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Canada's Virtual Care Revolution: A Framework for Success

Virtual healthcare enables improvements in chronic disease management, real-time patient and provider engagement, and coordination between healthcare teams. Every specialty is reconsidering what it does, how it does it, and where it does it in light of the high risks and costs of physical contact.

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The Study In Brief

A virtual care revolution is underway in Canada, spurred on by the COVID-19 pandemic. As of June 2020, virtual care represented over 70 percent of the ambulatory care provided by hospitals and doctors' offices across the country, a surprising increase from just five months before.

The COVID-19 pandemic has forced the health system to re-evaluate the costs of physical contact (CoPC) because of the material risk of viral transmission to providers and fellow patients, the scarcity of personal protective equipment (PPE), and increased cleaning costs. Patients who initially stopped seeking care in the first wave of the pandemic later sought care cautiously, although they are still reticent to physically interact with the health system. Globally, health systems must redesign care to minimize the CoPC, while conserving face-to-face capacity for the care of patients who need to be seen in person.

In this context, the pandemic represents an opportunity to substantially redesign healthcare delivery in Canada, making it more patient-centric and cost-effective, while substantially reducing the costs of physical contact borne by patients and healthcare providers alike.

Virtual models of care have been developed to meet these challenges; however, these models need to be situated in an approach to care that is equitable and oriented toward enhancing the health of populations. Doing so requires co-designing long-term solutions with patients, building trust among providers, and working with governments to establish sensible policies that will ensure the sustainable use of virtual care long-term.

With that vision in mind, we suggest that care redesign starts with asking three simple questions:

- Is this medical service necessary?
- Can this medical service be delivered well without physical contact?
- What site of service is best for physical contact?

Applied broadly across the health system, this care redesign would lead a massive shift away from physical interactions, towards an almost equal ratio of physical to virtual interactions. This would greatly reduce infection risk, but also has the potential to reduce healthcare costs, increase patient convenience and create health system capacity. In order to operationalize this new way of caring for patients, however, new rules are necessary to ensure we can deliver high-quality, sustainable healthcare as the "new normal."

This shift is a disruptive innovation. The CoPC are a new dimension against which to measure health system quality and accessibility. Innovative delivery models that reduce the CoPC can also create a new market opportunity and a new quality dimension upon which to compete.

Policy Areas: Access to Care; Fairness; Healthcare Delivery and Management; Health Technology; Insurance.
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As recently as February 2020, the *Canadian Medical Association Journal* reported that fewer than 25 percent of family physicians in Canada made themselves available by email, and just 4 percent provided video visits (Vogel 2020). But by June 2020, virtual care represented over 70 percent of the ambulatory care provided by hospitals and doctors' offices across the country.

Studies by the Commonwealth Fund demonstrated a drop in overall visits but replacement of a significant proportion of ambulatory visits by virtual care (Mehrotra et al. 2020). Community service providers and health charities that support patients and their caregivers have pivoted to be able to provide their services virtually. This trend is continuing even as pandemic-related restrictions ease.

We are already seeing major innovations in care. Our team works at several hospitals in Toronto where every specialty group is seeking to reduce unneeded visits, move care to virtual and preserve the scarce face-to-face visit capacity for those patients whose clinical situation demands it. Keeping physical visits to a minimum or relocating them away from the hospital allows the health system to increase overall volumes. It is not simply a question of replacing physical visits with virtual visits. Multifaceted care plans are being developed that combine various delivery mechanisms to maintain care while minimizing risk.

Background

The Costs of Physical Contact (CoPC)

There have always been costs for patients to physically interact with our healthcare system. These costs include lost income from time off work, childcare and transportation costs. Historically, these costs were rarely considered because they are borne by patients, rather than the health system, except in very specific circumstances, such as rural patients for whom access would be compromised.

The COVID-19 pandemic has forced the health system to re-evaluate the costs of physical contact (CoPC) because of the material risk of viral transmission to providers and fellow patients, the scarcity of personal protective equipment (PPE), and increased cleaning costs. Patients who initially stopped seeking care in the first wave of the pandemic later sought care cautiously, although they are still reticent to physically interact with the health system. Globally, health systems must redesign care to minimize the CoPC, while conserving face-to-face capacity for the care of patients who need to be seen in person.

A New Approach to Care Redesign: Starting with Three Questions

The COVID-19 pandemic represents an opportunity to substantially redesign healthcare delivery in Canada, making it more patient-centric and cost-effective, while substantially reducing the

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Key Concept Explainer

Costs of Physical Contact (CoPC)

For patients, face-to-face appointments with healthcare providers have traditionally come with certain costs, such as lost income from time off work, childcare and transportation costs. The COVID-19 pandemic has magnified the costs of physical meetings for providers as well because of the material risk of viral transmission to providers and fellow patients, the scarcity of personal protective equipment (PPE), and increased cleaning costs. Globally, health systems must redesign care to minimize the CoPC, while conserving face-to-face capacity for the care of patients who need to be seen in person.

CoPC. Virtual models of care have been developed to meet these challenges; however, these models need to be situated in an approach to care that is equitable and oriented toward enhancing the health of populations.[1] Doing so requires co-designing long-term solutions with patients, building trust among providers, and working with governments to establish sensible policies that will ensure the sustainable use of virtual care long-term.

With that vision in mind, we suggest that care redesign starts with asking three simple questions:

- Is this medical service necessary?
- Can this medical service be delivered well without physical contact?
- What site of service is best for physical contact?

The first question has been asked by the "Choosing Wisely" campaign for a decade.[2] The campaign advocates that providers and patients reconsider care that is not medically beneficial (e.g., over-prescribing of antibiotics for acute sinusitis (Cheng 2017) or care where the costs outweigh the benefits (e.g., over-prescribing of ECGs leading to expensive downstream testing (Bhatia et al. 2017)). In a world with high CoPC, medically unnecessary care not only increases health costs, but raises infection risk to providers, and patients, particularly those from vulnerable groups. In a high-risk COVID environment, some care should necessarily be deferred, perhaps indefinitely, because the CoPC outweigh any possible benefits.

The second question is that of communication modality. There are many health services that do not require face-to-face examinations. For example, stable cardiac patients can be safely monitored virtually with vital signs being measured by the patient or existing care providers, opening up space for sicker patients to receive in-person care. Several medical groups have begun to establish guidelines for which patients can be seen virtually.[3]

Virtualizing care where possible becomes a great enabler to provide needed care while minimizing the CoPC. This can be done in many ways, including phone, video or asynchronous messaging like email. In addition, where an existing care provider is present through a home care agency or

1 For the U.S. experience, see Verma (2020).

2 The "Choosing Wisely" campaign is a Canadian-based health education campaign launched to help clinicians and patients engage in conversations about unnecessary tests, treatments and procedures.

3 Among them: Accreditation Canada; the Alberta Medical Association; and the Alberta College of Family Physicians.

in senior living facilities, these providers can also provide the hands, eyes, and ears for the virtual provider to replicate the physical exam.

At Women's College Hospital in Toronto, over 90 percent of ambulatory visits were virtualized during the pandemic. This number will certainly not stay at over 90 percent. The target for the recovery phase of the pandemic is to have the proportion of virtual to in-person visits at 50 percent, a target that only a few short months ago would have been almost impossibly aggressive. In addition to the cardiology example above, we have examples from Well Baby visits, where visits without vaccinations or other physical interventions are being converted to virtual sessions for many newborns and moms. For elective surgery, we see a reduction in pre-operative testing and a shifting of considerable pre- and post-operative care to virtual, including pre-operative clinical visits and post-operative surgical wound assessments.[4] Mental health providers have moved to virtual *en masse*, with several providers commenting that remote care may allow for more immediate intervention, increase access for vulnerable patients and increase operational efficiency by reducing "no shows."

Virtual care enables improvements in chronic disease management, real-time patient and provider engagement, and coordination between healthcare teams. Every specialty is reconsidering what it does, how it does it, and where it does it in light of the high CoPC.

Table 1 describes a number of clinical scenarios where care is redesigned to reduce the CoPC. We detail what care redesign in the post-COVID world could look like based on the outlined principles above. For example, in pre-COVID laparoscopic cholecystectomy (gallbladder removal), there were six in-person interactions with the health system. In the post-COVID scenario, we recommend there be three virtual interactions, with two unnecessary interactions that could be eliminated and only one in-person interaction (the surgery itself).

Applied broadly across the health system, this care redesign would lead a massive shift away from physical interactions, towards an almost equal ratio of physical to virtual interactions. This would greatly reduce infection risk, but also has the potential to reduce healthcare costs, increase patient convenience and create health system capacity. In order to operationalize this new way of caring for patients, however, new rules are necessary to ensure we can deliver high quality, sustainable healthcare as the "new normal."

This shift is a disruptive innovation.[5] The CoPC are a new dimension against which to measure health system quality and accessibility. Innovative delivery models that reduce the CoPC can also create a new market opportunity and a new quality dimension upon which to compete. Quality care has to be available in a way that does not expose patients and providers to unreasonable infection risk. Physical capacity needs to be carefully organized and reserved for those patients who require in-person contact, whether for examination, testing or procedures. This will require re-thinking of how and where we deliver healthcare in future.

In order to enable this shift in healthcare delivery, we need a clear vision and intelligent planning. There are five system-level considerations that must to be addressed to appropriately and equitably provide a mix of virtual and in-person care (Bhatia et al. 2020):

1 Taking an integrated population health approach to system redesign;

4 For further discussion, see Semple and Armstrong (2017).

5 See Christensen et al. (2009) for a fuller discussion.

Table 1: Replacing In-Person Care with Virtual Care and Removing Unnecessary Visits

Clinical Area	Potentially Unnecessary	Conducted Virtually	Conducted in Person
Elective Laparoscopic Cholycystectomy	Pre-OP ECG Pre-Op Lab	Pre-Op Consult	Surgery
Mechanical Back Pain	Lower back MRI	Follow-up assessments	Initial physical examination to determine if 'red flags' Physiotherapy in an in-person/ virtual mix
Routine Annual Follow-up post PCI	Stress Test ECG	Cardiology visit	Bloodwork done at home Ambulatory BP monitor
Well Baby Visits		1,3,9 month physician/nurse visits	2,4, 6,12 month visits (w vaccinations)
Routine Screening (BMD, Mammography, Colon)	Screening tests when benefits to testing are less than infectious risk of contact	Physician visits to discuss results of testing and devise follow up plan	Higher risk testing where benefit exceeds infectious risk
Sleep Apnea		Respirology consult Home apnea screening test	Confirmation test
Dialysis		Nephrology follow-up with physician/nurse	Home peritoneal or home hemodialysis
Palliative Care	ER transfer, hospitalization	Most visits for regular symptom assessment	A minority of visits where exam or discussion benefiting from high interpersonal connection required
Peri-partum depression		Routine visits with clinician, group therapy sessions	Visits as part of pre-specified escalation pathways (e.g. for suicidality)

Source: Authors' compilation.

2 Implementing safe and effective clinical care models;

3 Monitoring utilization and outcomes;

4 Enabling the sustainability of the endeavour through appropriate payment and billing models; and

5 Ensuring privacy and other legal considerations are not barriers.

Below, we detail these considerations, provide recommendations on how to address them, and identify who should be responsible for addressing them.

PART 1

1.0 Taking an Integrated Population Health Approach to Virtualization in the Time of COVID

The pandemic underscores the importance of taking an integrated population health approach to health service delivery. In this sense, an integrated population health approach refers to a high-level health system strategy that is built around a model of primary healthcare explicitly focused on enhancing the health of a defined population.[6] In this brief section, we emphasize two components of such an approach: first, enhanced collaboration between organizations across the continuum of care to more fully address patient needs; and second, an explicit focus on the social determinants of population health. We outline what the new normal of virtual care will mean for each of these important features of an integrated population health approach to care.

Enhancing collaboration across the continuum of care is an essential element of an integrated population health approach (Farmanova et al. 2019). Reports from early in the pandemic showed that the crisis environment created by COVID-19 brought on a strong spirit of collaboration in parts of Quebec, allowing primary healthcare providers to forge new partnerships and strengthen their team-based approach to care (Boivin et al. 2020). Virtual care technologies were fundamental to such transformation, allowing for group conversations about patient needs that had simply not occurred before.

Despite the capability of virtual technologies to support real-time communication between providers, issues quickly become clear. For example, the lack of infrastructure for health data sharing between provider organizations across the continuum of care is amplified during the pandemic. Indeed, a proliferation of standalone virtual solutions during COVID-19 may well be increasing fragmentation and provider workload. For example, we have COVID-19 screening tools that connect patients to hospital-based testing centres, but are poorly linked back to primary care, public health or even other hospitals. This can lead to poor handoffs, confusion, and inefficient, possibly unsafe care. Integration of virtual services into existing clinical models is critical, although we do recognize the potential trade-offs of care integration with the ease of access to some digital health services. Further, patient-facing applications have the potential to improve integrated care or further fragment it, depending on their surrounding care model. Patient-facing, artificial-intelligence-based applications risk collecting health data entirely separately from the health system if not properly integrated, thereby adding another fragmented patient medical record that will likely not be accessible to inform clinician decision-making. However, if the data are integrated into the primary care system, and reviewed by the primary care providers, they have potential to integrate ongoing healthcare at home with clinical care, and empower patients in managing their own care.

Importantly, we acknowledge that consumer expectations and the pandemic have forced changes that are very uncomfortable for many providers. 2020 has become a year of forced innovation. Finding a balanced, integrated approach that makes best use of different care modalities will take some time. It is important that thoughtful experimentation be allowed as we establish the much discussed "new normal." Box 1 outlines some uses of information technologies that can support more integrated, population-health-focused models of care.

6 See, for example, Farmanova et al. (2019).

Box 1: Examples of Virtual Care to Support more Integrated, Population Health-Focused Models of Care

Synchronous patient visits: Using technology to engage patients in healthcare visits, generally taking place over the telephone or videoconference.

Asynchronous patient communication: Using technology to asynchronously send and receive messages to/from patients in relation to their care, for example, email exchanges.

Multi-provider meetings: Using technology to facilitate real-time discussion among healthcare providers about the care of a particular patient.

e-consults: Using asynchronous technologies to facilitate expedited access for primary care providers to specialist consultations.

Healthcare information sharing: Using technology to asynchronously exchange or share information about a patient or their care with other healthcare providers.

Data capture for quality improvement: Collecting data about care processes that facilitate insights to inform quality improvement. Modernization should increase transparency.

Data capture for administrative purposes: Collecting data about care processes to facilitate effective healthcare management.

1.1 Working towards Equitable Adoption of Virtual Care

A population health approach to system planning and care delivery requires a focus on the social determinants of health, which in the COVID era, manifest through the "digital divide" (Crawford and Serhal 2020). The digital divide refers to the reality that many people do not have access to technologies and the digital know-how to navigate a virtual visit (Latulippe et al. 2017). Some patient groups do not have the basic digital infrastructure, like a mobile device, to engage virtually (ibid.). A larger number of patients lack personal, private space in which to have a confidential conversation with a healthcare provider. Even for many patients with basic infrastructure, a lack of digital literacy skills may interfere with their ability to engage with virtual care (Veinot, Mitchell and Ancker 2017).

Policymakers need to understand that the social determinants of health now have a digital dimension. We need to consider health equity when digital services are designed. In a situation where virtual care is the dominant access channel for receiving a particular care or treatment, patients with an inability to access virtual services will have a harder time accessing meaningful care. For example, video visits may not be a suitable option for rural patients who lack reliable broadband access and may be more amenable to phone visits. Other challenges, like language barriers, patient disability, and cultural differences can all contribute to the digital divide (Crawford and Serhal 2020).

While global focus, and funding, has traditionally centered on video visits, it should be noted that many virtual interactions can be done over a telephone and may be as effective as video. Over 90 percent of virtual visits in Ontario relied on the telephone, a technology that is highly ubiquitous, is more publicly accessible, leverages a high-reliability network, and is easy to use. Video visit use, which was funded pre-pandemic, grew modestly during the first wave, but the growth of phone visits was explosive once funding for

Box 2: Patient Hypothetical for Virtual Care Model

Patient Example: Ambulatory Asha

Asha is an 84-year old South Asian woman who lives independently in a downtown retirement community on a fixed income. She has nine regular medications and sees seven specialists. She speaks English as a second language. She does not have much family in Canada, except for her daughter who supports some of her medical care. During COVID:

- Her Cardiologist calls her and reviews her blood pressure (which is taken using a validated home BP cuff).
- Her Endocrinologist calls her daughter to provide results on her routine bloodwork taken at a community lab.
- Her geriatric psychiatrist has suspended the Alzheimer's clinical trial that she is enrolled in.
- Her regular macular degeneration appointments have been suspended and her sight is deteriorating.
- Her other specialists (Ophthalmology, Respirology) have not been able to do physical visits due to public health requirements that have major impact on how they deliver services.
- Her daily wound care treatments have continued at the home by a PPE clad RPN.

Virtual visits for Asha cannot be done over video because of her poor eyesight. And secure messaging (email) has additional considerations: logistical, as her clinicians must email her daughter rather than her; and privacy related, as this email to her delegate has personal health information (PHI) sharing concerns that must be addressed. Further, written communication in English, particularly on technical medical issues, is a challenge for her and she must rely heavily on her daughter's support.

technology-agnostic virtual visits was permitted. The ideal technology modality for the delivery of virtual services requires more study.

Furthermore, patients who have access to the requisite technology in Ontario have previously shown preference for asynchronous visits over synchronous ones (Kelly et al. 2020). However, these perceived benefits were dependent on a positive experience with the technology, which requires technological literacy and internet access. Thus, for equitable virtual care, providing only one option is likely not the appropriate response. Rather, we recommend providing patients with options to connect with a provider through one of several modalities that is convenient and accessible to them, without compromising care quality. Box 2 describes a case example of the patient perspective on virtual care.

An integrated, population-health-focused approach to care should include virtual care as a central building block, and is work already underway in Canada (Breton et al.). The ability to effectively integrate virtual care into an integrated health system will require building trusting relationships between patient and providers, establishing strong governance structures, and leveraging technologies in ways that support integration and abide by the law. Importantly, this

Box 3: Virtual Primary Care Study Results

Project:
Ontario Telemedicine Network Enhanced Access to Primary Care.

Model:
In a 2018-2019 pilot project, primary care providers signed on to use one of two online platforms to conduct secure virtual consultations via asynchronous messaging or synchronous video or audio. 194 providers and 6,355 patients completed 14,317 visits in the initial proof-of-concept.

Patient experience:
98 percent of patients felt it was the same or better than in-person care; 93 percent of patients felt it saved them time; 92 percent of patients felt it was more convenient than in-person care; and over 90 percent of visits were over secure messaging.

Source: Women's College Hospital (2019).

trust should be built on existing clinical relationships with a patient and their own family physician, rather than through a "walk-in" clinic model.

PART 2

2.0 Implementing Safe and Clinically Effective Workflows

To deliver high-quality virtual care to patients, solutions must support clinically efficient workflows. To accomplish this, we must develop simple, safe and effective clinical pathways. There have been some initial developments of standards for virtual care, including by Accreditation Canada (2020). Although these standards are not widely addressed, they may be a good starting point. Implementing safe and clinically effective workflows should be accomplished through clinician engagement across the healthcare system.

Clinician buy-in has always been critical when deploying new care pathways involving technology, and the absence of strong physician champions is a major factor in failure. The value of digital solutions comes not in the tool itself, but in the tool's ability to enable a clinical model that improves care delivery (Shaw et al. 2018). Electronic health records (EHRs) are a paramount example of where this was poorly done, as tools were designed around administrative rather than clinical needs, leading to increased work, decreased satisfaction, and burnout (Gawande 2018). Physicians now spend close to 40 percent of their effort with the EHR and up to two additional hours of EHR related work each clinical day (Sinsky et al. 2016).

Clinicians have often raised concerns about the effect of virtual care on their workflow, particularly in regard to how to integrate these tools without additional administrative burden (Hickson et al. 2015; Rathi et al. 2017). In a virtual environment, basic tasks such as sending a prescription and tracking diagnostic testing can become more challenging because clinicians are forced to change the way they have done those tasks for years, and the virtual environment exposes the ongoing reliance on physical fax machines and landlines.

Workflows are replete with multiple steps that involve repeatedly converting information from electronic to paper and back again through cumbersome processes that involve unnecessary scanning, printing, and faxing. This transition between electronic and paper information sharing – for example a simple thing like requiring an "ink signature" – can increase administrative inefficiency and privacy risk.

Part of our recommended solution is to ensure that all the basic administrative functions of ambulatory care delivery, including referrals for services, consults, and the ordering and tracking of tests, be done virtually, easily, and consistently. Basic solutions like simple web-based referral forms, email and eFax should be the norm, not the exception. Most importantly, there must be some consistent framework through which tools fit into a coherent and rational workflow. This does not necessarily mean deep digital interoperability – rather, a system-wide sense of how tools with certain functions are meant to work together.

2.1 Ensuring the safety of Digital Health Technologies

To encourage use of digital health technologies, clinicians need to be able to trust that a new tool is safe for patients. There is a need for mechanisms to ensure that digital health technology is trustworthy and safe to use.

Some virtual tools will blur the lines between purely clinical tools, which historically were only accessible via providers, and consumer tools, which consumers can acquire directly, such as wearable devices. This ambiguity underscores a need for regulatory structures that prevent the use of unsafe tools (e.g., a direct-to-consumer mole assessment tool that under-diagnoses melanoma).

Currently, there are few ways for providers and patients to ensure the safety and effectiveness of a new tool modality. There is limited analysis in academic literature on the safety of virtual care solutions beyond superficial data on the high-level accuracy or reliability of solutions. Safety cannot be determined in idealized environments. Thus, more investigation is needed on the safety of these tools in real-life clinical situations (Agboola et al. 2016; Desveaux et al. 2017; Lewis et al. 2014). Poor design or integration can lead to significant consequences (Chou 2012).

Possible models to promote safety and trust in digital solutions include hard regulation of tools tied to ability to market, formal certification by independent third parties, less formal ratings/reviews, or just published frameworks for clinicians and patients to work through on their own (Table 2). Importantly, the federal government is working collaboratively with the provinces on developing national standards on digital tools, as well as best practices for the delivery of virtual care.

2.2 Determining if Virtual Care is the Right Care

There are a number of considerations in deciding how much of the overall care continuum should be virtual. A central consideration should be the fostering of the doctor-patient relationship. While convenience may dictate the use of certain virtual services for simple clinical services (i.e., the use of a virtual walk-in clinic), the development of a strong doctor-patient relationship will likely require physical encounters. This may mean encouraging face-to-face care during the early phases of relationship building with a patient, after which virtual visits help strengthen an already existing relationship (Gough et al. 2015). Additional considerations include the type of care being provided, the medical and social complexity of the case, the capabilities of the technology, and the opportunities for follow-up (CMA 2020; WHO 2019). In the current context, elevated CoPC means that reducing the total number of physical visits ensures that needed face-to-face visits will be safer because social distancing is maintained. Ultimately, the mix of in-person and virtual care will need to be

Table 2: Four Levels of Rigor for Assessing Virtual Solution Safety and Reliability

Mechanism	Example	Description	Pros	Cons
Consumer reporting/ Expert Reviews	Practical Apps*	Review of health management apps by clinicians	Easy to implement; Feedback from clinicians to guide consumers	Low rigor
Self-assessment using established framework	NICE Evidence Standards Framework**	Questions to identify high-risk digital health technologies	Supports organizations in risk and quality assessment when buying digital tools	High burden on organization/ provider procuring solution to review existing evidence; Organization liable for poor application of framework
Third party certification	FDA Digital Health Software Precertification***	List of tools or companies that are certified as safe and reliable by third party	Organizations/ providers know which solutions to trust; Shift liability away from organization	Runs a very real risk of limiting competition in that certification may miss new innovations and be rearward looking
Strict Licensing	Medical Devices Directorate****	Assessment of safety, effectiveness, and quality based on clinical trials and post-market surveillance	High rigor	Long approval timeline; Software changes frequently; High evidence burden; Limits free market competition

Notes:
* Ontario Telemedicine Network. Practical Apps. https://practicalapps.ca/ (2020).
** National Institute for Health and Care Excellence. *Evidence Standards Framework for Digital Health Technologies*.
*** FDA. Digital Health Software Precertification (Pre-Cert) Program.
**** Health Canada. *Medical Devices Directorate*.

Source: Authors' compilation.

determined in collaboration between providers and patients, informed by evidence, based on the goal of providing the best possible and safest care to their patients.

PART 3

3.0 Measuring System Utilization, Costs, and Health Outcomes

A widely held belief about virtual care is that it is more efficient than in-person care and will lead to improved quality and cost saving in the health system. This belief is based upon modernization experience in other industries. As virtual care becomes more prevalent, these assertions regarding utilization and outcomes will need to be tested and monitored.

3.1 Ensuring Virtual Care Improves Appropriate Health System Utilization

Reduced unnecessary appointments and testing have been touted by virtual care advocates as key benefits for mass virtualization. The drivers of differing patterns of service utilization between in-person and virtual visits is complex. Virtual

visits leave out a historically important part of the doctor's visit, which is the physical examination.

The evidence of the impact of virtual care on healthcare utilization is very mixed. In the first wave of the pandemic, overall primary care visits in Ontario dropped by 33 percent, and there was significant substitution of virtual visits for in-person. In a prior Ontario study of asynchronous messaging in primary care, 81 percent of complaints handled virtually required no follow-up, and only 5.6 percent required in person follow-up (Women's College Hospital 2019). However, the experience from Kaiser Permanente in the U.S. showed secure messaging led to an increase in both telephone and in-person encounters, particularly for those suffering from chronic diseases (Palen et al. 2012). Evidence suggests that diagnostic imaging and laboratory testing utilization are substantially lower during virtual consultations than in-person visits (Gordon et al. 2017). However, potentially inappropriate antibiotic prescriptions appear to be increased in virtual visits, particularly in direct-to-consumer virtual care clinics, where visits are not conducted by a physician in the patient's circle of care (Uscher-Pines et al. 2015). Further study on the impact of virtual care on utilization of diagnostics testing and therapeutics is necessary to estimate the cost impact of virtual care.

3.2 Understanding the Investments and Cost Savings of Virtual Care at the Provider and System Levels

The economic benefits of modernizing the health system through virtual care are often not realized by the same provider who bears the investment costs. In pre-COVID Canada, where reimbursement structures typically excluded virtual care, cost savings from a digital solution could come with both added capital investment and lost revenues. For example, consider a clinic that purchased a digital solution that improved the ability of the primary care provider to monitor the patient's health. This may result in better health outcomes for the patient, leading to fewer billable in-person visits with the provider, and potentially reduced need for emergency or hospital services due to improved ability to take preventative care measures. This tool would save the healthcare system money in reduced visits but cost the primary care physician uncompensated time to monitor the patient virtually.

There are extremely limited data on the cost-effectiveness of virtual care solutions. Proxy measures such as avoided referrals, reduced readmission rates, and reimbursement have been used to estimate cost savings.[7]

Cost savings are difficult to assess in virtual care because they are often distributed amongst multiple stakeholders with independent bottom lines. For example, a systematic review of virtual follow-up interventions for outpatient cancer care demonstrated significant reductions in outpatient follow-up visits (Tarver and Haggstrom 2019). It is not clear that, in Canada, these efficiencies would be realized at the hospital level without a reduction in staffing for the clinics.

This makes it difficult to determine who should pay for the solution: for example, consider a circumstance where the cost savings accumulate

7 For further discussion in the literature, see Rathi, S., Tsui, E., Mehta, N., Zahid, S. & Schuman, J. S. "The current state of teleophthalmology in the United States." *Ophthalmology* 124, 1729–1734 (2017); Yang, F. et al. "Continuity of care to prevent readmissions for patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis." COPD: Journal of *Chronic Obstructive Pulmonary Disease* 14, 251–261 (2017); Jayakody, A. et al. "Effectiveness of interventions utilising telephone follow up in reducing hospital readmission within 30 days for individuals with chronic disease: a systematic review." *BMC health services research* 16, 403 (2016).

at the system level through reduced hospital admissions and the technology requires the hospital to hire a dedicated nurse to review monitoring data. If the hospital revenue is reduced by decreasing admissions and there is no additional compensation to cover monitoring costs, what financial incentive is there for the hospital to also purchase the technology?

The pandemic and raised CoPC provides a unique opportunity for policymakers to overcome these barriers in a thoughtful way. Provider revenues will need to be supported and new capital investments will need to be made. These should be done in a fashion that modernizes the health system and not simply by retrofitting existing aging Information Technology systems.

3.3 Measuring the Effect of Virtual Care on Patient Health Outcomes

The impact of virtual care on patient outcomes is even more uncertain. Prior studies of telemonitoring in chronic conditions like heart failure and diabetes show mixed results, with no clear reduction in mortality or hospitalization (Van Spall et al. 2019; Agarwal et al. 2019). On the other hand, there is some evidence that virtual care will improve outcomes in a number of conditions. For example, telehealth has been found to reduce time to recovery in patients post-stroke (Halbert and Bautista 2019), and virtual care has been used as a tool to improve symptom control post-chemotherapy (Moretto et al. 2019). A major limitation of these results is that most are research studies or pilot projects, and generally not clinical programs at scale, which reduces the generalizability of the results. There are, however, examples of population-level studies of virtual care that demonstrate equivalent or improved outcomes to in-person care. For example, tele-ophthalmology was shown to improve screenings of diabetic retinopathy in a review of its implementation in hospital and outpatient settings across the United States (Rathi et al. 2017). Additionally, in Ontario, asynchronous, text-based virtual primary care visits implemented in five regions amongst over 14,000 patients effectively addressed the majority of primary care concerns with limited need for follow-up visits (Stamenova et al. 2020).

The current COVID pandemic has created a natural experiment for us to understand the impact of virtual care on health system utilization and outcomes. Mass adoption of virtual care across the country provides a unique opportunity to study care patterns, particularly in primary and specialty ambulatory care. Specific interest should be paid to patients with ambulatory sensitive chronic diseases, including heart failure, diabetes, hypertension, and asthma. High-quality ambulatory care can uniquely affect the trajectory of the disease in patients with these conditions. However, patients with these conditions are most likely to be adversely affected by COVID. Virtual care has the potential to be a powerful tool to not only provide them with needed care, but also reduce the risk of COVID infection.

A similar approach could be applied to supporting patients with mental health disorders, which could worsen under COVID-related lockdowns. What is unknown is what impact these virtual care interventions will have at scale. There is a concern that virtual care will be incremental to physical visits and not replace them. Even worse, would be virtual triage leading to an increase in total visits. If virtual care is to become a permanent fixture to manage patients with chronic disease, it is critically important that we demonstrate that it does not lead to substantially increased health system utilization without improving health outcomes compared to in-person care.

PART 4

4.0 Promoting Appropriate Funding Models and Billing for Virtual Care

Virtual care in Canada was enabled in large part due to the creation of temporary fee codes (i.e., new

Box 4: Funding Models

Fee-for-service: Clinicians are paid per service they provide (e.g., consultation, treatment, and follow-up would all be paid separately).

Capitation: Clinicians are paid a predetermined amount on a regular temporal basis (e.g., monthly, annually) per patient they serve, rather than per service provided (e.g., primary care provider would be paid a fixed amount per patient on her roster regardless of the services provided).

Bundled payment: A defined payment amount for an episode of care including payment for all involved clinicians and healthcare organizations involved (e.g., surgery, post-surgical care, and follow-up would all be covered under defined bundle amount).

Source: American Academy of Family Physicians. Glossary of Terms: Health Care Payment and Delivery Models.

billing codes that healthcare providers could use to be compensated for virtual visits with patients, intended to last only during the COVID-19 emergency) in response to COVID-19 in order to reduce the risk of infection. Moving forward, health systems must thoughtfully plan how to use fee-for-service, capitation, and bundled payment models for various digital health services by engaging in specialty-by-specialty review of the clinical value of virtual care.

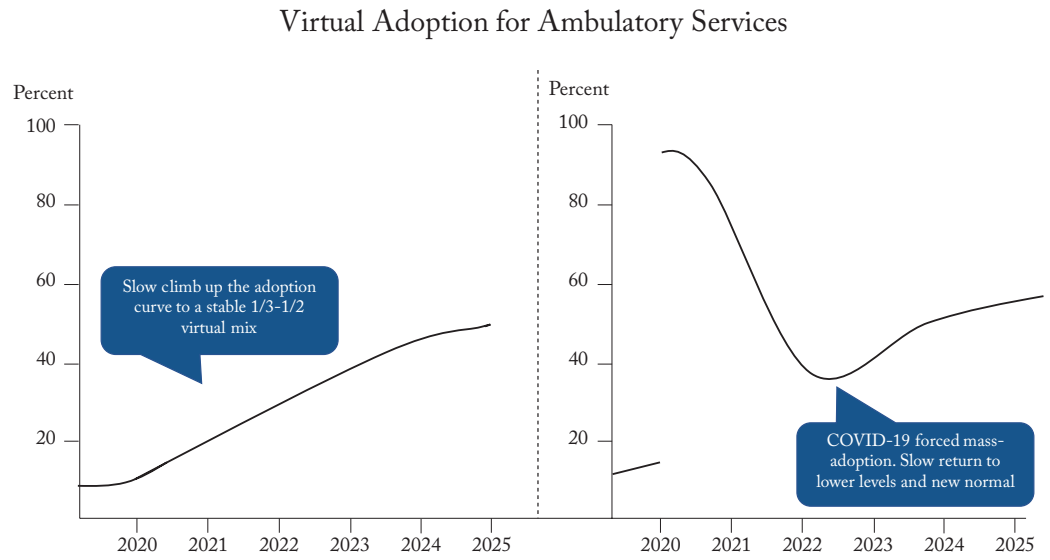
We have previously discussed how payment systems could change to promote use of virtual care (Bhatia and Falk 2018). We described a gradual process of opening existing fee codes and regulation to allow for delivery of care with patients separated in space and sometimes separated in time (asynchronous care). This earlier incremental expansion approach proposed the use of expert panels to assess available evidence to i) open codes to virtual delivery and ii) suggest how payment levels might change.

As stated earlier, payments for telephone interactions have been a huge factor in the rise of virtual care, as an equitable, accessible, convenient and usable technology that has high clinical value in many encounters. Our experience in the pandemic should convince us that the inclusion of payments for video prior to COVID, but not phone, was rather arbitrary and not founded in clinical need or benefit.

Rather than a gradual expansion, COVID caused the Ontario government to create codes in a weekend, and we have been adjusting to high utilization of virtual as a percentage of total payment ever since. The high utilization during the pandemic means we need to determine which virtual services to maintain and which to move back to physical care once the COVID emergency subsides (Figure 1) (Horner et al. 2011).

Fee-for-service (FFS) payment mechanisms are a blunt instrument with which to drive appropriate clinician behavior. In the same way that it was a mistake, traditionally, to have codes arbitrarily closed for virtual delivery pre-COVID, it may be a mistake to open all codes to virtual post-COVID. FFS payments favour the most efficient delivery modalities that they specify as eligible for payment. If either virtual or physical delivery is less time-intensive or more highly compensated, then clinicians will be incentivized under the FFS to use that modality. This may lead to overuse or inappropriate use of either physical or virtual care.

Figure 1: "Approach from Above": Virtual Care Adoption and COVID



Source: Figure created by authors to illustrate general trends in use of virtual care pre-, during, and post-the COVID pandemic.

The Canadian system's over-reliance on FFS payments is a disadvantage when we consider mixed modalities for care delivery. A capitated family doctor who is free to choose when to email her patient and when to schedule face-to-face visits can deliver a much better patient experience and often improve timeliness of care; for example, she can intervene earlier but also schedule excellent follow-up. A surgeon who is paid on a bundled payment model can determine which pre- and post-surgical visits need to be done in-person and where virtual follow-up is more appropriate. As demonstrated by Semple and colleagues, virtual wound care post-surgery can often result in both a better patient experience and higher quality care (Semple et al. 2015).

COVID has thrown these trade-offs into high relief by greatly raising the CoPC for all in-person visits. By allowing some visits to be moved to virtual, we also increase the safety of our treatment facilities, waiting rooms, and high-traffic clinical areas. Lowering physical volumes lowers the CoPC for all patients.

Clinical quality, patient safety, clinician safety, and convenience of all parties should drive decisions around our approach to payment for virtual care. Where physical contact is required, it should be built into payment mechanisms in a thoughtful way, perhaps with a modulator based on infection control status in our community.

PART 5

5.0 Building a Strong Legal Foundation to Virtual Care

The healthcare ecosystem, including all levels of government, healthcare providers and regulators, continues to work to ensure this large health system experiment on virtual care is a success. To ensure safe and effective virtual care will require the government to provide clear guidance on issues

of data privacy and security, to harmonize privacy legislation, and to provide clarity on virtual quality and standards of care.

Given the inconsistency in the types of technologies adopted for virtual care during COVID-19, there is need for clarity through governmental regulations on privacy and security requirements for digital health technologies. Through the course of the COVID-19 pandemic, virtual care models have been adapted in a crisis scenario. There is no single virtual care platform in any province, let alone across Canada. Ontario has promoted the Ontario Telemedicine Network but Zoom Health is also being used in many clinics across Ontario. Prince Edward Island recently purchased several licences to Zoom Health (Yarr 2020). Within a province, different healthcare providers use different platforms, without clear guidance as to the appropriate criteria for safe virtual care technology. For virtual care to become a permanent fixture in Canada's health sector, a positive and trusting experience for participants is critical.

Personal health information (PHI) is among the most sensitive types of personal information; privacy and security of the chosen communication technology remains an important and legitimate priority. A negative privacy perception may increase the perceived risks of virtual solutions, causing patients to opt-out of health information technologies (Shen et al. 2019). The perception and practice of data security are critical to virtual care design, adoption and use, for patients and providers alike.

Since there is neither a single approved virtual care platform for all providers nor criteria to guide providers' choices, clear disclosures about the security safeguards in place for a virtual care platform and process are needed. Disclosures should explain how information leakage, interception, and modification of telemedicine transmissions are safeguarded against. Such disclosures are not only necessary for building trust, but also for compliance with health privacy laws. Privacy laws across Canada require that PHI be safeguarded, which means having enhanced data security features.

Finally, there is need for consistency in language and compliance requirements under health privacy laws across Canada to promote successful integration of digital health technology (Box 5). When health privacy laws do not align, compliance and scalability of a virtual care platform become complicated. This can result in limited competition in the virtual care space and ultimately may harm the likelihood of virtual care flourishing in Canada.

Different definitions create a barrier to nationwide platforms, resulting in: (i) barriers to health information sharing because of the complexity of meeting different standards; and (ii) preventing a harmonized approach to virtual care to leverage economies of scale. Harmonizing health privacy laws will not only permit a national approach to virtual care, but also facilitate the movement of personal health information across Canada as patients move from province to province and will strengthen provincial and national efforts to standardize health data for research and evaluation.

Conclusion

The CoPC have been made manifest by the COVID-19 pandemic and have forced mass adoption of virtual care across Canada years ahead of schedule. Virtual care will be a mainstay of clinical care in the future. There is the potential to transform the patient and provider experience, lower costs and improve care, particularly for those with chronic diseases. For this potential to be realized, a thoughtful approach to policy needs to be undertaken. Federal and provincial governments must articulate a vision for what integrated population health should look like, nationally and provincially, with clearly defined goals and a timeline to achieve those goals

Policy at all levels needs to consider the issues of equity, population health management and integration. We have recommended using a

Box 5: Example of Inconsistency in Health Privacy Laws across Canada

The definition of a health information custodian ("HIC" or "custodian") varies across Canada. This matters because the custodian typically bears the bulk of compliance obligations. Since the HIC is responsible for complying with health privacy laws, it is important to correctly identify and support the HIC in properly meeting legal obligations. For example, Alberta's *Health Information Act* ("HIA")* defines the "custodian" under s. 1.1(f) to include healthcare practitioners as well as specific entities provided for under enumerated health-related acts. This means that only those individuals or entities prescribed by HIA and its regulations are custodians permitted to collect, use and disclose PHI and are responsible for that PHI under the law.

In Ontario, the *Personal Health Information Protection Act* ("PHIPA")** provides a broader definition of a HIC; the HIC may be a healthcare practitioner (such as in private practice) or a "…person who operates one of the following facilities, programs or services" including a public hospital, long-term care home, or any other named entity (see s. 3(4) of PHIPA). PHIPA also provides a broad option to self-identify as a HIC even if not named specifically, if the person "… operates ... a centre, program or service for community health or mental health whose primary purpose is the provision of healthcare" (s. 3(4) of PHIPA). Alberta's definition is more restrictive and prescriptive than Ontario's.

Notes:
*Revised Statute of Alberta, 2000, Chapter H-5.
**2004, Statute of Ontario 2004, Chapter 3, Schedule A.

series of three questions to consider what care is needed, whether it can be delivered virtually and/or physically, and how it should be delivered. Clinically relevant evaluations of virtual care will be necessary to ensure virtual care services are meeting populations' needs. Investments will be required by individual providers and by all level of governments. Policymakers need to ensure that capital cost barriers and reimbursement barriers are dealt with proactively and thoughtfully. We cannot allow policy inaction to slow modernization given the pandemic imperative to change care models. Frank discussions and debates will need to be undertaken with professional colleges, medical associations and the CMPA to ensure that policy issues are addressed in a national context.

New regulation and management will be required in the medium term to make the modern multi-modality system work. As with physical care, utilization metrics will need to be put in place for virtual care to ensure appropriateness. While this will add complexity, it will also add new policy levers that should allow improved and more effective care for individuals and better population health management. We expect new regulatory challenges for software and device approvals and certification. This should be accompanied by continuing innovation in information management privacy and security regulations. Again, a thoughtful considered approach to these issues is recommended. Making such an approach consistent across the country is highly desirable.

Modernization of our health system has been forced by current events. Providers and policymakers need to step up and partner with citizens to make sure that this has a positive impact on our health system and our population.

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