

A large, semi-transparent watermark or background image of a modern city skyline at night, framed by the glass walls of a building in the foreground.

Health City

Scaling the New Health Economy

2020 Report to the City of Edmonton

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Message from the CEO

This year has been a year of execution for Health City. When we officially launched in 2018, we had a bold plan of transforming the health sector through innovation and this year we have demonstrated the art of the possible. With strong support from our partners, we have developed catalytic projects in the areas of virtual care, remote diagnostic imaging, home health monitoring and data for health. We successfully demonstrated a novel mechanism to enable safe use of health data by the community, students, and industry through the implementation of synthetic data. This has put Edmonton on the map nationally and is driving the conversation of how to leverage our data assets to drive our post pandemic recovery, place our ourselves firmly in the new health economy and drive job growth.

The unique challenges and needs of the health system during our pandemic response have opened opportunities to deploy these platforms in live health care settings, allowing us to validate the impact they will have on delivering care as well as growing regional companies and attracting companies from other jurisdictions to partner with us to demonstrate and scale these projects. These projects have also opened the opportunity to create collaborations with several emerging companies and enable a constructive dialogue with the ministries of Jobs, Economy, and Innovation, Health and Service Alberta along with a number of MLAs who are now champions and understand the power of the health sector in Alberta's recovery.

Our key goal for 2021 is to take the initiatives that we delivered on this year and scale them in ways that will tangibly transform health care and drive economic growth in our region. We want to sincerely thank all our collaborators, supporters and most of all, our innovative companies breaking new ground in many fields this year that will set us on a trajectory of economic prosperity.

Reg Joseph

Power of Community and Industry

Partnerships with PCNs

Global transformation in the health sector has targeted non-acute services focused on prevention and effective management of chronic diseases as opposed to episodic or urgent care. We believe this is particularly poignant for health care in Canada where, as a nation providing access to a relatively small population over a vast geography, this is one of our key challenges.

To address this hurdle, Health City has focused primarily on community-based care organizations such as Primary Care Networks (PCNs). Our approach has been to work with PCNs and other community-based organizations to address identified problems with innovative approaches while leveraging regional industry talent and solutions. The opportunity is then created for companies in our region to test and validate solutions here in Alberta and then export them globally.

With PCNs, the challenge most often brought forward is increasing clinicians' reach to patients. Three projects that we have initiated this year focus on remote-based diagnostic imaging, home health care monitoring and virtual care. With these projects, the technology platforms we have deployed will enable regional companies to test and validate their solutions here in Alberta.

Remote-Based Diagnostic Imaging

Health City's collaboration with WestView PCN, Alberta Innovates and Edmonton-based MEDO.ai, winner of the "Engineering of the Future" award from Falling Walls Venture 2019, serves to address a challenge in providing access to remote imaging for early screening while creating opportunities for other Alberta companies to trial and validate solutions in our health system. Data collected from our system will enable these companies to secure regulatory approval as well as the solution's cost-effectiveness vital to penetrating markets in the rest of Canada and globally.

The project specifically focuses on screening children with hip dysplasia (medical term for a hip socket that does not fully cover the ball portion of the upper thighbone) using ultrasound. The innovative technology is provided by MEDO.ai and their artificial intelligence which can apply to basic ultrasound known as Automated Real-time Intelligent Assistant (ARIA). This technology, when paired with a hand-held ultrasound device, enables use in the field by untrained individuals (with only an hour's worth of training) and eliminates the need to travel to a diagnostic imaging center.

"We consider ourselves incredibly fortunate to have had the support of Alberta Innovates and Health City as we've founded and grown MEDO to the exciting state that we're currently at. Not only have they provided ongoing advice and mentorship, but they've invested financially at numerous times to support our ambitious commercialization and research efforts. We have accomplished a lot, but feel like we are only beginning, and look forward to our ongoing relationship."

David Quail
Vice President of Technology | MEDO.ai

By creating a clinical pathway for any imaging method (e.g. x-ray, CT scan, ultrasound) and for any disease, this opens the opportunity to explore a variety of diagnostics solutions for multiple applications - tapping into different companies throughout the region to validate and scale many solutions for global export.

This project has already seen success including securing regulatory clearance and additional funds to broaden the trial. [MEDO.ai recently secured U.S. Food and Drug Administration](#) (FDA) 510(k) clearance for its solution. Though MEDO.ai is now actively exploring export to the United States, the company plans to develop their next three products here in Edmonton – believing that validating and testing locally is their best option. The current project partnership with Health City, WestView PCN and MEDO.ai has also resulted in successfully securing funding from Alberta Innovates' Accelerating Innovation into Care (AICE) program.

Home Health Monitoring

Patients living with multiple complex chronic conditions are at greatest risk of having adverse outcomes from COVID-19 infection. As the need for alternative care delivery models increases, health care organizations continue to look for ways to deliver comprehensive care remotely.

Health City has partnered with the Central Zone PCN (which includes 13 PCNs and covers a population of almost 500,000), along with Boehringer Ingelheim and Telus Heath to provide [Home Health Monitoring \(HHM\)](#) for chronic disease patients.

"Boehringer Ingelheim's collaboration with Health City & Central Zone PCN highlights our dedication to delivering innovative solutions that serve current and future health care needs. The Central Zone PCN Home Health Monitoring Project will not only improve outcomes for those most at risk in primary care, but also provide significant benefits to the health care system, such as reducing hospitalizations and overall health care costs."

Andrea Sambati

President and CEO | Boehringer Ingelheim (Canada) Ltd

[This project](#) provides patients an HHM kit to regularly record their own health data, while primary care nurses monitor the HHM system for alerts and follow up with patients by telephone as needed. This enables patients to upload, view and trend their daily biometric results, such as temperature and blood pressure, and interact with their clinicians from home. HHM dashboards allow for primary care providers to care more effectively for large numbers of patients at one time.

A unique feature of this project is the concept of "Bring Your Own Device", which creates opportunities for many companies to test, validate and trial their own HHM for a variety of chronic conditions.

The next phase of this project will expand the trial to more patients. This expansion will provide us the ability to measure outcomes, positive impacts, and costs to the

health system for procurement purposes. From an economic development perspective, we have created a mechanism for a variety of regional companies to test and validate their HHM solutions in a live setting while receiving immediate feedback from clinicians and patients.

Virtual Care

Seniors living in care facilities are a complex population, often with many health challenges combined, are at an especially high risk of infection during the COVID-19 pandemic. Many of these residents live in rural areas where access to health care services is limited and over 15,000 of these residents depend on the care of specialty pharmacy services. To address these risks, Health City brought together specialty pharmacy care provider CareRx and pharmaceutical company Boehringer Ingelheim to implement virtual care services for this population. These services aim to improve the safety and quality of care (while decreasing delays and reactive medicine) for this group.

With [this project](#), we are evaluating two different innovations. One is virtual care – enabling patients to access care while limiting their exposure. The second is using the expanded scope of pharmacists to serve as the first point of contact for primary care – allowing us to explore alternative paths of care delivery.

In terms of economic development, this collaboration has also attracted the participation of one of the fastest growing Canadian companies, CloudMD. This project is an example which showcases that by working with Canadian companies like CloudMD to scale, companies can better position themselves for global export.

“Virtual care platforms are expected to increase connectivity with residents and create more opportunities to provide timely, preventative care to those residents that need it the most.”

Ryan Stempfle

Vice President and General Manager
(Western Canada) | CareRx

Transformational Partnerships

Through bridging non-traditional partnerships and deconstructing silos, Health City can achieve its mandate to diversify our economy, drive policy adoption and provide support to regional health-based companies.

The Power of Data

One area that has often been discussed is the strength we have in our region around artificial intelligence and machine learning. Coupled with the power of the data within the largest health authority in Canada (covering a genetically diverse population of 4.4 million), this has been an unrealized opportunity. Health City has targeted this opportunity by launching a new approach for handling data privacy as well as deploying practical industry-driven projects using our local machine learning from both the University of Alberta and an Alberta-based SME.

Synthetic Data

One of the key focuses emerging from the Health City Working Groups is better access to health data. Balancing the need for access to high quality data while maintaining personal health data privacy is a key challenge. An approach known as *synthetic data*, the first of its kind in Canada, was explored and deployed here in Alberta to help address data access. This novel approach has the potential to put Edmonton on the map nationally.

"Remarkably, I was somewhat shocked to observe the research results could be replicated with a fairly high level of precision within synthetic data. These synthetic datasets will be extremely beneficial for researchers to share data across jurisdictions. They will also allow academics and students easier access to health data and support more efficient training of the next generation of health data scientists."

Dr. Dean Eurich
Professor | University of Alberta

[This project](#) is a collaboration of multiple organizations, including the Institute of Health Economics (IHE), Health City, Replica Analytics, University of Alberta and Alberta Innovates.

The approach focuses on developing a synthetic dataset that can be utilized directly by students, community researchers and industry. This approach also eliminates patient privacy concerns or contravening the Alberta Health Information Act, as synthetic data contains no real patient health information.

The first phase focused on validating synthetic data in an academic setting. A white paper outlining this project has been included in Appendix A. The results were positive both in terms of privacy and being reflective of the

original database. The project also attracted the participation of the Office of the Information and Privacy Commissioner of Alberta.

Once validated, the goal will be to share datasets without requiring ethics approval making synthetic data sets available to innovators, academic institutions, philanthropic organizations, or industry while still preserving patient privacy. Health City's involvement in this initiative demonstrates that by creating further opportunities for health innovation in Alberta, we can also drive opportunities for economic development in the province and beyond.

Machine Learning

Chronic conditions can be complex to manage and are one of the largest costs to Alberta's health care system. These conditions require consistent care management and can be burdensome for the patient as well as the health care system. This project focuses on utilizing and leveraging our province's existing strength in machine learning, to improve patient and health system outcomes, reduce costs and transform health care.

"In the 12 years since founding OKAKI, it is not an exaggeration to say that I have not worked with any organization able to catalyze projects and partnerships as effectively as Health City. Health City continues to create connections, open doors and advocate for AB health technology companies. They have definitely helped us move our ideas and innovations forward."

Salim Samanani
Founder & Medical Director | OKAKI

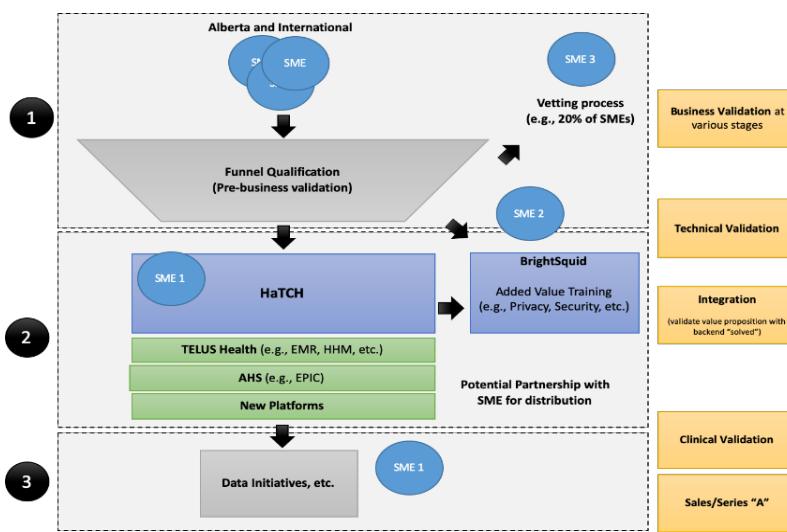
Through Health City's collaboration with Boehringer Ingelheim and Alberta-based OKAKI Health Intelligence Inc., this project aims to apply machine learning to Alberta clinical and administrative health data in order to predict the readmission risk within 30 days after discharge from a heart failure

hospitalization. We also can compare the performance of the machine learning models to that of other published predictive models. This pilot project hopes to demonstrate how the potential application of machine learning to population health administrative data can be used to develop predictive models for use in health care throughout Canada.

Funding has been secured and planning has begun for Phase II of the project, which will see partnerships with community-based physicians to validate the model's utility in heart failure prediction and intervention. This approach can be expanded to a variety of indications and uses, contributing to the economic development here in Alberta.

Recently Launched Health City Projects

Increasing Accessibility – HaTCH



Health City was recently approved for funding for the HaTCH Project, a collaboration with Western Economic Diversification, Telus, Alberta Health Services and regional SME Brightsquid. One of the most time-consuming and costly pieces for digital health startups is getting connected to the Alberta Health Services information technology backbone which is estimated to take up to 5 years and cost \$5 million. This is an investment that SMEs are unable to bear, especially because their focus needs to be on their product features not backend

integration. The HaTCH system will provide a platform for these companies to plug-in to existing technologies with much of the security, quality and robustness simplified already addressed. This can decrease the length of this process to 6 months and the costs down to \$100,000, allowing these companies to accelerate their testing and validation in our health system.

Mentorship Opportunities – TEC Edmonton/PRIMED

There are handful of established health companies that are well-positioned to provide coaching and guidance to emerging companies in our community. Just over a year ago, Health City engaged these companies by merging with the Alberta Health Industry Association (AHIA) board and our board established them to serve as Health City's Industry Advisory Committee. We believe that the best mentors to SMEs are successful companies. We have established a collaboration with one company from this group, PRIMED, and TEC Edmonton to create direct one on one coaching opportunities.

Industry Coach: **Medical Devices**

POWERED BY:



Working Groups

Health City's working groups have helped guide targeted projects led by our organization – the use of synthetic data being just one example. One of the goals of the working groups was to open opportunities for other organizations to organically drive initiatives and projects in our sector to “rise all tides”.

We recently highlighted some of these initiatives in a virtual event co-hosted with Deloitte leveraging a collaboration that we kicked off when SingularityU Canada held its conference in Edmonton back in spring 2019. Besides the Health City driven projects, there were also projects such as the [Amii/Roche National Artificial Intelligence Centre of Excellence](#) and the University of Alberta Health Accelerator, along with many others.

We believe we have achieved our goal in developing a community that self-starts innovative initiatives and is driving economic development in the health sector in unique ways. We no longer feel the need to continue with a formal working group structure but will continue to “plug in” and catalyze collaborative and initiatives where relevant. We see the working groups evolving into a celebration of health innovation as more companies, organizations and groups bring new innovations in health to the market.

Community Outreach & Media

Despite the challenges of the pandemic, Health City has continued to use our voice to create and participate in innovative discussions throughout 2020.

Future of Health



In 2020, Health City released 10 episodes as part of our Future of Health series. Collectively, the videos have amassed over 12,000 views and impressions on YouTube. Topics ranging from virtual care to vaccine development were featured and showcase Health City's scope and influence in our region. 12 local innovative health companies were showcased as part of this series.

Health City Talks

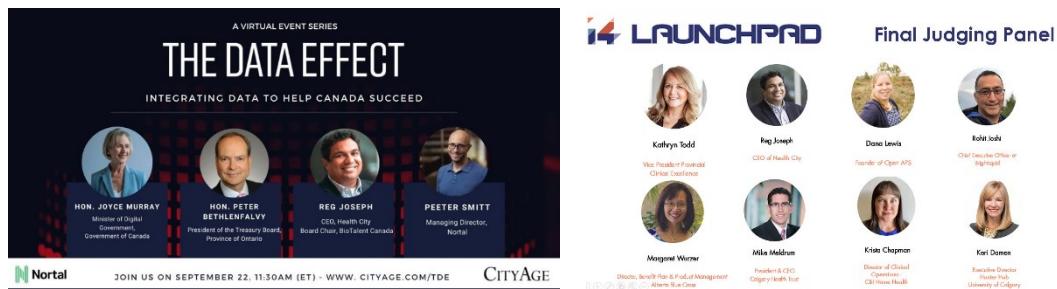
Health City has been able to pivot during the pandemic by providing virtual opportunities for companies, academic institutions, philanthropic organizations, and innovators to connect and share their innovative stories. The Health City Talks series showcased 18 different local companies, highlighting Edmonton's strength in virtual care, philanthropic organizations, and community outreach over five different discussions, moderated by Taproot Edmonton.



1. **Health City Talks: Virtual Care** featuring Maple, Shoppers Drug Mart, and Brightsquid.
2. **Health City Talks: Virtual Care – Episode 2** featuring Canadian Medical Association, Alberta Medical Association, and Brightsquid.
3. **Health City Talks: Philanthropic Organizations** featuring University Hospital Foundation, Calgary Health Trust, Stollery Children's Hospital, and Alberta Children's Hospital Foundation.
4. **Health City Talks: Why Alberta** featuring New West Networks, Forest Devices, RRP, and Protxx.
5. **Health City Talks: Citizen Care Pods, Parts I & II** featuring Citizen Care Pods, PCL Construction, Carpenters' District Council of Ontario, and Connectus Global.

Panels & Speaking Engagements

The Health City team has spoken and participated in more than 20 panels and webinars during 2020. Highlights include judging the i4 Launchpad Pitch Competition and representing Health City at the *CityAge: The Data Effect* as a panelist.



Media Coverage

Health City's voice and expertise has been showcased in numerous publications and media throughout 2020, including:

- National Post, Canadian Innovation Special Interest Feature – [Innovation Could Be the Solution to Canada's Growing Health Care Crisis](#)
- Modern Luxuria Magazine – [Disrupting Healthcare](#)
- Canadian Healthcare Technology – [Alberta rural patients trial new home health technology](#)
- Edmonton Journal – ['Information in front of us:' Home-based health monitoring trial for rural patients](#)
- Global News – [Virtual Care in Long Term Care Facilities](#)
- Canadian Healthcare Technology – [Tele-pharmacy project launched for LTC residents](#)

Health City put out 4 press releases in 2020. For more information, view Appendix B.

MLA's GOA Conversations

Emanating from the Central Zone project, Health City met with MLAs from jurisdictions in the Central Zone in 2020 (with many conversations coming in 2021). Please see Appendix C for all MLAs we have met with.

Podcasts & Publications

- Podcasts
 - [Alberta Impact with Bryce Lambert: Fixing Healthcare in Alberta and across Canada](#)
 - [Healthcare Management Forum Podcast: Transforming health and driving economic development](#)
- Publication – Healthcare Management Forum
 - Health City - Transforming health and driving economic development - Appendix D

What's Next

Throughout 2020, Health City's community and PCN approach has allowed us to forge new opportunities through new care pathways. In 2021, we will continue to expand on these pathways while working to join health transformation with economic development.

WD Cluster & Funding

Alongside BioAlberta, Health City is working to create a cluster around health analytics diagnostics, which will be the first of its kind. With the support of Western Economic Diversification Canada (WD), the cluster will become an investment platform for WD and a place of intervention in the health space.

The focus of the cluster is to invest in platforms that enable companies to rapidly accelerate their product development towards real-world use.

The Power of 5G & Internet of Things – Edmonton Global & Beaumont

5G is the next generation of wireless access that will drive a significant shift in how many of our wireless tools will be used in the future. The health sector will be a benefactor of 5G implementation. Health

City has partnered with Edmonton Global on their 5G initiative that will provide guidance and lead key initiatives for the health sector.

The city of Beaumont is also involved in the above initiative and are positioning Beaumont to be a 10G community. Health City has executed a Memorandum of Understanding with Beaumont to explore opportunities for high-availability networks to develop next generation health applications while demonstrating their value in Beaumont.

Post-Secondary Institutions – GRPC, MacEwan, NorQuest

Workforce training and readiness will be a key factor in fueling our economic growth. Many of Alberta's smaller universities and colleges have taken a proactive approach to augmenting training and providing additional "out of classroom" experiences to enhance learning in our rapidly changing economy.

Health City is partnering with many institutions including MacEwan University, Grand Prairie Regional College (GRPC), NorQuest College and others to explore initiatives and projects that will meet Health City's mandate while providing their students extra-curricular training opportunities.

Health City Operations and Team

Formed as a Federally incorporated not-for-profit organization in 2018, Health City continues to focus on cost-effective ways to conduct day-to-day operations. Our team includes a small group of highly skilled professionals with health care and business backgrounds. We leverage local contractors and companies to provide additional support and expertise as needed.

Our Team:



Reg Joseph
CEO



Antonio Bruni
Director, Business
Development



Lisa Laferriere
Director, Business
Operations



Rebecca Keichinger
Executive Assistant



Justin Pitt
Administrative Assistant

Our Board of Directors:



Jason Pincock –
Board Chair
CEO, DynaLIFEDx



Randy Yatscoff –
Vice Chair



Mel Wong - Director



Dianne Balon - Director
Vice President of
Government, Alberta Blue
Cross



Jim Saunderson -
Director

Information regarding the [Health City Steering Committee](#) is available on the Health City website.

2021 Budget

REVENUE

Grant	985,000
Industry *	330,000
Service Agreements	45,000
Other	2,500
Total Revenue	1,362,500

EXPENSES

Salaries & Benefits

Salaries Sub Total	633,147
Employer Cost & Benefits Sub Total	31,666
Total Salaries & Benefits	664,813

Business Development

Conference Registration	5,000
Conference Related Travel	10,000
Contractors / Consultants	80,000
Hosting / Events	2,500
Internships	7,000
Memberships & Subscriptions	5,000
Meeting Related Travel	3,000
Professional Development	1,500
Sponsorship	7,500
Ticketed Events	1,500
Business Development Sub Total	123,000

Marketing and Communications

Advertising	41,800
Contractors / Consultants	60,000
Marketing & Communications Sub Total	101,800

Operations

Board Expenses	600
Accounting, Legal, Bank Fees	30,000
Contractors / Consultants	500
Insurance	2,500
IT & Telecommunications	9,000
Rent	105,000
Professional Development	1,250
Technology	8,000
General Office	2,537
Operations Sub Total	159,387

Projects

Project Expenses	313,500
Total Expenses	1,362,500
Forecasted Cash Balance	-0

*Only includes amounts from signed agreements – additional funds expected but not forecasted

2020 Metrics

GOAL 1

Foster a health innovation ecosystem that provides an unparalleled environment for success for health innovation

Goal	Metric
1.1. Number of innovation projects/initiatives that either drive diversification, health adoption, or supports regional Small to Medium Enterprises getting products to market (attributed by Health City support)	10
1.2. Number of partnerships created or developed around health innovation	18
1.3. Number of new companies attracted to plug into or to re-engage the health ecosystem:	
1.3.1 Multinational Enterprises	9
1.3.2 Small to Medium Enterprises	11
1.3.3 Start-ups	27
1.3.4 Community stakeholders	23
1.4. Examples of projects related to artificial intelligence, machine learning, augmented or virtual reality and blockchain and internet-of-things (IOT) that have been translated into drivers of industry growth (attributed by Health City support).	
Synthetic Data <i>In collaboration with the Institute of Health Economics (IHE) and Alberta Innovates, this Health City project focuses on developing a synthetic dataset that can be utilized by small and medium-sized enterprises (SMEs) and multinational enterprises (MNEs) for their own purposes, with direct access to the dataset. Because synthetic data contains no real patient health information, the datasets have the potential to be shared freely without raising patient privacy concerns or contravening the Alberta Health Information Act. This novel technology is the first of its kind in Canada and puts Edmonton on the map nationally.</i>	
Remote Diagnostic Imaging <i>Health City's collaboration with Edmonton's own MEDO.ai serves to address a challenge in providing access to diagnostic capabilities for early screening problems while creating opportunities for other Alberta companies to do the same. The project, a collaboration with MEDO.ai and WestView PCN, specifically focuses on addressing early testing for pediatric hip dysplasia using ultrasound aided by Automated Real-time Intelligent Assistant (ARIA), but the opportunity is much broader. By creating a clinical pathway for any modality and for any indication this opens the opportunity to explore a variety of diagnostics solutions for multiple applications - tapping into different companies to validate and scale each.</i>	
Machine Learning <i>Through Health City's collaboration with Boehringer Ingelheim (BI) and OKAKI Health Intelligence Inc. (OKAKI), this project aims to apply machine learning to Alberta clinical and administrative health data to predict the readmission risk within 30 days after discharge from a heart failure hospitalization, as well as compare the performance of the machine learning models to that of other published predictive models. This pilot project also hopes to demonstrate how the potential application of machine learning to population health administrative data can be used to develop predictive models for use in health care throughout Canada.</i>	

GOAL 2

Edmonton becomes a destination of choice for health innovators, leaders, entrepreneurs, and researchers.

Goal	Metric
2.1. Number of student group events coordinated/developed/organized	2
2.2. Number of internships and mentorship opportunities spearheaded	15
2.3. Dollars secured to fund talent opportunities	\$6,825
2.4. Number of new employees created in industry, equated to Health City support	7

GOAL 3

Create a policy environment that accelerates the development and growth of the health innovation continuum, from discovery to commercialization and application.

Goal	Metric
3.1. Number of health innovation companies and organizations have accessed local health data (attributed to Health City)	5
3.2. Examples of policy related work that has advanced the development and growth of the health innovation continuum.	

Health City's model of driving health transformation and economic development is gaining traction at all levels of government. In addition to a Government of Alberta and Industry Roundtable held in early 2020, we met with 11 local MLAs, 5 of which are Ministers. Provincially, our message around the health economy being a driver of growth in Alberta has been well-received and championed by these MLAs.

Provincial Health Cluster

Western Economic Development Canada (WD), via leadership from Justin Riemer (Assistant Deputy Minister), has launched an initiative to develop an economic cluster in Alberta around health analytics and diagnostics. These subsectors were identified in a consultant's report as areas of strength and high growth in Alberta. The goal is for industry and government to work together to build platforms that enable industry to scale as opposed to funding individual company projects. Through this initiative, Health City has secured an investment from WD to implement a platform that enables companies to "plug into" the Telus Electronic Medical Record (EMR) backbone (Telus is the largest EMR vendor in Alberta) quickly and cost effectively to rapidly trial novel digital health applications; saving individual start-ups up to \$5 million dollars and years of effort in backend security and integration work to connect with Alberta Health Services information systems.

Data with OIPC

One provincial strength for Alberta that is often boasted about is data. The power of having Canada's largest health authority (Alberta Health Services) serving over 4.4 million people with broad genetic diversity, is a gold mine in terms of driving better health outcomes and economic development for our region. The challenge, however, is privacy of personal health information. Many approaches including "data de-identification" while interesting, have not been

able to adequately address privacy concerns. Health City and partners, including the University of Alberta, the Institute of Health Economics, Alberta Innovates and others, have successfully completed a pilot using a technique known as synthetic data. Synthetic data has been demonstrated to be the most effective approach thus far in terms of protecting personal health data while maintaining analytics utility. This pilot project has been reviewed and validated by the Office of the Information and Privacy Commissioner of Alberta (OIPC). In fact, the OIPC has joined the project team for the next project which will trial an industry driven (multinational company) project in Alberta. This is unique for Canada and positions Edmonton as a leader and can serve as a model for Canada in the field of health data.

AHS Trial Process

One challenge in Alberta (actually, in Canada overall) is the inability for companies to trial and validate novel solutions in our health systems. These trials are critical for companies to secure regulatory approvals and more importantly, to generate data on product utility and cost-effectiveness from the health system that companies leverage when exporting these solutions to other regions in Canada or globally. The issue is that most health systems in Canada connect such trials directly with procurement. Canadian health procurement of innovation is outdated and risk averse (here is an article on this from a mentor of mine – this is reference for the readers of this email only and is not for reporting purposes). The preference is often for products and solutions provided by large established companies (usually multinational) with data from other jurisdictions outside of Canada. From a global perspective, the health sector in Alberta for any given product is relatively small and while being able to sell in Alberta would be desirable, the true value for Alberta companies is the ability to rapidly validate a particular solution to prove its market value proposition and use that data to penetrate broader markets. Based on projects that Health City has worked on trialing novel solutions such as remote based diagnostic imaging in community-based organizations e.g. Primary Care Networks (PCNs), we believe this approach can and should be scaled to acute care. Health City approached the Ministers of Health and Jobs Economy & Innovation (JEI) with a challenge to figure out a mechanism to achieve rapid validation trials in Alberta as a platform to scale regional companies. Health City received a positive response from both ministries and a joint ministry meeting with Health City has been set for December 1, 2020. Developing a solution to rapidly validate innovations in Alberta's health system, will position Alberta as a leader in Canada and will likely serve as a model for the rest of the nation.

GOAL 4

Accelerate access to finance, capital, and institutional investment whilst removing financial barriers to growth.

Goal	Metric
4.1. Amount of funds attracted to the ecosystem, attributed by Health City support:	
4.1.1 Federal government	\$155,000
4.1.2 Provincial government	\$520,000
4.1.3 Industry	\$17,026,000
4.1.4 Other organizations	\$293,500

GOAL 5

Solidify Edmonton's reputation as a leading health innovation ecosystem.

Goal	Metric
5.1. Number of Edmonton Health City social media interactions	
<i>In 2020, Health City saw a 24.7% increase in Twitter followers (1241 in 2019 to 1548 in 2020). After launching a new LinkedIn page in July 2019, we have climbed to a respectful 1034 followers.</i>	
5.2. Number of speaking engagements to build awareness and Edmonton's brand	24
5.3. Describe examples of how Health City is known as the unified voice and convergence point for the health innovation	
<i>Despite the challenges of a worldwide pandemic, Health City has continued to use our voice to create and participate in innovative discussions in 2020.</i>	
<i>We released 10 episodes in our Future of Health series which collectively amassed over 12,000 views and impressions. Topics ranging from Virtual Care to vaccine development were featured and more than 12 local innovative health companies were showcased in this limited series.</i>	
<i>In April 2020, the first Episode of Health City Talks was released. This series of virtual panel discussions covers topics that highlight our region's strength in Virtual Care, Philanthropic Organizations and Community Outreach. To-date, 5 episodes featuring 18 different Alberta companies have been released and has attracted a combined total of 573 viewers. Filming will continue into 2021.</i>	
<i>In addition to our virtual online work, Health City has participated in more than 20 panels and webinars throughout the year. We have also been featured in several publications including National Post, Canadian Innovation Special Interest Feature, Global News, Canadian Healthcare Technology, and Edmonton's own Modern Luxuria magazine.</i>	

Table 1: Twitter

	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Impressions	38.6K	34.7K	41.3K	61.3K	63.3K	50.3K	38.7K	39K	39.9K	41.7K	38.5K	35.6K
Engagement Rate	1.10%	1.40%	1.30%	1.10%	1.40%	1.50%	1.90%	2.50%	1.70%	1.70%	1.70%	1.50%
Follower Increase	18	27	46	48	35	20	27	22	23	20	11	29
Clicks	122 (avg 4 per day)	85 (avg 3 per day)	78 (avg 3 per day)	97 (avg 3 per day)	185 (avg 6 per day)	181 (avg 6 per day)	89 (avg 3 per day)	241 (avg 8 per day)	102 (avg 3 per day)	61 (avg 2 per day)	59 (avg 2 per day)	60 (avg 2 per day)
Number of Posts	34	25	36	56	48	46	45	53	60	71	52	57

Table 2: LinkedIn

	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Impressions	10.8K	7.9K	10.1K	16K	6.9K	8.3K	8.2K	11.6K	9.4K	5.5K	7.8K	6.6K
Engagement Rate	5.90%	6.10%	6.50%	5.60%	5.70%	5.80%	9.80%	5.70%	5.40%	6.60%	5.46%	4.67%
Follower Increase	68	78	131	139	101	81	54	59	30	34	30	26
Clicks	438 (avg 14 per day)	279 (avg 9 per day)	365 (avg 12 per day)	579 (avg 18 per day)	243 (avg 8.1 per day)	307 (avg 9.9 per day)	254 (avg 8.5 per day)	414 (avg 13.4 per day)	294 (avg 9.5 per day)	336 (avg 11.2 per day)	230 (avg 7 per day)	193 (avg 6 per day)
Number of Posts	26	20	28	35	38	35	37	39	39	43	33	32

Synthetic Data

Case Study: Sharing Complex Health System Data

Appendix A

Synthetic Data

Case Study: Sharing Complex Health System Data

Background

Accessing individual level-health data is a process that can be convoluted and time consuming and can act as a significant barrier to the health innovation community. Data accessibility is a difficult endeavor and many organizations that have shown interest in health data have not been able to harness the potential power of this data.

New methods, such as synthetic data generation, have the potential to unlock the historically siloed and difficult-to-access data sets, and provide a channel for readily available access in a secure and reliable manner. Synthetic data is not considered to be personal information because there is no one-to-one mapping between the synthetic records and real people.

In this R&D project, we wanted to answer the question of whether synthetic data can be analytically useful and at the same time protect patient privacy. We synthesized a complex longitudinal health system dataset and evaluated its utility in a typical series of epidemiological analyses.

Objectives

The benefits of demonstrating that synthetic data can replicate estimates derived from longitudinal real-world -individual level data are:

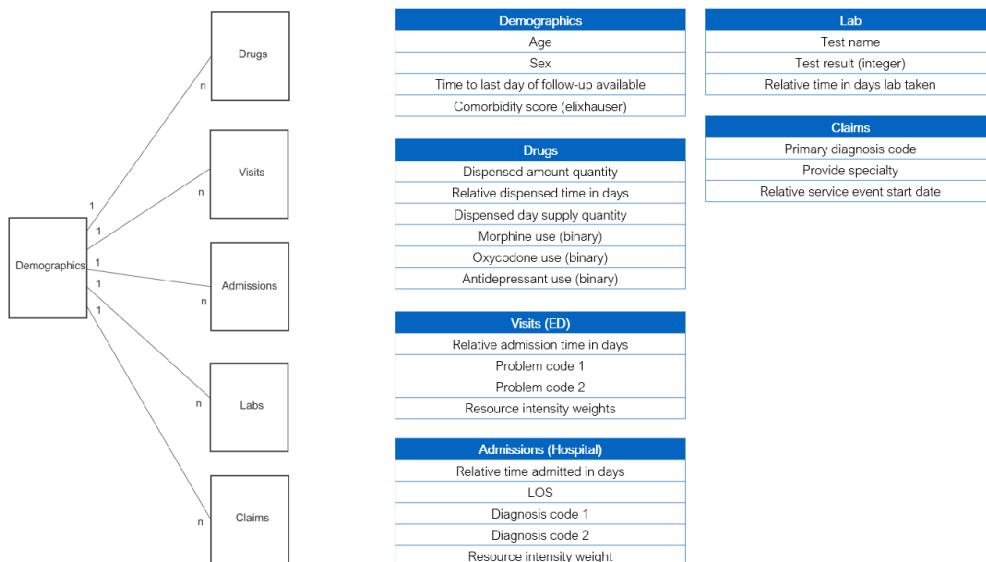
- 1) It would allow data to be made portable and, as a result, these datasets could be shared with researchers and industry partners outside of their respective jurisdictions without concerns related to the HIA or privacy - facilitating other research which is currently very difficult or not happening outside of the jurisdictions.
- 2) By allowing this data to be portable, researchers would be able to combine individual level data from multiple jurisdictions to conduct analyses at the individual level. This would be particularly appealing for exposures or endpoints that have low frequencies in any one population as the combination of the populations would increase statistical power and allow for the identification of rare but important exposures or events in populations. This also overcomes the current approach of running underpowered models within each jurisdiction and then combining the results through meta-analytical techniques.
- 3) From an economic development perspective, synthetic data enables investigation from the business and health innovation community to accelerate activities and levels the playing field for smaller companies or start-ups to enable product development, evaluate product market fit, and related commercialization activities.
- 4) Positive results also reduce the privacy and security risk and can attract organizations seeking access to health data to the province and country, leading to related economic development outcomes.

The project was performed as a collaboration among multiple organizations, including IHE, Health City, Replica Analytics, University of Alberta, and Alberta Innovates. Along the way, consultations with the provincial privacy commissioner were key to ensuring that the approach taken was transparent and benefited from regulatory feedback.

The Project and Data

The specific project to kick-off this effort focused on a single complex health dataset that combined administrative and clinical information. The dataset that needed to be synthesized consisted of 300,000 patient records covering multiple events per patient. Some patients had a handful of events and others had tens of thousands of events over a seven-year period. The domains covered in the data included drugs, laboratory results, emergency department visits, hospital admissions, and doctors' visits.

Data synthesis proceeds in two general steps. The first is to train a generative model on the original data. This training captures the patterns in the original dataset. Then the generative model is used to synthesize a new dataset that is based on the patterns that were captured during training. The generated data comes directly from the model and is not derived from the original data.



The objective was to create a generative model from this dataset such that the synthesized data would replicate analytic patterns. Specifically, the synthetic data was assessed based on how well models of mortality and other events (such as hospitalization) agreed with models built using the real data.

Solution & Outcomes

A deep learning model was developed to generate synthetic data. The model captured the baseline characteristics of the patients as well as their sequence of events and event attributes. Novel approaches were needed to address the heterogeneity in the data, and to leverage the history of events to generate valid subsequent events for each patient.

To validate the approach, some general comparisons of the original and synthetic data were performed. The comparisons showed that both datasets were quite similar. In addition, Cox regression models to predict various outcomes were also developed. The real and synthetic model were very similar with high confidence interval overlap (see the summary in the sidebar).

To address privacy concerns, a privacy risk assessment was performed to evaluate the likelihood that records in the synthetic dataset can be matched with real individuals. The results of that assessment demonstrated that the meaningful identity disclosure privacy risks were below commonly used risk thresholds by approximately an order of magnitude (see the summary in the sidebar).

Overall, we were able to demonstrate that a deep learning generative model can capture the key characteristics of a complex longitudinal health dataset and generate realistic synthetic variants. The synthetic variants had an acceptably low identity disclosure risk.

This approach allows data users to access the synthetic data with minimal constraints, but still provide privacy protection. As the technology is scaled, this will provide a means to rapidly make data available to a broad community of users and drive innovation within the province.

How Safe is Synthetic Data?

As part of this project, we evaluated the privacy risks of the generated synthetic data. The focus was estimating the probability to which a synthetic record can be correctly linked to a real person *and* learning something new about that person from the synthetic data. We determined that this probability was 0.0019 (less than half a percent), which is very low and lower than generally accepted thresholds for privacy risks. In general, it is always good to be prudent and evaluate the privacy risks in synthetic data, and we have a well-documented methodology for doing so.

How Good is the Quality of Synthetic Data?

The synthetic data was evaluated using multiple approaches. The first is to use generic metrics that compare the structure of the synthetic data to the real data. For example, we compare whether the number and type of events in the synthetic data are similar to those in the real data. The second approach is to perform a substantive epidemiological analysis on both datasets and see if we would draw the same conclusions. In the current project we built models to predict mortality and hospitalization.

Our results indicated that the synthetic data was similar to the real data structurally, and the substantive conclusions that would be drawn from the statistical models would be the same, even for complex multivariate models. This gives us some assurance that the synthetic data can be a useful proxy for real data in a number of specific use cases.

Future Opportunities

We see synthetic data as a precursor ‘funnel’ to *bona fide* health system data. Many health data requests are not developed or robust enough for direct access to health data. Yet, it is difficult for potential users to have sufficient data literacy without access to actual data (chicken/egg problem). We believe synthetic data addresses this problem by enabling users to better understand and refine their project or study parameters enabling them to have a well-developed data request prior to using actual health data.

Deploying synthetic data sets in areas of public health concerns will enable provincial health systems to freely partner with academic institutions, institutes or philanthropic organizations, or industry to broaden their talent pool of data scientists as well as data sets (such as social indicators of health).

A similar access challenge exists with artificial intelligence and machine learning projects. These projects often do not have a targeted question with defined parameters established but rather, are exploratory in nature and look for compelling artifacts or correlations in the data that one would not typically predict. However, securing ethics approval for such studies can be challenging. From an academic perspective this restricts the ability of exploratory data science research and limits our ability to train the next generation of health data scientists. Synthetic data sets would offer a safe way to make health data broadly available to many researchers and students for training and data literacy.

The concept of virtual clinical trials has been around for some time but here too, personal health data privacy is also a concern. The ability to leverage synthetic data techniques to better design clinical trials by testing hypothesis on synthesized data sets has the potential to enable rapid study design before ever touching a patient. The ability to integrate patient-facing input such as apps or other forms of data capture while maintaining privacy is a significant opportunity to transform how clinical trials are conducted.



Health City is a Canadian not-for-profit Corporation that works with clinicians, innovators, philanthropic organizations, and companies to develop new pathways of care that can drive better health outcomes and economic development in the health sector. Our focus is on transforming innovations from our health sector into solutions that have commercial application and global relevance, adopting them for impact locally and scaling them for export to global markets.

For more information, visit www.edmontonhealthcity.ca.

2020 Health City Press Releases

Appendix B

[Local Company uses AI to Bring Screening to the Point of Care](#) – MEDO.ai project

Source: Health City

May 26, 2020 06:00 ET

Local Company uses AI to Bring Screening to the Point of Care

Edmonton Innovator Develops World-Class Technology to Drive Better Outcomes

EDMONTON, Alberta, May 26, 2020 (GLOBE NEWSWIRE) -- Health City is pleased to announce a collaboration between MEDO.ai, WestView Primary Care Network and Alberta Innovates to initiate a key pilot study of MEDO.ai's artificial intelligence-augmented 3D ultrasound platform.

Edmonton-based MEDO.ai, following their "Engineering of the Future" award from Falling Walls Venture 2019 in Berlin, and has been accepted into the Alberta Innovates' Accelerating Innovation into Care (AICE) – Market Access Program. AICE is a key entrepreneurial ecosystem support program that provides digital health tech companies in Alberta with the opportunity to implement their innovative solutions in a real-world setting anywhere in North America.

"We could not be more excited about our partnership with the WestView Primary Care Network and Health City," stated David Quail, MEDO.ai's Vice President, Technology. "This partnership not only represents an opportunity to prevent hip osteoarthritis for thousands of Albertans every year but is also a critical step towards delivering MEDO.ai's artificial intelligence-based products into care. We now have the opportunity to deliver a service to remote and rural communities, which would normally only be available at large hospital centres."

By introducing this innovative new technology at the point of care, the solution has the potential to be deployed in remote communities that do not have ready access to major centres and hospitals. Early intervention drives better patient outcomes and reduces overall costs to the system.

"This is a fabulous example of the kind of collaboration that can occur between primary care and the other parts of the health care system to bring better care to more of our population. It is a real opportunity to promote better health care solutions through innovation," stated Dr. Allan Bailey, Director of Research and Evaluation, WestView Physician Collaborative and WestView Primary Care Network.

"Our local innovators are working to improve the lives of Albertans in direct partnership with health care providers," shared Dr. Antonio Bruni, Health City's Director, Business Development. "They are developing tools and creating a platform to test these solutions in real-case settings. We recognize that funding programs, like AICE are also instrumental in moving these initiatives forward."

Health City seeks to engage strong local leaders with a global vision. This project demonstrates the true spirit of collaboration and the potential to transform health for better outcomes and economic development. Technology in the community is the direction that health is going, and Alberta is taking a bold step to make this happen. Our region is a hub of world-class technology, talent, and innovation.

This collaboration brings innovative new technology to the point of care. Alberta-developed health care solutions provide local impact with global relevance — providing better access for patients and better tools for clinicians. Health City takes tremendous pride in showcasing the world-class technology and talent of the region.

About MEDO.ai

MEDO is an artificial intelligence technology startup company headquartered in Edmonton, Canada. MEDO builds cutting edge artificial intelligence that pairs with ultrasound devices to facilitate novice users' ability to detect common and critical conditions, even in remote and rural areas. MEDO believes that such technology will transform ultrasound for the 21st century. For more information, visit <https://medo.ai/>.

About Health City

Health City is an economic development organization that catalyzes, accelerates, and connects the health innovation community in Edmonton and surrounding regions. Health City promotes collaboration to create a vibrant health industry with improved health and social outcomes for our citizens. Our focus is on transforming innovations from our health sector into solutions that have commercial application and global relevance, adopting them for impact in Edmonton, and scaling them for export to global markets. For more information, visit www.edmontonhealthcity.ca.

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Source : Health City

07 juil. 2020 08h00 HE

Central Alberta Patients Participate in Home Health Monitoring Trial

Rural Patients Gain Access to an Innovative Model of Care

EDMONTON, Alberta, July 07, 2020 (GLOBE NEWSWIRE) -- Patients in central Alberta are participating in a home health monitoring technology trial. Wolf Creek, Drayton Valley, and Kalyna Country Primary Care Networks (PCNs) will be the first Central Zone PCNs to trial the technology for people with chronic health conditions, with potential to add more Central Zone PCNs in subsequent phases. The initiative is a collaborative effort between, Alberta Central Zone Primary Care Networks (PCNs), TELUS Health, Boehringer Ingelheim (Canada) Ltd., Alberta Innovates, Health City, and Alberta Health Services.

The initiative aims to implement and rapidly scale proven digital technologies to alleviate stress on the health system, while serving as a national model for ongoing stability of care. The project will test the efficacy of virtual monitoring solutions to care for a large number of patients at one time while in their own homes, and the ability to provide care in rural locations.

Dr. Jordan La Rue, a family physician in Sylvan Lake who is also Central Zone PCN Committee Co-chair noted, "as innovation hubs for team-based family medical services, PCNs are an ideal place to try out technology that may enhance access to high quality healthcare."

Andrea Thain Liptak, Committee Co-chair and Executive Director of Public Health, Primary Care, Chronic Disease Management, Children's Rehab Services, Allied Health, and Community Admin Support with AHS Central Zone, added, "we are excited to explore this new model of care through the Central Zone PCN. Our partnership between all Central Zone PCNs and Alberta Health Services puts us in a unique position to spread and evaluate innovative practices such as Home Health Monitoring."

"This collaboration is an opportunity to tangibly improve the lives of Albertans by using innovative approaches and technology to provide increased access to care in rural communities and addressing the challenges patients with chronic conditions face," stated Reg Joseph, Health City's CEO. "The Health City model supports early intervention in patient needs to drive better health outcomes and lower overall cost to the system, resulting in positive health impacts and economic impacts for our region. This project is the actualization of that model."

"Boehringer Ingelheim's collaboration with Health City & Central Zone PCNs highlights our dedication to delivering innovative solutions that serve current and future healthcare needs," said Andrea Sambati, President and CEO, Boehringer Ingelheim (Canada) Ltd. "The Central Zone PCN Home Health Monitoring Project will not only improve outcomes for those most at risk in primary care, but also provide significant benefits to the healthcare system, such as reducing hospitalizations and overall healthcare costs."

The TELUS Home Health Monitoring (HHM) solution allows patients to upload, view and trend their daily biometric results, such as temperature and blood pressure, and interact with their clinicians from home. The patient's physicians and clinical team use the dashboard to view and monitor large groups of patients and interact with them to provide any necessary support and resources.

"As a fellow Albertan, I'm proud that our province is the first to deploy Home Health Monitoring for chronic disease management and COVID-19 response in the primary care setting; enabling clinicians to remotely observe their patients with these conditions not only keep them safe from further exposure but also helps to alleviate some of the pressures on the healthcare system," said Shane Sabatino, vice president, public sector, TELUS Health.

"This collaborative aligns strongly with our innovation priorities at Alberta Innovates- namely, empowering and enhancing patient-centered care and realizing efficiencies in care pathways, by leveraging digital health solutions. We are in the fortunate position to partner with all the players involved to accelerate a timely and valuable digital innovation into care," said Tim Murphy, Vice President of Health, Alberta Innovates.

This project brings healthcare technology leaders together with local networks, providing new tools to patients and clinicians to drive positive health outcomes for the community. Health City is proud to be a part of the collaboration to bring health transformation to the Alberta Central Zone Primary Care Networks.

About Health City

Health City is a Canadian Not-for-profit Corporation that works with clinicians, innovators, philanthropic organizations, and companies to develop new pathways of care that can drive better health outcomes and economic development in the health sector. Our focus is on transforming innovations from our health sector into solutions that have commercial application and global relevance, adopting them for impact locally and scaling them for export to global markets.

For more information, visit www.edmontonhealthcity.ca.

About Boehringer Ingelheim (Canada) Ltd.

Making new and better medicines for humans and animals is at the heart of what we do. Our mission is to create breakthrough therapies that change lives. Since its founding in 1885, Boehringer Ingelheim is independent and family-owned. We have the freedom to pursue our long-term vision, looking ahead to identify the health challenges of the future and targeting those areas of need where we can do the most good.

As a world-leading, research-driven pharmaceutical company, more than 51,000 employees create value through innovation daily for our three business areas: Human Pharma, Animal Health, and Biopharmaceutical Contract Manufacturing. In 2019, Boehringer Ingelheim achieved net sales of 19 billion euros. Our significant investment of almost 3.5 billion euros in R&D drives innovation, enabling the next generation of medicines that save lives and improve quality of life.

We realize more scientific opportunities by embracing the power of partnership and diversity of experts across the life-science community. By working together, we accelerate the delivery of the

next medical breakthrough that will transform the lives of patients now, and in generations to come.

The Canadian headquarters of Boehringer Ingelheim was established in 1972 in Montreal, Quebec and is now located in Burlington, Ontario. Boehringer Ingelheim employs approximately 600 people across Canada.

More information about Boehringer Ingelheim can be found at <http://www.boehringer-ingelheim.ca> or in our annual report: <http://annualreport.boehringer-ingelheim.com>.

About TELUS Health and Payment Solutions

TELUS Health is a leader in digital health technology solutions such as home health monitoring, electronic medical and health records, virtual care, benefits and pharmacy management as well as personal emergency response services. TELUS Health is leveraging the power of technology to improve access to care and revolutionize the flow of health information to create better outcomes for Canadians while facilitating collaboration, efficiency and productivity for physicians, pharmacists, health authorities, allied healthcare professionals, insurers, employers and citizens. TELUS Payment Solutions complements our health solutions by delivering secure, industry-compliant payment and lending solutions that connect lenders, payors, insurers, extended health care providers and financial institutions to their customers across Canada.

For more information please visit: www.telushealth.com and www.telus.com/payment-solutions.

About Primary Care Networks

Primary Care Networks are a made-in-Alberta approach to improve and better coordinate patient access to primary care. Primary health care is the first point of contact most people have with the health system. In each PCN, a group of family doctors works with Alberta Health Services and other health providers such as pharmacists, nurses, mental health therapists, and dietitians to provide excellent health care. Each PCN designs programs and services to best meet local needs, which may vary from area to area. In the Central Zone, there are 12 PCNs that work together through the Central Zone PCN Committee to identify and coordinate opportunities for healthcare improvement throughout the Zone.

About Alberta Innovates

Alberta Innovates (AI) is a provincial agency working to address today's challenges, create new opportunities and forge a healthy, sustainable, and prosperous future for Albertans today and for generations to come. AI is well positioned to advance digital health technologies to accelerate improvements in the quality and long-term sustainability of our health system and the health of Albertans.

For more information, visit <https://albertainnovates.ca>.

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Source : Health City

22 sept. 2020 08h30 HE

Virtual Care Pharmacy Services Offered in Alberta Long-Term Care Facilities

Patients and Care Teams Across Alberta Increase Connectivity with Virtual Care Platform

EDMONTON, Alberta, Sept. 22, 2020 (GLOBE NEWSWIRE) -- Residents in long-term care facilities in Alberta can now access care from their pharmacist remotely thanks to a new pilot project that uses virtual care to improve connectivity between patients and healthcare providers. The CareRx Alberta Virtual Care Project is a collaboration between CareRx Corporation ("CareRx") (TSX: CRRX), a Canadian specialty pharmacy care provider, pharmaceutical company Boehringer Ingelheim (Canada) Ltd, and Health City.

CareRx pharmacists in Alberta are using CloudMD's virtual health platform, Livecare, to provide care to residents and assess the impact that virtual care can have on chronic disease management, particularly focused on residents with diabetes given its prevalence in the long-term care setting. The project aims to optimize treatment by utilizing a screening tool to assess cardiovascular risk reduction and customize care for each resident.

"Pharmacists play an important role as part of the long-term care team and that role is expanding to include chronic disease management and proactive medication optimization," said Ryan Stempfle, Vice President and General Manager (Western Canada) of CareRx. "Virtual care platforms are expected to increase connectivity with residents and create more opportunities to provide timely, preventative care to those residents that need it the most."

CareRx selected Livecare for the project due to its user-friendly platform and customizable experience. Using the platform, residents will have the ability to remotely access services such as pharmaceutical consultations. Livecare's technology will allow a full integration into CareRx's current pharmacy services, with the opportunity for further integration as residents' needs evolve. The remote services will provide residents with access to care in a safe environment and reduce the risk of exposure to illness, especially in light of COVID-19.

"Providing an integrated virtual care option for long-term care residents will increase access to care for a vulnerable population, reducing their risk of exposure and creating a connected care community for patients managing chronic conditions," said Reg Joseph, Health City's CEO. "Increased access to care results in early intervention, better health outcomes for residents, and lower overall cost to the health system."

"Boehringer Ingelheim's collaboration with CareRx and Health City highlights our dedication to delivering innovative solutions that serve current and future healthcare needs," said Andrea Sambati, President and CEO, Boehringer Ingelheim (Canada) Ltd. "The CareRx Alberta Virtual Care Project will not only improve outcomes for an at-risk patient population, but also provide benefits to the healthcare system, such as reducing hospitalizations and overall healthcare costs."

This project provides patients and care teams with new tools to increase connectivity and drive positive health outcomes for the community. Project evaluations will inform future expansions.

About Health City

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For more information, visit www.edmontonhealthcity.ca.

About CareRx Corporation

CareRx is Canada's leading provider of specialty pharmacy services to seniors. We serve approximately 50,000 residents in over 900 seniors and other communities, including long-term care homes, retirement homes, assisted living facilities, and group homes. We are a national organization with a large network of pharmacy fulfillment centres strategically located across the country. This allows us to deliver medications in a timely and cost-effective manner and quickly respond to routine changes in medication management. We use best-in-class technology that automates the preparation and verification of multi-dose compliance packaging of medication, providing the highest levels of safety and adherence for individuals with complex medication regimes. We take an active role in working with our home operator partners to promote resident health, staff education, and medication system quality and efficiency.

For more information, visit www.carerx.ca.

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About CloudMD

For more information on CloudMD and the Livecare telehealth solution visit <https://investors.cloudmd.ca>.

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Source : Health City

21 oct. 2020 10h00 HE

Alberta Project Validates First Synthetic Health Dataset in Province

Project Increases Data Accessibility While Maintaining Patient Privacy

EDMONTON, Alberta, Oct. 21, 2020 (GLOBE NEWSWIRE) -- The health innovation community has one more approach towards increasing the timely and safe utilization of health data thanks to a research project co-sponsored by Health City and the Institute of Health Economics (IHE) in partnership with Alberta Innovates, Replica Analytics, and University of Alberta. Unique in Canada, this project was initiated to provide insight into the value and validity of synthetic (simulated) data in health services research. The promising results have been submitted for publication.

Health City and its partners identified synthetic data generation as one approach to leverage the region's capacity and partnerships in data, artificial intelligence, and machine learning to fuel health system innovation. Synthetic data accurately simulates patient-derived datasets and, although generated from real world data, is not linked to the individuals from whom the data were derived. Because synthetic data contains no real patient health information, the datasets have the potential to be shared freely among investigators or those in industry without raising patient privacy concerns or contravening the Alberta *Health Information Act*. The project engaged the Office of the Information and Privacy Commissioner of Alberta to ensure synthetic data can be used in a way that respects the privacy of citizens.

"It was important we demonstrate not only that we protect the data privacy of Alberta," said Mark Diner, Director at Alberta Innovates, "but that the OIPC understands how the process works as well. Albertans must have confidence in game-changing, data-driven innovation."

"Alberta has the largest regional health authority in Canada, and the opportunity to use data to drive improved health outcomes is immense. Complex healthcare datasets can support research, policy development, and quality improvement projects across the province, but we need advanced tools like synthetic data to make use of these data sets safely. Due to its complexity, the notion that synthetic data would be able to sufficiently capture and simulate real world data in Alberta was unlikely," said Dr. Dean Eurich, Professor at University of Alberta. "Remarkably, I was somewhat shocked to observe the research results could be replicated with a fairly high level of precision within synthetic data. These synthetic datasets will be extremely beneficial for researchers to share data across jurisdictions. They will also allow academics and students easier access to health data and support more efficient training of the next generation of health data scientists."

Demonstrating the viability of synthetic datasets creates further opportunities for innovators to work alongside the health system while preserving patient privacy. Creating further opportunities for health innovation to occur in Alberta is a component to driving economic development for the province.

"Better data analysis techniques lead to better healthcare. Synthetic data provides a safe way for talented data scientists from community, academia, and industry to work alongside the health system to drive improved health and validate novel solutions developed in Alberta for Albertans," said Reg Joseph, CEO, Health City.

"Alberta has a rich repository of health data that can provide important insights to support improvements in health care and improved use of health care resources," stated Dr. Chris McCabe, CEO of IHE. "Synthetic data is a promising way to address the challenges of using personal health data directly. We look forward to testing this out and providing lessons on how we can use it for improved health and economic benefit for Alberta."

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For more information, visit www.edmontonhealthcity.ca.

About Institute of Health Economics

Institute of Health Economics (IHE) is a not-for-profit health research organization providing expertise to provincial and national stakeholders from the public and private sectors in evidence production, synthesis and application; economic analysis; and policy engagement. It was founded in 1995 on the belief that the best solutions to healthcare problems are the result of a collaborative approach, with all stakeholders at the table sharing insights and information in support of improved health outcomes and a thriving economy.

For more information, visit www.ihe.ca

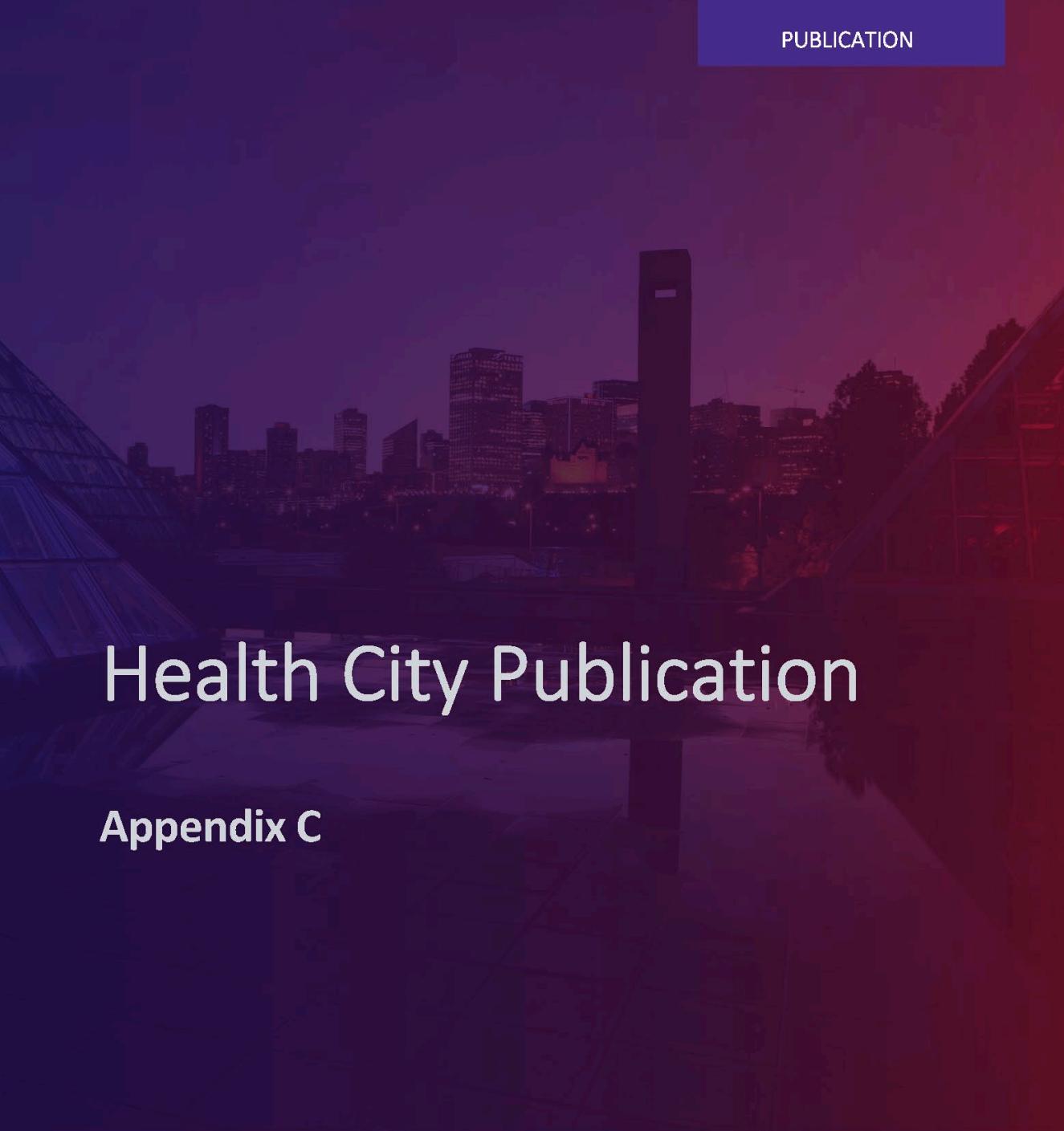
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PUBLICATION

Health City Publication

Appendix C



ORIGINAL ARTICLE

Health City: Transforming health and driving economic development

Reg Joseph, MBA¹; Antonio Bruni, PhD¹; and Chris Carvalho, PMP¹

Abstract

Health City was established in the fall of 2018 as a Canadian not-for-profit corporation that works with numerous stakeholders to develop new pathways of care that can drive better health outcomes and economic development in the health sector. Data, artificial intelligence, and extended reality are technology platforms in healthcare that are highlighted in the context of Health City Initiatives presented here. Health City's future area of focus in addressing challenges in procurement for health innovations is also discussed as a new approach that connects the health industry to healthcare. Health City has been an active stakeholder in health innovation in Edmonton and will continue to focus on developing a global niche and owning that space through meaningful partnerships and impactful projects. This will drive improved health outcomes and economic development for the Edmonton region and Canada that can be scaled globally.

Healthcare Management Forum
1-5
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Introduction

In the summer of 2017, the mayor of Edmonton, Don Iveson, with leadership from a steering committee,¹ launched Health City.² The intent stemmed from a confluence of factors that included the need to diversify our regional resource-based economy, increasing cost pressures on our health system while relative healthcare performance in Canada continued to decline,³ and the Edmonton Region's potential to participate in the global disruption of the health sector.⁴ These factors also apply broadly to the rest of Canada where provincial healthcare costs are approaching 50% of annual budgets in several Canadian jurisdictions.⁵

What is also clear is the opportunity for the municipality to play a role in health. Health is impacted by all levels of government. Typically, municipal governments do not play a substantive role in health planning or investment decisions. However, municipal investments often have direct impact on social indicators of health. If municipalities better understand these indicators and make investments that are coordinated, they unlock the ability to influence the entire health value chain. This enables the health system to act strategically and proactively in concert with the municipality to make an impact on both health costs and outcomes. Although a complex task, other global jurisdictions have accomplished this⁶ and Edmonton must try as well.

The formation of Health City

Health City was officially established in the fall of 2018. Health City is a Canadian not-for-profit corporation that works with clinicians, innovators, philanthropic organizations, and companies to develop new pathways of care that can drive better outcomes and economic development in the health sector. Health City is Edmonton-championed with a national scope.

Health City develops and executes transformational projects that leverage innovation and talent to increase patient access and to foster effectiveness within care teams. In doing so, Health City creates an innovative "living lab" environment that promotes the development of regional innovation. In turn, regional innovation retains and attracts companies to scale regionally and export globally. By bridging non-traditional partnerships and deconstructing silos, Health City can achieve its mandate to diversify our economy, drive cultural change and policy adoption, and provide validation opportunities for regional health-based companies.

Health City initiatives: Responding to trends and needs in healthcare

The digitization of healthcare has been a complex discussion over the last decade, but it has now arrived. To win in digital health—in the same way Netflix won in media streaming—organizations need to rethink their business models to meet goals related to cost, quality, patient engagement, and customer experience. To proactively embrace digital health, it is important to take note of other industries where digital convergence is a way of life. The pressure is on the health sector to catch up and keep up. As other industries have learned, disruption through digital innovations is full of threats and opportunities.⁷

There are many innovators from industry who are looking at the big picture and developing novel solutions to well-established healthcare challenges. Health City embraces these innovators and includes them as part of the team for health innovation. This collaborative effort enables Health City to

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impact health transformation and, of equal importance, to drive economic development. Thus far, the initiatives that Health City has been involved in are mainly related to digital health. As such, data, artificial intelligence, virtual care, and extended reality are trending areas of influence in healthcare that will be highlighted in the context of Health City Initiatives presented in the next sections.

The data opportunity

The use of data in healthcare has been bantered about for some time. The opportunity is not about “monetizing” the data; the real opportunity around data is to effectively track and use the right data to drive better health outcomes. Like in other industries, there is no reason why health companies should not play a defined role to join forces with health systems to address key public health or operational challenges in a transparent manner.

Industry consultation and participation is often done in sectors such as energy, agriculture, and the auto industry. It is key to find a way to do the same in the health sector. Adopting policies for proper use of healthcare data enable nations to both nurture a domestic healthcare industry and to reshape interactions with multinational companies that provide healthcare goods and services. The underlying motivation is clear: publicly funded healthcare is invariably a valued social program but can also contribute to economic development.⁸ In relation to data use, Health City has important initiatives underway.

One of the ways to address privacy with healthcare data is through the concept known as synthetic data. Synthetic health data sets are generated from real data sets that contain actual patient information. Statistical methods are used to maintain the quantitative properties of the original data set, yet importantly do not correspond to identifiable individuals from the original data set (the data set contains fictitious patient data). Thus, synthetic data maintains patient confidentiality. Since synthetic data contains no protected health information, the data sets can be shared freely among health investigators or those in industry, without raising patient privacy concerns or contravening the Alberta Health Information Act.

Health City is exploring the value of synthetic data in a collaboration with the Institute of Health Economics, Alberta Innovates, the University of Alberta, and an Ottawa-based start-up—Replica Analytics—as an innovation that can address existing reservations around de-identifying data, and the ability “re-identify” individuals’ personal data.⁹ This project is focused on achieving four key objectives, which are critical to the future scale and spread of a larger synthetic data initiative. These objectives are establishing a process for generating synthetic data that are representative of an existing Alberta Health database; identifying, documenting, and addressing the privacy and security concerns of key groups in Alberta (eg, Canadian Intellectual Property Office, data custodians, ethics boards) for future use and distribution of

the generated synthetic data set; analyzing and validating the synthetic data set to ensure their future utility; and presenting the results and outcomes to key government stakeholders that may assist in the development of required policy changes in data access, as well as acceptance of analyses conducted with synthetic data.

The initial stages of this work are expected to be completed by the fall of 2020. The anticipated outcomes could lay the foundation for future scale. Additionally, community and industry researchers may have increased opportunities for data accessibility and consequently, increased collaboration with the health system in a safe way that allows for the exploration of innovative solutions in various areas of healthcare.

Artificial intelligence to drive health outcomes

Remote and rural communities can be burdened with a lack of infrastructure and resources to ensure the delivery of adequate healthcare as compared to major centers. Equitable access to healthcare services is still a considerable barrier that must be addressed to meet the needs of these communities. Such barriers can lead to undiagnosed conditions that can result in long-term complications, straining an over-burdened acute care system. With rapid advancements in technology, closing the gap to equitable access is becoming a real possibility with solutions being developed within the Edmonton region. As an example, MEDO.ai, an Edmonton-based start-up, has developed technology which is being used in rural communities to aide in disease diagnosis and timely intervention. Through a partnership with Health City, WestView Primary Care Network (PCN), and Alberta Innovates, MEDO.ai has been able to deploy ultrasonography in remote and rural communities to diagnose hip dysplasia in newborns.¹⁰ Harnessing the power of artificial intelligence, the technology aims to better diagnose hip dysplasia in patients, with the anticipation of leading to timely intervention for improved health outcomes at the point of care in community care settings.

Another Health City initiative began with a collaborative partnership with Boehringer Ingelheim (Canada) Ltd (BI). The goal is to leverage artificial intelligence to examine patient data, with a focus on the social determinants of health, to better address health issues (including seniors’ health and chronic diseases). The project uses natural language processing on unstructured physician notes in patients’ electronic medical records where information on the patients’ social indicators of health often resides. Using such data, BI can develop risk prediction models that will support clinicians in augmenting and customizing care pathways for their patients.¹¹ The Health City partnership with BI is expected to drive innovation in the Edmonton region while yielding improved patient outcomes. The partnership, while in its infancy, has already created multiple collaborations with local innovators in the private sector, including Okaki Health Intelligence and AltaML, as well as partnerships with

the University of Alberta and SAGE Seniors' Association. At the heart of using artificial intelligence is the development of tools that can facilitate frontline providers to identify patients' needs, optimize care pathways, and focus on prevention.

Virtual care

Digital-based technologies not only address efficiency and improved tracking and measurement, but also enable basic tenets that Canadians hold dear, such as access to high-quality healthcare. While Alberta has slowly adopted virtual care, the COVID-19 pandemic has accelerated these changes thus creating opportunities to leverage gains and we are encouraged will likely to continue post-pandemic. Health City is currently involved in two key multiparty projects that demonstrate emerging models in virtual care delivery. The first is the Alberta Central Zone PCN Home Health Monitoring project (HHM). This initiative—a collaborative effort between Health City, Alberta Central Zone PCNs, Telus Health, BI, Alberta Innovates and Alberta Health Services—aims to deploy a community-based HHM solution for individuals with chronic conditions.

Patients across three PCNs in central Alberta will soon be participating in an HHM technology trial. The aim is to implement and rapidly scale proven remote monitoring digital technologies. This will alleviate stress on the health system while serving as a national model for ongoing stability of care. By reducing the risk of infection, enhancing patient recovery at home, and promoting self-management, it may be possible to shorten the time necessary for (post-pandemic) economic resurgence in Canada.

The second project pertains to virtual care delivery in Long-Term Care (LTC) facilities. Health City has partnered with Centric Health and BI to implement an initiative that will provide access to remote treatment to senior residents in LTC facilities in rural communities. In view of the scope of practice of Alberta Pharmacists, the Centric Health team will work closely with the selected LTC sites to establish a process whereby the pharmacist will send a daily schedule to the on-site staff member with a list of patients to be seen virtually. This project will be able to provide essential services to seniors while offering a proof of concept for how virtual services can be scaled across Centric Health and other organizations.

The overarching goal of virtual care Health City initiatives is to develop both operational and outcomes data around community-based models of care that can inform policy-makers as they consider virtual care solutions as part of the healthcare delivery toolset.

Extended reality

The extended reality market is also a key area of focus for Health City. In particular, *Enhanced Learning Incorporating eXtended Reality* (ELIXR) has the ability to

bring Edmonton-based post-secondary institutions together under one umbrella, building critical mass for such an important health subsector. Educators and practice experts will have the ability to create virtual and augmented reality simulations, training, and learning experiences. Using agile strategies, content can be distributed collaboratively through ELIXR's network of publishers to ensure that high-quality, extended reality learning experiences are made widely available to benefit students' and practicing professionals' continuing education and development.

Health City's mandate is to help pave the way for the transformation of our health economy through connecting ELIXR to companies and organizations in Health City's network. This will enable a marketplace for both Business-to-Business and Business-to-Consumer transactions that will serve as an economic driver for extended reality in the health sector.

Health City's future areas of focus

One of the challenges to innovation is procurement. In most Canadian jurisdictions, when innovators initiate the process of demonstrating an application's utility on a broad scale, procurement presents a hurdle. This is true whether innovation is developed internal or external to the health system. Health City—through its collaborations with various stakeholders in government, private sector, and health systems—expects to facilitate the adoption of healthcare innovations by addressing barriers in procurement. These barriers include inadequate early warning, lack of engagement between procurers and suppliers, overly prescriptive and burdensome procurement processes, risk aversion, and procurement capability shortfalls.¹² Procurement teams often focus almost exclusively on the lowest up-front prices for products and services not fully considering the potential greater return on investment in a total cost of ownership model.

Health City's strategic initiatives and collaborations have the potential to facilitate embedding innovation in procurement policies and procedures while maintaining transparency, integrity, economy, openness, fairness, competition, and accountability as core fundamental principles of public procurement. A new approach that connects the health industry to healthcare, going beyond the traditional purchaser-vendor relationship that currently exists, is much needed. There is also an imminent need to address increasing healthcare costs while improving health outcomes that are stagnant at best.

Canadian innovation is not wishful thinking: It is already happening

Canadian innovation is already happening and Health City has been an active stakeholder. A tangible and exciting example is Edmonton's representation in the Canada-Chicago Mentoring

Program (C2MP). C2MP was formed as a partnership between the Canadian Trade Commissioner Service and the Chicago Innovation Mentors at MATTER.health. C2MP delivers tailor-made mentorship focused on life sciences and healthcare innovators working in pharmaceuticals, health IT, and medical devices to Canadian companies. The competitive application process saw the admission of three Edmonton-based companies (RUNWITHIT Synthetics, UMAX Care, and Health Gauge) in the 2019 six-month program, emphasizing the strength of the Edmonton region's med-tech companies.¹³

As an opportunity to celebrate these companies, but also create opportunities of collision with C2MP and other local innovators, Health City hosted a unique forum to showcase the Program as part of its 2019 Breakfast Series. The panel-centric breakfast featured a participating C2MP mentor, regional innovators excelling within the C2MP, and the Canada Trade Commissioner Service. The anticipation is that more regional-based companies will apply to future C2MP cohorts, gaining access to expertise from mentors in the Chicago area while excelling and growing their companies locally. For those interested in following Health City's initiatives and exciting news, the web site <https://edmontonhealthcity.ca/> and the Twitter account @Yeghealthcity are the places where the most current information can be found.

Conclusion

Canada's estimated spending is \$264 billion in 2019, representing 11.4% of its gross domestic product. While many jurisdictions boast about their clinical and academic excellence globally, or innovations they have developed that are having global impact, most view the Canadian health systems through a single lens—a "cost centre" that needs to be managed. The progress and success achieved by Health City come in part from the organization's ability to host a table to explore projects that are informed by many stakeholders. Health City has an opportunity to drive innovation in the health system while simultaneously building a sector that can play a role in Alberta's economy. This combination will be even more vital in Alberta's post-pandemic recovery.

Overall, the emerging health economy is being disrupted by trends in healthcare, including digital health, virtual care, artificial intelligence, and extended reality. If the Edmonton region is to compete in these high-growth markets, Health City needs to continue to focus on developing a global niche and owning that space through meaningful partnerships and impactful projects. This will drive improved health outcomes and economic development for both the Edmonton region and Canada which can be scaled globally.

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