e-Governance infrastructure and has since been widely adopted by various public and private sector organizations in Estonia. X-Road is an intergovernmental data exchange system that enables secure data exchange between government agencies and healthcare providers. This system allows healthcare providers to access patient data in real-time, regardless of where the data was originally recorded (e-Estonia, 2023).

With a system like this in place, healthcare quickly moves from being a siloed and inaccessible sector to one that operates laterally and cooperatively. The X-Road platform uses encryption and digital signatures to ensure the privacy and security of patient data, and a centralized authentication system to prevent unauthorized access (e-Estonia, 2023). The continuous and proactive prioritization of cyber and data security is what makes X-Road so unique and ahead of its time when it comes to looking toward a digitized healthcare sector.

Currently, healthcare data is divided into the following main categories: clinical, genetic, and exogenous. While our infrastructure does a relatively good job collecting clinical data, with most medical records digitized, such data represents only 10% of determinants of health. Collecting and integrating genetic data in addition to exogenous data will allow the possibility of individualized treatment and therefore greater health outcomes for patients and less chance of medical errors (Offit, 2011).

One prominent area of potential organizational change is the structure and extent of data sharing. On the one hand, the value of data sharing is evident: aggregate data can translate into more accurate and timely public health decisions while sharable individual data can increase inefficiency and quality through more personalized healthcare solutions. On the other hand, extensive data sharing raises many organizational problems including the standardization of data structure, data security, data governance, and legislation to safeguard against misuse and abuse.

The X-Road platform has transformed the healthcare sector in Estonia by improving the delivery of healthcare services, reducing the risk of medical errors, and increasing patient satisfaction. With the X-Road platform, healthcare providers can access patient data more quickly and easily, allowing them to make more informed decisions about patient care.

The e-Health System

The e-Health system in Estonia is a digital health system that provides real-time access to patient data, enabling healthcare providers to make more informed decisions about patient care (e-Health, 2023). The e-Health system includes electronic health records (EHRs), a digital prescription system, and medical chatbots. Additionally, the e-Health system branches off into 3 subsystems: e-Prescription, e-Health Records, and e-Ambulance (e-Estonia, 2023). Powered by a KSI Blockchain technology, Estonia's e-health system prioritizes data integrity, security, and managing all possible threats to the system and people's confidential information.

To paint a picture, patients are provided an e-Identity which provides an individual with an ID-card, a mobile ID, an e-Residency, and a smart ID, all used to streamline healthcare provision and work clearly and transparently with healthcare providers (e-Estonia, 2023). Additionally, the capabilities of X-Road and e-Identities (which are assigned to allow Estonians) allow citizens to even use these e-IDs to vote and pay bills in addition to navigating their healthcare system from the palm of their hand.

Some of the main pillars of the e-Health system include:

Electronic health records enable healthcare providers to access patient data from anywhere in the country, allowing for more coordinated and efficient care. This borderless digital patient profile grants Estonians access to a healthcare system built on inclusion, efficacy, and transparency. EHRs enable healthcare providers to share patient information and collaborate on care plans. This helps ensure that patients receive the appropriate care and services they need.

The digital prescription system makes it easier for patients to access their medications when they need to, whether it be for an emergency or a simple refill. On the practitioner side, e-prescribing systems allow healthcare professionals to send prescriptions directly to pharmacies, eliminating the need for paper prescriptions and reducing the risk of medication errors.

Estonia has transformed the healthcare workforce through **telemedicine and AI-powered diagnosis and decision support**. Telemedicine allows healthcare providers to offer remote consultations, monitor patients remotely, reach patients who cannot reach them (e.g. seniors, or patients with mobility/disability issues), and provide care in remote areas. Remote consultations have spurred the efficacy of healthcare workplaces, saving time and costly resources for both patients and doctors.

Medical Chatbots can be easily accessed on e-Health websites and quickly assist patients in identifying health problems and finding appropriate care. This improves access to care and reduces the burden on healthcare providers. When it comes to real-life human support, the AI-powered diagnosis and decision support system in Estonia significantly assists healthcare professionals in diagnosing and treating patients more effectively (Petrone, 2022).

The system uses algorithms to analyze patient history and data and provides healthcare professionals with recommendations on the best course of action. Medical chatbot technology has improved the accuracy and efficiency of medical diagnosis and treatment, leading to better patient outcomes.

Telemedicine can help to reduce the risk of infection in hospitals. By enabling remote consultations and reducing the need for in-person visits, telemedicine can reduce the number of people coming into the hospital, which in turn can help to reduce the spread of infectious diseases. Additionally, telemedicine can enable healthcare professionals to collaborate and consult with each other remotely, reducing the need for face-to-face confidential meetings and helping minimize the risk of infection transmission, and other things such as long travel time (Hasselfeld, 2020).

Patient-First Care

When designing a holistic and innovative healthcare workforce, at the core of this mission is the patient. A key objective of progressive healthcare is centering patient needs and patient autonomy. X-Road and e-Health are hugely holistic in the fact that it fosters **health sovereignty** and puts the patient in control of their own health and medical decisions. By granting access to a digital patient portfolio, Estonia's e-Health promotes patient autonomy and self-determination.

A system that prioritizes **patient autonomy** allows patients to have access to all of their medical histories. This gives them the choice to be more informed about their health status, better understand their medical conditions, and make more informed decisions about their healthcare. Access to medical history is critical for patients to understand their health conditions, monitor their progress, avoid unnecessary tests, and become more involved in their health rather than having a complete, and blind, reliance on medical professionals.

Government Policies Supporting Estonia's e-Health system

The Estonian government played a crucial role in the development and success of Estonia's X-Road and e-Health platform. From the early days of the X-Road platform to the integration of e-Health services, the government has prioritized the use of technology to improve public services and has worked closely with stakeholders to ensure the security, privacy, and reliability of these systems. This collaboration has been critical to the success of Estonia's digital infrastructure and offers important lessons for other countries seeking to implement digital solutions in healthcare and public administration.

Estonia's Policy Initiatives

Estonia has implemented several policies to regulate e-health and ensure the security and privacy of patient data. One such policy is the **Personal Data Protection Act**, which outlines the rules for the collection, use, and disclosure of personal data, including health data (Jackson, 2021). The act specifies the measures that must be taken to ensure the confidentiality, integrity, and availability of personal data. It also includes provisions for the rights of data subjects.

The **Estonian e-Health Foundation** is responsible for the implementation and management of the country's e-health system (e-Health– Estonian Digital Solutions for Europe, 2016). The foundation is governed by the Estonian Ministry of Social Affairs and is responsible for maintaining the security and privacy of patient data. The foundation has implemented several technical measures to protect patient data, including data encryption, access control, and regular data backups.

Another important policy is the **Health Services Organisation Act**; this act provides the legal framework for the provision of health services in Estonia (Momentum, 2023). The act specifies the roles and responsibilities of healthcare providers and also sets out the requirements for the collection, use, and disclosure of health data.

Estonia also has a national health information exchange, known as the **Health Information System**, which allows healthcare providers to share patient data securely (Momentum, 2023). The exchange is based on the X-Road technology and provides a secure platform for the exchange of health information.

FINAL ANALYSIS OF THE FINDINGS & LOOKING TOWARDS FUTURE OPTIONS

The healthcare system in Canada is going through a significant transition and radical transformation. It is widely acknowledged that digital enablement will improve service access, decision-making, and patient self-management. The introduction of virtual care to access clinical services during COVID-19 made this apparent. The question of how healthcare organizations will grow and maintain virtual care services now looms large.

In comparison to other industrialized nations, Canada's healthcare system is falling behind, particularly in terms of equity, access, care outcomes, and administrative efficiency, however, the overall quality of care is improving.

The COVID-19 pandemic accelerated innovation by exacerbating the uptake of novel techniques and procedures. Consequently, the pandemic has increased the need for change, and certain trends that were already influencing how healthcare will be provided in the future are becoming more significant. As the population will grow through immigration and natural growth, the demand for services will grow as well.

As discussed in the case study from Estonia, a specific digital infrastructure called **X-Road** was created and put into place to meet the needs and circumstances of citizens. Although Estonia's principles such as secure and effective data exchange can be used in other nations, putting such a system into place in Canada would require careful consideration of the nation's particular legal, jurisdictional, technological, and cultural settings.

The **Secure Key Concierge service**, which offers secure authentication and authorization for online services, is just one example of the numerous digital systems and initiatives that Canada has already implemented to enable efficient and secure data exchange between various public and private sector organizations. Also, any new digital infrastructure would need to be implemented while taking into account Canada's strict legislative framework for data privacy and security.

Although Estonia's X-Road may be applicable to Canada, putting such a system into place would need a thorough evaluation of Canada's unique circumstances and needs. Several nations have adopted X-Road as a result of its success, including Finland, which has put in place a very similar system called Suomi.fi.

This demonstrates that with the proper customization and localization, X-Road can be implemented and tailored to the settings of other nations. For countries like Canada that wish to digitize their public services and enable secure data sharing across diverse institutions, X-Road is an appealing model due to its security, efficiency, and replicability.

RECOMMENDATIONS FOR BUILDING A STRONGER HEALTH ECOSYSTEM IN CANADA

01 PURSUING NEW TECHNOLOGY

New technology is essential for building a unified and digitized health ecosystem. It improves efficiency, collaboration, data-driven decision-making, and patient empowerment by streamlining healthcare delivery, and mobilizing health data sharing to improve healthcare delivery.

02 RE-DESIGNING THE ORGANIZATIONAL STRUCTURE

Improving the organizational structure of Canada's healthcare system is vital to address labour supply issues and enhance system efficiency. It is essential to design an infrastructure that attracts and retains workers.

03 RE-EDUCATING A SKILLS-ENABLED WORKFORCE

A health ecosystem built with new technologies and an organizational system requires the drive and efficacy of a highly trained skills-enabled workforce. Quality training is essential for the healthcare workforce to keep up with an increased reliance on digitized services.

New Technology

Learning from the successful experience of Estonia, Canada can benefit from developing and refining its own e-Health ecosystem which serves to digitize context-rich health records, facilitate the access and utilization of health data, and improve both the coverage and quality of healthcare services.

In the case of Estonia, the first of the three aims are achieved through **e-Identities and e-Health Records**; the second is achieved through a multitude of interconnected networks and services including **e-Ambulance, e-Prescription**, and the overarching X-Road Platform; the third is achieved through the implementation of **medical chatbots and telemedicine**. While the same three functions should likewise be the goal for the digitization of the healthcare system in Canada, the actual technologies implemented should cater to the Canadian situation.

e-Ambulance

e-Health Records

e-Prescription

e-Identities

Medical Chatbots

Technological Advancements in X-Road
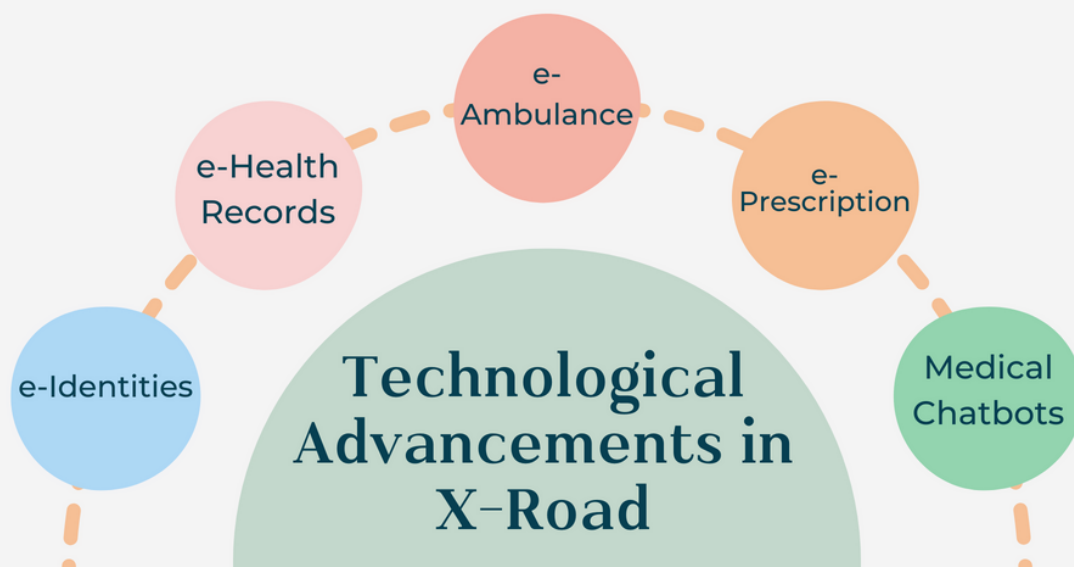
Stakeholders

Whether the technologies ultimately responsible for digitization will be developed domestically in Canada, acquired internationally, or a combination of both, many diverse stakeholders will no doubt be involved in the process. These include the following:

1. Canadian universities and research institutes from an informatic, STEM, and medical domain,
2. Technology companies, especially ones well-versed in the medical system and large-scale implementation,
3. Federal and provincial levels of government,
4. Patients, who in light of digitization may need to be divided into ones who are anticipating a smooth transition and ones who due to a disadvantaged socioeconomic background may be left behind,
5. Medical professionals who likewise may be divided into ones whose work will benefit from new digitization and ones whose function may be challenged or even replaced,
6. Healthcare providers based on size and funding are likely to have vastly different capacities to adopt the new digitization standards.

Challenges

Due to the amount of and variety of stakeholders involved, the development of a set of technologies that seamlessly integrate with each other will be a challenge in mobilization and coordination. Some sort of concerted government leadership, potentially in the form of a major private-public partnership, may be needed to accomplish the task on a national level. Furthermore, while a more decentralized model of digitization may better suit the different situations of each province, a more coordinated approach may amplify the network effect of data and thus provide more value.

As is discussed in the three dimensions of digital healthcare, technology development in this area needs to be mission-driven, i.e., it should be grounded in actual challenges currently experiencing while being mindful of the potential benefits. Thus, effective R&D will require a dense information network that relays information between the various stakeholders. A detailed scan of the current state of the healthcare system is crucial: a scan that contains both the bird's eye view of broader societal trends such as the aging population and a relative lack of senior and long-term care facilities.

It is crucial that any new technologies developed are in principle for the benefit of all. Due to the lack of access, rural area patients and the Indigenous population carry the risk of becoming invisible to the digitized healthcare system. However, the rise of e-Health and m-Health creates an opportunity to better reach and serve these communities if a conscious effort is made during the designing phase.

A New Organizational Structure

Canada's healthcare system faces challenges in terms of siloed and disconnected approaches to healthcare, and an urgent need to digitize healthcare and government. To address these challenges, Canada needs to move towards significantly restructuring the organizational structure of its healthcare system.

The way to accomplish this is through the mobilization of health data sharing between provincial and federal governments and between different areas of healthcare services (i.e., pharmacy, family physicians, specialists). By taking a decentralized approach to the current organizational structure, Canada can take significant steps towards designing a healthcare workforce that prioritizes efficiency, innovation, sustainability, and quality patient-first care.

Importance of Health Data Sharing

Canada is currently in a transitionary state as the potential future of health data sharing between provinces is looming. At this time, bilateral agreements between the federal government and the provincial government are underway as they discuss the future of our healthcare system. The federal government, as always, takes a fiscal stance on the matters at hand and, in exchange for the province's **cooperation** in sharing health data, is promising to make significant increases to the Canada Health Transfer. The questions we must ask at this time are how will data sharing help Canada, what are the challenges, and who are the relevant stakeholders.

Importance of Health Data Sharing

Sharing health data and having a consistent collection and unobstructed access to high-quality health data plays a significant role in research, macro-level decision-making, and organizational restructuring. A stronger organizational structure built on a holistic foundation of intergovernmental cooperation improves the delivery and design of healthcare services (both online and in-person) as we have seen in Estonia.

Currently, Canada has no national database for its diverse healthcare workforce which has over 100 health authorities and jurisdictions to conduct cross-analysis of the relevant human resource and organizational capacities and vital health data. This database would include everything from hospital wait times to staffing shortages, and real-time patient health updates as they navigate different services of the healthcare sector.

Additionally, as the COVID-19 pandemic highlighted, the sharing of and access to patient health data is crucial in the context of public health when it comes to detecting, preventing, and responding to health-related crises. According to the Pan-Canadian Health Data Strategy (2022), if Canada had a stronger health data-sharing foundation implemented then, the health disparities and poor outcomes Canadians faced during the pandemic would have been reduced in severity and countless lives would have been saved.

Stakeholders

In terms of stakeholders, the relevant actors include the federal government, provincial governments, territorial governments, healthcare providers, patients, and privacy advocates. The federal government must work with the provinces to establish a framework for health data sharing that meets the needs of healthcare providers and patients, while also addressing privacy concerns.

Healthcare providers must be willing to share data and adopt new technologies, while patients must be willing to consent to the sharing of their health data. Privacy advocates must be engaged in the process to ensure that privacy and data protection concerns are adequately addressed.

The holistic collaboration of these stakeholders is essential in restructuring the organizational capacity of our healthcare system through accessible data-sharing means.

Implementation Challenges

A move towards a more digitized form of healthcare is essential in restructuring existing, and inefficient organizational structures. This complex transition is met with various implementation challenges which can be seen as the source of Canada's lag in innovation when it comes to digitization, especially when compared to Estonia's success.

The implementation of health data sharing in Canada starts with the jurisdictional and legislative challenges that exist between the provinces and the federal government.

Legislative Challenges

As mentioned, the jurisdictional and legislative challenges to implementing health data sharing in Canada are rooted in the division of powers. Healthcare falls under provincial jurisdiction, which means that the provinces have control over the delivery and administration of healthcare services. The federal government's role in healthcare is limited to funding and supporting the provinces through the Canada Health Transfer (CHT).

This division of powers creates challenges for health data sharing because it requires cooperation and coordination between the federal government and the provinces. The federal government cannot unilaterally impose health data-sharing policies or systems on the provinces, as this would be seen as an infringement on provincial jurisdiction.

Instead, the federal government must work with the provinces to develop and implement health data-sharing initiatives that respect provincial jurisdiction and meet the needs of the different regions of Canada.

Educating the Workforce

Canadian healthcare organizations can be more adaptable and responsive to changes in the healthcare environment if their workforces are skill-enabled. Healthcare firms may better respond to new technology and changes in healthcare legislation, regulations, and best practices by investing in the growth of their employees. Overall, in today's complicated healthcare environment, a skilled healthcare workforce is essential for providing high-quality, patient-centered treatment. It can raise efficiency, lower costs, and boost patient experience overall while also enhancing healthcare outcomes.

Education & Training as a Means to Further the Digitization of Health

To advance the digitalization of health, education, and training are crucial because they give healthcare workers the information and abilities they need to use digital technologies to deliver high-quality patient care. The current healthcare personnel might not have the specific skills needed for digitization. Putting money into education and training can help close these skills gaps and provide medical personnel the know-how they need to effectively use digital technologies in patient care.

As discussed above, digitization has the potential to improve patient outcomes by enhancing communication and collaboration among healthcare providers, reducing errors, and improving access to healthcare services. Education and training can ensure that healthcare professionals have the knowledge and skills to leverage digital technologies in delivering better patient care. Moreover, it can help healthcare professionals understand how to use digital tools to increase efficiency and productivity.

Canada has the potential to become a global leader in digital health. By investing in education and training, Canada can create a highly skilled workforce that can drive innovation and help position the country as a leader in digital health. It can help improve patient outcomes, enhance healthcare efficiency, and position Canada as a leader in digital health.

Worker Retention

Providing education and training opportunities can give healthcare workers the chance to advance in their careers, which can lead to increased job satisfaction and a sense of accomplishment. This can also help to reduce turnover rates and retain staff. It can also provide workers to stay up-to-date with the latest advancements in their field, which can improve the quality of care they provide. This can also help to increase job satisfaction and reduce the risk of burnout. Investing in education and training can help healthcare workers to develop new skills and competencies that are essential to their roles. This can lead to improved performance, increased job satisfaction, and a sense of pride in their work.

Stakeholders

Investing in healthcare education in Canada can have numerous stakeholders who can benefit from it. Some essential stakeholders include:

1. **Healthcare professionals**: Investing in healthcare education can benefit healthcare professionals by providing them with the latest knowledge and skills required for delivering high-quality patient care.

2. **Patients**: Better-educated healthcare professionals can provide better healthcare services to patients, leading to improved health outcomes.

3. **Employers**: Investing in healthcare education can benefit employers by improving the quality of healthcare services provided by their employees and, in turn, increasing patient satisfaction.

4. **Government**: Investing in healthcare education can benefit the government by reducing healthcare costs through the prevention of diseases and the early detection of health problems.

5. **Educational institutions**: Investing in healthcare education can benefit educational institutions by providing them with the necessary resources to offer quality education and training to healthcare professionals.

6. **Research Community**: Investing in healthcare education can benefit the research community by providing them with a pool of knowledgeable healthcare professionals who can contribute to healthcare research.

7. **Society**: Investing in healthcare education can benefit society by improving the overall health of the population, leading to a healthier and more productive workforce.

Implementation Challenges

In Canada, investing in healthcare training and education can be difficult because it requires overcoming numerous implementation challenges. Securing financing is one of the major obstacles to investing in healthcare education and training in Canada. High-quality education and training programs can be expensive to provide, and the government may not always have the funds available to fund them.

Healthcare personnel may be averse to change, especially if they believe that new training and educational initiatives would interfere with their current workflow. It could be necessary to make a sizable investment in communication and change management techniques to overcome this opposition. Providing opportunities for **feedback and evaluation** is crucial to avoid implementation challenges and ensure the success of any new initiative. By soliciting feedback and involving stakeholders in the evaluation process, an organization can build buy-in and support for any changes made to healthcare operations. This helps ensure that stakeholders are invested in the success of the initiative and are more likely to help overcome any challenges that arise.

A wide range of **stakeholders** as discussed above, including governmental organizations, academic institutions, healthcare organizations, and professional groups, are involved in healthcare education and training. It can be difficult to coordinate various stakeholders and make sure that everyone is striving for the same objective.

Investing in **education and training** in healthcare requires significant investment in time, resources, and coordination among stakeholders. However, these investments can have a significant impact on the quality of healthcare in Canada and ultimately improve patient outcomes.
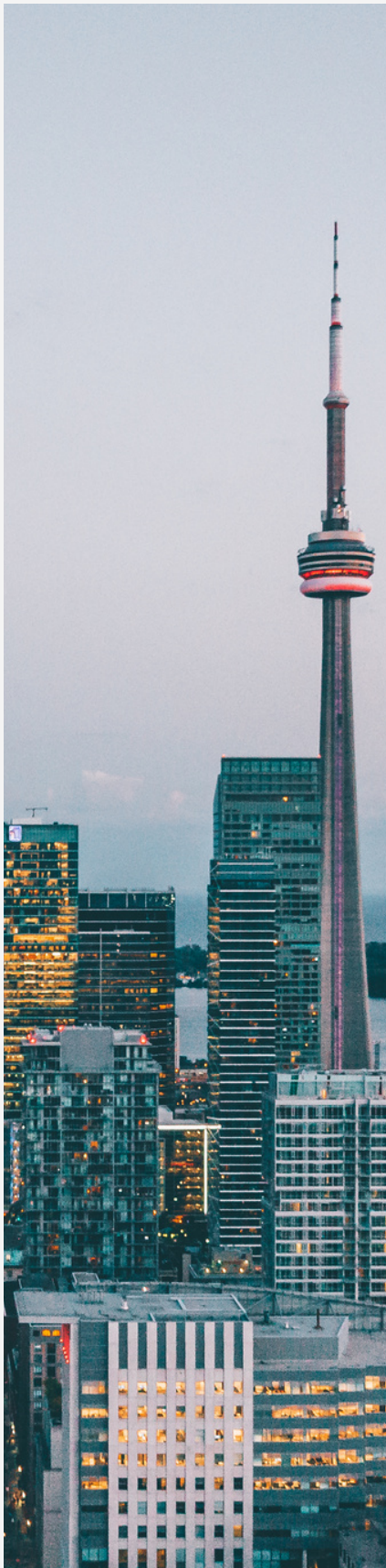
Summary

Looking to a new future for our healthcare system

The time has come to look forward to the future of the Canadian healthcare system and learn from our mistakes during the COVID-19 pandemic. We can look with confidence at the capabilities and opportunities Canada has to reinvent its healthcare workforce and organizational system to one situated within the digital age and a holistic health eco-system. There is much to learn from the challenges Canada's healthcare system has faced before, during, and in the recovery phase of the pandemic.

The workforce of healthcare professionals is going to face increasing challenges when it comes to providing quality and efficient care to patients and meeting the medical needs of our ageing population due to a limited workforce supply and lack of technological infrastructure. However, the emergence of AI and Big Data Technologies presents an opportunity to combat these issues, increase workforce productivity, and ultimately save lives.

Estonia's successful experience in advancing technological solutions to improve healthcare outcomes can serve as a model for Canada's own e-Health ecosystem development. There is much to reflect on in terms of Canada's capacity to digitize healthcare services and build a holistic and intergovernmental health ecosystem. Digitizing the healthcare system in Canada will require a concerted effort from a diverse group of stakeholders, including universities, technology companies, governments, patients, and medical professionals.

The development and implementation of new technologies should be mission-driven, financially sustainable, and benefit all Canadians, including those in rural and indigenous communities. Restructuring the organizational structure of Canada's healthcare system to mobilize health data sharing between provincial and federal governments and different areas of healthcare services is crucial. The shining light at the end of the tunnel is a digitally enabled healthcare system that can improve access to quality healthcare services for all Canadians.

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