

Deployment of Health Care Facility Digital Infrastructure in Canada

Recommendations for Policymakers

Canadian health care is undergoing a digital transformation. While COVID-19 accelerated the urgency of implementing virtually enabled care, it also highlighted long-standing gaps in the capacity and readiness of our health care systems to implement innovative, technology-centered solutions. A better future for Canadian patients and clinicians alike depends on high-quality, reliable digital infrastructure in our health care facilities (HCFs). CSA Group's research report "Deployment of Health Care Facility Digital Infrastructure in Canada, A Framework for Standard-Based Solutions" outlines the potential role for standards-based solutions in developing and maintaining high-quality digital infrastructure in HCFs.

The research report examines the unique position of HCFs relative to the rapid expansion of digital infrastructure and technologies. Core elements of a modernized health care system, such as electronic health records, digital access to diagnostic imaging, or virtual care portals, require corresponding systems and infrastructure. Putting these systems in place is no easy task: digital health care infrastructure within HCFs must support the safe transmission and storage of massive amounts of sensitive personal information between specialized equipment, medical devices, and data servers. For this to be seamless for both clinicians and patients, infrastructure must be networked, secure, and capable of interoperability within and between HCFs. Digital infrastructure benchmarks are also a moving target: systems need to be flexible to integrate ever-changing technologies and practices.

The importance of digital facility infrastructure to a world-class health care system

Canada remains behind other peer jurisdictions when it comes to digital health, ranking 29th in usage of information and communication technology (ICT) in health care, far behind other countries like the UK (5th) the Netherlands (7th) and Australia (14th). To remain competitive relative to other countries in digital health care delivery, Canada needs to prioritize the creation and integration of future-ready digital infrastructure in HCFs.¹

¹ G. P. Marchildon, S. Allin, and S. Merkur, "Canada Health System Review," *Health Systems in Transition* 22, no. 3, 2020, <https://apps.who.int/iris/bitstream/handle/10665/336311/HiT-22-3-2020-eng.pdf>.

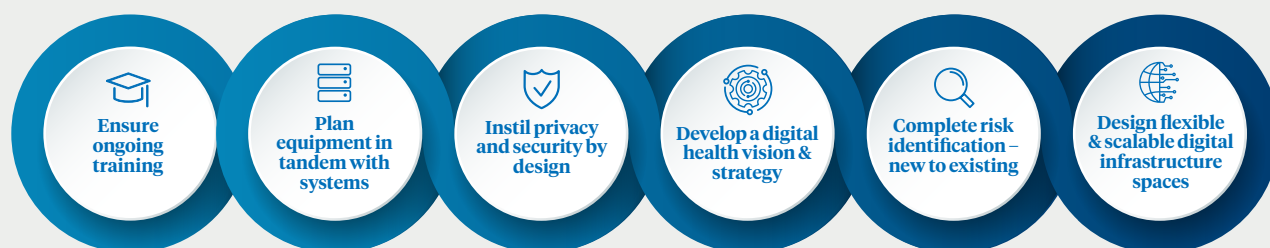
As physical health care facilities are being built, renovated, and retrofitted across the country, there is a generational opportunity to invest in digital health infrastructure that meets both international benchmarks and the needs of digital-first Canadians. But there are challenges and risks associated with making updates. If digital infrastructure remains fragmented — HCF-by-HCF, or jurisdiction-by-jurisdiction — current challenges around system interoperability, quality inconsistency, and lack of transparency will persist and worsen. Greater collaboration and knowledge-sharing within Canada’s health care sector can help create future-ready systems.

The report suggests that an overarching guidance document be created for the planning, design, implementation, intersystem communication, and lifecycle management of HCFs digital infrastructure. Both additional resources and a supportive policy environment will be instrumental to the success of shared digital infrastructure standards across Canada’s health care systems.

About the report

This brief is based on a CSA Group research report entitled “Deployment of Health Care Facility Digital Infrastructure in Canada, A Framework for Standard-Based Solutions”.²

Key recommendations



Additional recommendations from the report include:

- Develop a responsibility matrix
- Institute a master systems integrator
- Develop use cases and integration matrix
- Develop common definitions
- Complete workflow mapping
- Develop commissioning documents for new and existing buildings

² M. Angus et al., “Deployment of Health Care Facility Digital Infrastructure in Canada. A Framework for Standard-Based Solutions,” Canadian Standards Association, Toronto, ON, Canada, 2021, <https://www.csagroup.org/article/research/deployment-of-health-care-facility-digital-infrastructure-in-canada/>.

Success depends on a supportive policy environment

To have the digital health infrastructure those interviewed for this report said they wanted — one that is, maintainable, consistent, interconnected, networked, planned, and future-proofed — decision-makers must look beyond health care and engage with the broader public policy environment.

Intergovernmental coordination

Health care in Canada is delivered through 13 distinct provincial and territorial health care systems and funded in part by the federal government. This structure of shared activity creates unique challenges for building integrated digital health systems. A lack of interjurisdictional alignment in digital health has been more visible as the country worked to coordinate vaccine passports and other pan-Canadian pandemic responses.

Digital infrastructure poses special challenges for intergovernmental cooperation. The persistent lack of coordination between federal, provincial, and territorial (FPT) governments has consequences:

- **Portability and mobility:** Canadians are entitled to health coverage across provincial/territorial lines, whether on a short trip or after moving to a new home. If there are major gaps between FPTs in terms of quality or interoperability of infrastructure, Canadian health care will never be truly portable.
- **Efficiency and innovation:** Greater coordination and partnership between jurisdictions on common goals in digital health delivery would create massive savings in time, effort, and public dollars. Intergovernmental harmonization would also boost growth in the Canadian health innovation sector, where businesses, especially small and medium-sized businesses, struggle with small economies of scale across FPTs, differing regulatory environments, and low interoperability of existing digital infrastructure.
- **Path dependency and sunk costs:** Even with political will on the part of FPTs, lack of interoperability with current digital infrastructure presents tremendous challenges to further

integration. But the further provinces and territories re-invest in digital infrastructure independently, without using standards or integration planning within HCFs, the more complicated future pan-Canadian alignment will become.

- **Health equity within the federation:** Digital health infrastructure has a meaningful impact on health care availability and quality. If there are uneven or inconsistent approaches to digital health infrastructure by jurisdiction, Canadians in some provinces and territories may have significantly worse health care than others.

There are pan-Canadian organizations tasked with better integrating and coordinating digital health delivery. However, the success of these initiatives depends on the collaboration and political will of provinces and territories themselves, including a shared awareness of the distinct importance of digital infrastructure. True collaboration will not only help with these issues but will have a multiplier effect on success in other key policy areas, specifically:

- Cybersecurity
- Privacy
- Procurement
- Non-acute and long-term care
- Skills and workforce development

Cybersecurity

As repositories of vast amounts of sensitive data, HCFs are at high risk of being targeted by cyber threats. The rise of COVID-19 was accompanied by a global spike in ransomware attacks, particularly those aimed at health care organizations.³ The more HCFs rely on networked systems and digital integration, the more vulnerable facilities become to cyber-attacks. These attacks can be disastrous for health care delivery, including life-threatening gaps in care.

Despite this, Canada's health care sector receives no direct mention in *Canada's National Cyber Security Action Plan 2019-2024*,⁴ in contrast with the finance, telecommunications, energy, and transport sectors.


3 E. Skahill and D. West, "Why Hospitals and Healthcare Organizations Need to Take Cybersecurity More Seriously," Brookings Institute, 2021, <https://www.brookings.edu/blog/techtank/2021/08/09/why-hospitals-and-healthcare-organizations-need-to-take-cybersecurity-more-seriously/>. and R. Gilmore, "Ransomware Demands Double amid COVID-19, with Health Care Industry a Key Target: Report," Global News, March 2021, <https://globalnews.ca/news/7699883/coronavirus-cyber-security-ransomware-hack-canada/>.

4 Public Safety Canada, "National Cyber Security Action Plan 2019-2024," 2019, <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/ntnl-cbr-scr-tstrtg-2019/ntnl-cbr-scr-tstrtg-2019-en.pdf>.

Additionally, the report notes that no federal, provincial, or territorial building codes exist that protect against cybersecurity threats in the HCF digital infrastructure. Experts have stressed that governments have an important role to play in encouraging the development of cybersecurity standards, as well as providing resources necessary for their adoption.⁵

As Canadian policymakers push for better digital infrastructure in health facilities, they must also encourage greater cybersecurity measures to protect HCFs. In particular, policymakers should consider how potential approaches to managing the cybersecurity of devices — for example, the use of security labelling to say that a device meets standards — could help HCFs better manage information security across a wide spectrum of technologies.

Privacy



Both inside and outside clinical settings, digital health devices are particularly concerning to policymakers as they generate massive amounts of sensitive biometric data. Canada and several provinces are in the process of updating key pieces of privacy legislation. Federally, both the *Personal Information Protection and Electronic Documents Act* (PIPEDA) and the *Privacy Act* are in different stages of being replaced or changed. Policymakers must continue to be attentive to the possible impacts of privacy legislation on specific contexts of digital health delivery, and how adopting and using digital infrastructure standards in HCFs might support laws.

In turn, HCFs will be better equipped to adapt if principles supported by law are reflected in the broader regulatory environment and standards for digital infrastructure. For example, “privacy by design” is a principle appearing in other international privacy legislation like Europe’s *General Data Protection Regulation* (“GDPR”). It may become part of new privacy laws in Canadian jurisdictions. By implementing Recommendation 5 of this report (“Instil Privacy and

Security by Design”), HCFs will be better aligned with this shift. Importantly, infrastructure in HCFs must also be able to respond to evolving privacy requirements — for example, if using automated decision-making in clinical settings. Interoperability and integration of digital infrastructure is particularly important for evolving consent and rights regimes within privacy law.⁶ If equipment, systems, and digital infrastructure in HCFs are siloed or disconnected, it will be difficult to easily comply with privacy legislation changes, which may include a patients’ rights to data erasure, de-identification, and portability.

Procurement

Procurement within Canada’s health care systems is massively complex. Procurement processes differ depending on the type of project or system, as well as the jurisdiction in which the project is located. Flexibility in this sphere is important: a comprehensive, one-sized-fits all approach to digital infrastructure procurement would be poorly suited to meet the highly variable needs of different HCFs or encompass the wide spectrum of what is considered digital infrastructure.

However, changing and coordinating procurement processes at a high level is one way of achieving some key outcomes within the report. Governments are uniquely positioned to incentivize behaviour within a broader sphere of health care decision-makers, including hospital networks, contractors, consultants, vendors, and individual HCFs themselves. Within government RFPs, objectives beyond value-for-money can be met when they are defined, carved out, and evaluated.

There are precedents for embedding other priorities into infrastructure planning and procurement. In Community Benefit Agreements, bidders must provide a plan for how their infrastructure project will support key outcomes in the community, including details such as workforce development or the purchase of local goods and services. In the case of digital infrastructure, there is public value in achieving key benchmarks in interoperability, equipment planning, cybersecurity, and flexibility. Core recommendations in the report could be integrated into specifications for procurement; for example, requiring that publicly funded infrastructure projects in health

5 I. Mikolic-Torreira et al., “A Framework for Exploring Cybersecurity Policy Options,” RAND Corporation, November 23, 2016, <https://doi.org/10.7249/RR1700>.

6 Ontario Medical Association, “OMA Submission: Amendment to PHIPA Regulation O. Reg. 329/04 to Enable Digital Health Interoperability,” 2020, <https://www.oma.org/uploadedfiles/oma/media/public/omasubmission-digital-health-interoperability.pdf>.

include a “Master System Integrator,” that they have a plan for privacy by design, or that proposals be accompanied by risk identification processes.

Non-acute and long-term care

The term “health care facility” is closely associated with hospitals, but HCFs also include non-acute care settings, like long-term care homes, outpatient clinics, and rehabilitation centres. High-quality digital health infrastructure is also needed within these facilities, but they are often overlooked; there is a notable lack of research and thought leadership on digital health infrastructure in long-term or post-acute care.

If unaddressed, inattention to the unique needs of these facilities could create persistent problems within the broader health care system. As more and more health services are delivered in home and community settings, digital infrastructure supporting a full continuum of care is essential for important clinical information to “follow” a patient between facilities and providers. Digital infrastructure in long-term care facilities and other senior care facilities should be an area of particular attention to policymakers as Canada’s population ages. Digital solutions and technologies could provide much-needed innovation, efficiencies, and systemic accountability in these sectors.

Long-term care is not included under the *Canada Health Act*, and 54% of long-term care facilities in Canada are privately owned, representing regulatory and jurisdictional challenges in requiring particular types of digital infrastructure.⁷ As noted in the report, long-term care facilities typically have fewer financial resources available for implementing and renewing infrastructure or technology. Specific focus on digital health infrastructure, as well as supports for research and resourcing, is needed to create change and spur innovation in long-term care.

Skills, training, and workforce development

Digital infrastructure can only be effective when there are people in place who can plan, build, maintain,

and operate its component parts. For complex HCFs like hospitals, where “digital infrastructure” means everything from phone cables to diagnostic imaging software, this means having access to a diverse pool of skilled labour. For HCFs, efforts to transform or update digital infrastructure should always be paired with a concrete plan to manage varied personnel and training needs. As outlined in Recommendation 12 of this report (“Ensure ongoing training”), HCFs should ensure training responsibilities are clearly outlined when procuring or adopting a new system, whether delivered by the hospital, contractor, or vendor of a new system.

For policymakers, supporting stronger digital health infrastructure will require critical attention to skills pipelines and labour market trends. For digital infrastructure to be built and used successfully, HCFs will require both health care workers with digital knowledge and ICT and skilled-trade workers with health care knowledge. According to a 2021 Information and Communications Technology Council (ICTC) report, Canada is already facing a shortage of digitally skilled health care workers, with HCFs struggling to find qualified personnel.⁸ To fill this gap, ICTC suggests changes to education pathways—introducing more technology learning into medical programs, as well as creating specific programs in digital health and bioinformatics. Reskilling and retraining existing health care workers could do much to protect workers from the forces of automation, close the digital health care skills gap, and yield the full benefit of digital health care infrastructure and systems.

However, strong digital infrastructure in HCFs will largely depend on access to skilled trade workers, tech workers, and ICT workers, who may or may not specialize in health care. HCFs do not just need access to personnel who can set up a computer modem. They also need access to personnel who can set up complicated equipment like a telesurgery console. A 2019 report from RBC suggests developing a provincially-led national skills strategy for health care; if such an initiative moved forward, it should include these other skills necessary to create, maintain, and operate digital infrastructure in health facilities.⁹

7 Canadian Institute for Health Information, “Long-Term Care Homes in Canada: How Many and Who Owns Them?,” June 2021, <https://www.cihi.ca/en/long-term-care-homes-in-canada-how-many-and-who-owns-them>.

8 K. Rolfe, “Health Sector Faces Shortage of Digitally Skilled Labour as Reliance on Tech Grows: Report,” Financial Post, August 12, 2021, <https://financialpost.com/fp-work/health-sector-faces-shortage-of-digitally-skilled-labour-as-reliance-on-tech-grows-report>.

9 J. Stackhouse, “Paging Dr. Data: How the Coming Skills Revolution Can Transform Healthcare,” RBC Thought Leadership, 2019, https://thoughtleadership.rbc.com/paging-dr-data-how-the-coming-skills-revolution-can-transform-healthcare/?utm_source=vanity&utm_medium=print&utm_campaign=ent_paging_dr_data.