

Rapid Synthesis

Optimizing the Use of Hybrid-care Models for Delivery of Healthcare Services

10 January 2023



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Rapid Synthesis:
Optimizing the Use of Hybrid-care Models for Delivery of Healthcare Services
30-day response

10 January 2023

McMaster Health Forum

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Timeline

Rapid syntheses can be requested in a three-, 10-, 30-, 60- or 90-business-day timeframe. This synthesis was prepared over a 30-business-day timeframe. An overview of what can be provided and what cannot be provided in each of the different timelines is provided on McMaster Health Forum's Rapid Response program webpage (www.mcmasterforum.org/find-evidence/rapid-response).

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Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the rapid synthesis. The funder played no role in the identification, selection, assessment, synthesis or presentation of the research evidence profiled in the rapid synthesis.

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KEY MESSAGES

Questions

- 1) What are the features of hybrid-care models (i.e., those that combine virtual and in-person care)?
- 2) What are the impacts of hybrid-care models according to the quadruple aim for health systems of enhancing patient experience, improving population health, reducing costs, and improving the work life of healthcare providers?
- 3) What frameworks can be used to support monitoring and evaluation of quality of care delivered using hybrid-care models?

Why the issue is important

- The COVID-19 pandemic opened the opportunity to accelerate the use of virtual care options.
- This public-health emergency provided a test case to evaluate the potential for virtual solutions to complement in-person care in ways that improve continuity of care and increase access to quality care, particularly for underserved populations.
- Provincial and territorial health systems are now considering how to optimize the use of virtual care through hybrid-care models to leverage the benefits of in-person and virtual care.
- The focus of this rapid synthesis, therefore, is on how to use hybrid-care models to optimize the quality of primary and specialty care.

What we found

- We identified two overviews of systematic reviews, 24 systematic reviews (eight included a meta-analysis), one scoping review, and one rapid review from a targeted search for relevant literature.
- Most of the evidence identified focused on comparing virtual versus in-person healthcare, and very few studies explicitly described hybrid models.
- Overall, the reviews found that patients from different age groups and health conditions benefit from virtual healthcare services and hybrid models at a population level, and that virtual care reduced care-related costs for patients, produced high levels of satisfaction among patients and caregivers, and varied levels of satisfaction among providers.
- However, all of the included reviews concluded that the information available is insufficient in quantity and quality to recommend virtual care or hybrid models over exclusive in-person healthcare.
- We identified nine models for the provision of virtual and hybrid healthcare, which are based primarily on the healthcare provided (i.e., for cancer, chronic conditions, mental health, dermatology, obstetric, pediatric, primary healthcare, surgical services, and sexual health) rather than on specific characteristics of the hybrid models (e.g., how in-person and virtual care are integrated).
- The type of virtual care used (e.g., phone calls, web-based platforms, videoconferencing, remote monitoring) was not specific to any healthcare provided or model, and all the evidence included reported combinations of those strategies.
- We also identified experiences with hybrid-care models through a scan of jurisdictions that are more advanced or experienced with virtual care than Canada (Australia, Denmark, New Zealand, Norway, Sweden, United Kingdom and the states of California and Oregon in the United States).
- Across the findings of our jurisdictional scans, most countries' efforts to establish hybrid models were nascent, with lessons learned from a rapid shift to virtual care brought on by COVID-19 being used to inform broad considerations related to selecting, organizing, and implementing virtual-care services, as well as finding the right mix of virtual and in-person services.
- Several countries reported using hybrid models, or are developing hybrid models that typically focus on specific types of services or conditions.

QUESTIONS

- 1) What are the features of hybrid-care models (i.e., those that combine virtual and in-person care)?
- 2) What are the impacts of hybrid-care models according to the quadruple aim for health systems of enhancing patient experience, improving population health, reducing costs, and improving the work life of healthcare providers?
- 3) What frameworks can be used to support monitoring and evaluation of quality of care delivered using hybrid-care models?

WHY THE ISSUE IS IMPORTANT

The COVID-19 pandemic opened the opportunity to accelerate the incorporation of virtual-care options. This public-health emergency provided an ideal test case to evaluate the potential for virtual solutions to complement in-person care in ways that improve continuity of care and increase access to quality care, particularly for underserved populations. However, virtual care and hybrid models also impose challenges for providers and patients. Given this, provincial and territorial health systems are now considering how to optimize the use of virtual care through hybrid-care models to leverage the benefits of in-person and virtual care.

Virtual care refers to healthcare services that use information and communication technology (ICT) to share, transfer and communicate data or information. This communication can occur between the patient and the care provider, or between two providers.(1; 2) The patient may communicate from home or a primary or community health facility. Virtual care can be provided synchronously (e.g., via phone calls and videoconferencing), asynchronously (e.g., via web platforms, email or text messaging), or even through remote monitoring (i.e., patients in their homes use digital devices or mHealth apps to self-collect and electronically transmit biometric data to providers).(3; 4) There are myriad ways to combine in-person and virtual-care modalities. For example, some providers may choose to incorporate minimal virtual features such as telephone monitoring and secure web-based messaging into in-person care. Other providers may combine in-person consultations with videoconferencing.(2-4)

For healthcare providers engaged in outreach services in mobile clinics, homeless shelters, schools and workplaces, hybrid-care models are increasingly seen as essential. Moreover, providers may choose to support hybrid primary-care modalities in the hospital and incorporate virtual specialty-care solutions when necessary. Other hybrid options consider allied professions, general practitioners or paramedics for home visits and use virtual technologies to conduct joint visits with other members of the care team working remotely.(1) To inform this timely policy issue, this rapid synthesis explores the features of hybrid-care models that lead to successful outcomes for patients, providers and the health system, as well as frameworks that can be used to support monitoring and evaluation of the quality of care delivered using hybrid-care models.

Box 1: Background to the rapid synthesis

This rapid synthesis mobilizes both global and local research evidence about a question submitted to the McMaster Health Forum's Rapid Response program. Whenever possible, the rapid synthesis summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies, and to synthesize data from the included studies. The rapid synthesis does not contain recommendations, which would have required the authors to make judgments based on their personal values and preferences.

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This rapid synthesis was prepared over a 30-business-day timeframe and involved four steps:

- 1) submission of a question from a policymaker or stakeholder (in this case, a provincial ministry of health in Canada)
- 2) identifying, selecting, appraising and synthesizing relevant research evidence about the question
- 3) drafting the rapid synthesis in such a way as to present concisely and in accessible language the research evidence
- 4) finalizing the rapid synthesis based on the input of at least two merit reviewers.

WHAT WE FOUND

We identified two overviews of systematic reviews, 24 systematic reviews (eight included a meta-analysis), one scoping review, and one rapid review from a targeted search for relevant literature (see Box 2 for our search strategy). In addition, we identified experiences through a scan of jurisdictions that are more advanced or experienced with virtual care than Canada (Australia, Denmark, New Zealand, Norway, Sweden, United Kingdom and the states of California and Oregon in the United States).

We outline our key findings for each of our research questions from the identified evidence and jurisdictional scan below.

Key findings for question 1: What are the features of hybrid-care models (i.e., those that combine virtual and in-person care)?

We present findings about the features of hybrid-care models from evidence documents and from experiences identified from scans of other countries in relation to:

- the sectors involved
- populations served
- how different conditions are supported
- the providers engaged and how are they engaged
- the types of virtual care used
- integration of in-person and virtual care
- how system arrangements are used to enable the model.

We provide insights from evidence in in Table 1, with insights presented in relation to the use of hybrid-care models for specific conditions, types of care and/or sectors involved (e.g., cancer, chronic conditions, mental health, dermatology, obstetric, pediatric, primary healthcare, surgical services, and sexual health).

Across the findings of our jurisdictional scans, most countries' efforts to establish hybrid models of virtual and in-person care were nascent, with lessons learned from a rapid shift to virtual care brought on by COVID-19 being used to inform broad considerations related to selecting, organizing and implementing virtual-care services, as well as finding the right mix of virtual and in-person services. However, several countries are also currently using hybrid models or are in the process or developing hybrid models that usually focus on specific types of services or sets of conditions. Detailed findings from the jurisdiction scans are provide in Table 2, with the summary below highlighting common trends, unique approaches, and innovative models identified across the countries we searched.

What sectors are involved?

Key findings from evidence documents

Our evidence search revealed a range of different sectors involved in the delivery of hybrid-care models. The most common sector identified was hospital care, which generally includes a variety of primary and specialist

Box 2: Identification, selection and synthesis of research evidence

We identified research evidence (systematic reviews) by searching (on October 31, 2022) Health Systems Evidence (www.healthsystemsevidence.org), Cochrane Library, and PubMed. In Health Systems Evidence, we searched for overviews of systematic reviews and systematic reviews by combining the filters staff-continuity of care, staff/self – shared decision-making, integration of services, continuity of care, and outreach. In PubMed, we searched for telemedicine OR hybrid OR chealt OR mhealth OR telecare OR telenursing OR telemonitor* OR teleconsult* OR telecounsel* OR telecoach* OR virtual care OR framework OR model AND in person care OR face-to-face care. In Cochrane library we searched for “telemedicine”.

The results from the searches were assessed by one reviewer for inclusion. A document was included if it fit within the scope of the questions posed for the rapid synthesis.

For each systematic review we included in the synthesis, we documented the focus of the review, key findings, last year the literature was searched (as an indicator of how recently it was conducted), methodological quality using the AMSTAR quality appraisal tool (see the Appendix for more detail), and the proportion of the included studies that were conducted in Canada. For primary research (if included), we documented the focus of the study, methods used, a description of the sample, the jurisdiction(s) studied, key features of the intervention, and key findings. We then used this extracted information to develop a synthesis of the key findings from the included reviews and primary studies.

services provided in hospital, such as for patients with chronic conditions,(11-14) mental health care,(15-20) tele dermatology,(21) antenatal care,(14; 22) pediatric services,(23; 24) and surgical services.(28-30) Other sectors included home care and social services focusing on mental health care,(15-20) primary care,(25-27) specialty care, such as for oncology and oncological surgery,(8-10) and public-health and community services.(31)

Key findings from experiences in other countries

Many of the virtual-care models we identified focused on the primary-care sector. In Sweden, for example, [Kry](#) operates as a private digital healthcare provider focused on primary-care services delivered through video-consultation with providers as well as online self-care. In the U.K., [Virtually GP Practice](#) allows patients to access a GP, nurses, dietitians, mental health advisors, and physiotherapists through video consultations and online messaging. A few other models focused on other sectors, such as acute care and mental health. For example, the U.K.'s [virtual wards](#) focus on patients receiving acute care in hospitals as well as out-patients, and Denmark's [virtual hospital](#) model uses a combination of web-based electronic patient records and remote monitoring to enable specialist support and consultations for a range of patients receiving care at home. Several models included virtual and in-person services across sectors. For example, Denmark's [TeleCare North home monitoring](#) aims to support patients with COPD and heart failure by monitoring patients and coordinating services across primary and specialist providers. In the U.K., [Florence text messaging](#) is used to help primary-care, specialty-care and social-service providers to monitor patients and reduce consultation visits.

What populations are served?

Key findings from evidence documents

Most reviews we identified tended to be organized around conditions and services, rather than populations. Notable exceptions include virtual-care strategies that aimed to support primary-care delivery for the general population (25; 27) and rural populations,(25; 27) as well as a systematic review focusing on virtual-care strategies delivering sexual health services for adolescents and young adults ages 14 to 25.(31)

Key findings from experiences in other countries

Target populations served under hybrid-care models vary considerably, ranging from a variety of different types of patients across large geographical areas, to models focusing on specific conditions or groups of patients in a defined geographical area. In New Zealand, the Patient Anywhere receiving healthcare from the Specialist Elsewhere ([PASE](#)) model of care aims to support patients, especially those living in areas with health-service gaps, by allowing primary-care, specialty-care, mental health-service and diagnostic-service providers to connect with a centralized pool of specialists remotely such as by sharing health records, telephone or videoconferencing. The goal of the model is to ensure that no matter where patients live, their local providers can connect with specialists to improve patient care. In the U.S., the Centers for Medicare and Medicaid Services have produced [guidelines](#) for providers implementing hybrid-care models in their practices. The toolkit aims to help providers identify how virtual care can be incorporated into their workflow, discusses situations in which virtual care is likely (and unlikely) to be appropriate, and provides guidance for how to support patients, including patients who may need additional accommodation and consideration, so that virtual-care services can be used effectively, regardless of the specific care context in which they are used.

Hybrid-care models may also focus more specifically, such as on targeted sub-populations or patients within a particular jurisdiction. For example, the [Health and Human Services Telehealth Best Practice Guides](#) provide specific guidelines for a variety of populations in the U.S., including [American Indian and Alaska Native communities](#), [rural communities](#), and [outpatients](#) in emergency departments. In the U.K., [Airedale Hospital](#) uses telemedicine services such as online messaging, home monitoring (e.g., with wearables and tablets), and video consultation to reduce unnecessary hospital admissions and the amount of time spent in hospital.

How are different conditions supported?

Key findings from evidence documents

Generally, the evidence we identified focusing on hybrid-care models supporting different conditions tended to assess the potential of virtual care for improving diagnosis, patient correspondence and follow-up appointments, and in many cases care provided to patients. The specific conditions covered in the reviews we identified included cancer, chronic conditions, mental health, and dermatology, as well as conditions addressed through obstetric, pediatric, and a variety of surgical services (see Table 1).

For healthcare for patients with different types of cancer (i.e., endometrial, colorectal, thoracic, thyroid, breast, esophageal, cervical, and prostate), we included three systematic reviews, two high (8; 9) and one medium-quality.(10) We identified one high-quality overview and three systematic reviews, of which two are high (11; 12) and one medium-quality.(13) The chronic conditions covered were diabetes, hypertension and hyperlipidemia,(13) cardiac conditions,(11; 12) and heart failure, stroke, chronic-obstructive pulmonary disorder, and critically ill patients.(14) We also identified six systematic reviews focusing on mental health, of which two are high-quality (15; 16) and four medium-quality.(17-20) The populations covered were older adults with dementia (15; 17; 18) or Alzheimer's,(19) patients with anxiety disorders,(16; 19) epilepsy,(17-19) depression and suicidal ideation,(19) general mental disorders (children and adults),(19) soldiers and veterans,(19) prisoners,(19) or persons experiencing homelessness.(20)

In terms of dermatology, we identified one medium-quality systematic review focused on the provision of teledermatology for patients with different needs.(21) For obstetric care, we identified two high-quality systematic reviews providing information about virtual care for low-risk pregnancies.(14; 22) For pediatric care, we identified a high-quality systematic review (23) and one high-quality rapid review focusing on virtual care for pediatric services.(24) The populations served were premature infants (23) and children with different conditions.(24) Finally, we identified three systematic reviews on virtual care for surgical services, including two high- (28; 29) and one medium-quality.(30) These reviews covered populations with multiple orthopedic conditions (children and adults),(28) and adults requiring rehabilitation services after an orthopedic surgery.(29; 30)

Key findings from experiences in other countries

As part of efforts to increase the effective use of virtual care more broadly, some countries have included considerations for applying hybrid models of care to patients with specific conditions. In the U.S., the [Health and Human Services Telehealth Best Practice Guides](#) provide specific guidelines for patients with [chronic conditions](#), [HIV](#), [cancer](#), and those receiving [maternal care](#), [physical therapy](#) and [behavioural health care](#). In other cases, hybrid models have been designed to meet the needs of targeted populations with specific conditions. Virtual wards in the [U.K.](#), [Denmark](#), and [Australia](#) have used a combination of remote monitoring (e.g., tablets, apps, web-based tools, wearables, etc.), home visits, and telephone follow-ups/patient hotlines to help ensure patients receive hospital-level care at home to reduce hospital admissions. Such models are often geared towards patients with specific conditions such as wound patients, women with pregnancy complications or families of premature babies, and patients with respiratory conditions or heart failure. Finally, hybrid models are sometimes designed to support specific patient groups such as mental health patients and patients with chronic illnesses, such as diabetes and COPD. Denmark's [telepsychiatry](#) platform provides self-help programming, educational videos, and cognitive behavioural therapy through the Internet Psychiatric Clinic using a combination of asynchronous resources and synchronous counselling and video consultations. Additionally, the [TeleCare North home monitoring](#) program allows patients with COPD and heart failure to connect with hospital staff and home care providers to monitor their condition, provide access to information, and notify providers if action is needed.

What providers are engaged and how are they engaged?

Key findings from evidence documents

The types and combinations of providers engaged and how they are engaged varied somewhat in relation to the types of hybrid-care models being implemented (see Table 1). Common types of providers engaged included general practitioners, nurses, mental health professionals, and specialist care providers.

In terms of reviews on hybrid models supporting care for cancer patients and survivors, providers engaged included oncologic surgeons, psychologists, nurses, therapists, genetic counsellors, physicians and social-science professionals who variously were engaged to provide counselling, consultations, and follow-ups.(8-10) For hybrid models supporting care for patients with chronic conditions, multidisciplinary health teams, diabetes-trained clinical pharmacists, primary-care providers, specialized diabetes nurses, and specialty-care providers were engaged to provide consultations (including for other health professionals during in-person care) and to remotely administer exercise testing via smartphone applications.(11-14)

In reviews focusing on virtual care for mental health, providers included nurses, physicians, psychiatrists and neurologists who provided remote consultations, administered diagnostic tests, and provided care via phone or video-conferencing.(15-19) In terms of virtual care supporting dermatological care, general practitioners, nurses and dermatologists worked together, with dermatologists providing consultations remotely during in-person care provided by either the general practitioner or nurse.(21) Hybrid models used for antenatal care engaged obstetricians, who provided both in-person and virtual care, as well as midwives, nurse practitioners, registered nurses, and physicians providing televisits.(14; 22) For reviews focusing on virtual care for pediatric services, pediatricists and nurses were engaged for counselling, examination, and treatment of a variety of child diseases.(23; 24)

In terms of hybrid models supporting primary care, general practitioners, psychiatrists, physiotherapists, pharmacists, nurses, dentists, and allied professionals (27) were engaged to provide services via hotline as well as telephone and video-based services. Occupational therapists, physical therapists or physiotherapists, speech-language therapists,(26) midwives, physicians, lay health workers, nurses and administrative staff (25) were engaged via videoconferencing and telephone communication. For surgical services provided via virtual care, subspecialists from various specialties,(28) physicians and physical therapists (29; 30) were engaged through teleconferencing and videoconferencing to help facilitate the provision of telerehabilitation services and provide follow-ups. Finally, virtual-care interventions for sexual-health care engaged clinicians, school nurses, social workers, and psychologists who provided education and counselling.(31)

Key findings from experiences in other countries

The hybrid-care models identified often engaged several types of providers, including general practitioners, nurses and home-care providers, and different types of specialists to help coordinate and deliver services. Practitioners' responsibilities can include providing information or training to help patients self-manage or self-monitor their conditions, monitoring patients and referring patients to services when needed, or directly providing services virtually, such as through videoconferencing behavioural therapy, or in person with virtual assistance such as home visits conducted by nurses who remotely connect with specialists who provide consultations while care is being provided. Hybrid models of care often help facilitate collaboration and sharing of medical information across providers.

What types of virtual care are used?

Key findings from evidence documents

The type of virtual care used (e.g., phone calls, web-based platforms, videoconferencing) was not specific to any kind of healthcare provided or model, and all the evidence included reported combinations of those strategies. Synchronous virtual care such as telephone and videoconferencing calls were more common than asynchronous virtual care, which often took the form of patient data transmission, web-based services, mobile app, SMS, or email. Combinations of synchronous and asynchronous virtual care were often used together. For example, phone calls or videoconferencing for consultations or administering tests were used alongside asynchronous patient data transmission used for remote monitoring in the context of hybrid models supporting chronic conditions.(13; 14)

Key findings from experiences in other countries

The hybrid models we identified use a variety of synchronous and asynchronous virtual technologies to enable care coordination and the provision of services. The most common type of virtual care identified across models were video-based approaches to facilitate consultations (e.g., [Virtually GP Practice](#)), service delivery (e.g., [telepsychiatry](#)), or, in some cases a mix of the two, such as for virtual ward models or the [PASE](#) model of care, which combine in-person primary-care services with remote specialist consultations to improve access to care from the patient's home and local community, respectively. Telephone consultation or service provision is sometimes used alongside or instead of video-based approaches, and real-time online messaging services to connect patients with providers have also been leveraged to improve access to and responsiveness of healthcare services.

Asynchronous virtual technologies are often used to facilitate sharing medical information between patients and providers, as well as across providers, to help inform care coordination or to care. They are often used jointly with synchronous approaches, such as telephone and videoconferencing. For example, the [PASE](#) model described earlier also provides a centralized platform through which providers can share patient medical information with specialists to facilitate consultations. Similarly, [virtual wards](#) often involve remote monitoring technologies (e.g., tablets and wearables) to record patient data in real-time and video-consultations to assess patient status and next steps. Other asynchronous approaches include patient information and resources that are made available online. For example, [Kry](#) in Sweden and [telepsychiatry](#) in Denmark offer both synchronous video consultations and asynchronous patient education resources and online self-care options.

How are in-person and virtual care integrated?

Key findings from evidence documents

Virtual care has often been integrated with in-person services to provide virtual counselling, monitoring and follow-up in a variety of contexts. For example, among studies focusing on virtual care for cancer patients, virtual visits and follow-ups were conducted by oncology surgeons and other health providers before or after in-person surgery.(10) Similarly, telerehabilitation has been used after surgery to follow up with patients and monitor their progress.(29; 30) In other cases, synchronous virtual care has been used to support in-person services by helping transmit patient data (13; 14) or enable interactions with multidisciplinary team members during care.(13) Finally, virtual care has also been used to facilitate information provision and triaging necessary to inform next steps for both in-person or virtual services.(27; 31)

Key findings from experiences in other countries

While many models do not explain in detail exactly how in-person and virtual care services are integrated, many models reference the goal of reducing the need for more costly in-person visits and hospital admission

as a key reason for integrating virtual-care services into providers' workflow. In such cases, the choice of whether to use in-person services is generally centred around feasibility and clinical appropriateness. For example, models such as [virtual wards](#) that facilitate acute, hospital-based care and specialty services generally have guidelines for when patients should be transferred to in-person services as they escalate to higher levels of care needs when their condition changes. Similarly, protocols for deciding between virtual and in-person care such as [LACE score](#) (Length of stay, Acuity of admission, Comorbidity of patient, Emergency department utilization), and, more recently, tools relying on artificial intelligence have also been used to determine admission to virtual versus in-person services. In the U.S., CMS has provided [guidance](#) about situations in which virtual care is more likely to be appropriate, such as for wellness visits, managing chronic conditions, discussing test results, counselling about diagnostic and therapeutic options, dermatology, prescriptions for medicine, nutrition counselling, and mental health counselling. CMS notes that situations requiring a medical procedure, presence of abdominal pain, eye complaints, gynecologic complaints, dental complaints, highly nuanced or multiple complex health concerns, or any situation in which a physical exam would be likely to change a provider's recommendation are much more likely to be appropriate for in-person, rather than virtual care.

What system arrangements are used to enable the model?

Key findings from evidence documents

Across many of the reviews we included, system arrangements used to enable the hybrid care model under investigation were often not made explicit or focused on as a point of analysis. Some notable system arrangements identified across reviews included devices used to facilitate self-, remote- and home-monitoring (13; 20), and new funding arrangements and regulatory changes to support virtual-care delivery.(27)

Additional insights about system arrangements can be inferred by some of the barriers highlighted across reviews. For example, one review found overall high satisfaction with virtual care among patients and oncology surgeons, but some oncology surgeons expressed concerns that virtual visits would not fit into the existing clinical workflow, specifically concerning physician reimbursement.(10) This highlights the need for financial arrangements, including remuneration models, to appropriately account for virtual services. Additionally, while some virtual-care services have been generally well-regarded by practitioners in rural areas, some considered that virtual care could present a barrier to receiving support (e.g., funds, infrastructure, resources) necessary for in-person services.(17) Such concerns highlight that hybrid-care models must continue to strengthen capacity for delivering in-person services where necessary.

Key findings from experiences in other countries

Generally, aside from the new forms of delivery arrangements facilitated by hybrid care, most of the models we identified appeared to be layered on top of existing governance, financing and delivery arrangements. For example, the CMS [guidance](#) for virtual care often focuses on identifying what existing services and aspects of providers' current workflow can be replaced with virtual care, and provides instruction for Medicare and Medicaid service coding and billing in the context of virtual-care services. However, some models also highlight important system-level considerations or have created exceptions or new forms of system arrangements to help facilitate hybrid-care models. For example, the [virtual hospital](#) model in Denmark enables nurses working with wound patients to refer their patients directly to telehealth treatment without consulting a general practitioner. Choices about payment models that facilitate virtual care have been identified as an important enabler, but may depend on the types of services being provided. The [telepsychiatry](#) model in Denmark cited equal payment for in-person and virtually delivered services as an enabler, while the [Kry](#) model in Sweden highlights that lower payouts for some virtual services may be appropriate as the model itself is more cost-effective overall. Finally, many of the hybrid models identified involve sharing medical information across providers, and so integrating virtual-care models with broader electronic health record systems has been highlighted as an important consideration (e.g., the [Kry](#) model in Sweden, the [virtual hospital](#) in Denmark, and [PASE](#) in New Zealand).

Key features from question 2: What are the impacts of hybrid-care models according to the quadruple aim for health systems of enhancing patient experience, improving population health, reducing costs, and improving the work life of healthcare providers?

We found reviews that focused on virtual care for chronic conditions (e.g., cancer, heart disease, stroke), mental health, dermatology, child and maternal health, primary healthcare, surgical services, and sexual health. The type of virtual care used (e.g., phone calls, web-based platforms, videoconferencing, remote monitoring) was not specific to any healthcare provided or model, and all the evidence included reported combinations of those strategies. We summarize below key findings from evidence documents about impacts of hybrid-care models on the quadruple aim outcomes. Additional details are provided in Table 3 and in Appendix 1.

Most of the evidence identified focused on comparing virtual versus in-person healthcare, and very few studies explicitly described implementing hybrid models. The evidence analyzed in this rapid synthesis explored and evaluated different outcomes covering all the quadruple aims (i.e., enhancing patient experience, improving population health, reducing costs, and improving the work life of health care providers), but many reviews concluded that there are insufficient cost-impact assessments of virtual care and hybrid models. Four reviews specifically evaluated virtual care or hybrid models during the COVID-19 pandemic,(11; 18; 28; 33) while most of the reviews included studies that were developed before or during the pandemic.

Overall, the reviews found that patients from different age groups and health conditions benefit from virtual healthcare services and hybrid models at a population level, and that virtual care reduced care-related costs for patients, produced high levels of satisfaction among patients and caregivers, and varied levels of satisfaction among providers. Other reported patient-experience outcomes included convenience, acceptability and accessibility. Health outcomes that were reported included readmission rates, quality of life, mortality, functional capacity, blood pressure, lipid levels, pain levels, mental health, preterm births, NICU admissions, and sexual-health related outcomes. We also identified some reviews that reported cost-effectiveness and cost savings of virtual care generally, and specifically within mental health, teledermatology, dietetics, and telerehabilitation. However, all of the included reviews concluded that the information available is insufficient in quantity and quality to recommend virtual care or hybrid models over exclusive in-person healthcare.

Key findings related to enhancing patient experience

Patient satisfaction was the most reported outcome for patient experience of virtual-care services and hybrid models across different conditions. A medium-quality systematic review focused on barriers and facilitators for virtual care addressing different conditions identified 12 studies and found that patients were satisfied or very satisfied with home online consultation.(6) High satisfaction rates were reported among patients receiving virtual care for cancer care,(10) mental health,(17) and primary healthcare (e.g., occupational therapy, physical therapy, physiotherapy, speech-language therapy),(27) and maternal and child health.(22)

However, some of the identified evidence reported differing findings with some indicating no differences in satisfaction between virtual care and in-person care, some noting that people preferred in-person visits, and other reporting on challenges related to virtual care. For example, one high-quality review found no difference in the odds of satisfaction between patients receiving virtual care and those receiving in-person consultations or follow-up visits.(28) In another review related to surgery, four studies reported that 83.2% of participants were satisfied with virtual care in comparison to 86.0% in-person standard care for surgical consults and follow-ups, which were not statistically different.(30) In pediatrics, one high-quality review found that families often expressed a preference for in-person visits citing concerns from parents in the responsibility of describing their child's condition in the absence of an in-person examination.(24) In teledermatology, 14 studies in a medium-quality review focused on interventions combining both patient-provider and provider-provider virtual interactions, meaning that the patient sits next to one provider (general practitioner or nurse) while using living virtual-care platforms to interact with another provider (dermatologists or expert nurse), and nine studies investigated applications facilitating solely patient-provider

interaction.(21) Within five of these studies, most patients ranked standard in-person care as their favourite choice, even though patients were satisfied with the living interactive applications.(21) Finally, in a medium-quality systematic review, 15 of 20 studies reported that slow internet speed during the consultation resulted in poor video and audio quality, loss of connection, and participants' frustration and drop out.(6)

Other reported patient-experience outcomes included convenience, acceptability and accessibility. One medium-quality review about mental health services found that convenience was significantly higher in the virtual-care group as compared to the in-person group.(17) Another medium-quality review reported that virtual care increased the ability of family members with physical limitations or living far away to engage in medical visits, and that accessibility of virtual care was comparable to in-person meetings.(18) A medium-quality systematic review indicated that the ease of use of the virtual platform was reported as a critical factor of system effectiveness, high satisfaction, and the acceptability of the home online consultation system.(6)

Key findings related to improving population health and/or health outcomes

The evidence indicates that people from different age groups and with varying conditions of health can benefit from virtual healthcare services. Health outcomes that were reported included readmission rates, quality of life, mortality, functional capacity, blood pressure, lipid levels, pain levels, mental health, preterm births, NICU admissions, and sexual-health related outcomes.

Related to chronic conditions, one medium-quality systematic review reported that the 30- and 90-day readmission rates were not statistically different between patients with cancer who received virtual follow-up and those who received in-person follow-up.(10) Cancer survivors reported an increase in quality of life for those who received virtual care compared with those who received in-person care.(9) One high-quality review found that telephone genetic counselling was non-inferior compared to in-person genetic counselling for the outcomes of cancer-specific distress and genetic knowledge.(8)

In an overview of reviews about heart disease and stroke care, eight out of 13 meta-analyses showed a significant reduction in all-cause mortality in patients with heart failure utilizing virtual care compared to usual in-person care.(14) The same overview reported no significant changes in mortality in the telestroke group compared to usual care for thrombolysis, and mortality for COPD when virtual-care interventions were employed.(14) Two meta-analyses found that mortality was reduced when virtual care was used for critically ill patients.(14) One high-quality review found that hybrid cardiac rehabilitation showed similar improvement in functional capacity compared to in-person only care.(12) In terms of blood lipids, the review found no significant difference in all assessed lipid profile parameters, except for triglycerides, where the traditional cardiac rehabilitation model had better outcomes.(12) No significant differences were identified in terms of changes in exercise duration, systolic and diastolic blood pressure, or health-related quality of life.(12) A medium-quality review found that virtual care compared to usual in-person care was associated with greater reductions in HbA1c at six months and similar HbA1c outcomes at 12 months. However, there were no significant differences in blood pressure and lipid levels.(13)

Related to mental health, one high-quality review found that outcomes related to obsessive compulsive disorder, anxiety, depression symptom severity, function, working alliance and satisfaction were comparable between the virtual care and in-person delivery across each follow-up time point (immediately post intervention, three months, six months and 12 months).(16) Another high-quality review found agreement between dementia tests conducted virtually and in-person to be good but rarely perfect.(15) This review concluded that virtual testing is complex, and this is reflected in the heterogeneity seen in tests used, their application, and their analysis, which does not imply that remote assessment is not a valid approach.(15) One review reported that telepsychiatry and telepsychology may not be effective with new patients and is also not a long-term replacement for in-person consultations.(27)

One medium-quality systematic review focused on the provision of teledermatology for patients with different needs.(21) The review concluded that virtual care was superior to standard in-person care.

For surgical services, one high-quality review reported no differences in any measures of generic function (measured with scales SF-12, EQ-5D), disease-specific function (measured with scales WOMAC, Morrey Outcome Scale), or pain (measured with VAS, Revised Faces Pain Scale) between the virtual-care and in-person visit groups.(28) Another high-quality review found that the effectiveness of telerehabilitation was comparable to conventional in-person rehabilitation in improving various pain and functional outcomes in patients who underwent a total knee replacement.(29) A similar proportion of patients in telerehabilitation and usual care reported adverse events in the rehabilitation phase and/or follow-up period.(29) One medium-quality review found two studies that collectively reported lower readmission rates for patients followed up via videoconferencing compared to patients in standard care.(30)

Related to adolescents' sexual health-related education programs, virtual-care interventions such as phone texting, web-based information, and video-based counselling, were found to be effective for increasing self-efficacy for condom use, practice for condom use, and being screened/tested for sexually transmitted infections in a high-quality systematic review.(31)

For maternal and child health, one high-quality review found low-strength evidence that hybrid (televisits and in-person) versus in-person only visits do not differ in preterm births or NICU admissions.(22) Another high-quality review found a meta-analysis that examined the effect of prenatal home uterine remote monitoring on mortality, finding no difference in the relative risk of perinatal mortality, and a significant reduction in neonatal intensive care unit (ICU) admissions between the telehealth and the usual-care groups.(14)

Key findings related to costs

We identified some reviews that reported cost-effectiveness and cost savings of virtual care generally, and specifically within mental health, tele dermatology, dietetics, and telerehabilitation. In a medium-quality review, cost savings associated with virtual care were related to patient transport costs. Participants said that online consultation eliminated the burden of travelling from home to a health centre or outpatient unit. In addition, both reduced travel and waiting times were reported in nine articles as an advantage of using virtual care.(6)

A high-quality review found that 60% of the studies reported that virtual care programs were less expensive than in-person care for clinical care of mental disorders.(19) The per session costs of telepsychiatry programs varied widely, ranging from as low as US\$4.38 for the technology costs per neurology consultation for Alzheimer's care in Spain (not including neurologist costs), to \$498.85 for epilepsy consultation in Canada, covering only the costs of the videoconferencing equipment and not medical personnel.(19)

In a medium-quality review, two studies found higher societal costs for living interactive tele dermatology (e.g., virtual-care platforms to interact among a patient, their primary-care provider, and another provider) compared to standard in-person care. One study reported higher costs for living interactive applications from a hospital and a general practitioner's perspective, but lower costs from a patient's perspective. Other studies found living interactive applications to be cost-saving compared to standard in-person care.(21)

A scoping review found that Dietitians Australia has recommended that policymakers and healthcare funders include telehealth-delivered dietetic consultations as a cost-effective alternative or complement to in-person delivery of dietetic services.(27)

In telerehabilitation, one high-quality review found that overall utilization of hospital-based resources was 60% less in the telerehabilitation group than for the traditional face-to-face group, and the median total costs in the telerehabilitation group were significantly lower than in the usual care group (median \$1,050 versus \$2,805).(29)

Key findings related to improving the work life of healthcare providers

Most of the identified evidence indicated overall satisfaction and positivity with virtual care among healthcare providers, while also expressing potential challenges for their workflow and patient care. For example, one medium-quality review found high overall satisfaction with virtual care among patients and oncology surgeons, but some oncology surgeons expressed concerns that virtual visits would not fit into the existing clinical workflow, specifically concerning physician reimbursement.(10) One high-quality review found no differences in general surgeon satisfaction between those providing virtual care and those providing in-person care.(28) Similarly, a medium-quality review reported that 84.0% of providers of virtual-care services were overall satisfied compared to 85.0% of traditional in-person services, which did not prove significant difference.(30) Related to mental health services, two studies within a medium-quality review reported an overall 90% satisfaction of virtual care between clinicians and nurses.(17) In general, rural physicians showed positivity and appreciation for virtual-care programs, indicating that some patients would not have been able to receive specialist care without virtual care. Similarly, a high-quality review indicated that providers perceived virtual care as helpful to foster connections with colleagues, improve coordination and quality of care; however, some described challenges with senior colleagues who did not respond.(25) The same review found that some providers saw mHealth as creating more work, and felt that some patients needed face-to-face contact.(25) Five studies reported that dermatologists were satisfied with living interactive applications, but most dermatologists ranked standard in-person care as their favourite choice. One study showed that physicians were only confident with 59% of diagnoses that were made through the living interactive application compared with 87% confidence in diagnoses made in standard-care procedures.(21)

Important challenges were highlighted from the perspective of the healthcare providers, which included issues with ICT proficiency, lack of confidence in the quality/reliability of the technology, connectivity issues, and concerns around legal matters, increased administrative burden and/or fear of inability to conduct thorough examinations with reliance on subjective descriptions.(24) Additionally, some providers expressed that virtual care could be a barrier to receiving funds, infrastructure and resources for in-person services in rural areas.(17).

One high-quality systematic review that included 60 best practice guidelines for conducting virtual-care encounters included 60 guidelines providing recommendations for health providers, such as:

- ensuring that patient and the condition/disease are appropriate for a virtual encounter
- ensuring that the encounter is being conducted in a secure environment, and communicate potential security or confidentiality breaches to the patient
- ensuring that written and verbal consent for virtual encounters is documented
- communicating a backup plan to the patient in the event of technological failure
- familiarizing with the technology before beginning the virtual encounter
- confirming technology is functioning, consent is available, and the environment is ready before the appointment
- ensuring all staff is trained in using virtual care equipment/software
- speaking slowly and clearly, and take frequent pauses, narrate any physical examination manoeuvres
- placing the camera at eye level and look directly into the camera to simulate eye contact
- exaggerating non-verbal cues such as nodding and facial expressions
- prescribing at the practitioner's discretion, as would be done in an in-person visit.(7)

Key findings for question 3: What frameworks can be used to support monitoring and evaluation of quality of care delivered using hybrid-care models?

One framework, developed by the Pan American Health Organization, aimed to provide solutions for the successful implementation of telemedicine services.(3) This framework, based on a literature review, addressed the obstacles to incorporating and standardizing the use of telemedicine in healthcare institutions.

This theoretical framework is based on understanding the context within its broader structure, together with existing challenges and opportunities that occur during the process of ICT implementation, and changes that occur in organizations, management models, culture, and medical-care services. Moreover, it also reflects on key aspects related to prioritization, design, deployment, integration and assessment. However, this framework does not include a section on monitoring and evaluation of these models.(3)

Another framework,(2) developed by the World Health Organization, considered five types of telehealth interventions, which are based on the classification of digital-health interventions v1.0 developed in 2018 by the WHO. The types of telehealth include: 1) targeted client communication; 2) untargeted client communication; 3) health workers' decision support; 4) telemedicine; and 5) health workers' training. However, this framework does not consider strategies for monitoring and evaluation of telehealth interventions.(2)

One framework focused on hybrid virtual-care models.(1) This framework has an organizational focus guiding providers considering hybrid models. The framework first contemplates clinical efficacy and patient safety as the initial point to decide if virtual care is suitable. This implies choosing what types of patient care must be delivered in-person, what could be offered virtually, and what services might be accomplished without a patient visit. Second, when virtual care is suitable, the provider should identify, from a strictly technological standpoint, how much care can be delivered virtually and what mode of virtual care is most appropriate (i.e., synchronous or asynchronous). Third, the provider should consider if virtual care is suitable for a particular patient (i.e., acceptable and appropriate). Fourth, the provider should choose among different virtual-care devices, tools and apps available in the marketplace. This should include testing the digital tools, devices and apps used in virtual care. Last, this framework suggests that the provider consider if the institution or practice might combine modalities in workflows. This framework considers the right balance between in-person and virtual care and indicates that 50% is appropriate for virtual care. However, there are variations among fields. For instance, dermatology or psychiatry are more suitable for virtual modalities than orthopedic surgery. However, this framework does not include specific tools or strategies for monitoring and evaluation, but it does recommend that providers consider how to measure success, which data to use to inform continual improvement, how to capture patient and provider experience, and how to use that data to inform further decisions.(1)

There is a toolkit for the provision of high-quality virtual care in Canada. This toolkit aimed to improve virtual-care services provided via phone calls, videoconferencing, secure messaging, or remote patient monitoring. This toolkit highlights three priority areas. The first is appropriateness, referring to considering whether virtual care is appropriate and what modalities would work better. The second priority area is the use and optimization of virtual-care services, including adapting virtual care to clinical workflows. The third priority is for ensuring quality and safe virtual-care interactions, which focus on improving communication (e.g., web-side manner, virtual relationship building) and assessment (e.g., conducting physical examinations virtually).(32) One document published by Health Canada also provided policy recommendations for implementation of virtual care, including that virtual care must be considered part of the publicly funded health-delivery system and not as adjunct therapy.(33)

Table 1: Features of hybrid-care models identified from included evidence

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
<p>Supplementary virtual care for cancer patients and survivors</p> <ul style="list-style-type: none"> • Systematic review: n=3 (7,474 participants) <ul style="list-style-type: none"> ○ Two high-quality (8; 9) ○ One medium-quality (10) 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Specialty care (oncology and oncological surgery) • What populations are served? <ul style="list-style-type: none"> ○ Population with the following cancers: endometrial, colorectal, thoracic, thyroid, breast, and prostate (10) ○ Patients with BRCA1 and BRCA2 in breast cancer (8) ○ Population who survived the following cancers: breast, esophageal, colorectal, cervical, and other multiple forms of cancer (9) • How are different conditions supported? <ul style="list-style-type: none"> ○ Patients who underwent major oncologic surgery were followed up with telemedicine postoperative appointments (10) ○ Self-management training modules, provision of general information on the most common residual symptoms, survival counselling, diet and exercise prescriptions (9) ○ Genetic counselling for patients with BRCA1 and BRCA2 (8) • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Oncologic surgeons and “non-oncologic surgeons” (10) ○ Psychologist, nurse, therapist, social-sciences professionals (9) ○ Board-certified genetic counsellors, advanced nurses, physicians (8) • What types of virtual care are used? <ul style="list-style-type: none"> ○ The method of telehealth follow-up included phone calls, video calls, or a combination of both (10) ○ Telephone interventions, videoconferencing, email-based counselling, web-based self-management intervention, and internet-based tele-rehabilitation program (9) ○ Genetic counselling was provided through phone calls (8) • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ After surgery, patients were followed up with phone calls, video calls, or a combination of both (10) ○ After cancer treatment and successful remission, patients were offered virtual-care follow-up (9) ○ After in-person testing for BRCA1 and BRCA2, breast cancer patients were offered virtual genetic counselling (8) • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Not detailed
<p>Virtual care for chronic conditions</p> <ul style="list-style-type: none"> • Overview: n=1, high-quality (14) 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Hospital care • What populations are served?

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
<ul style="list-style-type: none"> ● Systematic review: n=3 (4,510 participants) <ul style="list-style-type: none"> ○ Two high-quality (11; 12) ○ One medium-quality (13) 	<ul style="list-style-type: none"> ○ Adults at least 18 years of age with diabetes, hypertension, or hyperlipidemia (13) ○ Adults with cardiac conditions (11; 12) ○ Adults with heart failure, stroke, chronic-obstructive pulmonary disorder, critically ill patients (14) ● How are different conditions supported? <ul style="list-style-type: none"> ○ Inclusion depends on patients to have HbA1c levels of at least 7%-8.5%; two studies required patients to be self-monitoring for diabetes, one study required participants to have blood pressures greater than 140/90, while another study on blood pressure required an ICD-9 diagnosis of hypertension (13) ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Members of a multidisciplinary healthcare team, diabetes-trained clinical pharmacists and primary-care providers; specialized diabetes nurses; primary-care specialist providers (13) ○ Physical therapists (11; 12) ○ Cardiologist, neurologist, pneumologist, critical-care specialists (14) ● What types of virtual care are used? <ul style="list-style-type: none"> ○ Face-to-face videoconferencing, telephone consultations, and self-monitoring devices, but all examined interventions included a synchronous encounter with a primary-care provider (13) ○ Remote administration of exercise testing in cardiac conditions via a smartphone application, rope, videoconferencing and accelerometer (11; 12) ○ Smartphone apps, telephone calls, interactive voice response calls, game consoles, web pages, remote monitoring, and videoconferencing (14) ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Four studies included interactions with members of a multidisciplinary healthcare team; in one study, participants worked with diabetes-trained clinical pharmacists in addition to their primary-care providers; in another, patients received supplemental education from specialized diabetes nurses; another study coupled telemedicine visits with in-depth primary-care specialist provider meetings to review the care of participating patients (13) ○ Synchronous virtual care was combined with other components such as asynchronous patient data transmission (13; 14) ○ Supervised functional tests using videoconferencing along a 30-metre corridor, using a counter to record the number of laps achieved along a 5-metre rope (11) ○ Telestroke interventions implied that a patient suffering from a stroke or early warning signs of one was reviewed via videoconference by a stroke specialist; the specialist often reviewed patient images or scans before thrombolysis occurred (14) ○ The majority of telehealth interventions for chronic-obstructive pulmonary disorder included the remote monitoring of symptoms with or without the addition of videoconferencing, telephone and web-based platforms (14)

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
	<ul style="list-style-type: none"> ○ For critically ill patients, tele-ICUs involved an off-site specialist using videoconference, remote monitoring of vitals, and the patient’s electronic medical record to direct further investigations and treatment (14) ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Patients in three studies were provided with glucometers for home self-monitoring while patients in two other studies self-monitored using their own blood pressure cuffs; one study required intervention group subjects to use a sphygmomanometer attached to the telemedicine device provided by the investigators (13)
<p>Virtual care for mental health</p> <ul style="list-style-type: none"> ● Systematic review: n=6 (23,572 participants) <ul style="list-style-type: none"> ○ Two high-quality (15; 16) ○ Four medium-quality (17-20) 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Hospital mental health care ○ Home care ○ Social services ● What populations are served? <ul style="list-style-type: none"> ○ Older adults with dementia (15; 17; 18) or Alzheimer’s (19), some of them living in rural areas (17) ○ Population with anxiety disorders (children and adults)(16; 19) ○ Patients with epilepsy (17-19) ○ Population with depression and suicidal ideation (19) ○ Population with general mental disorders (children and adults)(19) ○ Soldiers and veterans (19) ○ Prisoners (19) ○ Persons experiencing homelessness (20) ● How are different conditions supported? <ul style="list-style-type: none"> ○ Multi-domain cognitive assessment or neurological consultation for patients with dementia (15; 17; 18) ○ Follow-up of patients with anxiety (16) ○ Telepsychiatry consultation for patients with Alzheimer’s, depression, anxiety, suicidal ideation, epilepsy, and general mental disorders (children, adults, soldiers, veterans and prisoners)(19) ○ Mental health coaching and assessments, counselling, nicotine replacement therapy, and medication for smoking cessation (20) ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Nurses (17) ○ General practitioner, family doctor, rural physician (17; 19) ○ Psychiatrist (15-19) ○ Neurologist (17-19) ● What types of virtual care are used? <ul style="list-style-type: none"> ○ Remote neurologist consultation, mini-mental test or other disease assessment, phone call or videoconferencing (15; 17)

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
	<ul style="list-style-type: none"> ○ Videoconferencing and phone calls for providing family-based cognitive behavioural therapy or cognitive behavioural therapy for patients with anxiety (16) ○ Phone calls, videoconferencing, or both to provide cognitive assessment and follow-up of older adults with dementia; additionally, one study used television-based technology (18) ○ Telepsychiatry consultation through phone calls, synchronous videoconferencing, asynchronous web-based services, or a combination of them (19) ○ Two-way delivery of electronic case management by phone, mobile app, SMS, email, and social media (20) ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Studies varied; for instance, in one study, participants were divided into two groups, telemedicine or in-person; at follow-up, participants switched to the other type of consultation and continued to switch at certain time intervals (six weeks, 12 weeks, six months, one-year follow-up, etc.); in another study, participants were assigned to only one group, while in six studies participants received a combination of telemedicine and in-person care (17) ○ Virtual care was compared with in-person care (15; 16) ○ Some participants received only virtual care, while others received a reduced form of virtual care plus in-person services (18-20) ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Devices were provided for persons experiencing homelessness (20)
<p>Live interactive teledermatology</p> <ul style="list-style-type: none"> ● Systematic review: n=1 (2,094 participants) medium-quality (21) 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Hospital care ● What populations are served? <ul style="list-style-type: none"> ○ General population ● How are different conditions supported? <ul style="list-style-type: none"> ○ Interventions were provided by clinicians for patients with different skin diseases and wounds ● What types of virtual care are used? <ul style="list-style-type: none"> ○ Fourteen studies investigated an application combining both patient-provider and provider-provider virtual interactions, meaning that the patient sits next to one provider (general practitioner or nurse) while using living interaction platforms to interact with another provider (dermatologists or expert nurse) ○ Nine studies investigated applications facilitating solely patient-provider interaction ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ General practitioner, nurse, dermatologist ● How are in-person and virtual care integrated?

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
	<ul style="list-style-type: none"> ○ Patient-provider and provider–provider virtual interactions, meaning that the patient sits next to one provider (general practitioner or nurse) while using living interaction platforms to interact with another provider (dermatologists or expert nurse) ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Not detailed
<p>Virtual care for antenatal care</p> <ul style="list-style-type: none"> ● Systematic review: n=2 (31,644 participants), both high-quality (14; 22) 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Hospital care ● What populations are served? <ul style="list-style-type: none"> ○ Low-risk pregnant (22) ● How are different conditions supported? <ul style="list-style-type: none"> ○ Home blood pressure monitoring and fetal heart rate evaluation (with handheld fetal Doppler); some studies added self-measured symphyseal-fundal heights (22) ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ In-person care provided by obstetrician (22) ○ Televisits provided by the obstetrician, the midwife, nurse practitioner, physician, or registered nurse (22) ● What types of virtual care are used? <ul style="list-style-type: none"> ○ Web-based platform, phone call, and principally, videoconferencing (22) ○ Prenatal uterine home monitoring (14) ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Studies varied in the number of in-person antenatal visits (at least one provided by the obstetrician), and the number of televisits (at least one provided by the midwife, nurse practitioner, physician, or registered nurse) (22) ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Not detailed
<p>Virtual care for pediatric services</p> <ul style="list-style-type: none"> ● Systematic review: n=1 (2,655 participants), high quality (23) ● Rapid review: n=1, high-quality (24) 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Hospital care ● What populations are served? <ul style="list-style-type: none"> ○ Premature infants (23) ○ Children (24) ● How are different conditions supported? <ul style="list-style-type: none"> ○ Telemedicine evaluation for retinopathy of prematurity (ROP) in premature infant (23), and for different conditions in children (24) ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Pediatricist, nurses (23; 24)

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
	<ul style="list-style-type: none"> • What types of virtual care are used? <ul style="list-style-type: none"> ○ Web-based platform, phone calls, and principally, videoconferencing (24) ○ Videoconferencing (23) • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Virtual care for clinical assessment, counselling and treatment of different child diseases (24) ○ Telemedicine examination for retinopathy of prematurity (ROP) in premature infant (23) • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Not detailed
<p>Virtual strategies that supported the primary healthcare</p> <ul style="list-style-type: none"> • Systematic review: n=2 (1,825 participants) <ul style="list-style-type: none"> ○ One high-quality (25) ○ One medium-quality (26) • Scoping review: n=1, medium-quality (27) 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Primary care • What populations are served? <ul style="list-style-type: none"> ○ General population (25; 27) ○ Population living in rural areas (25; 26) • How are different conditions supported? <ul style="list-style-type: none"> ○ During the COVID-19 pandemic, Australia implemented a hotline providing COVID-19-related information and triage by health professionals; in addition, telephone calls and video-based telehealth were implemented for the provision of different healthcare services (27) ○ Different kinds of therapy for patients living in rural areas (26) ○ Provision of virtual healthcare for maternal, neonatal and child health, communicable and non-communicable diseases, cardiovascular diseases, and intimate partner violence (25) • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ General practitioners, psychiatrists, physiotherapists, pharmacists, nurses, dentists, and allied professions (27) ○ Occupational therapist, physical therapist or physiotherapist, and speech-language therapist (26) ○ Midwives, physicians, primary health workers, lay health workers, nurses, and administrative staff (25) • What types of virtual care are used? <ul style="list-style-type: none"> ○ Hotline, telephone calls and video-based telehealth services (27) ○ Videoconferencing, asynchronous telehealth websites with videos, and telephone communication (25; 26) • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ During the COVID-19 pandemic, Australia implemented a hotline providing COVID-19-related information and triage by health professionals; in addition, telephone calls and video-based telehealth services were implemented (27) • What system arrangements are used to enable the model?

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
	<ul style="list-style-type: none"> ○ New funding arrangements (such as the Australian MBS telehealth items) to support a ‘digital-first’ response to COVID-19 led to a significant increase in ‘tele-consultations’, and a corresponding decrease in in-person consultations (27) ○ These were mainly via telephone, with less than 3% using videoconferencing; this was associated with the accelerated development of digital provider order-entry applications, especially e-prescribing, e-pathology and e-imaging requests (27) ○ Regulations have also been amended to allow pharmacists to supply full Australian Pharmaceutical Benefits Schedule (PBS) quantity of long-term medications in selected cases (27) ○ Closures of and delays to cancer screening services due to COVID-19 resulted in fewer referrals for cancer prevention, screening and diagnostic services (27) ○ Transfer of survivorship care from secondary to primary care should also be accelerated, including the development of virtual models of shared cancer care (27)
<p>Virtual care for surgical services</p> <ul style="list-style-type: none"> ● Systematic review: n=3 (3,887 participants) <ul style="list-style-type: none"> ○ Two high-quality (28; 29) ○ One medium-quality (30) 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Hospital care ● What populations are served? <ul style="list-style-type: none"> ○ Population with multiple orthopedic conditions (children and adults) (28) ○ Adults requiring rehabilitation services after an orthopedic surgery (29; 30) ● How are different conditions supported? <ul style="list-style-type: none"> ○ Post-surgery follow-up of patients with different orthopedic conditions (28), and provision of telerehabilitation services (29; 30) ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Subspecialists in hip and knee arthroplasty, upper extremity, pediatric trauma, adult trauma, and general orthopedists (28) ○ Physicians and physical therapists (29; 30) ● What types of virtual care are used? <ul style="list-style-type: none"> ○ Web-based platform, principally videoconferencing (28), or only videoconferencing (30) ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Most studies implemented a combination of in-person and virtual care, commonly live video-based first consult or follow-up visit conducted in a local health facility (28) ○ Most studies implemented telerehabilitation after an orthopedic surgery (29; 30) ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Not detailed
<p>Virtual care interventions for adolescents’ sexual health</p>	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Public health, community services

Models identified (and sources of evidence about it)	Features of hybrid-care models identified from included systematic reviews and single studies
<p>Systematic review: n=1 (5,499 participants), high-quality (31)</p>	<ul style="list-style-type: none"> • What populations are served? <ul style="list-style-type: none"> ○ Adolescents and young adults, aged 14 to 25 years • How are different conditions supported? <ul style="list-style-type: none"> ○ A range of sexual health and general health topics were addressed, including substance use, safer sex strategies, sexual risk behaviours, and risk-reducing behaviours, including condom use, STI testing practices, and contraceptive options • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Interventions were provided by clinicians, school nurses, researchers, social workers, or psychologists • What types of virtual care are used? <ul style="list-style-type: none"> ○ Phone texting, web-based information, and video-based counselling • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Virtual care for education and counselling and in-person care for STI testing • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Not detailed

Table 2: Features of hybrid-care models identified from jurisdictional scan

Jurisdiction	Models identified	Features of models
Australia	<ul style="list-style-type: none"> • The rise of virtual health: The future of hybrid healthcare in Australia (report by PricewaterhouseCoopers – (PWC) Australia on a patient survey and recommendations) 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ All sectors/unspecified • What populations are served? <ul style="list-style-type: none"> ○ PWC’s consumer survey highlighted that there is no one-size-fits-all for virtual care, and that patients should be segmented based on preferences and needs ○ PWC recommends developing a survey to understand and segment consumer cohorts, preferences and needs disseminated via QR codes in wait rooms, email and social media • How are different conditions supported? <ul style="list-style-type: none"> ○ Consideration should be given to whether a patient’s condition presents barriers to online participation or otherwise requires the patient attend in person • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ PWC recommends introducing a new role “virtual health navigator” to act as the point-person who supports patient’s questions and experience when accessing virtual health • What types of virtual care are used? <ul style="list-style-type: none"> ○ Not identified • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ PWC recommends developing a tool to identify whether care should be offered through virtual or in-person, and could cover the following domains: <ul style="list-style-type: none"> ▪ clinical requirements ▪ patient preferences and technical capabilities • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ According to PWC, a hybrid model should use standardized assessment tools to identify patients’ needs and preferences about virtual care, and to identify when virtual care or in-person care is the most suitable approach for a given care interaction ○ The “virtual health navigator” role would help support the delivery of virtual-care services across the health system
	<ul style="list-style-type: none"> • Virtual ward and post-hospital discharge interventions • Can redo this with Virtual ward from NSW instead 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Acute care • What populations are served? <ul style="list-style-type: none"> ○ Acute care hospital patients and hospital out-patients • How are different conditions supported? <ul style="list-style-type: none"> ○ None identified

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Virtual wards are coordinated by interdisciplinary teams of at least two health professionals, often including ward clerks, nurses, physicians and/or GPs, allied health professionals, pharmacists, mental health professionals and community nurses • What types of virtual care are used? <ul style="list-style-type: none"> ○ Virtual ward ○ Telephone follow-ups and patient hotlines • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Admission to a virtual ward is determined by standardized tools most likely to benefit, often using the LACE score (Length of stay, Acuity of admission, Comorbidity of patient, Emergency department utilization), and, more recently, tools relying on artificial intelligence • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Standardized assessment tools to identify when patients should be admitted to virtual wards as well as interdisciplinary teams to ensure adequate skill mix and coordination
Denmark	<ul style="list-style-type: none"> • TeleCare North home monitoring (from the Healthcare Denmark white paper: Denmark – A telehealth nation) 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Primary care and specialist care • What populations are served? <ul style="list-style-type: none"> ○ Patients with chronic obstructive pulmonary disorder (COPD) and heart failure • How are different conditions supported? <ul style="list-style-type: none"> ○ Patients with COPD use home-monitoring solutions (involving a tablet and a telehealth app) to measure their blood pressure, pulse rate, saturation, and weight (as well as answer specific questions about breathing difficulty) and transmit these responses to their healthcare professionals ○ Patients with heart failure are also provided with home-monitoring equipment and a tablet to submit responses to hospital staff and the municipality • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ General practitioner and hospital staff are involved in training patients to engage in home monitoring, and they also keep track of the information patients submit and intervene if necessary • What types of virtual care are used? <ul style="list-style-type: none"> ○ Transmission of patient-collected data to healthcare professionals via home-monitoring technologies • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ For COPD patients, healthcare professionals use home-monitoring information to determine if additional actions need to be taken

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> ○ Heart failure patients are first engaged in the hospital after they are diagnosed through the up-titration process, which is meant to educate patients and initiate their treatment <ul style="list-style-type: none"> ▪ Following up-titration, patients are provided with self-monitoring equipment and sent home, and the responsibility for regular follow-up contact is transferred from the hospital to the municipality ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ An integrated care model that ensures cross-sectoral collaboration between hospitals, general practitioners and municipalities ○ Well-functioning information technology infrastructure (which is based on a flexible open-source telehealth platform) and telehealth equipment
	<ul style="list-style-type: none"> ● <u>The virtual hospital</u> (from the Healthcare Denmark white paper: Denmark – A telehealth nation) 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Hospitals and municipalities ● What populations are served? <ul style="list-style-type: none"> ○ Wound patients ○ Patients diagnosed with acute leukemia ○ Women with pregnancy complications ○ Premature babies and their families ● How are different conditions supported? <ul style="list-style-type: none"> ○ For wound patients, municipal home-care nurses are responsible for treating patients at home and in other residential settings and documenting patients’ progress using a web-based electronic patient record that specialists can access ○ Patients diagnosed with acute leukemia are provided with a backpack containing their treatment medicines and an integrated pump connected to an intravenous catheter that allows them to receive their treatment from home (with visits to the hospital every three days to restock and be assessed) ○ Women with pregnancy complications are provided with a self-monitoring system for physical and biochemical parameters that enables them to be monitored from home ○ Premature babies are enabled to be discharged from hospital sooner (once they are no longer in clinical danger) thanks to a package of solutions that enable home monitoring, patient education, and video consultations ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Municipal home-care workers conduct home visits with wounds patients and consult with specialists as needed through the web-based platform ○ Premature babies and their families are supported by nutrition professionals, hospital nurses who conduct video consultations, and doctors who conduct in-person check-ups

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> • What types of virtual care are used? <ul style="list-style-type: none"> ○ Home monitoring ○ Video consultations ○ Web-based electronic patient portals ○ Virtual patient education • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ The virtual hospital generally reduces the need for hospitalization to allow patients to spend more time at home and free up hospital resources, but the solution requires patients to attend hospitals to receive equipment, for some check-ups, and if necessary due to the deterioration of their condition ○ For example, patients receiving chemotherapy at home attend the hospital every two to three days to get a check-up, receive new medicines, and receive transfusions if necessary • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Electronic medical records ○ Well-functioning information technology infrastructure and telehealth equipment ○ Collaboration between hospitals and municipalities ○ For wound patient home care, the delegation of authority for nurses to refer patients to telehealth treatment without consulting a general practitioner
	<ul style="list-style-type: none"> • Telepsychiatry (from the Healthcare Denmark white paper: Denmark – A telehealth nation) 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Mental health • What populations are served? <ul style="list-style-type: none"> ○ Patients with mild to moderate depression and anxiety ○ Patients seeking outpatient psychiatric care • How are different conditions supported? <ul style="list-style-type: none"> ○ Patients with mild to moderate anxiety and depression are directed to the Internet Psychiatric Clinic, which gives them access to evidence-based treatment and guidance without the need for a referral <ul style="list-style-type: none"> ▪ Patients can access self-help programming, educational videos, and cognitive behavioural therapy, and their treatment also includes a video-based assessment and end-of-treatment interview ○ The telepsychiatry program has been operating video-based outpatient psychiatry appointments since 2013 • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Psychiatrists and counsellors provide care through virtual platforms ○ Telepsychiatry is also a tool for healthcare professionals to convene for joint decision-making

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> • What types of virtual care are used? <ul style="list-style-type: none"> ○ Asynchronous virtual treatment and educational programs ○ Synchronous counselling appointments ○ Video consultations for scheduled and urgent outpatient visits, medication management, psychotherapy and other therapeutic and supportive consultations • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ General/unspecified • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ National infrastructure for telehealth data ○ Ability for patients to self-refer to the Internet Psychiatric Clinic ○ Practice guidelines for video-based mental healthcare that address regulatory, technical and administrative issues ○ Equal reimbursement for video-based and in-person outpatient psychiatric visits
New Zealand	<ul style="list-style-type: none"> • Patient Anywhere receiving healthcare from the Specialist Elsewhere (PASE) model of care (white paper) 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Can include primary care, specialty care, mental health services, and diagnostic services • What populations are served? <ul style="list-style-type: none"> ○ General/unspecified • How are different conditions supported? <ul style="list-style-type: none"> ○ Centralized pool of specialists allow for services and input to be provided for a range of conditions and different types of patients • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ A range of health-service providers can contact specialists once a gap in service availability or the need for specialist input is identified ○ The specialist can then provide input or intervention remotely • What types of virtual care are used? <ul style="list-style-type: none"> ○ Unspecified/diverse (e.g., sharing health records, telephone or videoconferencing, etc.) • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ The PASE model allows local providers of patients at home, receiving services in the community, or in hospital to access the National Cloud Based System (NCS) if a service gap or need for specialist input is identified ○ A specialist to address the gap or provide input can then supplement care remotely to ensure access to quality care from anywhere, rather than rely only on available local services and capacity • What system arrangements are used to enable the model?

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> ○ Centralized booking system and shared health records that collectively serve as a cloud-based multi-specialty health-service provider ○ Interdisciplinary teams to ensure adequate skill mix and coordination
Norway	<ul style="list-style-type: none"> ● Nothing identified 	<ul style="list-style-type: none"> ● Nothing identified
Sweden	<ul style="list-style-type: none"> ● <u>Kry</u> (private digital healthcare provider) 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Primary care and mental health ● What populations are served? <ul style="list-style-type: none"> ○ General ● How are different conditions supported? <ul style="list-style-type: none"> ○ Kry offers video consultation via its app for a range of primary-care and mental health concerns, including prescription renewals and referrals to specialists ○ Kry also offers free at-home chlamydia testing ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Kry employs doctors, nurses and psychologists to provide consultations over video chat as well as in 26 physical clinics it operates ○ Patients can also choose to register with a permanent primary-care doctor at one of the physical locations, and also use the app's resources when necessary ○ The app uses a triage system to determine which provider a patient needs to see based on their needs, and may also direct the patient towards self-care options ● What types of virtual care are used? <ul style="list-style-type: none"> ○ Video-consultation with providers ○ Online self-care options ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ The service provides patients with the option to book a virtual consultation or an in-person consultation if they prefer ○ Patients who are seen via video consultation may be directed to a physical clinic if a clinician determines they need a physical examination ○ Patients seen via video consultation may also be directed to in-person settings for laboratory testing and specialist appointments ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Patient costs for accessing healthcare are determined by Swedish regions, and Kry follows the same payment schedule as they are reimbursed by regional government for services provided ○ In Sweden, virtual consultations with physicians are generally reimbursed at a lower rate than in-person consultations

Jurisdiction	Models identified	Features of models
	<ul style="list-style-type: none"> • Consultative neurology 	<ul style="list-style-type: none"> ○ Kry keeps its own electronic medical records, but these records are integrated and shared with other healthcare providers who are affiliated with the National Patient Overview • What sectors are involved? <ul style="list-style-type: none"> ○ Specialist care • What populations are served? <ul style="list-style-type: none"> ○ Patients needing advanced Parkinson’s disease treatment • How are different conditions supported? <ul style="list-style-type: none"> ○ Local neurologists across Sweden are able to have video consultations with Parkinson’s specialists at Karolinska University Hospital to get a second opinion on their patients • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ General neurologists can lean on the expertise of Parkinson’s specialists to improve patient care and reduce unnecessary referrals • What types of virtual care are used? <ul style="list-style-type: none"> ○ Video consultations • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Local neurologists maintain usual contact with patients, but can virtually confer with specialist colleagues to optimize treatment • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Innovations in referral systems
United Kingdom (U.K.)	<ul style="list-style-type: none"> • Virtually GP Practice 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Primary care • What populations are served? <ul style="list-style-type: none"> ○ Approximately 15,000 patients across London • How are different conditions supported? <ul style="list-style-type: none"> ○ Most primary-care services are provided via video consultations and online messaging ○ Patients are referred to a physical clinic or NHS urgent care clinic if needed ○ Virtually also offers combined virtual and in-person service offerings for diet and weight loss, dermatology, contraception and family planning, mental health, physiotherapy, and sexual health • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Primary-care physicians employed by Virtually (including those with a specialization in dermatology) provide typical primary-care services via virtual consultation and in-person ○ Staff nurses, dietitians, mental health advisors, and physiotherapists also provide services virtually and in-person, dependent on patient needs

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> • What types of virtual care are used? <ul style="list-style-type: none"> ○ Video consultation ○ Online messaging with practitioners ○ Online uploading of photos of skin conditions ○ Electronic prescription delivery to pharmacies • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Patients are given the option to book virtual or in-person primary-care appointments ○ Patients may be directed to book in-person follow-up appointments if clinicians determine they need a physical examination • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ NHS England only allows patients to be registered with a single GP practice, so patients are required to switch to Virtually if they wish to use their services <ul style="list-style-type: none"> ▪ NHS England provides GP practices with a set amount of money every year on a per patient basis to cover all primary-care services
	<ul style="list-style-type: none"> • Virtual wards 	<ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Acute care • What populations are served? <ul style="list-style-type: none"> ○ Patients with conditions that can be safely managed and monitored from home, such as respiratory conditions, heart failure, and exacerbations of frailty-related conditions ○ Thus far, virtual wards have been most used for patients with acute respiratory infections and acute exacerbations of frailty-related conditions • How are different conditions supported? <ul style="list-style-type: none"> ○ Patients receive daily clinical reviews from a consultant practitioner ○ Technology (tablets, apps, web-based tools, wearables, etc.) enables the remote monitoring, measurement, and reporting of vital signs ○ Patients receive acute -person care at home on an as-needed basis • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Providers from acute trusts, community health services, primary care, and specialists may be engaged in virtual wards depending on local area implementation and patient needs ○ Multidisciplinary staff teams (including nurses, allied health professionals, and general practitioners) operate virtual wards, including remote monitoring of patients and visiting patients in their homes as needed ○ Virtual wards are meant to be run by a named consultant practitioner or suitably trained general practitioners ○ Virtual wards also have the option of drawing upon staff who may be self-isolating at home

Jurisdiction	Models identified	Features of models
	<ul style="list-style-type: none"> • Airedale Hospital NHS Foundation Trust – Using telemedicine to reduce hospital admissions 	<ul style="list-style-type: none"> • What types of virtual care are used? <ul style="list-style-type: none"> ○ Video consultation ○ Online messaging with practitioners ○ Home monitoring of patients using technological solutions (such as wearables and tablets) • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Patients receive acute in-person care on an as-needed basis, dependent on the specific condition they have and the severity of their condition ○ Virtual wards are meant to have clear pathways for referral and escalation • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Virtual wards build on existing services and teams, but use technology to enable different delivery solutions ○ Care provided through virtual wards is covered by existing clinical negligence schemes for indemnity coverage ○ Virtual wards need to collaborate with existing health services in the community to provide patients referrals and respond to emergency situations ○ Virtual wards are cited as an important system feature to be expanded to improve the responsiveness of the health system in the 2022/2023 NHS priorities and operational planning guidance document <ul style="list-style-type: none"> • What sectors are involved? <ul style="list-style-type: none"> ○ Hospital and acute care • What populations are served? <ul style="list-style-type: none"> ○ Patients with long-term conditions (such as diabetes, COPD, and heart failure) as well as those near end of life who risk being unnecessarily admitted to hospital ○ Includes patients in prisons, care homes, and patients in their own homes • How are different conditions supported? <ul style="list-style-type: none"> ○ A telemedicine system is provided to patients that enables two-way communication with providers at the Telehealth Hub at Airedale Hospital • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Patients are initially put in contact with a senior nurse through the video link system, but may be directed to a physician if needed ○ All providers are based at a central Telehealth Hub at the Airedale Hospital ○ When patients in care homes require prescriptions, local general practitioners are engaged and asked to issue the prescription • What types of virtual care are used? <ul style="list-style-type: none"> ○ Video consultation via either a set-top television box or Cisco Jabber

Jurisdiction	Models identified	Features of models
	<ul style="list-style-type: none"> • <u>Florence text messaging to monitor a range of conditions</u> 	<ul style="list-style-type: none"> • How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ The goal of this system is to reduce unnecessary hospital admissions and the amount of time spent in hospital • What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Local general practitioners are engaged to provide prescriptions for patients in care homes; however, it is noted that some providers have issues with issuing prescriptions for patient they have not seen ○ Deploying telemedicine in prisons reduces the resources needed for escorts and bed watches ○ This model is limited by the fact that providers are paid more for a hospital admission than an avoided admission • What sectors are involved? <ul style="list-style-type: none"> ○ Primary care ○ Hospital care ○ Community care ○ Mental health ○ Social sector • What populations are served? <ul style="list-style-type: none"> ○ Various patient populations can be served by Florence’s technology which links patients’ phones or tablets to their clinicians’ computers ○ The technology can provide reminders to patients, allow patients to report symptoms or self-collected measurements, and allows clinicians to respond to patient questions • How are different conditions supported? <ul style="list-style-type: none"> ○ Florence uses SMS (text message) technology to enable communication between patients and clinicians ○ This technology-mediated communication is meant to improve adherence to medications and appointments, advise patients and providers if pre-agreed-upon actions need to be taken, and enables clinicians to easily visualize statistics on their patients’ health • What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ A range of providers could be engaged with this service ○ Providers can pre-program actions to be taken based on incoming text messages from patients and also provide personalized advice based on information they receive from patients • What types of virtual care are used? <ul style="list-style-type: none"> ○ SMS (text message) communication between patients and clinicians ○ Florence can also integrate with other technology-enabled care services • How are in-person and virtual care integrated?

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> ○ This technology is meant to reduce the number of consultations needed and improve the quality and appropriateness of care ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ Integrations of various information technology systems
United States (U.S.)	<ul style="list-style-type: none"> ● Health and Human Services Telehealth Best Practice Guides ● Hybrid Virtual Care Models or Optional Patient Experience – California Telehealth Resource Center (CTRC) report on Hybrid Virtual Care Models 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ General/unspecified ● What populations are served? <ul style="list-style-type: none"> ○ HHS provides specific guidelines for telehealth for American Indian and Alaska Native communities, rural communities, and outpatients in emergency departments ● How are different conditions supported? <ul style="list-style-type: none"> ○ HHS provides guidelines about telehealth for patients with chronic conditions, HIV, cancer, and those receiving maternal care, physical therapy and behavioural health care ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ HHS’s Best Practice Guides provide information and recommendations for providers to help ensure that they adequately plan their telehealth workflow, ensure compliance with relevant patient privacy regulations and laws related to virtual care, assess staff readiness to interact with specific populations and use virtual care technology, and consider how to monitor the success of their program ● What types of virtual care are used? <ul style="list-style-type: none"> ○ General/unspecified ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ General/unspecified ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ None identified <ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ Primary and specialty care ● What populations are served? <ul style="list-style-type: none"> ○ General/unspecified ● How are different conditions supported? <ul style="list-style-type: none"> ○ Unspecified ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ Depending on a health centre’s needs, providers may be asked to fold minimal virtual features such as telephone check-ins and secure messaging into in-person care, while others may be

Jurisdiction	Models identified	Features of models
		<p>asked to pivot seamlessly between in-person and video visits while engaging in other virtual tools between visits</p> <ul style="list-style-type: none"> ○ Other hybrid models may leverage home health aides or paramedics to make house calls while using virtual technologies to conduct co-visits with other specialists ● What types of virtual care are used? <ul style="list-style-type: none"> ○ Real-time virtual care such as through telephone or videoconference ○ Asynchronous virtual care such as through secure electronic messaging, e-visits, surveys or questionnaires ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ Hybrid modes of primary care can include in-house services combined with virtual specialty care services as needed, or leverage home health aides or paramedics to make house calls and use virtual technologies to conduct co-visits involving other team members working remotely ○ Practices should develop clinical protocols for triaging conditions to in-person or virtual care, while creating patient questionnaires to understand whether virtual care is a good fit considering a patients’ condition, preferences, and digital literacy <ul style="list-style-type: none"> ▪ Such protocols should identify care that must be in-person, such as the criteria developed at UCLA Health and the Ontario College of Family Physicians, identify care that could be delivered virtually, and also ensure that patients are screened for virtual-care compatibility ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ None identified
	<ul style="list-style-type: none"> ● Centers for Medicare and Medicaid Services: From Coverage to Care: Telehealth for Providers: What You Need to Know 	<ul style="list-style-type: none"> ● What sectors are involved? <ul style="list-style-type: none"> ○ General ● What populations are served? <ul style="list-style-type: none"> ○ General ● How are different conditions supported? <ul style="list-style-type: none"> ○ CMS provides additional considerations to help accommodate patients with disabilities, language barriers or living in rural areas when using telehealth services ● What providers engaged and how are they engaged? <ul style="list-style-type: none"> ○ CMS suggests providers create Q&A sheets or share the Telehealth: What to Know for Your Family resource to help patients know what to expect when using telehealth services ○ Providers are expected to provide support for patients such as by preparing a script to help guide patients to download an app needed for telehealth services ● What types of virtual care are used?

Jurisdiction	Models identified	Features of models
		<ul style="list-style-type: none"> ○ Live video, remote evaluation of recorded video and images, e-visits, remote patient monitoring, audio-only visits (telephone), mobile health (mHealth), case-based teleconferencing (coordinated and integrated service provision across providers) ● How are in-person and virtual care integrated? <ul style="list-style-type: none"> ○ To establish telehealth workflow and protocols, providers should consider what services they will make available via telehealth, when they will be provided, how patients can schedule appointments, how patients with disabilities such as hearing loss or visual impairment will be accommodated, and how the program will be monitored and adapted to ensure long-term success ○ CMS recommends that telehealth is more likely appropriate for the following situations: general wellness visits; management of chronic conditions; discussion of test results; counselling about diagnostic and therapeutic options, dermatology, prescriptions for medicine, nutrition counselling, mental health counselling ○ CMS recommends that telehealth is less likely appropriate for health concerns requiring a procedure, abdominal pain, eye complaints, gynecologic complaints, dental complaints, highly nuanced or multiple complex health concerns, any situation in which a physical exam would change a provider’s recommendation ● What system arrangements are used to enable the model? <ul style="list-style-type: none"> ○ The resource outlines federal and state policies for Medicare billing for telehealth, as well as documentation and coding tips for providers

Table 3: Overview of the factors or circumstances that make of virtual healthcare a suitable option for delivering quality services

Models identified (and sources of evidence about it)	Evidence of quadruple-aim outcomes of hybrid-care models identified from included systematic reviews and primary studies			
	Patient experiences	Health of populations	Costs	Provider experiences
<p>Supplementary virtual care for cancer patients and survivors</p> <ul style="list-style-type: none"> • Systematic review: n=3 <ul style="list-style-type: none"> ○ Two high-quality (8; 9) ○ One medium-quality (10) 	<ul style="list-style-type: none"> • The eight studies reporting on patient perspectives indicated high overall satisfaction based on surveys or standardized questionnaire scores (10) • Nearly all studies reported high satisfaction with no statistically significant difference compared to non-telehealth groups, and one study even reported that the telehealth group had statistically higher satisfaction than non-telehealth (10) 	<ul style="list-style-type: none"> • 30- and 90-day readmission rates were not statistically different between patients who received telemedicine follow-up and those who received in-person follow-up (10) • One study of 50 colorectal cancer patients reported the same recurrence rate in telemedicine (5/25 recurrence) and in-person patients (5/25 recurrence) as detected by CT scans (10) • Fours studies reporting morbidity and mortality found no difference in the 90-day mortality between patients who received virtual follow-up and patients who received in-person care (10) • There were significant increases in quality of life (≥ 3 points) for both those in the video conferencing telehealth and live delivery intervention groups compared with the in-person group (9) 	<ul style="list-style-type: none"> • Not identified 	<ul style="list-style-type: none"> • Regarding the perspectives of oncologic surgeons, telehealth was generally well-received, although one study reported lower satisfaction for surgical oncologists compared to non-surgical oncologists (10) • Surgical oncologists in one study expressed concerns that virtual visits would not fit into the existing clinical workflow, specifically concerning physician reimbursement (10)

		<ul style="list-style-type: none"> • The telehealth-delivered program showed the greatest improvement in quality of life of 5.12 points, compared with the same program given in-person (9) • Pre-test genetic counselling meta-analysis showed that telephone genetic counselling was non-inferior compared to in-person genetic counselling for the outcomes of cancer-specific distress and genetic knowledge (8) 		
<p>Synchronous virtual care for chronic conditions</p> <ul style="list-style-type: none"> • Overview: n=1, high-quality (14) • Systematic review: n=3 <ul style="list-style-type: none"> ○ Two high-quality (11; 12) ○ One medium-quality (13) 	<ul style="list-style-type: none"> • Not identified 	<ul style="list-style-type: none"> • Compared to usual care with in-person visits, telemedicine was associated with greater reductions in HbA1c at six months and similar HbA1c outcomes at 12 months (13) • Telemedicine conferred no significant differences in blood pressure and lipid levels compared to in-person clinic visits (13) • The 6MWT's cardiac test were administered via a smartphone application, rope, videoconferencing and accelerometer, and proved to be feasible, valid and reliable (11) 	<ul style="list-style-type: none"> • Not identified 	<ul style="list-style-type: none"> • Not identified

		<ul style="list-style-type: none"> • Eight of 13 meta-analyses showed a significant reduction in all-cause mortality in patients with heart failure utilizing telehealth, compared with usual care (14) • Each meta-analysis attributed this effect to how a patient remotely monitored at home allowed for early detection of heart failure signs and, therefore, earlier intervention (14) • Three meta-analyses examined the effect of neurology (telestroke) interventions on mortality outcomes, and each of the studies reported no significant change in mortality in the telestroke group compared to usual care when thrombolysis was indicated (14) • Five meta-analyses reviewed how telehealth affected mortality outcomes for patients living with chronic-obstructive pulmonary disorder; overall, there appeared to be no significant difference in mortality for COPD when telehealth interventions were employed (14) 		
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		<ul style="list-style-type: none"> • Two meta-analyses examined the effect of telehealth on mortality in critically ill patients being treated within ICUs, and found that mortality was reduced by telehealth (14) • One review found that hybrid cardiac rehabilitation compared to in-person has a similar improvement in functional capacity (12) • No significant difference was detected between the two models in terms of changes in exercise duration, systolic and diastolic blood pressure, or health-related quality of life (12) • In terms of blood lipids, no significant difference was noted between hybrid and traditional in-person cardiac rehabilitation models in all assessed lipid profile parameters, except for triglycerides (favouring the conventional cardiac rehabilitation model) (12) 		
<p>Virtual care for mental health</p> <ul style="list-style-type: none"> • Systematic review: n=6 <ul style="list-style-type: none"> ○ Two high-quality (15; 16) 	<ul style="list-style-type: none"> • Convenience rating was significantly higher in the telemedicine group, as compared to the in-person group (17) 	<ul style="list-style-type: none"> • Two studies considered adherence and found that adherence to recommendations and care plan was good, wherein, of all the participants who were prescribed medicines, 	<ul style="list-style-type: none"> • Comparing telepsychiatry programs for clinical care of mental disorders to in-person consultation or usual care, 60% of studies reported that telepsychiatry programs 	<ul style="list-style-type: none"> • Two studies explored clinician satisfaction, reporting an overall 90% satisfaction of clinicians and nurses (17)

<ul style="list-style-type: none"> ○ Four medium-quality (17-20) 	<ul style="list-style-type: none"> ● Satisfaction was reported to be high in the telehealth group; 99% of the participants would recommend telemedicine to another person (17) ● Virtual care increased the ability of family members with physical limitations or living far away to engage in medical visits (18) ● Accessibility of virtual care was comparable to in-person meetings (18) 	<p>89% took their medications (17)</p> <ul style="list-style-type: none"> ● Outcomes related to obsessive-compulsive disorder, anxiety, depression symptom severity, function, working alliance and satisfaction were comparable between the two modes of delivery across each follow-up time point (immediately post-intervention, three months, six months and 12 months), with no significant differences reported ($p > 0.05$) (16) ● Across 24 studies comparing equivalent remote and in-person dementia assessment tests (14 telephone, 10 video calls), the agreement between tests was good, but rarely perfect (15) ● All eHealth interventions provided to persons experiencing homelessness were brief, and many included co-interventions; no conclusions about effectiveness can be derived from this review (20) 	<p>were less expensive, and 32% reported that telepsychiatry programs were more expensive (19)</p> <ul style="list-style-type: none"> ● Three studies reported cost-effectiveness analyses, favouring telepsychiatry programs, but at highly elevated cost-effectiveness thresholds (19) ● The per session costs of telepsychiatry programs varied widely, ranging from as low as 3.74 euros (US\$4.38 in 2019) for the technology costs per neurology consultation for Alzheimer's care in Spain (not including neurologist costs), to \$498.85 for epilepsy consultation in Canada, covering only the costs of the videoconferencing equipment and not medical personnel (19) ● None of the trials in one systematic review reported on the costs of telehealth compared to face-to-face care (16) 	<ul style="list-style-type: none"> ● All the rural physicians reported that they would use telehealth in the future (17) ● Rural physicians showed positivity and appreciation for the program, without which, some of the patients would not be able to receive specialist care, would have to travel long distances, and accessibility would decrease for Indigenous communities (17) ● Family physicians considered telemedicine as a barrier to receiving (e.g. funds, infrastructure, resources) in-person services in rural areas (17)
<p>Live interactive teledermatology</p>	<ul style="list-style-type: none"> ● Five studies reported that patients were satisfied 	<ul style="list-style-type: none"> ● The review found living interactive to be superior to standard in-person care 	<ul style="list-style-type: none"> ● Seven studies compared costs, and two studies found higher societal 	<ul style="list-style-type: none"> ● Five studies reported that providers were satisfied with

<ul style="list-style-type: none"> • Systematic review: n=1, medium-quality (21) 	<p>with the living interactive applications</p> <ul style="list-style-type: none"> • One study reported high satisfaction of patients, but there was a significant difference in comparing living interactive teledermatology with standard care in favour of the latter • Most patients ranked standard in-person care as their favourite choice 	<ul style="list-style-type: none"> • Two studies reported fewer referrals using living interactive teledermatology, and two studies reported less travel time for patients using living interactive teledermatology • Thirteen studies examined accuracy, and all assessed living interactive teledermatology to be comparable to standard care • Eleven studies assessed accuracy in terms of the diagnostic agreement between living interactive teledermatology and standard care; all studies reported values suggesting comparability of living interactive to standard care with agreement rates between 60% and 80% • One study of this review reported no differences in adverse effects between virtual care and in-person care 	<p>costs for living interactive applications compared to standard care</p> <ul style="list-style-type: none"> • One study reported higher costs for living interactive applications from a hospital's and a general practitioner's perspectives, but lower costs from a patient's perspective • Other studies found living interactive applications to be cost-saving in comparison with standard care 	<p>the living interactive applications</p> <ul style="list-style-type: none"> • Most dermatologists ranked standard in-person care as their favourite choice • One study showed that physicians were only confident with 59% of diagnoses they made through the living interactive application compared with 87% confidence in diagnoses made in standard care procedures
<p>Virtual care for routine antenatal care</p> <ul style="list-style-type: none"> • Systematic review: n=2, both high-quality (14; 22) 	<ul style="list-style-type: none"> • Low-strength evidence that patients receiving hybrid visits were more likely to be satisfied with antenatal care than patients receiving all in-person care; however, a survey that directly 	<ul style="list-style-type: none"> • In comparisons of hybrid (televisits and in-person) versus in-person only visits, low-strength evidence did not find differences in preterm births (four studies) or NICU admissions (three studies), 	<ul style="list-style-type: none"> • Not identified 	<ul style="list-style-type: none"> • Not identified

	<p>compared satisfaction with televisits versus satisfaction with in-person visits (among patients receiving hybrid visits) was inconsistent, finding greater satisfaction with in-person visits (22)</p>	<p>but did suggest greater satisfaction with hybrid visits (two studies) (22)</p> <ul style="list-style-type: none"> • A single meta-analysis examined the effect of prenatal home uterine remote monitoring on mortality, finding no difference in the relative risk of perinatal mortality, and a significant reduction in neonatal intensive care unit (ICU) admissions between the telehealth and the usual care groups (14) 		
<p>Virtual care for pediatric services</p> <ul style="list-style-type: none"> • Systematic review: n=1, high quality (23) • Rapid review: n=1, high-quality (24) 	<ul style="list-style-type: none"> • Families often expressed a preference for in-person visits, but those who had tried tele-consultations lived far from clinics or perceived increased convenience with technology considered telemedicine more favourably (24) • Concerns from parents included the responsibility of describing their child's condition in the absence of an in-person examination (24) 	<ul style="list-style-type: none"> • Virtually all 14 studies reporting the accuracy of telemedicine assessment found that telemedicine results compared very favourably with the in-person examination in detecting retinopathy of prematurity; sensitivity and specificity for retinopathy of prematurity detection generally ranged from 70% to 100%, with corresponding positive and negative predictive values and accuracy (23) • Many of the studies showed 100% sensitivity for treatment-requiring retinopathy of prematurity (23) 	<ul style="list-style-type: none"> • Not identified 	<ul style="list-style-type: none"> • Important challenges highlighted from the perspective of the healthcare providers included issues with ICT proficiency, lack of confidence in the quality/reliability of the technology, and connectivity issues (24) • Concerns around legal issues increased administrative burden and/or fear of inability to conduct thorough examinations with reliance on subjective descriptions (24)

<p>Virtual strategies that supported the primary healthcare</p> <ul style="list-style-type: none"> • Systematic review: n=2 <ul style="list-style-type: none"> ○ One high-quality (25) ○ One medium-quality (26) • Scoping review: n=1, medium-quality (27) 	<ul style="list-style-type: none"> • Tele-management of acute painful conditions by the general practitioner may be augmented by tele-physiotherapy for early management or subsequent follow-up; it is essential for people living in remote areas or those who are otherwise isolated (27) • Delivery of Tai Chi and Qi Gong by telehealth was feasible and resulted in increased overall patient satisfaction with cancer care services during the lockdown (27) • There is high patient satisfaction with telehealth services for occupational therapy, physical therapy or physiotherapy, and speech-language therapy (26) • A few participants across all studies reported dissatisfaction due to poor technological quality or other program difficulties (26) 	<ul style="list-style-type: none"> • Telepsychiatry and telepsychology may not be effective with new patients and is also not a long-term replacement for in-person consultations (27) • Studies have shown that telehealth-delivered dietetic consultations are comparable to those delivered in-person, without requiring higher levels of additional training nor compromising the quality of service provision (27) 	<ul style="list-style-type: none"> • Dietitians Australia has recommended that policymakers and healthcare funders include telehealth-delivered dietetic consultations as a cost-effective alternative or complement to the in-person delivery of dietetic services (27) 	<ul style="list-style-type: none"> • Health workers appreciated being more connected to colleagues and thought that this improved coordination and quality of care; however, some described problems when senior colleagues did not respond or responded in anger (25) • Health workers appreciated how mHealth let them take on new tasks, work flexibly, and reach clients in difficult-to-reach areas, but not when it was slow or time-consuming (25) • Some health workers saw mHealth as creating more work (25) • Health workers felt that communicating with clients by mobile phone improved care and their relationships with clients, but felt that some clients needed face-to-face contact (25) • Some health workers did not mind being contacted by clients outside working hours, while others wanted boundaries (25) • Some health workers did not mind covering extra costs with virtual care, and others complained that phone credit was not delivered on time (25)
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<p>Virtual care for surgical services</p> <ul style="list-style-type: none"> • Systematic review: n=3 <ul style="list-style-type: none"> ○ Two high-quality (28; 29) ○ One medium-quality (30) 	<ul style="list-style-type: none"> • The review found no difference in the odds of satisfaction between patients receiving telemedicine care and those receiving in-person care (28) • Patients reported time savings; when travel time was excluded, patients saved 17 minutes, and when travel time was included patients saved 180 minutes (28) • Four studies reported on overall patient satisfaction; comparatively, 83.2% of participants who received telemedicine were satisfied in comparison to 86.0% in the standard care, which did not prove statistically different (30) 	<ul style="list-style-type: none"> • There were no reported differences in any measures of generic function (measured with scales SF-12, EQ-5D), disease-specific function (measured with scales WOMAC, Morrey Outcome Scale), or pain (measured with VAS, Revised Faces Pain Scale) between the telemedicine and in-person visit groups (28) • No harms were reported in studies included in this review (28) • Two studies collectively reported readmission rates of 7.6% for telemedicine patients compared to 17.2% of usual care patients (30) • Functionality measured with WOMAC, Timed Up and Go Test, and Stair Test had no statistical difference between patients that received telehealth or usual care (30) • The effectiveness of telerehabilitation was comparable to conventional in-person rehabilitation in improving various pain and functional outcomes in patients who 	<ul style="list-style-type: none"> • Overall utilization of hospital-based resources was 60% less in the telerehabilitation group than for the traditional face-to-face group (29) • The median total costs in the telerehabilitation group were significantly lower than in the usual care group (median \$1,050 versus \$2,805)(29) 	<ul style="list-style-type: none"> • There were no differences in surgeon satisfaction between those providing telemedicine care and those providing in-person care (28) • Only one study reported on physician satisfaction; comparatively, 84.0% of telemedicine appointments were rated with overall satisfaction compared to 85.0% of traditional in-clinic visits, which did not prove a significant difference (30)
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		<p>underwent a total knee replacement (29)</p> <ul style="list-style-type: none"> • A similar proportion of patients in telerehabilitation and usual care reported adverse events in the rehabilitation phase and/or follow-up period; no adverse events were related to telerehabilitation, while two minor adverse events might associate with usual care (29) 		
<p>Virtual care interventions for adolescent sexual health</p> <ul style="list-style-type: none"> • Systematic review: n=1, high-quality (31) 	<ul style="list-style-type: none"> • Not identified 	<ul style="list-style-type: none"> • Telehealth interventions can be effective in delivering adolescents' sexual health-related education programs to increase self-efficacy for condom use, practice for condom use, and being screened/tested for sexual transmitted infections 	<ul style="list-style-type: none"> • Not identified 	<ul style="list-style-type: none"> • Not identified

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APPENDICES

The following tables provide detailed information about the systematic reviews and primary studies identified in the rapid synthesis. The ensuing information was extracted from the following sources:

- systematic reviews - the focus of the review, key findings, last year the literature was searched, and the proportion of studies conducted in Canada
- primary studies - the focus of the study, methods used, study sample, jurisdiction studied, key features of the intervention and the study findings (based on the outcomes reported in the study).

For the appendix table providing details about the systematic reviews, the fourth column presents a rating of the overall quality of each review. The quality of each review has been assessed using AMSTAR (A Measurement Tool to Assess Reviews), which rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered “high scores.” A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8).

All of the information provided in the appendix tables was taken into account by the authors in describing the findings in the rapid synthesis.

Appendix 1: Summary of findings from systematic reviews and other types of reviews about factors or circumstances that make virtual healthcare a suitable option for delivering quality services

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
Systematic reviews of reviews	<u>An overview of the effect of telehealth on mortality</u> (14)	<p>This review collated existing meta-analyses of mortality rates to provide a holistic view of the current evidence regarding telehealth safety. Twenty-four studies were included, five overarching medical disciplines were represented (cardiovascular, neurology, pulmonary, obstetrics and intensive care). The most reported modalities used as part of the interventions were telephone, videoconferencing and remote monitoring.</p> <p>Included studies reported mortality rates for telehealth interventions in five clinical disciplines: cardiovascular (n=13), neurology (n=3), pulmonary (n=5), obstetrics (n=1) and intensive care (n=2). The majority of these meta-analyses found that when comparing telehealth interventions with usual care, there was no increase in mortality rates.</p> <p>Eight of the 13 meta-analyses showed a significant reduction in all-cause mortality in patients with heart failure utilizing telehealth, compared with usual care. Three studies reported a reduced risk of heart failure-specific mortality compared with usual care. Each meta-analysis attributed this effect to how a patient remotely monitored at home allowed for early detection of heart failure signs, and therefore earlier intervention.</p> <p>Three meta-analyses examined the effect of neurology (telestroke) interventions on mortality outcomes. Telestroke interventions are where a patient suffering from a stroke or early warning signs of one is reviewed via videoconference by a stroke specialist. Patient images or scans will often be reviewed by the specialist before thrombolysis occurs. Each of the studies reported no significant change in mortality in the telestroke group compared to usual care when thrombolysis was indicated.</p> <p>Five meta-analyses reviewed how telehealth affected mortality outcomes for patients living with chronic-obstructive pulmonary disorder (COPD, n=5). While these meta-analyses did not exclusively focus on a single telehealth modality, the majority of telehealth interventions for COPD include the remote monitoring of symptoms with or without the addition of videoconferencing, telephone and web-based platforms. Overall, there appeared to be no significant difference in mortality for COPD when telehealth interventions were employed.</p> <p>Only one meta-analysis reported a non-significant increase in the relative risk of mortality for COPD compared with usual care, although the authors noted there were only a few studies included in this meta-analysis and that the finding may be attributable to the small sample sizes.</p>	Last search November 2020	7/10	7/24

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>A single meta-analysis examined the effect of prenatal home uterine remote monitoring on mortality. The authors reported no difference in the relative risk of perinatal mortality, and a significant reduction in neonatal intensive care unit (ICU) admissions between the telehealth and the usual care groups.</p> <p>Two meta-analyses examined the effect of telehealth on mortality in critically ill patients being treated within ICUs. These studies examined tele-ICUs which involve an off-site specialist using videoconference, remote monitoring of vitals, and the patient's electronic medical record to direct further investigations and treatment. ICU mortality was reduced by telehealth in both studies, however, Young et al. did not observe a significant reduction of in-hospital mortality when connecting to a tele-ICU.</p>			
	<p><u>In-Person and Technology-Mediated Peer Support in Diabetes Care</u> (34)</p>	<p>The purpose of this systematic review of reviews was to identify evidence and gaps focused on in-person and technology-mediated diabetes peer support and its impact on clinical, behavioural, and psychosocial outcomes.</p> <p>Nine systematic reviews and meta-analyses meeting criteria were included. Findings suggest peer support interventions can have a positive impact on clinical (A1C, blood pressure, cholesterol, weight), behavioural (diabetes knowledge, being active, healthy eating, medication management, self-management, self-efficacy, empowerment), and psychosocial (social support, health and diabetes distress, depression, quality of life) outcomes. Research gaps exist related to understanding the effects of emerging technology-mediated peer support modalities and the effects of peer support on gestational diabetes.</p>	<p>Last search December 2018</p>	<p>9/11</p>	<p>Not informed</p>
<p>Systematic reviews</p>	<p><u>Hybrid versus traditional cardiac rehabilitation models</u> (12)</p>	<p>This systematic review and meta-analysis aimed to test whether hybrid models for providing cardiac rehabilitation are superior or equivalent to the traditional in-person cardiac rehabilitation for patients after myocardial infarction, heart failure, and cardiac surgery.</p> <p>The review included six studies (1,195 participants) finding that the summary effect size showed similar improvement in functional capacity in hybrid and standard cardiac rehabilitation programs (SMD = -0.04, 95% CI -0.18 to 0.09, p = 0.51). No significant difference was detected between the two models in terms of changes in exercise duration (SMD = -0.14, 95% CI -0.51 to 0.24, p = 0.47), systolic (SMD = -0.01, 95% CI -0.14 to 0.12, p = 0.91), and diastolic (SMD = -0.03, 95% CI -0.16 to 0.11, p = 0.7) blood pressure, or health-related quality of life (SMD = -0.08, 95% CI -0.23 to 0.07, p = 0.27). In terms of blood lipids, no significant difference was noted between hybrid and traditional cardiac rehabilitation models in all assessed lipid profile parameters, except for triglycerides (favouring the traditional cardiac rehabilitation model).</p>	<p>Last search 15 July, 2018</p>	<p>9/11</p>	<p>1/6</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>The review concluded that hybrid cardiac rehabilitation protocols showed comparable efficacy to the traditional in-person model; however, it is required to validate these findings, especially regarding the long-term outcomes.</p>			
	<p><u>Barriers and facilitators that influence telemedicine-based, real-time, online consultation at patients' homes</u> (6)</p>	<p>This review aimed to investigate the barriers and the facilitators that influence the use of home consultation systems in the health care context. This review also aims to identify the effectiveness of Home Online Health Consultation (HOHC) systems in improving patients' health as well as their satisfaction with the systems.</p> <p>This review included 45 articles. The review identified several external and internal facilitators and barriers to HOHC systems that were used in the creation of a HOHC framework. The framework consists of four requirements; the framework also consists of 17 facilitators and eight barriers, which were further categorized as internal and external influencers on HOHC. Overall, patients from different age groups and with different health conditions benefited from remote health services. HOHC via videoconferencing was effective in delivering online treatment and was well-accepted by patients, as it simulated in-person, face-to-face consultation. Acceptance by patients increased because of online consultation facilitators that promoted effective and convenient remote treatment. However, some patients preferred face-to-face consultation and showed resistance to online consultation. Resistance to online consultation was influenced by some of the identified barriers. Overall, the framework identified the facilitators and barriers that positively and negatively influenced the uptake of HOHC systems, respectively.</p> <p>HOHC systems in all reviewed articles featured the use of synchronous videoconferencing systems or software as a medium to facilitate the communication between a health professional and a patient or a patient's carer. The videoconferencing feature was a part of a complex telemedicine system or a simple stand-alone software program on a patient's mobile phone or personal computer. The results showed that 25 of the studies conducted online consultation via specially developed telemedicine systems that provide videoconferencing as part of its main services. The remaining studies used off-the-shelf videoconferencing software to conduct the home online consultation. In total, four studies used Skype software, four studies used Vidyo software, five studies used Web-based videoconferencing systems, two studies used Adobe Connect, and other studies used different platforms, including Cisco WebEx, Moodle, Cisco Jabber, Facebook Messenger, or the Microsoft NetMeeting system. The complexity of the HOHC system used was related to the complexity of the patient's health condition. If a patient had multiple and complex health conditions, a complex telemedicine system was used for monitoring his or her health condition. In contrast, when a patient had a single health condition, a simple system was used for remote treatment.</p>	<p>Last search 15 November, 2019</p>	<p>5/9</p>	<p>4/45</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>Effectiveness of videoconferencing: Twelve studies reported that the online consultation was effective and was as good as in-person consultation. However, one study reported that patients preferred a combination of online consultation and face-to-face consultation, and two studies reported that participants preferred face-to-face consultation.</p> <p>Patient’s satisfaction: In total, 12 studies reported on participants’ satisfaction with the use of HOHC systems. Overall, patients reported being satisfied or very satisfied with home online consultation.</p> <p>Barriers: HOHC systems in all reviewed articles required patients to have access to the internet and phone line services to receive the needed healthcare services at their homes. All studies used internet access as an inclusion criterion to participate in the study. However, some studies reported that participants dropped out due to later internet connection issues. Internet speed that affected the quality of the HOHC was mentioned in 20 studies. In total, 15 out of 20 studies (75%) reported that slow internet speed during the consultation resulted in poor video and audio quality, loss of connection, and participants’ frustration. On the other hand, fast internet speed was reported in five out of the 20 studies (25%), which had a positive impact on the communication quality between patients and care providers. Poor signal from the wireless and 3G networks was reported in three studies, which affected the quality of the online consultation. For example, the wireless and 3G network signals were affected by the home interior and the weather conditions, which reduced the wireless and 3G signal strength. Ease of use of the HOHC system was related to how easily patients and clinicians were able to navigate and use its services. Ease of use was reported by patients and clinicians in 22 studies as a key factor of system effectiveness, high satisfaction, and the acceptability of the HOHC system. Patients’ training was reported in 20 studies, which helped patients to use the system and its equipment easily. Training was provided by the healthcare provider to patients before starting the online therapy, given in the following forms: face-to-face, through video orientation, or through manual documentation. The type of training provided depended on the type of health condition and the specific online consultation system. Training for clinicians to use the online consultation system was reported in 10 studies. In-person training aimed to familiarize clinicians with the system, the system’s equipment, and the treatment procedures. However, lack of staff training affected the uptake of online consultation. For example, Peel et al. indicated frequent changes of staff during the study and their lack of training limited the uptake of the eHAB™ system. Cost savings was reported in 21 studies as an advantage of using HOHC. In some studies, cost savings were calculated based on the cost of the travelled mileage per patient, or were reported without details of cost savings. Other studies compared the cost of online consultation to traditional face-to-face consultation. Reducing travel time was reported in 15 articles as an advantage of using HOHC. Participants reported that online consultation eliminated the burden of travelling from home to health centre or outpatient</p>			

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>unit. In addition, both reducing travel and waiting times were reported in nine articles as an advantage of using HOHC. Patients reported that HOHC eliminated their waiting times for therapy and clinicians reported that it reduced their travel time; thus, there was no waiting time.</p> <p>There are four requirements for HOHC. Security and privacy are very important requirements because the communication supported by HOHC is personal and confidential. The security and privacy of the HOHC can be considered from the aspect of its compliance with HIPAA. This act sets the standard for security and privacy for patients' sensitive health information and records that are held or transferred in electronic form between healthcare providers and patients. Another requirement is the internet service availability for this type of consultation, without which patients cannot access online consultation. The availability of a device is a requirement, and it can be either a personal device (e.g., mobile phone, tablet, or PC) or a telemedicine device provided by the healthcare provider to patients. These requirements are essential for delivering any HOHC, and online consultation cannot be performed without them.</p>			
	<p><u>Health workers' perceptions and experiences of using mHealth technologies to deliver primary healthcare services</u> (25)</p>	<p>This qualitative evidence synthesis focused on health workers' perceptions and experiences of using mobile health (mHealth) to register clients, track their health, and make decisions about care, as well as to communicate with clients and other health workers.</p> <p>The review included studies of mHealth programs that were part of primary healthcare services. These services could be implemented in public or private primary healthcare facilities, community and workplace, or the homes of clients. The review found 53 studies that met the inclusion criteria and sampled 43 of these for the analysis. Most of the 43 included sample studies were from low- or middle-income countries. In many of the studies, the mobile devices had decision-support software loaded onto them, which showed the steps the health workers had to follow when they provided healthcare. Other uses included in-person and/or text message communication and recording clients' health information. Almost half of the studies looked at health workers' use of mobile devices for mother, child, and newborn health.</p> <p>The following are findings with moderate or high confidence:</p> <ul style="list-style-type: none"> • mHealth changed how health workers worked with each other: "Health workers appreciated being more connected to colleagues and thought that this improved coordination and quality of care. However, some described problems when senior colleagues did not respond or responded in anger. Some preferred face-to-face connection with colleagues. Some believed that mHealth improved their reporting, while others compared it to "big brother watching"." • mHealth changed how health workers delivered care: "Health workers appreciated how mHealth let them take on new tasks, work flexibly, and reach clients in difficult-to-reach 	<p>Last search February 2020</p>	<p>11/11</p>	<p>2/43</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>areas. They appreciated mHealth when it improved feedback, speed and workflow, but not when it was slow or time consuming. Some health workers found decision-support software useful; others thought it threatened their clinical skills. Most health workers saw mHealth as better than paper, but some preferred paper. Some health workers saw mHealth as creating more work.”</p> <ul style="list-style-type: none"> • mHealth led to new forms of engagement and relationships with clients and communities: “Health workers felt that communicating with clients by mobile phone improved care and their relationships with clients, but felt that some clients needed face-to-face contact. Health workers were aware of the importance of protecting confidential client information when using mobile devices. Some health workers did not mind being contacted by clients outside working hours, while others wanted boundaries. Health workers described how some community members trusted health workers that used mHealth while others were skeptical. Health workers pointed to problems when clients needed to own their own phones.” • Health workers' use and perceptions of mHealth could be influenced by factors tied to costs, the health worker, the technology, the health system and society, poor network access, and poor access to electricity: “Some health workers did not mind covering extra costs. Others complained that phone credit was not delivered on time. Health workers who were accustomed to using mobile phones were sometimes more positive towards mHealth. Others with less experience, were sometimes embarrassed about making mistakes in front of clients or worried about job security. Health workers wanted training, technical support, user-friendly devices, and systems that were integrated into existing electronic health systems. The main challenges health workers experienced were poor network connections, access to electricity, and the cost of recharging phones. Other problems included damaged phones. Factors outside the health system also influenced how health workers experienced mHealth, including language, gender, and poverty issues. Health workers felt that their commitment to clients helped them cope with these challenges.” <p>This review concluded that perceptions reflect the interplay between the technology, contexts, and human attributes. Detailed descriptions of the program, implementation processes and contexts, alongside effectiveness studies, will help to unravel this interplay to formulate hypotheses regarding the effectiveness of mHealth.</p>			
	<p><u>How satisfied are patients and surgeons with telemedicine in orthopedic care during the COVID-19 pandemic?</u> (28)</p>	<p>This systematic review and meta-analysis of randomized trials for orthopaedic care delivery focused on 1) identifying the levels of patient and surgeon satisfaction with the use of telemedicine as a tool; 2) identifying differences in patient-reported outcomes between telemedicine visits and in-person visits; and 3) identifying the difference in time commitment between telemedicine and in-person visits. The review included 12 articles (representing eight randomized controlled trials). There were 1,008 patients randomized</p>	<p>Last search April 2020</p>	<p>9/11</p>	<p>2/12</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>(511 to telemedicine groups and 497 to control groups). In the review, subspecialties represented hip and knee arthroplasty (two trials), upper extremity (two trials), pediatric trauma (one trial), adult trauma (one trial), and general orthopedics (two trials).</p> <p>The review found no difference in the odds of satisfaction between patients receiving telemedicine care and those receiving in-person care (pooled odds ratio 0.89 [95% CI 0.40 to 1.99]; $p = 0.79$).</p> <p>There were also no differences in surgeon satisfaction (pooled OR 0.38 [95% CI 0.07 to 2.19]; $p = 0.28$).</p> <p>There were no reported differences in any measures of generic function (SF-12, EQ-5D), disease-specific function (WOMAC, Morrey Outcome Scale), or pain (VAS, Revised Faces Pain Scale) between the telemedicine and control visit groups. The outcome measures used were heterogeneous across studies; therefore, quantitative pooling was not considered appropriate.</p> <p>Patients reported time savings, both when travel time was excluded (17 minutes shorter [95% CI 2 to 32]; $p = 0.03$) and when it was included (180 minutes shorter [95% CI 78 to 281]; $p < 0.001$).</p> <p>The review concluded that evidence from heterogeneous randomized studies demonstrates that the use of telemedicine for orthopedic assessments does not result in identifiable differences in patient or surgeon satisfaction compared with in-person assessments. Importantly, the source studies in this review did not adequately capture or report safety endpoints, such as complications or missed diagnoses. Although telemedicine may lead to a similar patient experience, surgeons should maintain a low threshold for follow-up with in-person assessments whenever possible in the absence of further safety data.</p>			
	<p>Telemedicine and the rural dementia population (17)</p>	<p>Geriatric populations affected by dementia require greater access to healthcare services, particularly in rural areas. As such, the aim of this systematic review aimed to examine the impact of telemedicine on health outcomes in elderly individuals with dementia living in rural areas.</p> <p>This review included 12 studies, which had diverse populations. The studies used a variety of cognitive tests and reported mixed results regarding the differences in patient performance when assessed in-person as compared to telemedicine consultation. Overall, both patients and physicians reported satisfaction with telemedicine; however, there were mixed results regarding the reliability of cognitive tests and the infrastructure required. Convenience, satisfaction, comfort and recommending telemedicine were reported to be high in the telemedicine group and physicians reported they would use telemedicine again.</p>	<p>Last search September 2020</p>	<p>5/9</p>	<p>5/12</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>Patient and caregiver satisfaction is measured using several methods, such as feedback, satisfaction questionnaires, surveys, etc. Overall, convenience and satisfaction were reported to be high in the telehealth group. Moreover, participants were reported to be very likely to recommend telemedicine to others. The “informal feedback”, from patients and caregivers, received by rural physicians, suggested satisfaction with the services. At the six- and 12-week follow-up appointments, the mean satisfaction rating was not significantly different between the two groups (in-person versus telemedicine). Convenience rating was significantly higher in the telemedicine group, as compared to the in-person group. The results of the Telehealth Satisfaction Questionnaire suggest that all participants would use telemedicine again, and that 99 % of the participants would recommend telemedicine to another person.</p> <p>Of the 13 studies included, only two considered adherences to and implementation of the recommendations of the specialist consult via telemedicine. Barton et al. found that adherence to recommendations and care plan was good, wherein, of all the participants who were prescribed medicines, 89 % took their medications.</p> <p>Only two studies considered healthcare professionals’ satisfaction of telemedicine, through the use of a survey and focus group. In the study by Dham et al. [26], clinicians and nurses reported an overall 90 % satisfaction in the 11 questions. Conn et al. elucidate that the physicians were mostly satisfied with the recommendations that the specialists made for the patients. All the rural physicians reported that they would use telehealth in the future. Some key findings from the focus group included positivity and appreciation for the program, without which, some of the patients would not be able to receive specialist care, would have to travel long distances, and accessibility would decrease for Indigenous communities (who could use the program with family and with the aid of an interpreter, if required). The primary limitation/barrier reported by the authors was receiving referrals from family physicians. Family physicians considered telemedicine as a barrier to receiving (e.g., funds, infrastructure, resources) in-person services in rural areas.</p> <p>The review concluded that testing conditions and the accessibility of telemedicine yield inconclusive results as to whether telemedicine can improve the management of dementia in geriatric individuals.</p>			
	<p>Live interactive tele dermatology compared to in-person care (21)</p>	<p>This systematic review was a current overview on effectiveness, costs, feasibility and accuracy of living interactive dermatology applications compared to standard care.</p> <p>Twenty-three publications were included in the final analysis: 17 case–control studies and six randomized controlled trials. Eleven studies focused on patient consultation, three on patient organization and nine on combined applications of the aforementioned. Nine studies investigated applications facilitating patient–provider interaction. Fourteen studies evaluated applications combining patient–provider and provider–provider interaction, meaning the</p>	<p>Last search April 2019</p>	<p>7/11</p>	<p>1/23</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>patient sits next to one provider while using living interactive applications to interact with another provider.</p> <p>Time effectiveness: All seven studies examining time effectiveness found living interactive to be superior to standard in-person care. Two studies reported less referrals using living interactive tele dermatology, and two studies reported less travel time for patients using living interactive tele dermatology. One study each found shorter waiting times, less consultations, shorter consultation sessions and shorter travel/consultation time with living interactive tele dermatology.</p> <p>Seven studies compared costs of living interactive applications with standard care. Two studies found higher societal costs for living interactive applications compared to standard care. Loane et al. reported higher costs for living interactive applications from a hospital's and a general practitioner's perspectives, but lower costs from a patient's perspective. Other studies found living interactive applications to be cost saving in comparison with standard care. Thus, Oakley et al. and Loane et al. revealed cost savings by living interactive applications within the same trial for both the societal and the patients' perspectives. Seghers et al. found 56% lower costs using tele dermatology within the setting of inpatient psychiatric care by the reduction of manpower and transportation; however, acquisition cost was not considered.</p> <p>Ten studies examined feasibility of living interactive applications. One study emphasized living interactive tele dermatology to be less feasible than standard care regarding the physicians' confidence with their diagnoses. They showed that physicians were only confident with 59% of diagnoses they made by means of the living interactive application compared with 87% confidence in diagnoses made in standard care procedures. Another study also demonstrated differences in confidence, which was significantly higher in in-person consultations. However, Romero et al. showed confidence in 89% of diagnoses derived with a living interactive application.</p> <p>In the study by Seghers et al., feasibility was examined as adverse events occurring during consultation in an inpatient psychiatric care setting, with no differences between modes as no adverse events occurred.</p> <p>Regarding satisfaction with the consultation, five studies reported that both patients and providers were satisfied with the living interactive applications. Marchell et al. also reported high satisfaction of patients and providers, but there was a significant difference in comparing living interactive tele dermatology with standard care in favour of the latter. Most patients and dermatologists ranked face-to-face standard care as their favourable choice.</p>			

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>Thirteen studies examined accuracy, and all assessed living interactive teledermatology to be comparable to standard care. Eleven studies assessed accuracy in terms of diagnostic agreement between living interactive teledermatology and standard care. All studies reported values suggesting comparability of living interactive to standard care with agreement rates between 60% and 80%, except for Gilmour et al., reporting lower agreement for all diagnoses with 59%. Agreement rates were very high in all studies ranging from 0.72 to 1.0, but the agreement between in-person consultation and consensus diagnosis was significantly higher than between consensus diagnosis and the other modes.</p> <p>This review reveals that living interactive applications can be a time-effective substitute of or supplement to standard dermatological care. Results demonstrated that living interactive and standard care are comparable regarding feasibility and accuracy. No clear tendencies can be reported about costs. However, there is a lack of current comparative studies.</p>			
	<p><u>The use of eHealth interventions among persons experiencing homelessness</u> (20)</p>	<p>The focus of this systematic review was to examine the feasibility, effectiveness, and experience of eHealth interventions when used to improve the health of persons experiencing homelessness.</p> <p>Eight articles met eligibility criteria. The accessibility, flexibility, and convenience of the interventions were valued by participants. However, phone retention, limited adaptability, a high level of human involvement, and preference for in-person communication may pose future implementation challenges.</p> <p>Seven studies used mobile phones and two used computers as platforms to deliver eHealth interventions. Two studies delivered SMS texting interventions, three were mobile app interventions, and three were interventions that leveraged email, social networking sites, and web portals. Six studies provided participants with devices and six had interventions with two-way communication capabilities. Five studies had co-interventions that involved mental health coaching and assessments, assistance with using devices, counselling, nicotine replacement therapy (NRT), and medication for smoking cessation. A high level of human involvement was needed for the co-interventions, as well as on the back-end, when designing and delivering eHealth interventions to study participants. Intervention length ranged from four to 12 weeks.</p> <p>Although eHealth interventions have been found to be effective in prior studies with other populations, few conclusions can be drawn about the effectiveness of these interventions for persons experiencing homelessness, as all studies were pilots or examined feasibility with small samples and had low or moderate study quality scores. Accordingly, before eHealth interventions are scaled-up and disseminated widely, implementation challenges must be addressed and more high-quality trials of eHealth interventions for persons experiencing homelessness are needed.</p>	<p>Last search December 2019</p>	<p>5/10</p>	<p>0/8</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>All eHealth interventions were brief and many included co-interventions. Given the complex health needs of the homeless population, it is important to be realistic with expectations and intentional in targeted outcomes when designing and implementing these interventions.</p> <p>The review concluded that eHealth interventions are promising digital tools that have the potential to improve access to care and service delivery. eHealth interventions are feasible and usable for persons experiencing homelessness. These interventions may have health benefits by augmenting existing services and if implementation challenges are addressed.</p>			
	<p><u>Telephone versus in-person genetic counselling in BRCA1/BRCA2 genetic testing</u> (8)</p>	<p>This systematic review and meta-analysis aimed to answer if telephone genetic counselling for BRCA1 and BRCA2 genetic testing is non-inferior to in-person genetic counselling for the outcomes of cancer-specific distress and genetic knowledge.</p> <p>Four studies were included in the qualitative synthesis of the results. Three studies were included in the quantitative synthesis of the results. Telephone genetic counselling was non-inferior compared to in-person genetic counselling for the outcomes of cancer-specific distress and genetic knowledge. Sensitivity analysis corroborated the main results. Telephone genetic counselling for BRCA1/BRCA2 genetic testing may be an alternative model of delivering genetic services in front of the increased demand, or when required by social context. However, the paucity of the evidence prevents the drawing of strong conclusions regarding the generalizability of these results.</p> <p>Cancer-specific distress: Pre-test genetic counselling meta-analysis showed that telephone genetic counselling was non-inferior compared to in-person genetic counselling for the outcome of cancer-specific distress (95% CI -1.15, 1.86; upper-bound non-inferiority margin: 4; X² < 0.95, I² 0%).</p> <p>Genetic knowledge: Meta-analysis showed that telephone genetic counselling was non-inferior compared to in-person genetic counselling for the outcome of genetic knowledge (95% CI -0.27, 0.16, X² p < .01, I² 84%).</p>	<p>Last search April 2020</p>	<p>9/11</p>	<p>0/4</p>
	<p><u>The effectiveness of telehealth versus face-to face interventions for anxiety disorders</u> (16)</p>	<p>This systematic review and meta-analysis aimed to identify, appraise, and synthesise randomized controlled trials (RCTs) comparing telehealth to face-to-face delivery of care to individuals of any age or gender, diagnosed with anxiety disorders, and disorders with anxiety features.</p> <p>A total of five RCTs were included; telehealth was conducted by video in three studies, and by phone in two. Overall, risk of bias was low to moderate for most domains. Outcomes related to obsessive compulsive disorder, anxiety, depression symptom severity, function, working alliance and satisfaction were comparable between the two modes of delivery</p>	<p>Last search December 2020</p>	<p>10/11</p>	<p>1/5</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>across each follow-up time point (immediately post intervention, three months, six months and 12 months), with no significant differences reported ($p > 0.05$).</p> <p>None of the trials reported on the costs of telehealth compared to face-to-face care.</p> <p>These findings support previous research suggesting that psychotherapy delivered remotely may be as effective as conventional face-to-face therapy. Fletcher et al. conducted a non-systematic literature review for the efficacy of video-delivered therapy, which found that video-to-home treatment of mental health conditions offers a viable option for care access for patients, especially when there are logistical or other barriers to receiving in-person care.</p> <p>There were no significant differences in OCD outcomes between telehealth and face-to-face therapy immediately post treatment (156 participants, MD 0.14 (95% CI -0.17 to 0.45, $p = 0.38$) or at any of the follow-up time points: three months (124 participants, standardized mean difference: 0.05, 95% CI -0.3 to 0.4, $p = 0.78$), six months (136 participants, standardized mean difference: 0.1, 95% CI -0.24 to 0.44, $p = 0.56$), and at 12 months (52 participants, standardized mean difference: 0.34, 95% CI -0.21 to 0.89, $p = 0.22$).</p> <p>Only one study explored the anxiety-specific component of the DASS-A scale. There were no significant differences identified in the immediate post-treatment period between groups (23 participants, mean difference: -0.47, 95% CI -6.94 to 6.0, $p = 0.66$) or at the 1.5-month follow-up (16 participants, mean difference: -1.53, 95% CI -7.93 to 4.87, $p = 0.66$).</p>			
	<p><u>Telemedicine for older adults with dementia during COVID-19: an alternative to in-person health services?</u> (18)</p>	<p>This systematic review aimed to explore the use, accessibility, and feasibility of telemedicine in older adults with dementia, as well as examine the potential mental health impacts of these technologies, through reviewing evidence from studies conducted during COVID-19.</p> <p>A total of seven articles were included in this review. Throughout the studies, cognitive and mental health assessments (e.g., MoCA, FAST, etc.) were performed. Despite the barriers, telemedicine was noted as a feasible approach to assist individuals with dementia in connecting with their service providers and family while reducing complications related to travel (e.g., difficulty moving, traffic, distance).</p> <p>The findings of this systematic review clarify noteworthy developments within telemedicine research in the wake of COVID-19, delivered to older adults with dementia (e.g., refinement of remote cognitive assessments through a mobile unit, or developing television-based treatments that are intuitively designed for older adults with dementia, etc)]. Two main themes were observed: the barriers remaining to telemedicine implementation in the wake of COVID-19, and the benefits of telemedicine use during COVID-19.</p> <p>As the number of telemedicine projects continues to rise in response to the pandemic, it should be noted that the group for which the technology is perhaps most imperative (i.e., older adults with cognitive decline – most at-risk for COVID-19) may not be fully equipped</p>	<p>Last search October 2021</p>	<p>5/9</p>	<p>0/7</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		to use it without the proper assistance. To begin with, the lack of knowledge and digital literacy are established causes of stress and disengagement with technology among older adults. More so, older adults are typically less accustomed to technologies and may avoid them entirely. In this situation, a competent caregiver would play a crucial role.			
	<u>Influence of synchronous primary-care telemedicine versus in-person visits on diabetes, hypertension, and hyperlipidemia outcomes</u> (13)	<p>This review compares the effect of synchronous telemedicine versus in-person primary-care visits on patient clinical outcomes for diabetes, hypertension, and hyperlipidemia, including hemoglobin A1c (HbA1c), blood pressure, and/or lipid levels. Seven publications met our inclusion criteria. The telemedicine interventions investigated were multifaceted. All included synchronous visits with a primary-care provider through videoconferencing and/or telephone, combined with other components such as asynchronous patient data transmission.</p> <p>Five studies reported on HbA1c changes, five on blood pressure changes, and three on changes in lipid levels. Compared to usual care with in-person visits, telemedicine was associated with greater reductions in HbA1c at six months and similar HbA1c outcomes at 12 months. Telemedicine conferred no significant differences in blood pressure and lipid levels compared to in-person clinic visits.</p> <p>Diabetes: Only three of the five studies compared the intervention and control groups for changes in HbA1c levels. These studies showed that compared to usual care with in-person visits, telemedicine was associated with significantly greater HbA1c improvements at five and six months, and similar HbA1c outcomes at 12 months.</p> <p>Hypertension: Three studies compared outcomes among intervention and control groups. In these studies, the systolic and diastolic blood pressures in the telemedicine intervention groups did not differ significantly from those of the control groups at the end of the measurement period.</p> <p>Hyperlipidemia: Of the two studies comparing intervention and control groups, one demonstrated no statistically significant differences in LDL-C and triglycerides at five months while another found no significant differences in total cholesterol changes at 12 months.</p> <p>The review concluded that existing literature showed that in the primary-care setting, telemedicine was not inferior to in-person visits for the management of diabetes, hypertension, or hypercholesterolemia.</p>	Last search January 2021	4/9	0/7
	<u>Patient satisfaction with telehealth in rural settings</u> (26)	The aim of this study was to evaluate patients' reports of their satisfaction with telehealth compared to standard in-person therapy for patients living in rural areas.	Last search December 2019	5/10	0/4

Optimizing the Use of Hybrid-care Models for Delivery of Healthcare Services

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>Four articles met inclusion criteria. There was high satisfaction for patients in all studies regarding the use of telehealth services that were delivered through videoconferencing, asynchronous telehealth websites with videos, and telephone communication. All four of the analyzed studies included videoconferencing.</p> <p>The findings of this review revealed that there is high patient satisfaction with telehealth services for occupational therapy, physical therapy or physiotherapy, and speech-language therapy. Most of the participants in all studies reported satisfaction with telehealth or indicated that they would utilize services again. A few participants across all studies reported dissatisfaction due to poor technological quality or other program difficulties. The four studies all differed in types of rehabilitation services provided via telehealth, and therefore further studies are necessary for more in-depth reviews of specific telehealth services.</p>			
	<p>Schedule of visits and televisits for routine antenatal care (22)</p>	<p>This systematic review aimed to support the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine in developing a new evidence-based joint consensus statement to address the preferred visit schedule and the use of televisits for routine antenatal care.</p> <p>Ten studies evaluated scheduled number of routine visits and seven studies evaluated televisits. Nine qualitative studies also addressed these topics. Studies evaluated a wide range of reduced and traditional visit schedules and approaches to incorporating televisits.</p> <p>In comparisons of hybrid (televisits and in-person) versus in-person only visits, low-strength evidence did not find differences in preterm births (four studies) or NICU admissions (three studies), but did suggest greater satisfaction with hybrid visits (two studies). Qualitative studies suggested patients and providers were open to reduced schedules and televisits for routine antenatal care, but importantly, patients and providers had concerns about quality of care, and providers and clinic leadership had suggestions on how to best implement practice changes.</p> <p>Low-strength evidence from studies comparing hybrid (televisit and in-person) and all in-person visits did not indicate differences regarding preterm births (one RCT, three NRCSs; summary OR 0.93, 95% CI 0.84 to 1.03, P=0.18) or NICU admissions (three NRCSs; summary OR 1.02, 95% CI 0.82 to 1.28). There was also low-strength evidence that patients receiving hybrid visits were more likely to be satisfied with antenatal care than patients receiving all in-person care (one RCT, one NRCS); however, a survey that directly compared satisfaction with televisits versus satisfaction with in-person visits (among patients receiving hybrid visits) was inconsistent, finding greater satisfaction with in-person visits.</p> <p>The review concluded that the evidence base is relatively sparse, with insufficient evidence for numerous prioritized outcomes. Studies were heterogeneous in the care models employed. Where there was sufficient evidence to make conclusions, studies did not find</p>	<p>Last search 12 February, 2022</p>	<p>8/11</p>	<p>0/10</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>significant differences in harms to mother or baby between alternative models, but evidence suggested greater satisfaction with care with hybrid visits. Qualitative evidence suggests diverse barriers and facilitators to uptake of reduced visit schedules or televisits for routine antenatal care. Given the shortcomings of the evidence base, considerations other than proof of differences in outcomes may need to be considered regarding implications for clinical practice.</p>			
	<p><u>The efficacy of remote virtual care in comparison to traditional clinical visits for elective orthopedic patients (30)</u></p>	<p>This systematic review and meta-analysis aimed to evaluate the efficacy of telemedicine for elective orthopedic patients in the recovery and/or rehabilitation period.</p> <p>Eleven studies were included in the meta-analyses, with a total of 1,054 patients (521 remote; 533 standard) included in this study.</p> <p>Four studies reported on overall patient satisfaction, which was typically reported in terms of percentage of cohort that were ‘very satisfied’ or ‘satisfied’ with service, and subsequently converted to a representative ‘n’ of cohort for the ease of meta-analysis. Comparatively, 83.2% (114/137) in telemedicine cohort and 86.0% (129/150) in the standard routine were satisfied with care received. This did not prove statistically significant on meta-analysis (RR, 0.98; 95% CI, 0.90-1.07; I2 = 0%; p = 0.52). Therefore, patient satisfaction was similar among cohorts.</p> <p>Only two studies reported readmission rates in the follow-up period and thus a comparative z-test of proportions was performed rather than a meta-analysis. Collectively, 13/171 (7.6%) of the telemedicine patients were readmitted or hospitalized in the follow-up period compared to 30/174 (17.2%) of control patients, which did prove statistically significant (p = 0.003) on z-test of proportions in favour of virtual care cohorts.</p> <p>Both telemedicine and control cohorts were comparable for patient retention analysis (RR, 1.25; 95% CI, 0.51e3.06; p = 0.54; I2 ¼ 0%). Similarly, there was no statistical difference appreciated between cohorts for overall Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score (p = 0.30), Timed Up and Go Test (p = 0.40), and Stair Test (p = 0.18). Significant difference did exist for visual analogue scale (VAS) scores (p = 0.02) in favour of in-clinic management.</p> <p>Only one study reported on physician satisfaction. Comparatively, 84.0% (25/30) of telemedicine appointments were rated with overall satisfaction compared to 85.0% (24/28) of traditional in-clinic visits, which did not prove significant on z-test of proportions (p = 0.40).</p> <p>The review concluded that virtual consultations are as effective as traditional in-person consultations for the care of elective orthopedic patients in the recovery and rehabilitation period.</p>	<p>Last search 4 January, 2021</p>	<p>6/11</p>	<p>Not informed</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p><u>Comparing the diagnostic accuracy of telemedicine utilization versus in-person clinical examination for retinopathy of prematurity in premature infants</u> (23)</p>	<p>This review aimed to synthesize the literature assessing the diagnostic accuracy of telemedicine evaluation compared with clinical examination for retinopathy of prematurity (ROP) in premature infants.</p> <p>Fourteen studies (2,655 participants) were included. Most studies found that telemedicine performance for detecting ROP was comparable to ophthalmic examination, especially with regard to identifying treatment-requiring ROP.</p> <p>At the very least, a measure of accuracy of telemedicine screening for ROP was reported in 14 studies. While ROP was assessed at different levels in various scenarios, virtually every study found that telemedicine results compared very favorably with in-person examination in detecting ROP. Sensitivity and specificity for ROP detection generally ranged from 70% to 100%, with corresponding positive and negative predictive values and accuracy. Many of the studies showed 100% sensitivity for treatment-requiring ROP (i.e., type 1 ROP).</p> <p>The review concluded that telemedicine evaluation can reliably detect ROP. Incorporation of telemedicine into conventional neonatal care has the potential to improve access to ROP care.</p>	<p>Last search 27 September, 2020</p>	<p>10/11</p>	<p>3/14</p>
	<p><u>Economic evaluation and costs of telepsychiatry programs</u> (19)</p>	<p>This systematic review examined cost reporting of telepsychiatry programs for mental health care.</p> <p>Twenty-six unique studies met inclusion criteria (17,967 participants) for studies reporting costs, including economic evaluations such as cost-effectiveness analyses, or costs of developing telepsychiatry programs for clinical care of mental disorders. Included studies enrolled participants with mental disorders. Most studies targeted depression (n=7; 27%), general mental disorders and screening (n=7; 27%), child mental health (n=4; 15%) and geriatric mental health (n=4; 15%). Nearly all studies (n=25; 96%) compared telepsychiatry program costs with either standard in-person consultation or usual care, with 15 (60%) reporting that telepsychiatry programs were less expensive, and eight (32%) showing telepsychiatry programs were more expensive. Three studies reported cost-effectiveness analyses, favouring telepsychiatry programs, but at highly elevated cost-effectiveness thresholds. Few studies reported costs of developing or delivering telepsychiatry programs.</p> <p>The per session costs of telepsychiatry programs varied widely, ranging from as low as 3.74 euros (US\$4.38 in 2019) for the technology costs per neurology consultation for Alzheimer's care in Spain (not including neurologist costs), to \$498.85 (US\$430.85 in 2019) for epilepsy consultation in Canada, covering only the costs of the videoconferencing equipment and not medical personnel.</p> <p>Three studies, all from the United States, reported cost-effectiveness analyses. One assessed the cost-effectiveness of a telepsychiatry program for veterans and military personnel with</p>	<p>Last search 16 March, 2018</p>	<p>6/10</p>	<p>4/26</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>depression and found that the telepsychiatry program produced only 0.004 greater quality-adjusted life years (QALYs) compared with in-person treatment at considerably higher cost. The resulting incremental cost-effectiveness ratio (ICER) was US\$14,434,503 per QALY (\$14,688,886 per QALY in 2019) gained relative to in-person care. In a study of a telemedicine-based collaborative care program for PTSD in veterans, the costs of the telepsychiatry program were higher than usual care, and the ICER was US\$185,565 USD per QALY (US\$193,542 per QALY in 2019) gained relative to usual care. In another study among veterans with depression, a telemedicine-based stepped collaborative care program with telepsychiatry consultation resulted in significantly higher expenditures, and the ICER was US\$85,634 per QALY (US\$100,401 per QALY in 2019) gained relative to usual care.</p> <p>The review concluded that costs of telepsychiatry programs varied widely, with substantial heterogeneity in how costs were defined and reported. Some programs cost less than in-person services while others cost more. Therefore, rigorous cost-effectiveness studies following established standards in economic evaluation are needed to inform implementation and sustainability of these programs in health systems.</p>			
	<p><u>Diagnostic test accuracy of remote, multi-domain cognitive assessment (telephone and video call) for dementia (15)</u></p>	<p>This Cochrane review aimed to assess the test accuracy of any multi-domain cognitive test delivered remotely for the diagnosis of any form of dementia, and to assess for potential differences in cognitive test scoring when using a remote platform, and where a remote screener was compared to the equivalent face-to-face test.</p> <p>The review included 31 studies (19 differing tests, 3,075 participants), of which seven studies (six telephone, one video call, 756 participants) were relevant to the primary objective of describing test accuracy against a clinical diagnosis of dementia. All studies were at unclear or high risk of bias in at least one domain, but were low risk in applicability to the review question. Overall, sensitivity of remote tools varied with values between 26% and 100%, and specificity between 65% and 100%, with no clearly superior test.</p> <p>Across the 24 papers comparing equivalent remote and in-person tests (14 telephone, 10 video call), agreement between tests was good, but rarely perfect (correlation coefficient range: 0.48 to 0.98).</p> <p>The review concluded that despite the common and increasing use of remote cognitive assessment, supporting evidence on test accuracy is limited. Available data do not allow us to suggest a preferred test. Remote testing is complex, and this is reflected in the heterogeneity seen in tests used, their application, and their analysis. The limited and inconsistent evidence, with issues around bias, precludes any recommendation on the preferred remote test version, items or test threshold that should be applied in practice. This does not imply that remote assessment is not a valid approach.</p>	<p>Last search 2 June, 2021</p>	<p>11</p>	<p>0/6</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
	<p><u>The safety and acceptability of using telehealth for follow-up of patients following cancer surgery</u> (10)</p>	<p>This review aimed to examine the feasibility, safety, and patient satisfaction with virtual follow-up appointments after cancer operations. Outcomes including adverse events, detection of recurrence and patient and provider satisfaction were assessed and compared for those undergoing virtual or in-person post-operative visits.</p> <p>Eleven studies, with 3,369 patients, were included. Cancer types included were gynecological, colorectal, esophageal, lung, thyroid, breast, prostate and major HPB resections. Detection of recurrence and readmission rates were similar when comparing virtual consultations with in-person visits. Most studies showed high patient and healthcare provider satisfaction with virtual consultations following cancer resection. Concerns were raised about the integration of virtual consultations into workflows in fee-for-service settings, where reimbursement for virtual care may be an issue.</p> <p>Readmission rates and unscheduled visits: Uppal et al. conducted a retrospective study to compare surgical cancer patients who received telemedicine follow-up with those who received in-person follow-up, and found that 30- and 90-day readmission rates were not statistically different between groups ($p = 0.77$ and $p = 0.29$, respectively). The mean time to readmission was also similar ($p = 0.585$) in this study.</p> <p>Recurrence rates: Beaver et al. also conducted a similar study of 50 colorectal cancer patients and found the same recurrence rate in telemedicine (5/25 recurrence) and in-person patients (5/25 recurrence) as detected by CT scans.</p> <p>Morbidity and mortality: There were four studies that reported on patient morbidity or mortality. Those studies found no difference in the 90-day mortality between patients who received virtual follow-up and patients who received in-person care.</p> <p>The eight studies reporting on patient perspectives indicated high overall satisfaction based on surveys or standardized questionnaire scores (i.e., STAI-S, GHQ-12, Likert scales, etc.). Nearly all studies reported high satisfaction with no statistically significant difference compared to non-telehealth groups, and the 2012 study by Beaver et al. even reported that the telehealth group had statistically higher satisfaction than non-telehealth.</p> <p>Regarding the perspectives of oncologic surgeons, telehealth was generally well-received, although Neeman et al. reported lower satisfaction for surgical oncologists compared to non-surgical oncologists. Surgical oncologists in the study by Viers et al. expressed concerns that virtual visits would not fit into the existing clinical workflow, specifically concerning physician reimbursement.</p> <p>The review concluded that virtual follow-up care can provide timely and safe consultations in surgical oncology. Virtual consultations are as safe as in-person visits for assessing</p>	<p>Last search May 2022</p>	<p>6/10</p>	<p>NI</p>

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>complications and recurrence. Where appropriate, virtual consultations can safely be integrated into the post-operative care pathway for those undergoing resection of malignancy.</p>			
	<p><u>Home-based and remote functional exercise testing in cardiac conditions, during the COVID-19 pandemic and beyond</u> (11)</p>	<p>This review aimed to identify functional exercise tests that have been conducted in the home or remotely in patients with cardiac conditions.</p> <p>Five studies (six articles) were included, with a total of 438 patients with cardiac conditions. Tests used at home or remotely were the 6-minute walk test (6MWT, five studies) and the timed up and go test (one study). No studies reported the use of step tests in the home or remotely. The 6MWTs were administered via a smartphone application, rope, videoconferencing and accelerometer, and proved to be feasible, valid and reliable.</p> <p>The review concluded that despite a marked demand for home-based exercise programs, the 6MWT remains the most administered functional exercise test for people with cardiac conditions.</p>	<p>Last search 27 September, 2020</p>	<p>8/10</p>	<p>0/5</p>
	<p><u>Physical examination components adapted for telemedicine</u> (5)</p>	<p>This systematic review summarized the accuracy and reliability of virtual assessments compared with traditional in-person examination tools.</p> <p>A total of 64 studies were included and categorized into five clinical domains: neurological (n=41), HEENT (head, eyes, ears, nose, and throat, n=5), cardiopulmonary (n=5), musculoskeletal (n=8), and assessment of critically ill patients (n=5). The cognitive assessment within the neurological exam was by far the most studied (n=19) with the Mini-Mental Status Exam found to be highly reliable in multiple settings. Most studies showed relatively good reliability of the virtual assessment, although sample sizes were often small (<50 participants).</p> <p>Overall, all studies found moderate-to-high reliability of the NIH Stroke Scale as a composite score performed over video compared with in-person. However, not all elements in this scale were equally reliable. Generally, motor, consciousness, and neglect components of the exam were highly reliable, while facial palsy, visual fields, and ataxia components were less reliable across the seven studies that reported subcomponents.</p> <p>Five studies assessing HEENT examinations met inclusion criteria. Of these, only one study used specialized video-otoscopy while the remainder used standard video equipment and tools, including flashlight and tongue blade. Studies generally revealed good to very good agreement on diagnosis and management of a variety of HEENT assessments, including management of facial fracture, strabismus, and otitis media. Two studies focusing on pediatric populations showed very high agreement on diagnosis of common presenting symptoms. An exception to this trend was a study assessing sore throat in the emergency department by Akhtar et al. In that study, the primary outcome, tonsil size, was only fairly</p>	<p>Last search September 2019</p>	<p>6/10</p>	<p>Not informed</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>correlated between face-to-face and telemedicine (TM) modalities ($j = 0.361$), however secondary outcomes, including tonsil coloration ($j = 0.434$) and presence of tender superficial cervical adenopathy ($j = 0.434$) were moderately correlated.</p> <p>Five studies assessing cardiopulmonary examination met inclusion criteria. These studies focused on auscultation of the chest in ambulatory, hospital, and non-clinical settings, including schools. Studies aimed at assessing murmurs showed sensitivity ranging from 78.5% to 85% in detecting pathologic murmurs, however cardiologists from the Mahnke et al. study still recommended face-to-face examination or echocardiogram in 44% and 41% of cases, respectively. Studies of inpatients by Fragasso et al. showed excellent test characteristics for inpatient tele-auscultation in both clinically stable general medicine patients and heart failure patients, with 92% concordance compared with face-to-face examination. Conclusions from included studies suggested tele-auscultation is feasible and may be reliable as a tool for the diagnosis of common cardiac conditions.</p> <p>Eight studies evaluated the reliability of various components of the musculoskeletal exam. These included examinations of lower back pain (three studies), knee (two), shoulder (one), ankle (one), and non-articular lower limb disorders (one). Most studies were conducted in adults presenting with pain of a specific joint or back to physical therapy outpatient clinics and were limited to sample sizes between 15 and 20 patients. Only one study recruited up to 47 patients. All used videoconferencing equipment and none employed a trained facilitator to help manoeuvre the patient.</p> <p>Five studies assessing acutely ill patients met inclusion criteria. All studies involved pediatric patients in either the emergency department or intensive care unit settings, and often utilized facilitators at the bedside to obtain vital signs, manoeuvre the patient or camera, and operate peripheral equipment, including electronic stethoscopes. Respiratory, circulatory, and neurological exams were assessed, often utilizing scoring systems. For example, Siew et al. found overall moderate agreement between telemedicine and face-to-face ($j = 0.6-0.85$) using the Respiratory Observation Checklist, which includes respiratory distress, tachypnea, nasal flaring, and respiratory muscle retractions. Similarly, Gattu et al. also found high correlation (ICC = 0.95) using a simplified respiratory score made up of respiratory rate (ICC = 0.92), dyspnea (0.94), retractions (0.85), and wheezing (0.77). In ventilated neonatal intensive care unit (NICU) or pediatric intensive care unit patients, Bell et al. found digital vent settings to yield excellent to perfect agreement while patient-generated parameters (patient triggered breaths, over breathing, and need for capnography or suctioning) had poor agreement.</p> <p>This review concluded that overall, virtual assessments performed similarly to in-person exam components for diagnostic accuracy, but had a wide range of inter-rater reliability. The high heterogeneity in population, setting, and outcomes reported across studies render it</p>			

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		difficult to draw broad conclusions on the most effective exam components to adopt into clinical practice.			
	Best practices for the provision of virtual care (7)	<p>The purpose of this study was to systematically review existing best practice guidelines for conducting telemedicine encounters.</p> <p>A total of 60 guidelines for virtual-care encounters were included; 52% of these were published in the context of the COVID-19 pandemic. The majority (95%) of provider guidelines specified a type of virtual encounter to which their guidelines applied. Of included guidelines, 65% provided guidance regarding confidentiality/security, 58% discussed technology/setup, and 56% commented on patient consent.</p> <p>Thirty-one guidelines also provided guidance to patients or caregivers. Overall guideline quality was poor.</p> <p>The majority (95%) of provider guidelines specified a type of virtual encounter to which their guidelines applied. Although specifications within guidelines varied, 65% provided guidance regarding confidentiality/security, 58% discussed technology/setup, and 56% commented on patient consent. Conversely, guidance on patient selection (31%), documentation (27%), and prescribing (12%) was infrequent. Of included guidelines, 52% (31/60) provided guidance for patients or caregivers with respect to telemedicine encounters. Of these, the most common guidance was provided around appearance and physical environment (included in 87% of guidelines), whereas patient identification was least frequently discussed (5/31 guidelines).</p> <p>The principal recommendations were:</p> <ul style="list-style-type: none"> • ensure that patient and case are appropriate for a telemedicine encounter • ensure that encounter is being conducted in a secure environment, communicate security of environment as well as potential for breaches of confidentiality to the patient, and identify all individuals in a room • ensure that written consent for a telemedicine encounter is documented, obtain verbal consent before beginning the encounter • communicate a backup plan to the patient in the event of technological failure, and familiarize yourself with the technology before beginning the encounter • confirm technology is functioning, consent is available, and environment is ready before appointment, and provide patient with a checklist of any preparation before the visit • ensure all staff trained in using virtual care equipment/software, consider ongoing professional development specific to virtual care • speak slowly and clearly and take frequent pauses, and narrate any physical examination manoeuvres • place camera at eye level and look directly into the camera to simulate eye contact, and exaggerate non-verbal cues such as nodding and facial expressions 	Last search 1 January, 2021	9/10	4/60

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<ul style="list-style-type: none"> ensure that patient encounter, modality of appointment, consent, and content of visit are appropriately documented, and consider using a template prescribe at practitioner’s discretion as would be done in an in-person visit <p>This review concluded that the general best practices for successful telemedicine encounters include ensuring confidentiality and consent, preparation before a visit, and clear patient communication.</p>			
	The effect of telehealth interventions on quality of life of cancer survivors (9)	<p>The aim of this systematic review and meta-analysis was comparing the effect of telehealth interventions to usual care for cancer survivors’ quality of life.</p> <p>Eleven articles fit all systematic review and meta-analysis criteria. Initial analyses indicated that telehealth interventions demonstrated large improvements compared with usual care in quality-of-life measures ($\Delta = 0.750$, $p = 0.007$), albeit with substantial heterogeneity. Upon further analysis and outlier removal, telehealth interventions demonstrated significant improvements in quality of life compared with usual care ($\Delta = 0.141-0.144$, $p < 0.05$). The results of the systematic review with meta-analysis indicate that supplementary interventions through telehealth may have a positive impact on quality of life compared with in-person usual care.</p> <p>Of the 11 studies included, six (55%) were of breast cancer survivors, one (9%) esophageal cancer survivors, one (9%) colorectal cancer survivors, one (9%) of cervical cancer survivors, and two (18%) included cancer survivors of multiple forms of cancer. Five of the 11 (45%) studies utilized telephone interventions, one (9%) a videoconferencing intervention technique, one (9%) email-based counselling, three (27%) web-based self-management intervention, and one (9%) internet-based tele-rehabilitation program.</p> <p>There were significant increases in quality of life (QOL) (≥ 3 points) for both those in the videoconferencing telehealth and live delivery intervention groups compared with the control group. The telehealth delivered program showed the greatest improvement in QOL of 5.12 points, compared with the same program given in-person, which showed an increase of 3.55 points from baseline, and the waitlist had a slight increase of 2.4 points from baseline to the three-month post-intervention assessment. Freeman et al. noted in their study limitations in the differences between sample sizes in each group may have led to the variability in the increase in QOL scores, as the telemedicine delivery group was just under half the size as the in-person delivery and control groups.</p>	Last search 31 October, 2017	8/11	2/11
	Effects of telehealth interventions for adolescent sexual health (31)	<p>Telehealth interventions to advance adolescent sexual health have evolved and are being used to promote adolescent sexual health knowledge and healthy sexual behaviours. This study aimed to explore the meta-effects of telehealth interventions on self-efficacy of using condoms, condom use practices, and sexually transmitted infection testing behaviours among adolescents.</p>	Last search 8 May, 2021	10/11	0/15

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Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>A total of 15 studies (n=5,499) that used telehealth interventions with adolescents were included in the analysis. Telehealth interventions were found to increase self-efficacy for condom use (standardized mean difference: 0.22; 95% confidence interval: 0.08-0.36), practice for condom use (standardized mean difference: 0.35; 95% confidence interval: 0.23-0.47) and being screened/tested for sexual transmitted infections (standardized mean difference: 0.61; 95% confidence interval: 0.31-0.92).</p> <p>Five studies evaluated self-efficacy for condom use (n=1,404 adolescents), and the random effects model weighted SMD was 0.22 (95% CI 0.08–0.36), indicating that the telehealth interventions group had better self-efficacy for condom use than the control group (p < 0.001). Low heterogeneity was identified between the studies (τ^2: 0.01; Q: 7.74, degree of freedom (df): 5, I2: 35.39%).</p> <p>Eight studies assessed practice of condom use (n=2,290 adolescents), the random effects model weighted SMD was 0.35 (95% CI 0.23–0.47), indicating that the telehealth interventions group had more adherence for condom use than the control group (p < 0.001). Low heterogeneity was identified between the studies (τ^2: 0.01; Q: 11.95, degree of freedom (df): 7, I2: 41.43%).</p> <p>Three studies (n=294 adolescents) evaluated STI testing, and the random effects model weighted SMD was 0.61 (95% CI: 0.31–0.92), indicating that the telehealth interventions group had more adherence for STI testing than the control group (p < 0.001). Low heterogeneity was identified between the studies (τ^2: 0.02; Q: 3.02, degree of freedom (df): 2, I2: 33.69%).</p> <p>The review concluded that telehealth interventions show promise as effective intervention-delivery solutions for improving self-efficacy and certain sexual health behaviours among adolescents. These telehealth strategies could be important alternatives to in-person visits to accessing sexual health information or services near where they live.</p>			
	<p><u>The effectiveness of telerehabilitation in patients after total knee replacement</u> (29)</p>	<p>This study aimed to compare the effectiveness of telerehabilitation with conventional in-person rehabilitation in patients who underwent a total knee replacement.</p> <p>A total of 11 studies met the eligibility criteria and included 1,825 participants in the systematic review. Overall, the results revealed that the effectiveness of telerehabilitation is comparable to conventional in-person rehabilitation in improving various pain and functional outcomes in patients who underwent a total knee replacement. In the meta-analysis with the fixed-effects model, no significant difference was found in the improvement of pain and physical function in patients with knee osteoarthritis compared with conventional rehabilitation (Standardized Mean Difference (SMD) -0.15, 95% CI -0.47 to 0.16, P = 0.34 and SMD -0.04, 95% CI -0.19 to 0.12, P = 0.62, respectively). In addition,</p>	<p>Last search 28 February, 2022</p>	<p>9/11</p>	<p>3/11</p>

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>the utilization of hospital resources and costs were significantly lower in telerehabilitation when compared with in-person rehabilitation.</p> <p>There were two studies (n=316) that investigated the effectiveness of telerehabilitation after total knee replacement in terms of cost. Overall utilization of hospital-based resources was 60% less in the telerehabilitation group than for the traditional face-to-face group. The median total costs in the telerehabilitation group were significantly lower than in the control group (median \$1,050 versus \$2,805, P < 0.001). The number of chargeable home health and outpatient visits in the telerehabilitation group was significantly lower than in the control group (P< 0.001).</p> <p>Four studies (n=1,165) have documented the occurrence of adverse events during the intervention phase. Hospital readmission for knee-related problems and patient(s) admitted for manipulation under anesthesia due to poor knee range of motion were similar in both groups. A similar proportion of patients in telerehabilitation and control groups reported adverse events in the rehabilitation phase and/or follow-up period, with no adverse events related to telerehabilitation, while two minor adverse events might associate with usual care. The readmission risk among the two groups was similar in a study by Fleischman et al., but the authors did not provide detailed reasons for readmission in the two groups.</p> <p>Rehospitalization in 12 weeks in the telerehabilitation group was significantly lower than in the control group (12 versus 30, P =0.007).</p> <p>This review concluded that telerehabilitation was comparable to conventional in-person rehabilitation in improving clinical outcomes following total knee replacement. However, it might be a preferable alternative rehabilitation intervention for patients following total knee replacement given the significantly lower cost of telerehabilitation.</p>			
Rapid reviews	Barriers and facilitators for implementing pediatric telemedicine (24)	<p>This rapid mixed-methods evidence synthesis aimed to identify barriers, facilitators, and documented stakeholder experiences of implementing pediatric telemedicine, to inform the pandemic response.</p> <p>The review included 27 studies (19 quantitative; five mixed-methods, three qualitative). Important challenges highlighted from the perspective of the healthcare providers included issues with ICT proficiency, lack of confidence in the quality/reliability of the technology, connectivity issues, concerns around legal issues, increased administrative burden and/or fear of inability to conduct thorough examinations with reliance on subjective descriptions. Facilitators included clear dissemination of the aims of ICT services, involvement of staff throughout planning and implementation, sufficient training, and cultivation of telemedicine champions.</p> <p>Families often expressed preference for in-person visits, but those who had tried tele-consultations, lived far from clinics, or perceived increased convenience with technology</p>	Last search September 2020	9/11	Not informed

McMaster Health Forum

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		considered telemedicine more favourably. Concerns from parents included the responsibility of describing their child’s condition in the absence of an in-person examination.			
Literature reviews	<p><u>From telehealth to virtual primary care in Australia</u> (27)</p>	<p>This rapid scoping review examined informatics and digital health strategies that supported the primary-care response to COVID-19 in Australia.</p> <p>The scoping review included 29 eligible papers. The majority were “perspectives” papers, and few documents were original research into digital health and COVID-19 in primary care, which meant limited evidence on effectiveness, access, equity, utility, safety, and quality.</p> <p>The review found that telehealth was the key digital-health response in primary care, together with mobile applications and national hotlines, to enable the delivery of virtual primary care and support public health. Enablers and barriers such as workforce training, digital resources, patient experience and ethical issues, and business model and management issues were identified as important in the evolution of virtual primary care.</p> <p>These virtual models of primary care operationalize the WHO framework on Integrated People-centred Health Services (IPCHS) by integrating care at the primary-secondary interface (e.g., between GPs and specialists), integrating health and social care (e.g., between primary care, allied health and social services) and orienting care provision around peoples’ needs (i.e., people-centred). Services provided included: general practice, psychiatry, physiotherapy, pharmacy, nursing, cancer care, nutrition, child health.</p> <p>New funding arrangements (such as the Australian MBS telehealth items) to support a ‘digital-first’ response to COVID-19 led to a significant increase in ‘tele-consultations’, and a corresponding decrease in in-person consultations. These were mainly via telephone, with less than 3% using videoconferencing. This was associated with accelerated development of digital provider order-entry applications, especially e-prescribing, e-pathology and e-imaging requests. Regulations have also been amended to allow pharmacists to supply full Australian Pharmaceutical Benefits Schedule (PBS) quantity of long-term medications in selected cases.</p> <p>There were also parallel developments in child health with a focus on national planning for infant and young child feeding in emergencies.</p> <p>Dietitians Australia have recommended that policymakers and healthcare funders include telehealth-delivered dietetic consultations as a cost-effective alternative or complement to in-person delivery of dietetic services. Studies have shown that telehealth-delivered dietetic consultations are comparable to those delivered in-person, without requiring higher levels of additional training nor compromising quality of service provision.</p>	Last search 4 January, 2021	5/9	Not informed

Optimizing the Use of Hybrid-care Models for Delivery of Healthcare Services

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
		<p>Telepsychiatry was already available for ongoing care before COVID-19. Telepsychiatry and telepsychology may not be effective with new patients and is also not a long-term replacement for in-person consultations. Privacy and cybersecurity, especially with small practices, was a particular issue in mental health. Patients were increasingly using mobile apps to deal with psychological trauma related to COVID-19. However, there is limited evidence on the effectiveness of these largely unregulated apps.</p> <p>Tele-management of acute painful conditions by the GP may also be augmented by tele-physiotherapy for early management or subsequent follow-up. This is particularly important for people living in remote areas or those who are otherwise isolated. Delivery of Tai Chi and Qi Gong by telehealth was feasible and resulted in increased overall patient satisfaction with cancer care services during the lockdown.</p> <p>COVID-19 induced changes in lifestyle behaviours, including a reduction in physical activity, sleep quality, mental health, and healthy diet, and an increase in alcohol and smoking intake, producing adverse health impacts over the long term.(36) Increased access to telehealth-delivered preventive care and health promotion counselling is essential. With increasing use, equity and access issues in telehealth utilization were observed, for example, challenges for women accessing early medical abortion services through MBS telehealth services.</p> <p>Closures of, and delays to cancer screening services due to COVID-19 resulted in fewer referrals for cancer prevention, screening, and diagnostic services. The care of cancer survivors requires needs assessment and delivery of ongoing care through telehealth-enabled models of care, and practice management strategies. The transfer of survivorship care from secondary to primary care should also be accelerated, including the development of virtual models of shared care.</p> <p>The review concluded that COVID-19 has transformed Australian primary care with the rapid adaptation of digital technologies to complement “in-person” primary care with telehealth and virtual models of care. The pandemic has also highlighted several literacy, maturity/readiness, and micro-, meso- and macro-organizational challenges with adopting and adapting telehealth to support integrated person-centred healthcare.</p>			
Scoping reviews					



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