Strategic Clinical Networks

AHS Virtual Care Evaluation Framework

A guide for programs and services in Alberta Health Services

April 2022

Alberta Health Services
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Glossary

Asynchronous	Not occurring real-time (e.g., email).
Equity	Equity is the absence of unfair, avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other dimensions of inequality (e.g. sex, gender, ethnicity, disability, or sexual orientation). *(World Health Organization [WHO])*
Evaluation	The systematic assessment of the design, implementation or results of an initiative for the purposes of learning or decision-making. (*Canadian Evaluation Society*)
Health equity	When everyone can attain their full potential for health and well-being, regardless of their differences *(adapted from the WHO).*
Logic model	A visual depiction of the "if-then" (causal) relationship between a program's or initiative's inputs, activities, and what the program or initiative intends to accomplish (*AHS Evaluation Planning*)
Quality of care	Care that is acceptable, accessible, appropriate, effective, efficient, and safe (*Health Quality Council of Alberta*)
Quintuple Aim	An expansion of the Quadruple Aim to include health equity. The five aims are: improved patient and family experience with care, improved patient and population health outcomes, improved experience and safety of the workforce, improved financial health and value for money, and health equity (*Nundy et al., JAMA, 2022*)
Secure messaging	The asynchronous exchange of information between providers and patients, or between providers, through electronic platforms that adhere to the standards of safety and privacy. (*Health Canada Report of the Task Team on Equitable Access to Virtual Care*)
Synchronous	Occurring real-time (e.g., videoconference).
Virtual care	The use of innovations and technologies to connect providers to one another and/or connect providers to patients to deliver care at a distance (*AHS Virtual Health*)
Virtual care equity	The provision of remote health services using any form of communication or information technology to facilitate or maximize the quality of patient care by joining patients and/or members of their circle of care in a manner that ensures an absence of avoidable or remediable differences among groups of people based on digital or social determinants of health. (*Health Canada Report of the Task Team on Equitable Access to Virtual Care*)

Guidance to the Reader

Why was this framework created?

The *AHS Virtual Care Evaluation Framework* provides a consistent approach to evaluating the acceptability, accessibility, appropriateness, effectiveness, efficiency, and safety of virtual care services at AHS. Evaluation is an important step in service and program planning and delivery. Through systematic and comprehensive approaches, questions can be identified and answered to inform planning and decision-making. Deliberate and consistent evaluation practices, including how findings are mobilized within AHS, will lead to higher quality, safer, and more sustainable healthcare.

Given the ongoing changes related to virtual care as a result of the COVID-19 pandemic, evaluation is especially important for virtual services and programs. Although virtual care is not new, various virtual care strategies have been implemented across AHS, particularly in response to the increased demand for virtual care due to the pandemic. For example:

- The AHS Virtual Health Executive Council was created to provide leadership and make decisions regarding virtual care design and delivery.
- The AHS Virtual Health Program released its *2021-24 Strategy Plan*, which describes how the program will facilitate and support virtual care across the organization to promote a 'coordinated, consistent, and innovative approach' and 'develop standards that add value to care provision'. Evaluation will play a key role in these efforts and inform future decision making and planning.
- The *AHS Virtual Care Evaluation Framework* was created to encourage and guide future evaluations of virtual services and programs.

What is the goal of the framework?

The Virtual Care Evaluation Framework is a practical guide for people and teams wishing to evaluate virtual care in AHS. Specifically, the framework supports a common vision and understanding within AHS about the goals of virtual care, the process needed for optimal delivery, and the desired outcomes. A common evaluation approach enables teams to compare and share learnings, build organizational wisdom, and guide best practice approaches.

Questions are suggested across a range of domains applicable to virtual care that may guide evaluators and help other decision-makers identify the questions important for them. For example:

- What outcomes do you expect to see from virtual care and why? How does the impact of virtual care align with the Quintuple Aim and the Health Quality Council of Alberta (HQCA) domains of quality and safety?
- What process measures are important to think about when evaluating a virtual care service or program? How do the process pieces link to the outcomes observed?
- What contextual factors might influence outcomes? For example, Internet connectivity, remuneration models, usability of technology, etc.?

Who is the framework for?

The Virtual Care Evaluation Framework is primarily intended for people and teams in AHS wishing to evaluate a virtual care service or program. This could include members of the Strategic Clinical Networks, operations staff, Information Technology, or other program managers and leads. The framework may also be useful for evaluators tasked with evaluating a virtual care service or program.

The evaluation framework may also be useful for other aspects of program planning and service design. It includes suggestions regarding what resources, participants, and activities are needed for optimal virtual care delivery and describes why virtual care (when integrated with in-person care) may lead to an improvement in the quality and safety of care. Together, these concepts may help teams discuss and make decisions about what inputs are needed and what outcomes can be expected based on the vision and theory of virtual care.

How should you use the framework?

The Virtual Care Evaluation Framework may be used in different ways. Groups wishing to develop evaluation questions may reference the framework to identify those appropriate for their local context. Others may use the Logic Model to better understand the inputs, participants, activities needed to plan or evaluate the process of virtual care. Expected short- and medium-term outcomes of virtual care are suggested, which may be used to guide value assessments of virtual care. Contextual factors are another important consideration of virtual care planning and evaluation, as situations may arise beyond the control of AHS that influence the adoption or results of virtual care. Lastly,

key resources from a provincial and national perspective are provided to guide further reading in this area.

The evaluation framework is high-level and serves as a practical guide to drive thinking and conversations to plan an evaluation. It does not recommend specific indicators or methods on how to evaluate virtual care. The intention is that evaluators can refer to the framework to learn about relevant process, outcome, and context domains that they can then break down into more granular detail for their specific needs. A User's Guide is being developed to accompany the framework to provide support on how to apply the framework to a specific evaluation.

There are existing frameworks in AHS that will be complementary to this framework. For example, the AHS Innovation Pipeline Primer, the Value in Healthcare: Designing an Integrated Value-Based Healthcare System, and others. What the Virtual Care Evaluation Framework offers that is different, is the focus on virtual care – specifically, the vision and goals of virtual care and the theoretical underpinning behind why technology enables higher quality and safer care. For example: the resources and processes needed to achieve optimal virtual care delivery in AHS and how these link to the outcomes. Once the foundation behind these pieces is developed, other frameworks such as the Innovation Pipeline and Value in Healthcare can be used to help evaluate the scale-and-spread of virtual care as well as identify relevant indicators that help assess value.

Scope

This AHS Virtual Care Evaluation Framework is applicable to all forms of virtual care that connect patients, families, and AHS healthcare providers. The AHS Virtual Health program defines virtual care as "*the use of innovations and technologies to connect providers to one another and/or connect providers to patients to deliver care at a distance*"[1].

Framework components

The framework includes:

- relevant **background information** and key concepts about virtual care
- a **Logic Model** that describes the inputs and outcomes of virtual care and the connections between them.

- Examples of **evaluation questions**, developed through engagement with patients, family members, healthcare providers, and AHS staff. These evaluation questions ask evaluators to consider how and to what degree virtual care is achieving high quality and safe care (as defined by the Health Quality Council of Alberta[4, 5] and AHS' Quality and Safety Committee[6]), and the Quintuple Aim[3] (an expansion of the Quadruple Aim[7] to include a fifth aim, health equity[8]).
- **Other important considerations** of a virtual care evaluation, including design, comparator, timeline.

A User's Guide is being prepared as a separate document to accompany this framework as a practical tool to help those doing evaluations of specific programs and services adapt this framework to their evaluation needs.

Background

What is virtual care?

Virtual care is "the use of innovations and technologies to connect providers to one another and/or connect providers to patients to deliver care at a distance"[1]. Essentially, any technology-facilitated interactions that are directly or indirectly related to healthcare delivery, when not all parties are in the same room at the same time. These interactions can be between healthcare providers alone (for example, an eConsult) or between patients, families, and healthcare providers. Both forms of virtual care take place in real-time (synchronous virtual care) or as an asynchronous approach (**Figure 1**).

> Virtual care is *"the use of innovations and technologies to connect providers to one another and/or connect providers to patients to deliver care at a distance."*[1]

Virtual care has existed for many years; beginning with traditional approaches such as the telephone and site-based Telehealth[9] (patients and families go to a designated healthcare facility nearest to their location that is specifically equipped with videoconferencing equipment to attend and participate in a video visit with a remote healthcare provider). In Alberta, a province-wide clinical information system (Connect Care) was first launched in November 2019[10]. This single system will enable virtual care in several ways. It will allow healthcare providers at AHS to have a *"central access point for more complete, up-to-date patient information and best practices".* Further, patients and families will be better able to access their health

information through portals within Connect Care (MyAHS Connect[11]) and healthcare providers will be able to better communicate with each other and patients[12].

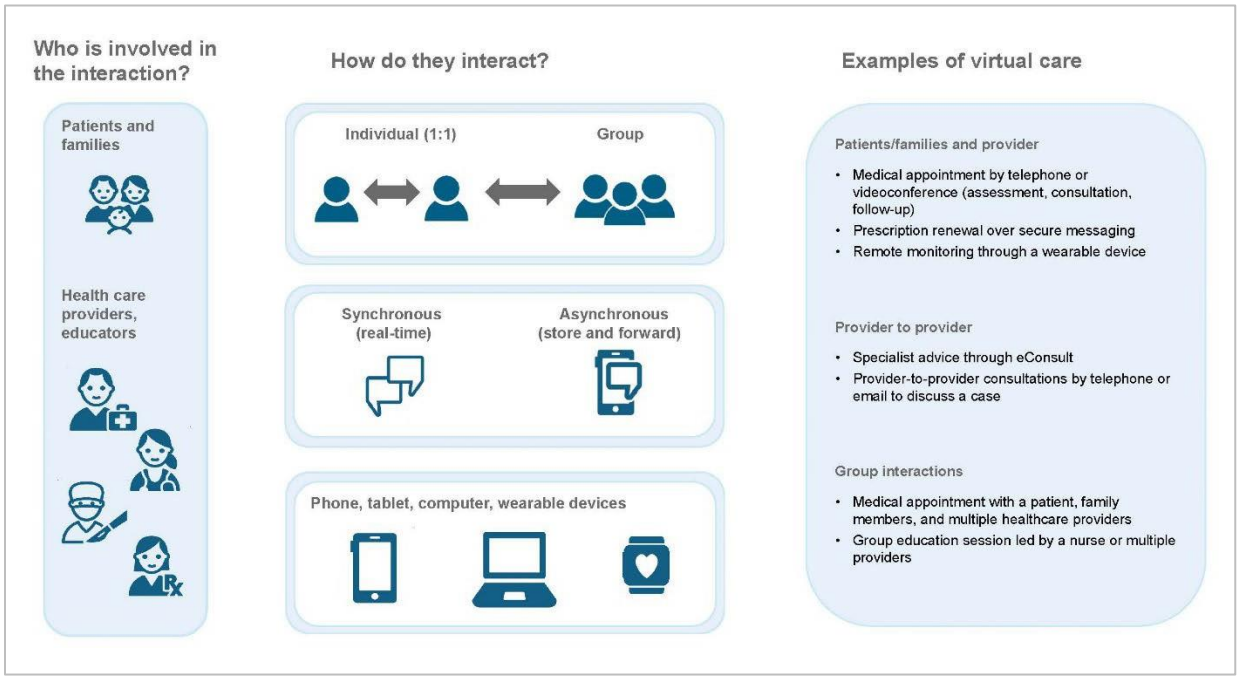

Figure 1. Common models of virtual care.

While adoption of virtual care has been increasing over time, the COVID-19 pandemic significantly accelerated virtual care use globally, including Alberta[13]. More telephone visits were used for care delivery. Common videoconferencing platforms such as Zoom® were added to the healthcare toolkit to facilitate video visits between providers and patients, as well as to connect providers together real-time. This also enabled the ability to provide care outside of hospitals and healthcare centers and directly into a patient's home or community. Secure messaging has also facilitated more asynchronous communication between patients, family members, healthcare providers, and clinic staff, including the sharing of audio and video files to support care. Wearable devices with specific monitoring or data-sharing applications, or other remote monitoring equipment, helped providers monitor patients while in their own homes, rather than requiring care to be delivered in a healthcare facility.

What is the vision of virtual care?

As commonly stated, virtual care is simply another tool in the healthcare system's toolkit. Similar to in-person care, the ultimate goals of virtual care are to achieve high quality and safe care in a manner that is equitable, sustainable, and positive for patients, families, and care teams. As such, the intention is not that virtual care will yield outcomes different than those desired from in-person care, but when used as a complementary service to in-person care, virtual care can increase AHS' ability to achieve an equitable and high-value health delivery system through the four organizational key goals[7]: Improve the Experiences of Patients and Families; Improve Patient and Population Health Outcomes; Improve the Experience and Safety of Our People; and Improve Financial Health and Value for Money.

The AHS Virtual Health Strategy acknowledges the vision of "quality virtual care – anytime, anywhere" where the goals of virtual care include patient-focused, high quality, integrated, and effective care"[1]. The opportunities to fully integrate clinically appropriate virtual care spans the continuum of care: hyperacute, acute, subacute, rehabilitation, ambulatory, and community-based care.[1]" As an organization, AHS aims to improve access to services and provide the highest quality of care[7], meaning that care is acceptable, accessible, appropriate, effective, efficient, and safe[4]. Virtual care can play an important role in helping AHS achieve these goals. AHS strives to deliver 'value-based care', which balances quality, cost-effectiveness, equity, and feasibility[14]. An Innovation Pipeline strategy was developed in the organization to standardize evidence requirements that support value-based care across the system[15]. This strategy guides the scaling and spreading of innovations, some of which apply to virtual care, from conceptualization to organization-wide adoption.

Additionally, health equity is an important intended outcome of quality care. Virtual care may reduce several barriers to in-person care, creating opportunities for achieving greater health equity. However, if virtual care improves access for those who are already accessing in-person care, without improving access for vulnerable populations with access challenges to in-person care, it could worsen entrenched inequities – meaning understanding the impact on access across many patient groups is critical. Efforts are needed to ensure virtual care is delivered with consideration for inclusivity of Alberta's diverse population "*in a manner that ensures an absence of avoidable or remediable differences among groups of people based on digital or social determinants of health*."[16]

Therefore, the conceptual model around which this framework was built focuses on how virtual care, when integrated with in-person care, will facilitate higher quality and safe

care and lead to better outcomes (**Figure *2***), such as those proposed by the Quintuple Aim[3]. When virtual care is used appropriately to complement in-person care, we increase our ability to deliver quality and safe care and subsequently better outcomes.

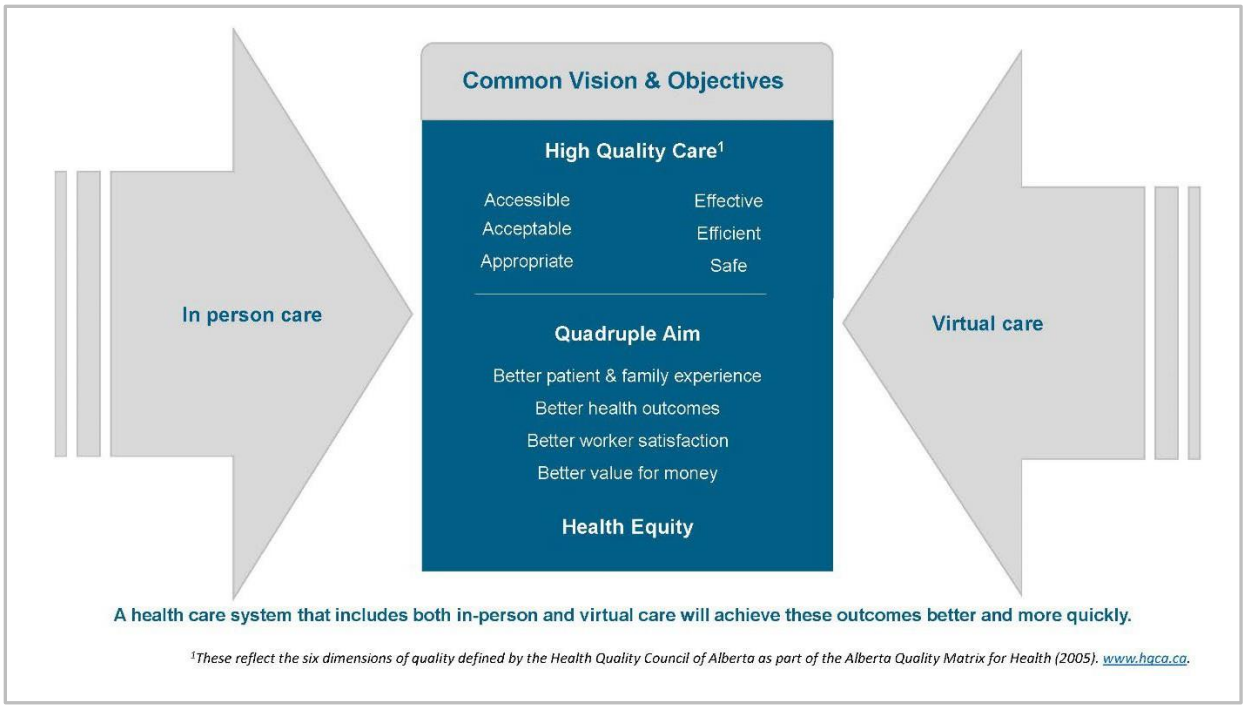

Figure 2. Conceptual model of virtual care.

Setting realistic expectations about virtual care

In every industry, digital technology has helped improve service delivery, whether through improving communication, efficiency, timeliness, or other means. However, many drawbacks have also been observed. Further, technology itself is not always enough to drive change. Processes, culture change, barriers, and other contextual factors play an important role in the adoption and outcomes of digital technology.

Virtual care is no exception. By adding information and communication technology to complement in-person care, we have increased the potential to deliver higher quality and safer care. In many cases, technology can reduce barriers associated with accessing healthcare. For example, people living in rural or remote communities often have to travel to receive care, which can be inconvenient, dangerous in some cases, and could even delay treatment. Others may need to take time off work or find childcare to receive care. Virtual care may help mitigate some of the challenges seen with in-

person care, improving access to care. Additionally, technology may help healthcare providers communicate with each other more easily, enabling shared care models and better information sharing. However, technology (thus, virtual care) will not by itself lead to high quality and safe care. Achieving optimal population health requires a focus on more than medical needs and a change in how *health* needs are identified and addressed[17]. While virtual care may play a role in changing the culture of how care is delivered, it will be important to recognize it alone will not achieve these goals.

Additionally, not everyone, whether directly or indirectly involved in virtual care delivery, has equitable access to virtual care. Resources are not distributed equally across healthcare providers and teams. Likewise, patients and families do not all have the same access to tools required for virtual care, whether related to income, language, digital literacy, Internet connectivity, among others. Technology itself is not enough to provide optimal virtual care. Efforts are needed to ensure the process of virtual care delivery is optimal and that users are trained and receive access to the resources required.

Why do we need to evaluate virtual care?

Evolving context

Virtual care is constantly evolving as is the landscape that encompasses it. New digital technologies are increasingly available and more affordable. Policies and guidelines are getting modernized where possible to remove barriers to optimal virtual care. Societally, people are becoming more familiar and comfortable with using technology for healthcare and the demand for virtual care among patients and families is increasing. More information about the effectiveness and safety of virtual care is needed to manage demand and expectations appropriately. Additionally, key barriers to optimal virtual care remain[18, 19], and ongoing efforts are underway to clear the path for a comprehensive virtual care approach in Alberta[20].

Evaluating virtual care from various perspectives including implementation, process, outcome, and impact is important; particularly as the conditions in which virtual care occurs change, technology improves, as does our knowledge and experience. Formative evaluations will help guide implementation[21], which can increase our understanding about what is needed and how to optimally design and deliver virtual care. Summative evaluations may help inform decision-making through learning about what results we see from various virtual care services, what aspects of the process are working (or not), and whether they are cost-effective and sustainable in the long term.

Complexity

Virtual care is complex[22]. As with in-person care, many factors influence the delivery and outcome of a virtual encounter. Technology is just one aspect of virtual care, and how it is used to facilitate high quality care is an important focus of an evaluation. For example, secure messaging is a standard platform for asynchronous communication; however, how and when providers and patients use it to communicate and exchange information with each other is more likely to influence success or failure than the platform itself. Further, virtual care ideally is delivered in complement with in-person care, and thus attributing outcomes to virtual care alone may require evaluation considerations.

Equity

The World Health Organization defines equity as *"the absence of unfair, avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other dimensions of inequality (e.g. sex, gender, ethnicity, disability, or sexual orientation)".*[8] According to the WHO, health equity is about everyone achieving their full potential for health and well-being, regardless of these differences.

There are two perspectives of equity to consider when evaluating the impact of virtual care. The first addresses the potential ways in which virtual care may make healthcare *more* equitable and the second is about how it might make healthcare *less* equitable.

To the first point, there are many barriers that patients and families may face when trying to access in-person care. For example, driving long distances, needing to book time off work or find childcare, and costs associated with travel and parking. Virtual care may reduce some of these barriers, helping achieve health equity through improving the accessibility of healthcare among people that experience these barriers. In other words, the dimensions of inequality listed above may not be relevant with virtual care, reducing the equity gap.

However, to the second perspective, there is a risk that virtual care may actually contribute to health inequity, as new barriers have been identified associated with accessing virtual care. Virtual care equity refers to the delivery of virtual care "*in a manner that ensures an absence of avoidable or remediable differences among groups of people based on digital or social determinants of health*."[16] Similar to in-person care, there are economic and social determinants of accessing virtual care related to "affordability, availability, accessibility, accommodation, and acceptability"[23]. Not everyone can afford smartphones and computers or knows how to use the technology.

Internet connectivity is weaker in some areas, particularly in rural and remote communities. Language barriers, or vision and hearing impairment may be more of an issue with virtual care compared to in-person care. For some, receiving virtual care may be convenient and comfortable; however, others may have difficulty finding a private, quiet, and safe physical space[24]. Other challenges with virtual care continue to be uncovered. The digital divide (i.e., the gap between those that can access digital technology and those that can't) is a major risk to virtual care equity[25], and efforts to evaluate whether resources and activities close or intensify the divide are important. Recognizing that the virtual care experience is not the same for everyone, nor in every situation, is an important consideration when evaluating the role of virtual care in achieving health equity.

Virtual care equity *refers to the delivery of virtual care "in a manner that ensures an absence of avoidable or remediable differences among groups of people based on digital or social determinants of health."*[16]

Virtual Care Logic Model

Overview

The AHS Virtual Care Logic Model (**Figure 3**) provides a sequential illustration of the inputs and resources required, people (participants) involved, and their respective activities. Together, these elements describe the *process* of virtual care. Additionally, the desired *outcomes* in the short- and medium-term are described, as is the ultimate impact. Other pieces such as continuous improvement and contextual factors are highlighted.

The Logic Model was developed iteratively through multiple activities (**Appendix A, Table 1**). Throughout these steps, all participants of virtual care (patients and family members, care providers, community partners, healthcare providers, operations, evaluators, etc.) were engaged to capture diverse perspectives and ensure all those involved in virtual care provided input (**Appendix B, Table 1**). Relevant literature was also used to guide the development of the framework.

From these learnings, key messages were incorporated into the Logic Model that we recommend be used in the evaluation of virtual care:

1. **There are many participants in virtual care**. These include those that directly use virtual care (patients, family members, healthcare providers) as well as those indirectly involved, such as other clinic team members and AHS staff involved with operations, administration, evaluation, privacy and security, Information Technology, etc.). Each participant and role is important and has a unique set of activities required to optimize virtual care. Better understanding participants' experiences (including evaluating their roles, activities, and supports needed) will help create processes that lead to successful virtual care.

2. **Technology is an enabler of quality and safe care.** Virtual care leverages technology to improve healthcare delivery (where appropriate) and is not necessarily intended to achieve an entirely new set of outcomes. Rather, a healthcare system that uses both in-person and virtual care appropriately may reach existing goals more rapidly or to a greater degree, or at lower cost. In other words, virtual care, when used appropriately and as part of the overall health system, will help AHS better achieve its vision and support the mission to "*provide a patient-focused, quality health system that is accessible and sustainable for all Albertans*."[26]

3. **There are potential challenges and limitations of virtual care that need to be identified and addressed.** Virtual care may not always improve the quality of care across all situations or in all people for various reasons. There are many barriers to receiving virtual care[18, 20] such as a limited access to the technology (computer/smartphone or software) or knowledge of how to use it, poor Internet connectivity, unclear policies and guidelines, clinician remuneration, among other challenges[27]. These should be considered and mitigated as much as possible. Further, there are some situations where virtual care may not be appropriate, leading to unintended consequences and potential harms[28]. Knowing what challenges and limitations of virtual care exist, and ensuring that all virtual care participants, especially patients, families, and the community, are involved in the design and continuous improvement cycle, is essential to drive the appropriate use of virtual care.

4. **Important contextual factors may influence how well virtual care functions.** These factors may relate to policies (licensing, remuneration, etc.), technology (Internet access, hardware, software), or other aspects such as the increased demand for virtual care observed during the COVID-19 pandemic. Although many of

these factors are external to AHS, they are important to consider when evaluating any aspect of virtual care.

All of these considerations informed the AHS Virtual Care Logic Model (**Figure 3**). The right side of the logic model focuses on the expected outcomes of virtual care: the short and intermediate/ long-term outcomes and its overall impact. Process considerations for optimal virtual care are described on the left side of the model. These include resources needed, the various participants that are directly and indirectly involved in virtual care, and the specific activities of each group. Efforts to continuously improve the processes involved in delivering virtual care are also needed through appropriate monitoring and evaluation, quality improvement, and re-designing how virtual care is delivered over time; with significant input from all participants. Lastly, there are important context pieces, both internal and external, influencing how virtual delivery enables quality care. These may be related to technology, reasons for using virtual care, policies, among others.

The Virtual Care Logic Model uses a system-level lens and can be applied to the various types of virtual care services taking place at AHS. It provides a high-level conceptual model and examples to support evaluators, researchers, program planners, service designers, or other decision-makers and help direct them in their work. The various components of the model are described below, including examples evaluators can use and adapt in evaluating specific virtual care services and programs.

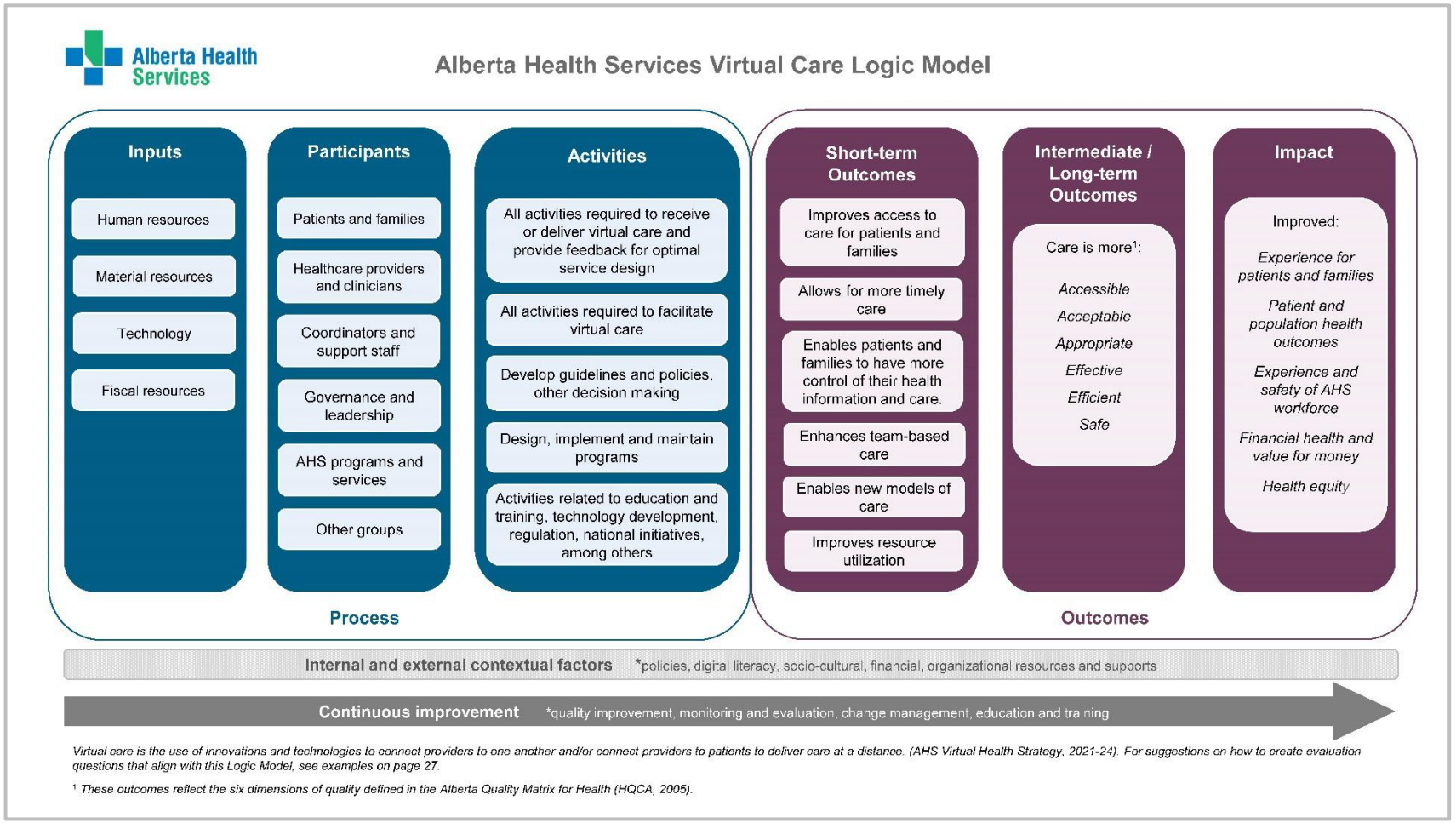

Figure 3. Alberta Health Services Virtual Care Logic Model

Components of the Logic Model

Inputs

Similar to in-person care, virtual care requires human, material, technological, and fiscal resources. Although the resources required for virtual care are comparable to in-person care, how they are used and allocated across the system may look different. For example:

- A virtual patient education group class may be able to expand across different geographic areas, reducing the need for multiple classes in different communities and instead having participants join one virtual class, increasing the ability to offer classes when local staffing shortages exist.
- Video visits occurring between healthcare providers and patients (attending from their own home) may reduce the need for physical facility space.
- Conversely, more computers equipped with cameras and microphones, software licenses, and better Internet connectivity might be required.
- New roles may need to be created to coordinate and facilitate virtual care across the province.

Examples of the human, material, technological, and fiscal resources required for virtual care are provided below.

Human resources

- Healthcare providers
- Clinic and operations staff
- Virtual care coordinators
- Virtual Health program staff
- Privacy and security staff
- Information Technology staff
- Leadership and administration staff
- Managers
- Evaluators

Material resources

- Hardware (computers, tablets, smartphones, peripherals)
- Materials for Internet infrastructure (modems, cables, routers, etc.)
- Facility/office space (when healthcare providers or staff deliver or support virtual care from an AHS facility)

Technological resources

- Software platforms and licenses
- Information about their use and compliance with privacy and security legislature

Fiscal resources

- Fiscal resources from all sources, public and private.

Participants

There are many people involved in virtual care. Some directly use virtual care and others are involved in its coordination. Others are responsible for making decisions and developing policies that govern virtual care, and some monitor, evaluate, and change how these services are delivered and their ultimate impact. Examples include:

Direct users of virtual care

- Patients
- Family members
- Healthcare providers, clinicians

Coordinators and support staff

- Clinic or program staff (e.g. booking clerks, virtual care coordinators)
- Information technology staff
- Virtual Health Program staff

Governance and leadership

- Alberta Health
- AHS Leadership (e.g., Virtual Health Executive Council (VHEC), Clinical Operations Executive Committee (COEC), Quality, Safety and Outcomes Improvement Executive Committee (QSO), and Executive Leadership Team (ELT))

AHS programs and services

- Operational leadership
- Strategic Clinical Networks
- Provincial programs

Other external groups

- Post-secondary training (e.g., medical school, nursing school)
- Regulatory bodies, colleges, and professional associations
- Office of the Information and Privacy Commissioner of Alberta
- Community centres and other supports
- Provincial and national organizations (e.g., Health Quality Council of Alberta, Canadian Institute for Health Information, Canada Health Infoway, patient-oriented organizations)
- Federal government
- Digital health technology vendors

Activities

Each of these participants has specific objectives and activities to fulfil in order for virtual care to be successful.

For **virtual care users** (patients, family members, and healthcare providers and clinicians) these include accessing technology and having a suitable Internet connection and attending the encounter to either receive or deliver care. Training on how to best use the platform may also be required, as is requesting support when needed. Providing ongoing feedback regarding their experience with virtual care will help ensure patients, families, and healthcare providers and clinicians have the tools and information they need.

For **coordinators and support staff**, activities may include working with patients and families ahead of a visit to ensure they are appropriately set-up and able to use the technology prior to the encounter. Scheduling and documenting details about the virtual visit (date, time, platform, link, consent, etc.) may also be required. Vendors may offer training and support for AHS providers and staff and community supports (libraries, senior centres, etc.) may similarly help patients and families improve their digital literacy and ability to receive virtual care.

There are many activities related to **governance and leadership** needed to guide virtual care forward. Within AHS, policies and clinical practice guidelines are being developed to direct healthcare providers and operations staff on how to best deliver virtual care, and when it may not be appropriate to use virtual care (e.g., the Virtual Health program's Virtual Care Best Practice Guide and Guidelines for Clinicians). Decisions need to be made; for example: which technologies should be procured and how to implement them across the system. Other governance and leadership groups such as regulatory colleges are reviewing and modernizing their policies to accommodate and optimize virtual care.

AHS programs and services play a key role in advancing the vision and goals of AHS. In respect to virtual care, various care settings such as acute care, ambulatory care clinics, home hospital virtual delivery, and many programs may have implemented a process for using virtual care. Broader AHS programs or departments also oversee, coordinate, and enable virtual care or assist with the evaluation and measurement of virtual care and related experience/ satisfaction. Other specific programs may exist to support AHS' strategies, many of which are now offered virtually[7]. These include those related to addiction and mental health, chronic disease management, palliative care support, and more.

There are many **other** players in virtual care, many external to AHS, that are developing tools and sharing information about virtual care. In Alberta, educators at post-secondary training (e.g., medical or nursing school) can help train healthcare providers how to use virtual care optimally. Regulators, colleges, and professional associations make important decisions and develop guidelines essential for virtual care delivery. The Office of the Information and Privacy Commissioner of Alberta (OIPC) provides oversight on which technologies are private and secure for use in AHS. The Health Quality Council of Alberta guides high quality and safe virtual care. Community centres and other supports may help Albertans access digital health platforms needed for virtual care and improve their digital literacy.

The Federal government may also be involved in several activities that inform or support virtual care in Alberta, including working with Indigenous nations and groups. The Alberta Indigenous Virtual Care Clinic is also an important participant that provides virtual care to people identifying as First Nations, Inuit and Métis. Many provincial and national organizations and academic institutions (e.g., the Canadian Institute for Health Information, Canada Health Infoway, Digital Health Canada, patient-oriented organizations, Women's College Hospital Institute for Health System Solutions and Virtual Care) publish guiding documents to guide practice, policy, research, and evaluation. Digital health technology vendors create software and hardware needed for virtual care.

Outcomes

Virtual care is simply another tool in the toolkit. By adding it to our healthcare system, we expect to improve outcomes (e.g., overall quality of care, experience of patients and providers) and reach our organizational aims more quickly and to a greater degree, enhancing impact and value.

Short-term outcomes

The following list suggests potential ways in which innovation and technology (thus virtual care) can yield quality and safe care. As the scope of virtual care is broad, all items may not be applicable to each virtual service and may further depend on other contextual factors related to geography, socioeconomics, language, urgency of care, among others. Potential short-term outcomes expected through virtual care include:

Short-term outcome	Examples
Improves access to care for patients and families	• Patients and families can avoid traveling long distances to receive care. • Reduced stress for patients and families associated with finding the clinic, parking, etc. • Fewer costs associated with travel or childcare or time off work. • Less perceived stigma when seeking care. • Privacy and comfort of receiving care in own environment. • Family members or friends can more easily join their loved ones during a visit. • Increased flexibility and convenience.
Enable more **timely care**	• Patients, families, and healthcare providers can connect more quickly if needed. • Healthcare providers in rural or remote settings can interact with urban providers in real-time.
Enable patients and families to have more **control** of their health information and care	• Patients have access to their health information through portals. • Patients and family members can initiate conversation through secure messaging. • The overall change in culture where care meets patients and families in their environment rather than them needing to go to care. • Virtual care allows patients and families to have more choice when selecting which format of care is appropriate in different situations.
Facilitate **teamwork**	• Allows patients, family members, healthcare providers, and clinic or program staff communicate or share information with each other for care decisions.
Enable **new models of care**.	• Multiple providers may be able to more easily attend an appointment together or deliver other forms of shared-care, patients in hospital may be able to stay connected with their families and friends.
Improves **resource utilization**	• Less use of physical facility/clinic space. • Fewer group sessions need to be organized when one session can include more participants.

Intermediate or long-term outcomes

For any of the short-term outcomes mentioned above, integrating virtual care into the overall healthcare system may lead to an increase in the quality and safety of care[4-6]. Compared to a healthcare system that is exclusively in-person, a system that offers both virtual and in-person care (appropriately) expects to deliver care that is higher quality and safer. In alignment with the Health Quality Council of Alberta matrix[4], this means that care will be more:

- **Acceptable** (e.g., patients and families report higher levels of satisfaction with care, healthcare providers report positive work experience)
- **Accessible** (e.g., clinics report fewer no-show rates or cancellations, patients and families report fewer barriers to receiving care)
- **Appropriate** (e.g., patients and families are able to be connected with the right healthcare provider, regardless of geographic location)
- **Effective** (e.g., health and outcomes improve, fewer complications)
- **Efficient** (e.g., patients and families need to spend less time travelling to receive care or have fewer costs, the healthcare system requires fewer resources)
- **Safe** (e.g., patients and families are able to receive care more quickly, patients and families are able to access their health records, care teams are able to better communicate)

Impact

The ultimate objective of virtual care is to help achieve the **Quintuple Aim**. While not every virtual service may improve all of these goals, collectively by adding virtual care to our healthcare system, we strive to:

- Improve the experiences of patients and families
- Improve patient and population health outcomes
- Improve the experience and safety of the AHS workforce
- Improve financial health and value for money
- Improve health equity

Continuous improvement

As we continue to use and learn about virtual care, ongoing efforts are needed to **continuously improve** virtual care across AHS. These include:

- Change management activities (efforts to motivate, prepare, and support individuals and organizations through change).
- Monitoring (routinely measuring and reporting on key indicators, such as utilization (% total visits that are virtual), access (% visits by local geographic area or neighbourhood), efficiency (no show and cancellation rates)).
- Evaluation and research (generating evidence to inform the impact of virtual care on patient and care provider experiences, outcomes, and practices, and mobilizing results for improvement or change).
- Quality improvement (systematic approach to examine and improve performance).

Contextual factors

The adoption and impact of virtual care will be influenced by several internal and external factors. Research of virtual care prior to the COVID-19 pandemic suggest that key determinants of virtual care adoption are related to the technology being used and its acceptability among users, financing, characteristics of the organization implementing the service, and policy and legislation.[30] Examples of factors, internal and external to AHS, that may influence the process, impact, or value of money of virtual care include:

Internal

- Organizational structure
- AHS' goals, vision, principles, and strategies
- AHS' policies
- Technology procured and available at AHS
- Health Information Systems available to the organization, including their structure and integration (e.g., Connect Care)
- Resources and supports for virtual care evaluation, monitoring, and improvement

External

- Social (e.g., degree to which technology is adopted societally, acceptance of remote work)
- Political, legal and remuneration policies
- Cultural (acceptance of virtual care; digital platforms available across multiple languages)
- Ability level (e.g., mobility, hearing, vision)
- Digital literacy (i.e., how comfortable and knowledgeable individuals are when using virtual care platforms or peripheral tools)
- Geographical (distance required to travel to receive or deliver care; distribution of services across the province)
- Environmental (weather; carbon footprint associated with travelling to receive or deliver care)
- Financial (resources required and available for virtual care)
- Internet connectivity (how well individuals are able to access Internet required for virtual care)
- External organizations involved in virtual care (e.g., Canadian Institute for Health Information, Infoway, Centre for Digital Health Evaluation, Health Quality Council of Alberta, patient-oriented organizations, etc.)

Other considerations of virtual care evaluations

To this point, this evaluation framework has described process requirements and expected outcomes of virtual care, the relationships between them, and contextual factors that influence the entire model. Other important considerations when evaluating, planning, or making decisions about virtual care include: the evaluation design, timeframe, comparator, and unintended consequences.

Evaluation design

Many questions remain about the value, effectiveness, current use, and potential of virtual care. In combination, both monitoring and evaluation will help answer these questions. Monitoring the impact through indicators created on a dashboard, such as the number of virtual visits completed, provides important data markers to observe whether a desired outcome is occurring or not. However, this type of monitoring captures only one part of the story to evaluate how change occurs and how to sustain it. The work to get to a point of understanding what will support and sustain change is complex in healthcare settings. To guide this work, evaluation and implementation science offer frameworks, models, and theories to support thinking about the contextual conditions and processes needed for successful implementation and sustainment of a change in practice. Ultimately, the design should match the question(s) and the goals of evaluation.

Virtual care complements in-person care where appropriate. As such, designing a virtual care evaluation requires consideration into three key factors.

1. Evaluators should consider whether the aim of the evaluation is to guide or change how virtual care is being delivered (i.e., a formative evaluation) or make a decision based on the outcomes identified (i.e., a summative evaluation). Process (formative) evaluations address virtual care implementation questions and often require an iterative plan-do-study-act iterative approach. Outcome (summative) evaluations focus on the impact virtual care has, often used to guide procurement or funding decisions.

2. In addition to the objective of the evaluation, deciding whether to observe what happens when virtual care is used or intervening and allocating virtual care as part of an experimental approach will influence how results can be interpreted. Observational designs tend to focus more on experience and costs and while they may suggest associations between virtual care use and health outcomes, attributing cause-and-effect in these settings are more challenging. Usability testing is another common way of evaluating virtual care. Measures and outcomes in this setting tend to focus more on whether the technology was user-friendly as opposed to effective. Evaluations focused on the usability of virtual care technology have been very common over the last few years, as technology in healthcare has been rapidly evolving and adoption across different settings has been increasing.

3. The type of data required to address the evaluation will vary. Evaluations exploring utilization of virtual care (for example, across regions or services and programs) will sufficiently be addressed through quantitative approaches. Questions exploring ‘how’ or ‘why’ (for example, how did virtual care impact patient-perceived access to care or patient-provider relationships) are more complex and may benefit from qualitative approaches. Most often, a mixed-method approach is needed. Regardless of the approach, efforts to increase the rigor of quantitative, qualitative, and mixed-methods evaluations will help improve the quality and utility of the findings.

Timeframe

Evaluating virtual care over a longer period of time (for example, evaluating at several points in time over the course of months or a year) may be important for a number of reasons. First, no two virtual care encounters are alike. Therefore, understanding the experience and outcomes of virtual care with different participants (e.g., patients, families, healthcare providers, and clinicians, etc.), across different settings, will be important to be able to rigorously evaluate the outcomes of virtual care. Additionally, the real impact of virtual care may not be initially apparent. For example, a patient, family member, or provider may rate high satisfaction with a video visit; however, the patient may need to follow-up with urgent care days later. If diagnoses are missed through virtual care, longer term impacts (both physically and emotionally) may occur.

Conversely, a healthcare system may not see immediate benefits of virtual care; however, it may see improvements in cost savings, workforce satisfaction, and population health over time. The overall impact of virtual care from a systems perspective may take time to realize, particularly as we work our way through the initial phases of implementing many of these newer models and technologies.

Lastly, quality virtual care is not episodic, but rather continuous and integrated with in-person care. Therefore, longitudinal evaluations that take into account when and how virtual care is used to complement in-person care will improve our understanding of both the long-term impact of virtual care as well as the overall appropriateness of how to best integrate virtual care with in-person care.

Comparator

As mentioned, virtual care is intended to complement in-person care, when appropriate. In other words, healthcare will be a continuous delivery of services, some in-person and others virtual, as opposed to creating systems of virtual-only care. Technology is simply an enabler of quality care, and the model of care in which virtual care is being delivered is perhaps equally (or more) important than the technology being used. For example, is the virtual service being offered to replace an equivalent in-person service, to modify existing services, or to create a new service altogether?

Understanding whether an evaluation intends to identify whether a virtual service as 'as good as' or 'better' than its comparator is important[31]. This also highlights the importance of considering what virtual care is being compared to during a virtual care evaluation. In some cases, particularly rural and remote areas, there may be no other care options available, so the comparator is no care. In other settings, virtual care may be an alternative to an existing, in-person service and therefore being compared to in-person care.

Unintended consequences

A question often raised about virtual care relates to its appropriateness. Increasingly known is that virtual care is not the ideal method of care delivery in all situations, settings, and across all people. There are risks of virtual care[28] that should be considered if different from the main outcome of an evaluation. For example, video visits over Zoom® may improve access to care and reduce a no-show rate; however, it may also negatively impact the patient-provider relationship, lead to ergonomic issues of healthcare providers and clinic staff, or result in inappropriate prescriptions or referrals for diagnostic imaging. Additionally, virtual care may lead to multiple encounters if the reason for the visit cannot be addressed through a virtual visit. For example, a provider and patient may discuss an issue by phone or video and ultimately decide the patient needs to be seen in person, resulting in a duplication of care.

Also important is monitoring safety. While this is addressed as a quality outcome in the Logic Model, studies that focus on reducing system costs or enabling patients to receive care in their own environments must also consider whether virtual care is causing harm. Safety measures appropriate to the virtual service and context being evaluated would also need to be considered. In some cases, unintended consequences of virtual care may be positive, such as reducing the carbon footprint associated with traveling to receive or deliver virtual care.

What questions are important when evaluating virtual care?

Types of questions

Questions will depend on the purpose of the evaluation; however, there are many types of questions that will be important to consider when evaluating virtual care services in AHS. The Logic Model (**Figure 3**) identifies six short-term outcomes or objectives of virtual care. Other goals may be determined by specific groups, programs, or settings. If these goals of virtual care are achieved, we expect to see higher quality and safe care and ultimately, the implementation of the Quintuple Aim. Therefore, evaluations could focus on assessing whether these intended goals are (or are not) achieved through virtual care, whether an increase in quality and safety of care was achieved, and to what degree the Quintuple Aim was addressed through virtual care.

Further, focusing on unintended consequences may help clarify possible risks of virtual care. Process evaluations that focus on virtual care implementation will help understand how we can best deliver virtual care so that it is equitable, effective, safe, and sustainable. Given the complexity of virtual care, evaluations beyond examining the effectiveness of virtual care will help explore other impacts (for example, unintended consequences), how virtual care works and the importance of contextual factors, how it best integrates with in-person care to collectively lead to system change, and how the evaluation findings can inform decision-making[32].

Therefore, evaluation questions should be developed recognizing the contextual nature of virtual care. Questions that focus more on the ‘how’ or ‘why’ or ‘to what degree’ are likely to be more useful at this current time than those addressing ‘yes’ and ‘no’ questions. Examples of emerging evaluation questions that may be helpful in guiding virtual care evaluations are described below.

Examples: Emerging questions to guide evaluations of virtual care

Evaluation questions related to how virtual care enables quality care

1. What impact does virtual care have on **access to care** for patients and families?
    a. Are barriers reduced, increased, or not changed? How and to what degree?
    b. In which populations and settings does virtual care lead to a positive impact? In which does it not?
    c. What is needed to address concerns?

2. What impact does virtual care have on the **timeliness** of care? (For example: reduced wait time to see a healthcare provider, more rapid consultation between providers, shorter Emergency Department wait time, etc.)
    a. Is the timeliness of care delivery better, worse, or the same through virtual technology? How and to what degree?
    b. In which populations and settings does virtual care lead to more timely care? In which does it not?
    c. What is needed to address concerns?

3. What impact does virtual care have on **enabling patients and families** to have more control of their health information and care?
    a. Do patients and families have more, less, or the same amount of control through virtual care? How and to what degree?
    b. In which populations and settings does virtual care lead to more patient and family control? In which does it not?
    c. What is needed to address concerns?

4. What impact does virtual care have on **teamwork** (including patients, families, healthcare providers and clinicians, and other clinic or program team members)?
    a. Does virtual care lead to more, less, or the same amount of teamwork? How and to what degree?
    b. In which populations and settings does virtual care lead to more teamwork? In which does it not?
    c. What is needed to address concerns?

5. What impact does virtual care have on enabling **new models** of care? (For example, after hours clinics, remote monitoring through wearable devices, encounters involving patients, family members, multiple providers, etc.)
    a. Does virtual care lead to new models of care? How and to what degree?

   b. In which populations and settings does virtual care lead to new models of care? In which does it not?
   c. What is needed to address concerns?

6. What impact does virtual care have on healthcare **resource utilization**?
   a. Does virtual care lead to a more efficient and sustainable healthcare system? How and to what degree?
   b. In which populations and settings does virtual care lead to greater efficiency and sustainability? In which does it not?
   c. What is needed to address concerns?

Evaluation questions related to the impact of virtual care on quality care

When virtual care is integrated with in-person care, is healthcare overall more:

1. Acceptable?
2. Accessible?
3. Appropriate?
4. Effective?
5. Efficient?
6. Safe?

Evaluation questions related to the impact of virtual care on the Quintuple Aim

When virtual care is integrated with in-person care, is there an improvement in:

1. The experiences of patients and families?
2. Patient and population health outcomes (including community-level)?
3. The experience and safety of the AHS workforce?
4. Financial health and value for money?
5. Health equity?

Questions specifically related to the impact of virtual care on Health Equity may include:

1. In which populations or settings is virtual care not accessible, effective, or safe?
2. What are the barriers or limitations of virtual care in these populations or settings, and how can they be mitigated? What are the facilitators of optimal virtual care in specific populations or settings, and how can they be leveraged?
3. To what degree are patients, family members, and the community involved in the ongoing design or delivery of virtual care?

Summary

Virtual care is not new; however, has significantly changed over the last few years, largely due to the COVID-19 pandemic, and will continue to evolve. Evidence is needed to support future decision-making and planning as we move forward with virtual care in AHS. Questions about the quality, safety, and sustainability of virtual care need to be addressed so we can better understand when virtual services are appropriate and when they are not. Risks need to be identified and mitigation approaches need to be developed. Process measures need to be evaluated so that we can design and delivery virtual care in the best way possible.

While the ultimate goals of virtual care are not different than those of in-person care, there are several benefits of using innovations and technology to support care (i.e., virtual care). These include:

- improving **access** to care
- allowing for more **timely care**
- enabling **patients and families** to have more **contro**l
- enhancing **team-based** care
- enabling **new models** of care, and
- improving **resource utilization**

Evaluations that assess the degree to which these are accomplished will better our understanding of the *ways* in which virtual care improves the **quality** and **safety** of our healthcare system. Evaluations that focus on the desired impact such as the **Quintuple Aim** will help understand the value of virtual care. **Process** evaluations will guide future service and program planning and decision-making, as will **economic** analyses. Considering **contextual factors** as part of the evaluation will help better understand the situations where virtual care may be appropriate and those that is may not.

The AHS Virtual Care Evaluation Framework aims to provide a common foundation within AHS from which evaluations may be planned. Through ongoing consultation with AHS healthcare providers and staff, patients, families, and community members, this framework was developed to help evaluators, planners, and decision-makers navigate the complexity of virtual care as we move forward.

Recommended reading and resources

AHS

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Appendix A

Table 1. Steps involved in developing the Virtual Care Evaluation Framework.

Activity	Description	Who was involved	Timeline
Environmental scan	Identify key resources relevant to virtual care. Organization-wide survey to learn more about virtual care evaluations taking place in AHS.	Relevant provincial and national governments and organizations, academic institutions, etc. Strategic Clinical Networks, the AHS Virtual Health Program, and other organizational partners.	Spring 2021 to Winter 2021
Interviews	Collect diverse perspectives about virtual care: how is it being used in AHS, what are the benefits and potential challenges, how do we optimize virtual care?	AHS healthcare providers and staff involved (directly or indirectly) in virtual care. Albertans: patient and family and community members.	Spring/ Summer 2021
Draft Logic Model	Bring together the learnings to conceptualize the value of virtual care and the various process elements required.	Virtual Care Evaluation Framework Working Group	Summer/ Fall 2021
Feedback sessions	Share the draft Logic Model to collect input regarding clarity, appropriateness, and gaps.	AHS healthcare providers and staff, patients, family members, community members.	Fall 2021
Completion of framework	Finalize content and identify strategy for organization-wide implementation. Develop a Users' Guide to facilitate adoption.	Virtual Care Evaluation Framework Working Group; Virtual Care Evaluation Advisory Committee	Winter 2021

Appendix B

Table 2. Engagement strategy

Stage in framework development	Audience	Purpose of engagement	How engagement occurred	How feedback was incorporated into the framework
Scoping	AHS providers, clinicians, and staff	Collect perspectives on the value, risks, and inputs and processes required for optimal virtual care.	Individual interviews (online) 29 people were interviewed.	Key messages regarding the resources, participants, and activities needed and the expected outcomes were used to draft key concepts of the Logic Model.
	Patients and family members		Group interviews (online) 11 people participated (total of 3 meetings).	
Feedback	AHS providers, clinicians, and staff, patients, family members, community members	To present draft Logic Model concepts and emerging evaluation questions for feedback on clarity, appropriateness, relevance, and completeness.	Group discussions (online) – concepts presented to larger groups and then divided into smaller breakout sessions. 39 people attended (total of 3 sessions)	Feedback on the concepts and questions were collected. Logic Model components were added or rephrased to address gaps or improve clarity. Evaluation questions were rephrased.
			Asynchronous and de-identified survey (online) 18 responses submitted.	