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The COVID-19 Pandemic and the Future of Telemedicine

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Foreword

This report was commissioned by the Health Committee of the Organisation for Economic Co-operation and Development (OECD) in June 2021, to be delivered back to the Committee in June 2022, with the aim of assessing the impact of the COVID-19 pandemic on the use of telemedicine in OECD countries.

The report provides an update to a Health Working Paper published in January 2020, which showed that, while care delivered via telemedicine could be both safe and effective, telemedicine services represented only a small fraction of all health care activity and spending. At that time, providers and patients seeking to use telemedicine faced regulatory uncertainty, limited financing and reimbursement, and unclear governance. Just a few weeks later, in response to the unfolding COVID-19 crisis, governments across the OECD adopted broad non-pharmaceutical interventions to limit social contacts and mobility. With in-person care heavily restricted, governments and providers moved quickly to expand remote care services. Consequently, the number of remote consultations skyrocketed. The sudden increase in virtual care has had clear benefits, preserving access to and continuity of care. Yet, it has also laid bare the limits of remote care and added to concerns that some teleconsultations constitute low value care.

This report provides an overview of national policies to implement and scale up remote consultations during the COVID-19 pandemic and tries to quantify the resulting boom in the use of telemedicine services; the impact that the massive shift to virtual care has had on health care system performance; and policy priorities for remote care as countries move to a post-acute stage of the COVID-19 pandemic. It is of course important to remember that the COVID-19 pandemic is not over, that data and information are still developing, and the priorities for policy makers highlighted here take this context into account.

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Table of contents

FIGURES

TABLES

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Executive summary

In early 2020, as countries grappled with the enormous uncertainty surrounding the spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the disease it caused, COVID-19, normal life came to a halt. With governments focused on preventing and treating COVID-19, and people drastically altering their behaviour to limit infection, **many in-person health services were postponed or simply cancelled, causing massive disruptions in the delivery of essential health care services**, with consequences that persist today.

Faced with significant disruptions to in-person care, **governments moved quickly to promote the use of remote care**, introducing legislation and revising existing laws. After the start of the pandemic, all nine OECD countries that allowed only in-person consultations dropped this restriction. Three countries allowed prescriptions to be written remotely, and seven countries relaxed a prerequisite that patients were only allowed to have teleconsultations with physicians that they had already consulted in-person before. Governments also promoted the use of telemedicine through changes in providers' payment systems. After the start of the pandemic, eight countries began covering real-time teleconsultations through government/compulsory schemes.

The number of **teleconsultations skyrocketed in the early months of the pandemic, partly offsetting the reduction in in-person care services**, and playing a vital role in maintaining access to, and continuity of, care in 2020. Provisional data from OECD show that, due to the boom in remote doctor consultations, the number of total doctor consultations increased in 2020 compared to 2019 in Australia, Denmark and Norway. If not for teleconsultations, in nine OECD countries, doctor consultations would have dropped on average by 14% in 2020, while in fact they only dropped by 3%. In nine OECD countries for which data are available, doctor teleconsultations represented 21% of all doctor consultations in 2020, compared to 11% in 2019. Almost half of all doctor consultations in Denmark in 2020 were teleconsultations.

While access to remote care services among older and poorer patients, as well as those living in rural areas remains concerning, there is **evidence that since the start of the pandemic access to remote care has increased for vulnerable groups** in some cases. For example, in the United States, in 2021, people aged 51 and older now represent a larger share of all users of remote care, and rates of telemedicine use were highest among patients with lower income. In Canada, in 2020, the highest rates of use were reported among adults aged 65 years and older.

Across the OECD, **patients who used telemedicine services are overwhelmingly satisfied**. There is also ample evidence that telemedicine services save patients money and time. From a patient's perspective, telemedicine services represent good value for money: around two in five patients who used remote care services during the pandemic even prefer telemedicine services to in-person appointments.

Physicians have more mixed views of the importance of remote care services, with the pandemic in a new phase in which vaccines are widely available, and in-person services have mostly resumed. Some physicians expect to reduce their provision of telemedicine services or even stop providing them altogether following a period of increased use in 2020. Moreover, **changes to promote telemedicine through regulations in 16 countries and through financing in 12 countries are only temporary** and subject to

review. It is possible that, despite significant demand from patients for remote care services, these will soon become unavailable or subject to stricter regulations.

From the perspective of health systems, it is unclear whether the telemedicine boom during the pandemic represented good value for money. A key underlying uncertainty is whether telemedicine services substitute for or complement in-person care. On the one hand, telemedicine services reduce subsequent (and more costly) health care utilisation and lower the probability that patients miss appointments or decide to forgo care. On the other hand, teleconsultations can lead to subsequent (duplicative) in-person care and, under certain provider payment schemes, may lead to higher spending at no extra value for health systems and patients.

There is a lack of systematic data collection in OECD countries on the reasons why patients use teleconsultations and on the use of health care services following a teleconsultation. Although the COVID-19 pandemic has created opportunities to explore the impact of remote care services on health system performance, not all countries have taken advantage of these opportunities to collect data and conduct studies. Only ten countries reported data collections on quality indicators such as safety and health outcomes.

This is an appropriate time for debate among stakeholders regarding whether to continue using telemedicine services, how to regulate their use, how to pay for them, and how to make sure that they constitute good value for money for all. Notwithstanding the significant heterogeneity in telemedicine use in the OECD, there are three priorities that policy makers should consider for the future:

- **Learn more about which patients are using remote care services, why they are using these services and what happens after they use them.** This is essential to inform discussions of the impact of telemedicine services on health system performance.
- **Investigate whether payment and organisational arrangements for provision of telemedicine services, are creating economic incentives that encourage appropriate and effective use of services.** It is far from clear that current prices and provider payment mechanisms for remote care services are incentivising and promoting care that is high-quality, delivered at the right time and at the right price. Presently, there are little cost and utilisation data analyses to inform decisions concerning provider payment arrangements and prices.
- **Foster a model of integrated care delivery in which remote and in-person care services are fully co-ordinated and part of a seamless care pathway.** In-person and remote care services are currently fragmented, with significant disagreement among providers on the merits of telemedicine services. This is not optimal and does not serve the interests of patients.

All three priorities rely heavily on data being collected, analysed and reported. Telemedicine is a tool and, like any other tool, it can be well used or misused. **When well used, remote care is beneficial for patients and can add value to health systems**, but risks of misuse need to be better understood and minimised.

1 Use of telemedicine has boomed during the COVID-19 pandemic

With the COVID-19 pandemic causing massive disruptions in the delivery of essential health care services, governments moved quickly to simplify and promote the use of telemedicine. This chapter highlights some of the swift and extensive changes that policy makers enacted concerning the regulation and financing of telemedicine in the early months of the pandemic and demonstrates the large increases in the use of remote care services that followed. Despite growing interest in telemedicine before the start of the pandemic and significant growth in remote care use during the pandemic, the chapter emphasises that data on telemedicine, including data on the number of teleconsultations provided, are scarce, and that less than half of OECD countries have data on patient characteristics, type of telemedicine service, reasons for telemedicine use, and subsequent care.

In the beginning of 2020, as SARS-CoV-2 spread globally, everyone – from citizens to health workers and policy makers – tried to understand the effects of the virus and the disease it caused, COVID-19. In the weeks and months that followed the identification of a cluster of cases of pneumonia of unknown cause in China, there was enormous uncertainty. Very little was known about how SARS-CoV-2 spread and how to limit its transmission, what the symptoms and the effects of COVID-19 were and how to treat it, and which individuals were most at risk of severe disease and what could be done to protect them. As governments, societies and economies grappled with these unknowns, normal life came to a halt. Previously unthinkable far-reaching and drastic actions were taken by both governments and populations to limit the spread of SARS-CoV-2 and the health impact of COVID-19. As health systems focused on preventing and treating COVID-19, and with populations drastically altering their behaviours to limit infections, many essential in-person health services were either postponed or simply cancelled.

1.1. The COVID-19 pandemic has massively disrupted in-person health services

The COVID-19 pandemic has caused immense disruptions in the delivery of essential health care services, from prevention to curative to palliative care. The first wave of SARS-CoV-2 infections and COVID-19 cases had the most significant impact on delivery of health services, but even today, well over two years since the first outbreak, most countries are still grappling with the effects of the pandemic on health care delivery (WHO, 2022[1]). In May 2020, the number of in-person primary care consultations plummeted, falling by 66% in Portugal, about 40% in Australia, 18% in Austria and 7% in Norway, compared with the same month in 2019 (OECD, 2021[2]). In-person consultations per capita dropped in seven of eight countries with 2020 data, and by up to 30% in Chile and Spain (ibid).

Elective surgeries were delayed, in turn causing waiting lists to grow. In seven OECD countries (Hungary, Ireland, New Zealand, Portugal, Slovenia, Spain and Sweden), for which data are available, waiting times for three elective surgeries – cataract surgery, hip replacement surgery, and knee replacement surgery – increased in 2020 compared with 2019 (OECD, 2021[2]). The median waiting times in these seven countries increased in 2020 by 88 days for knee replacement surgery, 58 days for hip replacement surgery, and 30 days for cataract surgery, compared to 2019 (ibid). In Canada**,** the number of procedures for knee replacement fell by 26% from 2019 to 2020, while the mean waiting time from specialist assessment to treatment increased from 121 days to 197 days (a 60% increase). In Spain, the number of procedures for knee replacement fell by 31% between 2019 and 2020.

Preventive health services dropped during the first year of the COVID-19 pandemic. On average across seven OECD countries (Chile, Iceland, Lithuania, New Zealand, Slovenia, Spain and Türkiye) for which comparable data exist, the share of women screened for breast cancer within the previous two years fell by 5 percentage points in 2020, compared with 2019 (OECD, 2021[2]). It has been estimated that there were 100 million fewer cancer screening tests performed in the EU27 and the United Kingdom in 2020 because of the pandemic (European Cancer Organisation, 2021[3]). Delays in access to diagnostic services during the pandemic were reported in many OECD countries, including Australia, Belgium, Canada (in Ontario), Denmark, Finland, France, Ireland, Italy, Korea, the Netherlands, Slovenia and Sweden.

Emergency departments had fewer visits in 2020, compared to 2019, especially in March and April of 2020. In Australia, average daily visits to hospital emergency departments were down 38% between early March and early April 2020, compared to the same window of time in 2019 (AIHW, 2020[4]). In the United Kingdom, emergency department visits in March 2020 were 29% lower than in March 2019 (Appleby, 2020[5]). In Paris, France, the incidence of out-of-hospital cardiac arrest doubled between 16 March and 26 April 2020, compared to the same period in previous years (Marijon et al., 2020[6]). In Germany, all-cause admissions were 30% lower in calendar weeks 10 to 16 of 2020, compared to the same period in 2019 (Schwarz et al., 2020[7]). In some Italian regions, paediatric emergency department visits fell by 73% to 88% in March 2020, compared with March 2019 and 2018 (Lazzerini et al., 2020[8]).

The impact of the COVID-19 pandemic on essential health services was especially hard on older people, as well as those living with one or more chronic health conditions. In a national Australian survey, over half of respondents aged 45 years and older who cited a need for health care or disability services reported that access to care had gotten worse (Cicuttini et al., 2022[9]). Responses to the Survey of Health, Ageing and Retirement in Europe indicate that individuals aged 50 years or older who had a chronic condition were, on average across EU27 countries, over 40% more likely to report forgoing or postponing medical care due to COVID-19 than those who did not have a chronic condition. In a survey of adults aged 65 years or older in 11 OECD countries (Australia, Canada, France, Germany, the Netherlands, New Zealand, Norway, Sweden, Switzerland, and the United States), one in five respondents with two or more chronic conditions reported having a medical appointment cancelled or postponed because of the COVID-19 pandemic (Williams II et al., 2021[10]).

In the United States, the Centers for Disease Control and Prevention (CDC) Morbidity Mortality Weekly Reports estimated that around 40% of adults delayed medical care due to COVID-19. According to the CDC National Center for Health Statistics' Research and Development Survey, among the overall population, after the start of the pandemic, 15.6% skipped regular check-ups, 10.1% skipped prescription medication, and 8% skipped ongoing treatment and diagnostic tests/screening. These rates were significantly higher in the diabetes subpopulation, with 24.1% skipping regular check-ups, 18.6% skipping prescription medication, 15.8% skipping diagnostic or medical screening tests, and 18.7% skipping treatment for an ongoing condition.

1.2. With the COVID-19 pandemic causing significant disruptions to in-person care, governments swiftly adopted policies to promote the use of telemedicine

1.2.1. Before the COVID-19 pandemic, telemedicine use was growing but very slowly

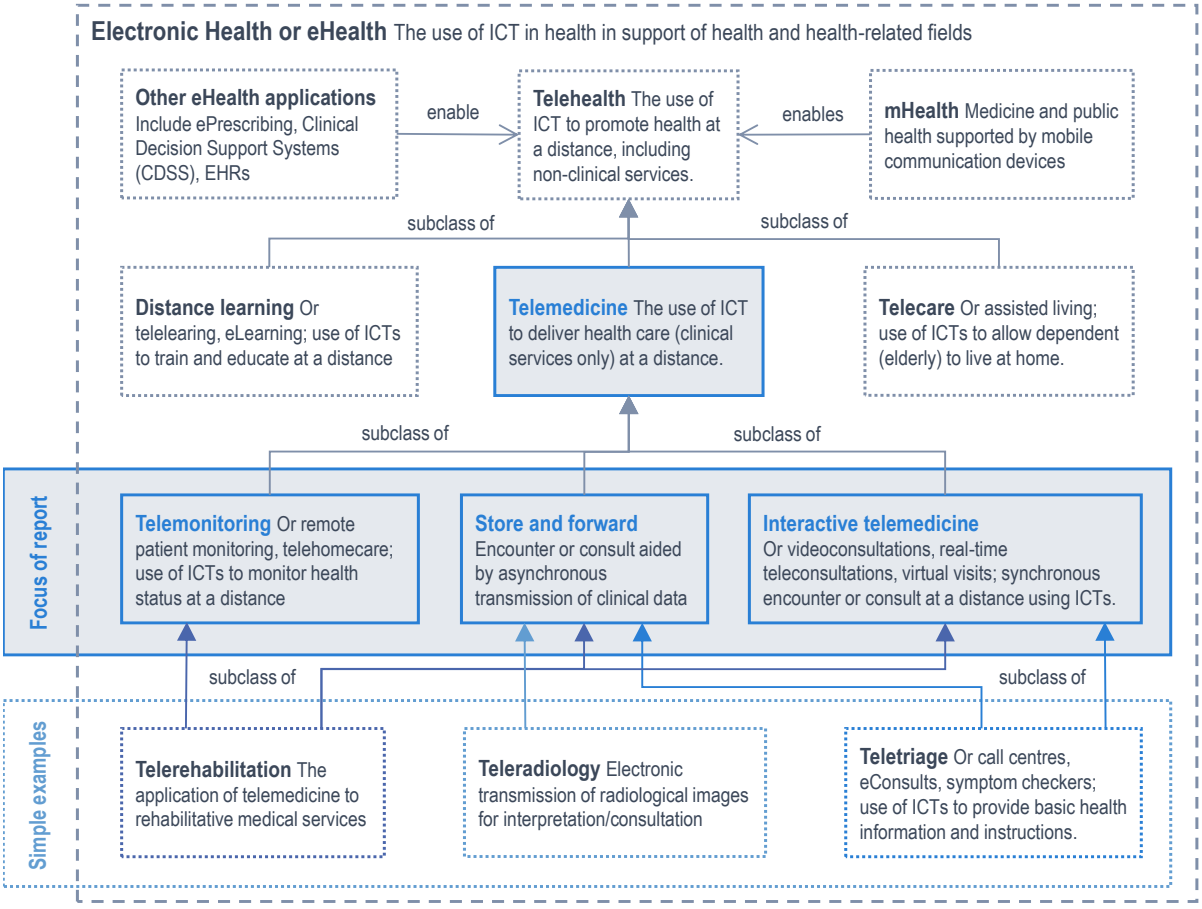
Before the COVID-19 pandemic, there was already growing interest in digital health technologies, such as telemedicine, as means to tackle significant health policy challenges. Populations were ageing globally and the prevalence of multimorbidity – the presence of several chronic illnesses in the same person – was rising, along with demands for more responsive health care services. With health care systems struggling to address more complex needs, many OECD countries were also experiencing growing gaps between health care workers needed and those available. Health expenditure was growing at its fastest rate in seven years (OECD, 2018[11]), while much effort and money were spent on wasteful care: care that does not have benefits for patients and that could be replaced by cheaper or better alternatives (OECD, 2017[12]).

Health care providers and policy makers were increasingly looking towards new digitally enabled models of care, turning in particular to electronic or digital health, or eHealth: the use of information and communications technologies in support of health and health-related fields, from care services to surveillance and education (WHO, 2019[13]). The ecosystem of digital health or eHealth technologies was rich and varied, as illustrated in Figure 1.1. Many different terms were – and still are – used, often focusing on a specific aspect of the intervention: the technology or medium used (e.g. mobile health or mHealth), the medical specialty (e.g. teleradiology), the target disease or condition (e.g. telestroke and telediabetes), the type of care (e.g. telerehabilitation and telecare), and the activity or task (e.g. clinical decision support systems and ePrescribing). Among eHealth interventions, there was growing interest in telemedicine – the use of ICTs to deliver clinical services at a distance (see Box 1.1 for a comprehensive definition) – as a way to deliver quality health services: care that is effective, safe, timely, aligned with the preferences and needs of patients and communities, equitable and efficient (OECD/WHO/World Bank Group, 2018[14]).

The number of telemedicine services was growing, but it still represented a very small proportion of the overall volume of services provided by health care systems in OECD countries (Oliveira Hashiguchi, 2020[15]). Providers and patients seeking to make use of telemedicine services faced regulatory

uncertainty, limited financing and reimbursement, and unclear governance. It was possible to use telemedicine services in most OECD countries, but many governments had requirements specific to telemedicine that effectively disincentivised its use (Oliveira Hashiguchi, 2020[15]). In the early days of 2020, Hungary required that physicians making a final diagnosis or a significant therapeutic change do so only in the presence of the patient, effectively barring the use of telemedicine. In Japan and France, patients were required to see a physician in-person before being able to consult that physician via telemedicine (with exceptions in France for urgent care and for when the patient's usual physician was not available). Lithuania only allowed provider-to-provider interactions. The states of Georgia and Texas, in the United States required that patients have an in-person follow-up appointment after a teleconsultation (Thomas and Capistrant, 2017[16]). In Slovenia, only telestroke was covered by compulsory health insurance. In Poland, the National Health Fund reimbursed only a limited number of telemedicine services, including cardiac rehabilitation. In the Czech Republic, only in-person consultations were reimbursed.

Figure 1.1. Telemedicine and the broader eHealth ecosystem



Note: ICT stands for information and communication technology.
Source: OECD compilation building on glossaries from the American and German telemedicine associations, and from ISO/TS 13131:2014.

Box 1.1. The definition of telemedicine used in this report

There is no single widely used definition of telemedicine. For the purposes of this report, telemedicine is the use of information and communication technologies to deliver health care at a distance (Oliveira Hashiguchi, 2020[15]). This definition is aligned with the WHO's definition of telemedicine. In some OECD countries, the term telehealth is used more commonly, and often interchangeably with telemedicine. However, as illustrated in Figure 1.1, in this report, telemedicine and telehealth are considered different, with telehealth being a broader concept (CDC, 2019[17]). Throughout this report, care has been taken to ensure that terms are used in line with the definitions in Figure 1.1. However, it is not always possible to establish clear definitions from all sources using these terms, and so this report uses the term telehealth whenever it is not clear whether sources are referring to telemedicine or telehealth. Whenever possible, details on the exact services provided are given.

To further expand on the definition of telemedicine used in this report, three categories of telemedicine are considered, which can be combined as appropriate (Flodgren et al., 2015[18]): telemonitoring, store and forward, and interactive telemedicine. Telemonitoring is the use of mobile devices and platforms to conduct routine medical tests, communicate the results to health care workers in real-time, and potentially launch pre-programmed automated responses. Store and forward is similar but is used for clinical data that are less time-sensitive and for which a delay between transmission and response is acceptable (e.g. store and forward is widely used in dermatology). Finally, interactive or real-time telemedicine involves direct and synchronous communication between providers and patients (e.g. direct-to-patient or in health care facilities).

Interventions that facilitate medical education of health care workers (e.g. physicians, nurses, etc.) at a distance via ICTs (e.g. tele-education or e-learning) are not included in the definition of telemedicine used in this report. Mobile applications that do not involve any transfer of data or any patient-to-provider communication, such as self-care and wellness mobile applications, are also not included. Any intervention that does not involve clinical services, such as public health awareness campaigns, is not included. All applications matching the definition of telemedicine in this report are included, whether they involve public or private providers, and regardless of the specific technology used (e-mail, video, fixed or mobile phone).

Note: see Oliveira Hashiguchi (2020[15]), "Bringing health care to the patient: An overview of the use of telemedicine in OECD countries", https://doi.org/10.1787/8e56ede7-en; Sood et al. (2007[19]), "What is telemedicine? A collection of 104 peer-reviewed perspectives and theoretical underpinnings" https://doi.org/10.1089/TMJ.2006.0073; and Rural Telehealth Evaluation Center (RTEC) (2022[20]) for more on definitions, *Telehealth: Current Definitions and Future Trends*, https://idhi.uams.edu/rtec/wp-content/uploads/sites/4/2022/05/Telehealth-Definitions-Paper-06MAY2022-1.pdf

1.2.2. The COVID-19 pandemic greatly accelerated the use of telemedicine

Then, in early 2020, in response to the unfolding COVID-19 pandemic, governments and health care providers moved quickly to simplify and promote the adoption and use of remote care services. According to the OECD Survey on Telemedicine and COVID-19 (see Box 1.2), before March 2020, nine countries[1] only allowed medical consultations to be performed in the physical presence of the patient (see Figure 1.2). After March 2020, all but Korea dropped this requirement (still, Korea made it possible to temporarily use telemedicine services at the highest alert level of COVID-19).

Figure 1.2. Pre-pandemic restrictions to the use of telemedicine were relaxed in early 2020

Country agreement with statements before and after the start of the COVID-19 pandemic

Telemedicine is just another way to deliver health care and is governed under existing health legislation and regulations		Medical consultations can only be performed in the physical presence of the patient		Prescriptions can only be written in the physical presence of the patient		Teleconsultations are only allowed if the patient has consulted the health care worker in-person in the past	
BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER
Australia		Korea		Austria	Austria	Australia*	
Austria		Estonia	Estonia	Türkiye	Türkiye	Czech Republic	
Belgium		Hungary	Hungary	United States	United States	Netherlands	
Costa Rica		Iceland	Iceland	Korea	Korea	Mexico	
England		Ireland	Ireland	Australia		Estonia	Estonia
France		Luxembourg	Luxembourg	Belgium		Luxembourg	Luxembourg
Germany		Mexico	Mexico	Canada		France	France
Japan		Türkiye	Türkiye	Costa Rica		Iceland	Iceland
Latvia		United States	United States	Czech Republic		Ireland	Ireland
Lithuania		Australia		England		Japan	Japan
Mexico		Austria		Estonia		Lithuania	Lithuania
Netherlands		Belgium		France		New Zealand	New Zealand
New Zealand		Canada		Germany		United States	United States
Norway		Costa Rica		Hungary		Korea	Korea
Poland		Czech Republic		Iceland		Austria	
Portugal		England		Ireland		Belgium	
Slovenia		Finland		Israel		Canada	
Sweden		France		Japan		Costa Rica	
Switzerland		Germany		Latvia		England	
Canada	Canada	Israel		Lithuania		Finland	
Estonia	Estonia	Japan		Luxembourg		Germany	
Ireland	Ireland	Latvia		Mexico		Hungary	
Luxembourg	Luxembourg	Lithuania		Netherlands		Israel	
Türkiye	Türkiye	Netherlands		New Zealand		Latvia	
United States	United States	New Zealand		Norway		Norway	
Korea	Korea	Norway		Poland		Poland	
Czech Republic		Poland		Portugal		Portugal	
Israel		Portugal		Slovenia		Slovenia	
Hungary	Hungary	Slovenia		Sweden		Sweden	
Iceland	Iceland	Sweden		Switzerland		Switzerland	
Finland		Switzerland		Finland		Türkiye	

Legend: Yes | No | Missing

Note: * Only applicable for General Practitioners and other Medical Officers practicing in general practice, with limited exceptions. Agreement with statements is shown for both before March 2020 (i.e. before the start of the pandemic) and after March 2020 (i.e. after the start of the pandemic). For the United States, medical consultations were already allowed prior to the pandemic, but only for certain payers; for example, state Medicaid programs could allow telehealth services, but for certain populations only (e.g. rural).
Source: OECD Survey on Telemedicine and COVID-19 (2022).

Box 1.2. The OECD Survey on Telemedicine and COVID-19, 2021-22

The OECD designed a survey to understand how COVID-19 has changed the telemedicine and remote care landscape, and to inform policy directions for the use of remote care services in the near future. The survey has four thematic focuses, with information requested for two periods: before and after the start of the COVID-19 pandemic (for simplicity, these periods are considered to be before and after March 2020). The four thematic focuses are utilisation; legislation, policies and guidelines; financing, pricing and provider payment; and impact on health system performance (e.g. access, quality and equity). The questionnaire was sent to OECD countries in December 2021, and responses were accepted until the end of April 2022. A total of 31 OECD countries participated in the survey. More details on participation in the survey provided in Annex A.

After the start of the COVID-19 pandemic, Austria, Türkiye, and the United States dropped requirements that prescriptions could only be written in the physical presence of the patient, and seven countries relaxed a prerequisite that patients were only allowed to have teleconsultations with physicians with whom they had already consulted in-person before (see Figure 1.2). Estonia and Türkiye introduced new legislation, or revised existing laws, to authorise or regulate the use of telemedicine after the start of the pandemic. In the United States, through the CARES Act provisions, Medicare telehealth restrictions that previously only allowed rural providers to offer telehealth were waived during the pandemic. These findings are in line with responses to the OECD Resilience of Health Systems Questionnaire showing that Australia**,** Austria, Canada, Costa Rica, Czech Republic, Finland, Ireland, Israel, Italy, Latvia, Lithuania, Portugal, Spain, the United Kingdom, and the United States all scaled up telehealth to maintain access to primary health care services and improve care co-ordination.

Governments also promoted the use of telemedicine through financing and provider payment. After the start of the COVID-19 pandemic, eight countries began covering real-time (synchronous) teleconsultations through government/compulsory schemes (see Figure 1.3). In Mexico, while there are no specific financial schemes for payment of remote care services, remote care can be covered through employer and employee contributions or provided for free by the *Instituto de Salud para el Bienestar* (Health Institute for Welfare). In Belgium, while there were no significant legislative changes, in March 2020 a new legal base was adopted allowing reimbursement of telemedicine. In England**,** the financing of telemedicine has only changed in the context of secondary care since telemedicine services in primary care were and are covered by government financing schemes. In secondary care, before the pandemic, telemedicine services were mostly financed through voluntary schemes and out-of-pocket payments, and only changed to government/compulsory financing afterwards. In the United States, for the first time, audio-only telehealth services were allowed in fee-for-service Medicare during the pandemic. While there have been limited changes to the financing of asynchronous store-and-forward telemedicine services during the pandemic, eight countries (Belgium, England, Estonia, Germany, Hungary, Ireland, Latvia and Switzerland) began covering remote patient monitoring services after the start of the pandemic (see Figure 1.3).

Figure 1.3. Public financial coverage of telemedicine services increased in early 2020

Country agreement with statements before and after the start of the COVID-19 pandemic

Real-time (synchronous) teleconsultations are covered by government / compulsory financing schemes		Remote patient monitoring services are covered by government / compulsory financing schemes		Asynchronous (store-and-forward) telemedicine services are covered by government / compulsory financing schemes	
BEFORE	**AFTER**	**BEFORE**	**AFTER**	**BEFORE**	**AFTER**
Australia		Canada		Canada	
Canada		Finland		Costa Rica	
Costa Rica		France		England	
Finland		Iceland		Finland	
France		Israel		France	
Germany		Japan		Israel	
Iceland		Netherlands		Japan	
Ireland		Norway		Lithuania	
Israel		Poland		Luxembourg	
Japan		Portugal		Netherlands	
Lithuania		Sweden		Norway	
Netherlands		Türkiye		Portugal	
New Zealand		United States		Sweden	
Norway		Belgium	Belgium	United States	
Poland		England	England	Hungary	Hungary
Portugal		Estonia	Estonia	Australia	
Slovenia		Germany	Germany	Belgium	
Sweden		Ireland	Ireland	Czech Republic	
Switzerland		Latvia	Latvia	Estonia	
Türkiye		Switzerland	Switzerland	Germany	
United States		Hungary	Hungary	Latvia	
Belgium	Belgium	Australia		Mexico	
Czech Republic	Czech Republic	Costa Rica		Poland	
England	England	Czech Republic		Iceland	
Estonia	Estonia	Lithuania		Ireland	
Latvia	Latvia	Luxembourg		Korea	
Luxembourg	Luxembourg	Mexico		New Zealand	
Hungary	Hungary	Korea		Slovenia	
Korea	Korea	New Zealand		Switzerland	
Mexico		Slovenia		Türkiye	

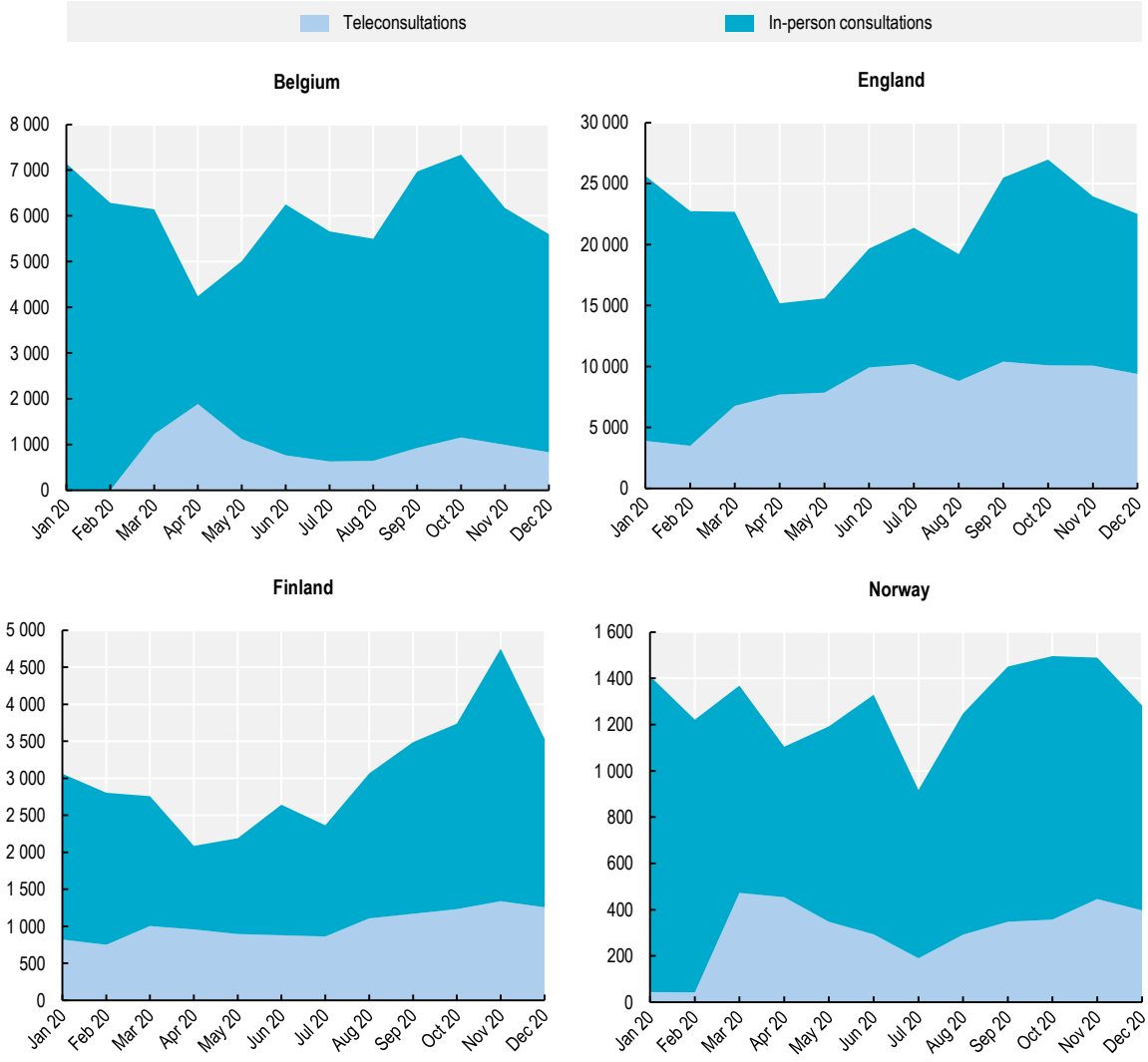
Legend: Yes | No | Missing

Note: Agreement with statements is shown for both before March 2020 (i.e. before the start of the pandemic) and after March 2020 (i.e. after the start of the pandemic). Austria did not respond to this section of the survey. Answers for England are for Secondary Care only, and for General Practice the answers are "yes" as these services are provided by GPs that are funded by the government.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

1.3. The use of telemedicine has skyrocketed during the COVID-19 pandemic, partly compensating for the disruptions to in-person care services

Reductions in the number of in-person health care services provided in OECD countries were partly offset by an unprecedented scale-up of telemedicine services, following the adoption by governments of policies to promote remote care. The number of teleconsultations skyrocketed in the early months of the pandemic, offsetting, to some extent, the reduction in in-person health care services, as illustrated in Figure 1.4. Due to differences in definitions (see Box 1.1), most data on the use of telemedicine services are not fully comparable across countries.

Figure 1.4. Reductions in the number of in-person consultations were partly offset by increases in the number of teleconsultations, in selected OECD countries from January to December 2020



Note: Numbers of consultations (in thousands) may not be directly comparable across countries due to different definitions. In England, teleconsultations include telephone and video consultations; in Finland, teleconsultations include telephone connections, electronic services, and real-time remote transactions, while in-person consultations include customer visit to reception and hospital visit; in Belgium, in-person consultations include general practitioner appointments and specialist appointments.
Source: Belgian National Institute for Health and Disability Insurance, Finish National Institute for Health and Welfare, Norwegian Directorate of Health, and NHS Digital for England.

In Belgium, there were no teleconsultations at all in January and February of 2020; then there were over 1.2 million teleconsultations performed just in March 2020 alone. In Norway, the number of teleconsultations increased more than 10 times, from around 43 000 in January 2020 to over 470 000 in March of 2020. In England, the number of teleconsultations almost doubled from February to March 2020 and grew further in the months after March to almost three times the number of teleconsultations in January 2020. In Finland, the number of teleconsultations increased in March of 2020 as well but not as markedly as in other countries. While time-series of the number of telemedicine services are not available for all OECD countries, Table 1.1 provides some illustrative examples of the astounding growth in the use of telemedicine during the pandemic. Numbers of in-person and telemedicine services may not be directly comparable across countries due to differences in definitions.

Table 1.1. The use of telemedicine grew exponentially in many OECD countries in 2020

Examples of the growth in volume of, and spending on, telemedicine services after the start of COVID-19

	Before the start of the COVID-19 pandemic	After the start of the COVID-19 pandemic
Australia	The volume of telemedicine services funded by the Medicare Benefits Schedule (MBS) had been steadily growing from 101 741 in 2013 to **188 369 telemedicine services in 2017** (Oliveira Hashiguchi, 2020[15]).	In the quarter ending September 2020, 13.3% of all MBS services, **15.5 million, were telehealth consultations** (AIHW, 2021[21]). Between 16 March 2020 and 27 September 2020, **2.5 million** Medicare-subsidised **mental health related services** were delivered via telehealth nationally (out of 7.2 million), with **AUD 791 million** paid in benefits (AIHW, 2022[22]). A 10% drop in in-person **antenatal care** between January and September 2020, compared to 2019, was almost entirely offset by an uptake of **91 000 telehealth services** (AIHW, 2021[23]).
Belgium	There was **no reimbursement** of telemedicine services before March 2020; **no telemedicine services** were provided in January and February of 2020 (see note).	Of the over 72 million appointments performed in 2020, over **10.5 million** were delivered using telemedicine. In April 2020, 44.4% of all appointments were done via telemedicine. A total of **EUR 238 million** were paid in benefits (INAMI, 2021[24]).
Canada	Between 2012 and 2014, the number of interactive real-time clinical sessions grew by 46%, from 282 529 to **411 778** appointments, representing **about CAD 405 000** of billable services (Oliveira Hashiguchi, 2020[15]; CMA, 2019[25]). In Ontario, virtual care use increased from 0.2% in the first quarter of 2012 to **1.8% of total ambulatory visits** in the fourth quarter of 2019 (Bhatia et al., 2021[26])	In April 2020, telemedicine accounted for **77%** (**3 194 107** of 4 161 582) of all ambulatory visits among people in Ontario (Mehrotra, Bhatia and Snoswell, 2021[27]). Almost three-quarters (73.7%) of all primary care visits and 63.9% of specialty care visits were delivered virtually in the second quarter of 2020 in Ontario (Bhatia et al., 2021[26]). National poll data from 14-17 May 2020 shows **almost half of all Canadians** had accessed a physician using virtual care (CMA, CFPC and RCPSC, 2022[28]). In May 2020, the federal government announced an investment of **CAD 240.5 million** to accelerate the use of virtual tools and digital approaches (CMA, CFPC and RCPSC, 2022[28]).
France	There were 1 500 teleconsultations in 2017, 5 985 in 2018, and **136 882** in 2019, according to data from the Caisse Nationale de l'Assurance Maladie (CNAM; see note).	In the first half of 2020, the number of teleconsultations invoiced to l'Assurance Maladie rose from 40 000 acts per month to **4.5 million in April**. During the first lockdown, one in four consultations was a teleconsultation (L'Assurance Maladie, 2020[29]). **10.9 million teleconsultations** were performed between January and September 2021 (see note).

	Before the start of the COVID-19 pandemic	After the start of the COVID-19 pandemic
Germany	There were almost **3 000 video consultations** nationwide in 2019 (KBV, 2021[30]).	There were almost **1.4 million video consultations** in the first half of 2020. Almost **1.2 million times patients** consulted a doctor or psychotherapist via video in the second quarter of 2020 (KBV, 2021[30]).
Iceland	In May and April 2018/19, telephone consultations accounted for around **43%** and web-based services for more than **10% of all consultations** provided in primary health care centres (Sigurdsson et al., 2020[31]). In 2019, the platform Heilsuvera, which offers health information online, allows appointments to be scheduled, and offers telephone calls and online chat with health professionals, was **accessed 1.2 million times** (Möller, 2021[32]).	In March and April 2020, the use of telephone consultations delivered at primary health care centres **increased by 69%** compared to that period in 2018/19. The use of web-based consultations increased by 213%, while office visits decreased by 41%. **Remote services made up more than 80% of the consultations** delivered at that time (Sigurdsson et al., 2020[31]). The use of the online platform Heilsuvera almost tripled since 2019. The number of users rose to 194 180, so that almost **70% of the Icelandic** population is registered (Möller, 2021[32]).
Lithuania	While telemedicine services were implemented already in 2018, they played a small role in the Lithuanian health care system before the pandemic: 57% of all outpatient consultations were with family physicians and **98% through direct consultations** (Liseckiene, 2021[33])	The numbers of remote services delivered in 2020 were more than **25 times as high as in 2019**, jumping from 260 568 to **6 676 110**, which is an **increase of 2 462%.** The numbers for the first 11 months of 2021 surpassed those of 2020, showing that remote consultations continue be widely used (see note).
Netherlands	In 2018, there were **more than 20 million telephone consultations** in outpatient care. The number of consultations via e-mail doubled between 2015 and 2018, with more 400 000 provided in 2018 (Rompelberg, Suijkerbuijk and Wouters, 2020[34]). In 2019, **about 10% of all consultations** in outpatient care have been delivered remotely with about 1 900 video consultations per year. Only 51% of Dutch hospitals offered video calling in 2019 (Nederlandse Vereniging van Ziekenhuizen (NVZ), 2022[35])	In 2021, **99% of hospitals** in the Netherlands offered video consultations, compared to only 51% in 2019. While in 2019, there were 1 900 video consultation in outpatient care per year, in 2020 there were around 44 000, **a 23-fold increase**. In 2021, the numbers rose again to roughly **66 000 video calls** (Nederlandse Vereniging van Ziekenhuizen (NVZ), 2022[35]). In total, **28.3% of outpatient care consultations** were delivered remotely in 2021, which includes telephone and video consultations, teledermatology and written consultations (ibid).
Poland	While telemedicine was available before the pandemic in Poland it made up only a fraction of the overall health care services. However, use was on the rise, with **4 335 teleconsultations delivered in 2017**, **9 249 in 2018** and **14 930 in 2019** (see note)**.**	The number of teleconsultations skyrocketed, accounting for up to **80% of all consultations** at times (National Health Fund, Department of Patient Services (Departament Obsługi Pacjenta, Narodowy Fundusz Zdrowia), 2020[36]). In 2020, **56.8 million medical consultations** in primary care were carried out remotely and 16.3 million in specialised care. There were 116 500 appointments for dental advice provided remotely (see note).
Portugal	85% of surveyed physicians had not participated in teleconsultations (O'Neill et al., 2022[37]). Between January and December of 2019, **29 778 teleconsultations** were performed (ACSS, 2022[38]).	During the first wave of the pandemic, 94% of physicians used teleconsultations (O'Neill et al., 2022[37]). Between January and December of 2020, a total of 44 475 teleconsultations were performed, and between January and December 2021 a total of **354 634 teleconsultations** had been performed (ACSS, 2022[38]).

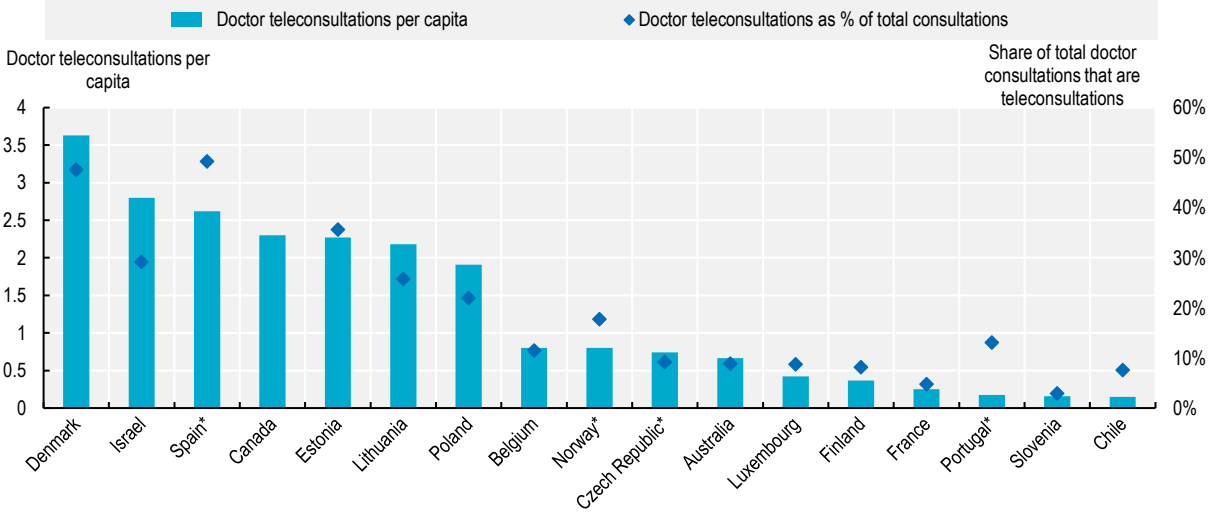
	Before the start of the COVID-19 pandemic	After the start of the COVID-19 pandemic
Sweden	From 2016 to 2019, the number of video visits rose remarkably from 20 149 to **1 159 377**, which is **and increase of 5 654%** (Swedish Agency for Health and Social Care Analysis, 2022[39]). This still only accounted for a fraction of the health care services provided in total. In 2018, the costs for teleconsultations constituted roughly **1% of Swedish health care spending** in primary care (Vårdanalys, 2020[40]).	With the pandemic, the numbers of video teleconsultations increased yet again from 1 159 377 in 2019 to 2 308 089 in 2020, a **growth of 99%** (Swedish Agency for Health and Social Care Analysis, 2022[39])**.** While video consultations only accounted for about 3% of all physical visits in 2019, this number **rose to 7%** in 2020. Although these numbers do not include the digital visits scheduled instead of physical visits due to the pandemic, they still signify a shift towards remote care (Swedish Agency for Health and Social Care Analysis, 2022[39]). In 2020, the costs of video visits amounted to **2% of the net cost** in Swedish primary care, compared to 0.5% in 2018 (Swedish Agency for Health and Social Care Analysis, 2022[39]).
United States	The number of Medicare fee-for-service beneficiary telehealth visits was approximately **840 000 in 2019**. Prior to the pandemic, telehealth made up **less than 1% of visits** across all visit specialties (Samson et al., 2021[41]).	The number of Medicare fee-for-service beneficiary telehealth visits **increased 63-fold** in 2020, to nearly **52.7 million**. Telehealth increased to 8% of primary care visits. Telehealth comprised a third of total visits to behavioural health specialists (Samson et al., 2021[41]).

Note: Numbers of services may not be directly comparable across countries due to differences in definitions. The data in this table are not meant to be exhaustive. Telehealth and virtual care are used interchangeably with telemedicine. The source for statistics without citations is the OECD Survey of Telemedicine and COVID-19 (2022).
Source: OECD analysis of multiple sources (see citations in table), including the OECD Survey on Telemedicine and COVID-19 (2022).

Figure 1.5 shows the number of doctor teleconsultations per capita, and the share of total doctor consultations that are teleconsultations, since 2020. In nine OECD countries for which data are available from the 2022 OECD Health Statistics and an ad-hoc data collection on teleconsultations, doctor teleconsultations represented 21% of all doctor consultations in 2020, compared to 11% in 2019.

Figure 1.5. Doctor teleconsultations in OECD countries, in 2020

Doctor teleconsultations per capita and doctor teleconsultations as a share of total doctor consultations



Note: All values are provisional; * Norway excludes teleconsultations by medical specialists, Spain covers consultations to generalist and paediatricians who work in primary health care centres of the National Health System; values for the Czech Republic are estimates. Data for Portugal are from the "Portal da transparência", a data website of the National Health Service.
Source: OECD Health Statistics (2022); OECD ad-hoc data collection on teleconsultations (2022).

Survey data also provide insights into how many patients used teleconsultations during the pandemic. In the 22 OECD countries that are also Member States of the European Union, an average of 32.9% of adults surveyed by Eurofound in June/July of 2020 reported they had a medical consultation online or by phone since the start of the pandemic (Eurofound, 2020[42]). In February/March of 2021, an average of 45.3% of adults surveyed by Eurofound reported they had a medical consultation online or by phone since the start of the pandemic. The shares in February/March of 2021 ranged from 23.2% in France to 71.6% in Spain. In Canada, 47% of respondents reported using telehealth services to receive advice from a doctor since the start of the pandemic in May 2020 (CMA and Abacus Data, 2020[43]). In Australia, one in seven adults had used a telehealth service (including making online bookings, e-Prescriptions, and consulting health information online) over the four weeks preceding April 2021 (Australian Bureau of Statistics, 2021[44]). In Costa Rica, one-third of consultations in 2020 took place via teleconsultation, with a similar proportion (34%) reported for the first eight months of 2021 (OECD, 2021[2]).

1.4. Data on telemedicine services are very limited, with almost half of OECD countries having no breakdowns by demographic and socio-economic factors

Despite growing interest in telemedicine before the start of the COVID-19 pandemic and significant growth in telemedicine use during the pandemic, data on remote care services, including data on the number of teleconsultations (i.e. phone and video calls) provided, are scarce. While only four countries (Austria, Iceland, Japan and Switzerland) reported that they could not currently provide any data on the number of teleconsultations, only 17 out of 38 OECD countries reported data on the number of doctor teleconsultations performed since 2020 in the 2022 OECD ad-hoc data collection on teleconsultations (see Figure 1.5). Based on the OECD Survey on Telemedicine and COVID-19, at least 10 out of the 27 countries that are able to report data on teleconsultations can only do so starting in March 2020. For example, in Hungary, Korea and Türkiye, the use of telemedicine only became a significant part of the delivery of health care during the pandemic, so no data are available pre-COVID. Estonia, Iceland and Mexico reported they will be able to collect better and more detailed data soon.

One challenge is that central governments have no visibility of remote care services provided by public authorities at subnational level or by private providers that are not paid through government/compulsory financing schemes. In Austria, inpatient care is the responsibility of the nine provinces, while outpatient care (provided by doctors in private practice) is the responsibility of the social security institutions, with data on teleconsultations dispersed across multiple actors. In New Zealand, the central government only has data on teleconsultations provided by the National Telehealth Service, which is a free telephone service that provides episodic care across the country. Teleconsultations taking place outside the National Telehealth Service are difficult to track due to the devolved nature of New Zealand's health care system. Canada, Israel, Sweden and Switzerland also reported that data collection on teleconsultations takes place primarily at a subnational level (see Chapter 2, Box 2.1) for a more detailed discussion of how devolution of responsibilities in health affects the provision of telemedicine services).

The collection and reporting of data on teleconsultations are often associated with financing schemes. In the United States, there are extensive data on the teleconsultations provided to patients that are insured via Medicare and Medicaid, while no data are available for those using private insurance. In Latvia, data are only available for teleconsultations financed through government/compulsory schemes, starting from March 2020 when financing was introduced. In France, only data on video teleconsultations are available, since this is the only type of telemedicine that can be reimbursed.

1.4.1. Fewer than half of OECD countries have data on patient characteristics, type of telemedicine service, reasons for telemedicine use, and subsequent care

While over half of 31 reporting countries can stratify the number of teleconsultations by patient age (18 countries) and gender (17 countries), breakdowns by income, education, employment status, ethnicity and nationality are only possible in at most five OECD countries. Only seven countries can quantify the number of teleconsultations provided to rural and urban patients. Although many countries do not actively collect data on whether a teleconsultation took place in an urban or rural area, the Czech Republic and England note that such information can be estimated based on the location of the patient or provider. The exact measures of socio-economic indicators differ across countries. Luxembourg can provide data on whether the patient is employed in the private sector, self-employed, or is a civil servant, as well as the patient's monthly wage (including base wage, overtime, and other additional income). New Zealand only has data on patients' Social Deprivation Index, which is partly based on income. Canada and Costa Rica and the United States are the countries with the most comprehensive data on patients receiving teleconsultations, collecting data on at least six socio-economic indicators. As with the total number of teleconsultations performed, often data on socio-economic and demographic characteristics of patients using teleconsultations are not collected or reported by central governments.

Data on the number of telemedicine services provided by type of communication technology used are also limited. Fewer than half of countries can provide a breakdown for real-time audio (11 countries) and video consultations (14 countries). Iceland and the Netherlands are the only countries able to provide data on telemedicine delivered via email. Iceland specified that, since 2021, it collects data on the number of messages exchanged between health care professionals and patients, the number of electronic requests for drug prescription renewals, and electronic bookings for a medical appointment. All messaging takes place through a secure communication channel via the medical records systems and health portals.

In England, data for general practice differentiates between telephone and online/video medical appointments, the latter of which includes both synchronous and asynchronous consultations, whereas data for secondary care only covers video consultations. In Ireland, there are data on audio and video consultations combined, but only for appointments provided by acute care hospitals. In Norway, there are no data collected on the type of teleconsultation, but there are population surveys that provide some information on the types of digital consultations that patients use. In countries with case-based provider payment systems, such as the Czech Republic and the United States, it may be possible to determine what type of communication technology was used in a teleconsultation. This may also be possible in Belgium, however there are only some codes which require a specific type of communication technology, and most telemedicine codes allow the use of both audio-only and video communication.

Regarding the type of telemedicine service provided, 11 countries have data on the use of remote monitoring and only five countries have data on store-and-forward telemedicine. Moreover, the data that are available are often focused on specific health conditions or care settings. In Türkiye, for instance, there are national data only for some procedures such as remote monitoring of patients with a pacemaker, while Belgium only collects data on patient monitoring for COVID-19. In Norway, there are data on remote monitoring from specialist hospitals that work with rehabilitation patients. There are pilot projects on remote monitoring in Austria and Lithuania, but data from these projects are likely not representative.

Data on the reasons why patients used teleconsultations are available in just over half of reporting countries (17 out of 31 countries). In Belgium, Costa Rica and Lithuania, procedural codes, diagnostic data, and administrative information are used to gain insight into patient's reasons for using telemedicine. In Belgium, it is possible to differentiate between COVID-19 triage and psychiatric and psychological consultations. In Costa Rica ICD-10 codes are used, and Lithuania can differentiate between the following reasons for teleconsulting: evaluation of health status, exam appointments, e-prescriptions, exam results, and medical leave certificates. In Australia, Norway, Slovenia, Sweden and the United States there are studies or reports on telemedicine that also cover the reasons for telemedicine use. In the United States,

for example, there have been various government and academic analyses conducted to assess the reasons for telehealth visits.

Finally, ten countries (out of 31 reporting countries) have data or studies on the subsequent use of health care services following a teleconsultation. In New Zealand, it is possible to collect data on what users of the National Telehealth Service are advised to do after the teleconsultation has taken place, but it is difficult to assess whether patients follow the advice. In Costa Rica, data are collected via the electronic health record, including requests for examination or prescriptions. In Estonia, data are not directly collected but may be generated by linking separate datasets. In the Czech Republic, Luxembourg and the United States**,** there are research studies on this topic, and in Norway, data are gathered as part of a population survey on eHealth, which also includes questions about whether the use of telemedicine led to a physical follow-up appointment.

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Note

[1] Estonia, Hungary, Iceland, Ireland, Korea, Luxembourg, Mexico, Türkiye and the United States.

2 The regulation and financing of telemedicine in the OECD, before and during COVID-19

Before the COVID-19 pandemic, most OECD countries allowed at least some form of telemedicine, but policies on remote care services effectively disincentivised their use. After the start of the pandemic, governments quickly adopted new policies to promote the use of telemedicine, essentially mainstreaming, and partly or fully paying for, remote care services. This chapter provides a detailed overview of how telemedicine services are regulated and financed across OECD countries, both before and during the pandemic. The chapter calls attention to the fact that, in around a third of OECD countries, changes to the regulation and financing of telemedicine services are temporary, and that it is possible that, despite significant demand from patients for remote care services, these may soon become unavailable or, as before the pandemic, subject to strict regulations.

Before the COVID-19 pandemic, most OECD countries allowed at least some form of telemedicine. However, policies varied widely regarding the types of telemedicine allowed, the funding and provider payment schemes used, requirements in terms of distance between participants, eligibility of health workers and patients to participate, patient consent, and integration with traditional in-person health care services (Oliveira Hashiguchi, 2020[1]). As discussed in the previous chapter, after the start of the pandemic, governments quickly adopted new policies to promote the use of remote care, essentially allowing, and partly or fully paying for, telemedicine services. Consequently, telemedicine services have become more widely available across OECD countries. This is not to say that there has been a homogenisation of regulations concerning care delivered via telemedicine across countries. There are still meaningful differences in how remote care is organised, regulated, and financed across the OECD.

While there are certainly benefits to decentralisation (e.g. telemedicine services that are more patient-centred and designed to fit the needs of local communities), countries with decentralised governments and devolved responsibilities face unique challenges in the promotion and use of telemedicine services. These include limited central government legislative and regulatory powers, as well as narrow visibility of the utilisation of services at local levels of government (see Box 2.1).

Box 2.1. Subnational variation in how telemedicine is regulated, funded, and delivered in decentralised countries can create administrative challenges for central governments

Decentralisation is a key characteristic of many OECD health systems, with subnational governments often responsible for the delivery and financing of health services. Australia, Canada, Germany, Spain, and the United States all devolve some regulatory authority to regions, provinces, and states. While decentralisation can have benefits, it can also create administrative challenges. It can be difficult for central governments to have visibility into the collection and reporting of data on telemedicine use, as well as to understand what types of telemedicine services are available and what restrictions are in place. In Canada, for instance, provinces and territories have primary jurisdiction over the administration and delivery of health care, so that policies, guidelines, and regulations will differ from province to province. As such, answers from Canada to the OECD Survey on Telemedicine and COVID-19 are based on information and data available for one or more jurisdictions, and they are not representative of every Canadian jurisdiction. In the United States, the specificities of telemedicine regulation differ from state to state. In Austria, Israel and Switzerland, information and data on telemedicine services are collected by regional authorities or insurance providers and are not always available to central governments.

Note: See OECD (2019[2]), *Making Decentralisation Work: A Handbook for Policy-Makers*, https://doi.org/10.1787/g2g9faa7-en, for a more detailed discussion of the benefits and risks of decentralisation.

2.1. Although questions remain regarding jurisdiction and medical liability, since the start of the pandemic more health workers can perform teleconsultations

In most countries that participated in the OECD Survey on Telemedicine and COVID-19, regulations regarding patient consent and responsibility for deciding whether a teleconsultation is appropriate have not changed after the start of the COVID-19 pandemic (see Figure 2.1 and Figure 2.2). Since the start of the pandemic, three more countries (Hungary, Luxembourg, and the United States) joined a majority of countries stating that it is the sole responsibility of the health care worker to determine whether a teleconsultation is appropriate. Three countries (Estonia, Hungary and Luxembourg) joined a majority of countries requiring that patients give their written or oral consent before participating in teleconsultations.

In all 28 countries who responded to this part of the questionnaire, in-person appointments are not required after a teleconsultation (which was not the case in Lithuania pre-pandemic; see Figure B.1 in Annex B). In 23 countries, provider-to-provider telehealth services are allowed (only Estonia and Mexico do not allow these; see Figure B.1 in Annex B).

Since the start of the pandemic, three countries (Germany, Hungary and the United States) joined another ten countries in allowing group teleconsultations to be performed, for example such as for pulmonary rehabilitation or cognitive behavioural therapy (Banbury et al., 2018[3]). The most significant change has been in allowing health care workers other than doctors (such as nurses, for example) to perform teleconsultations. Six countries (Estonia, Germany, Iceland, Luxembourg, Portugal and the United States) have changed their policies on which medical staff can perform teleconsultations since the start of the pandemic, bringing the total number of countries allowing teleconsultations to be performed by health workers other than doctors to 23 countries.

Despite the rapid adoption of policies to promote the use of telemedicine, just over half of countries participating in this part of the survey (17 out of 30 countries) state that jurisdiction and medical liability in telemedicine services are well established and clear (see Figure 2.2). In Belgium, for example, legislation is still developing and the growth in teleconsultations has been driven by changes to provider payment. In New Zealand, jurisdiction and liability in the context of telemedicine services are open to interpretation. While this may give providers some freedom, it also leads to uncertainties and may make it difficult for some providers to offer remote care services. One example is the notion that the quality of care delivered by telehealth services should be the same as in an in-person interaction, a requirement that is often difficult to assess.

In Canada, a review of licensing requirements for physicians providing virtual care, which are determined at the provincial and territorial level by regulatory authorities, found that differences in requirements across provinces may make it difficult to provide care for patients across Canadian borders (Sweatman and Laviolette, 2021[4]; CMA, CFPC and RCPSC, 2022[5]). While there have been discussions in Canada regarding a pan-Canadian license, such a licensing arrangement is not currently available and provinces such as Ontario require that physicians providing virtual care be licensed with the College of Physicians and Surgeons of Ontario (there is room for the provision of virtual care from an unregistered physician if this is considered in the patient's best interest). The situation is similar in the United States, where most states temporarily accepted licenses from other states to allow COVID-19 telehealth services, but many such waivers are now or soon expiring.

Figure 2.1. More health care workers, besides doctors, can now perform teleconsultations

Country agreement with statements before and after the start of the COVID-19 pandemic

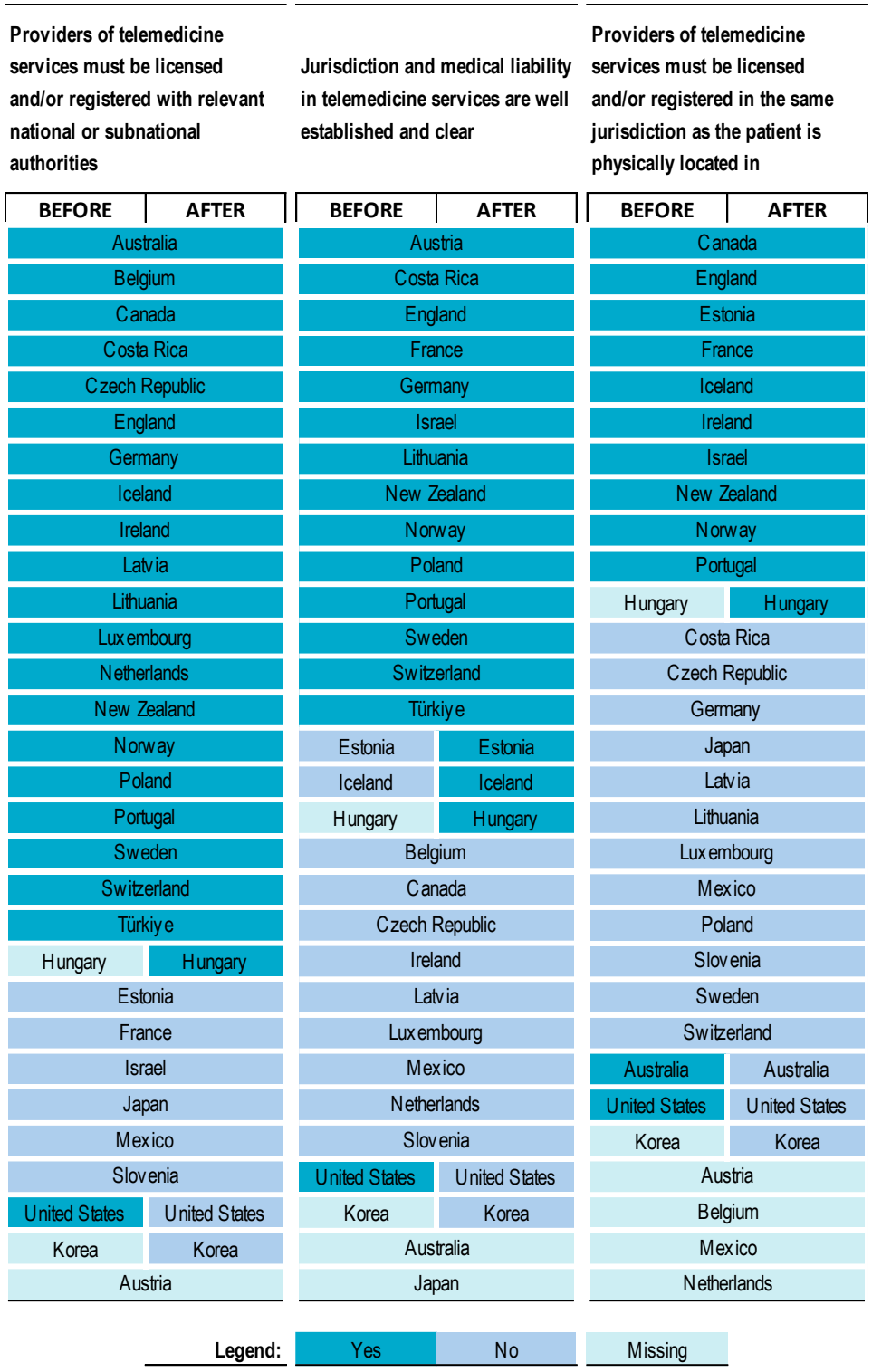
It is the health care worker's sole responsibility to determine whether a teleconsultation is appropriate		Patients must give written or oral consent to participate in a teleconsultation		Group teleconsultations (e.g. telerehabilitation) are allowed		Medical staff other than doctors (e.g. nurses) can perform teleconsultations	
BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER	BEFORE	AFTER
Australia		Australia		Austria		Belgium	
Austria		Belgium		Belgium		Canada	
Costa Rica		Canada		Costa Rica		Costa Rica	
Czech Republic		Costa Rica		Czech Republic		England	
England		Czech Republic		England		France	
France		France		Ireland		Ireland	
Germany		Germany		Israel		Israel	
Ireland		Iceland		Latvia		Latvia	
Israel		Ireland		New Zealand		Lithuania	
Latvia		Israel		Portugal		Netherlands	
Lithuania		Japan		Germany	Germany	New Zealand	
Mexico		Latvia		United States	United States	Norway	
New Zealand		Lithuania		Hungary	Hungary	Poland	
Norway		Mexico		Australia		Sweden	
Poland		Netherlands		Estonia		Switzerland	
Slovenia		Poland		France		Estonia	Estonia
Switzerland		Portugal		Iceland		Germany	Germany
Luxembourg	Luxembourg	Sweden		Lithuania		Iceland	Iceland
United States	United States	Türkiye		Luxembourg		Luxembourg	Luxembourg
Hungary	Hungary	United States		Mexico		Portugal	Portugal
Korea	Korea	Estonia	Estonia	Poland		United States	United States
Belgium		Luxembourg	Luxembourg	Türkiye		Australia	Australia
Canada		Hungary	Hungary	Canada		Hungary	Hungary
Estonia		England		Japan		Czech Republic	
Iceland		New Zealand		Korea		Japan	
Japan		Norway		Netherlands		Mexico	
Netherlands		Slovenia		Norway		Slovenia	
Portugal		Switzerland		Slovenia		Türkiye	
Sweden		Austria		Sweden		Korea	Korea
Türkiye		Korea		Switzerland		Austria	

Legend: Yes | No | Missing

Note: Agreement with statements is shown for both before March 2020 (i.e. before the start of the pandemic) and after March 2020 (i.e. after the start of the pandemic). Finland did not respond to this section of the survey.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

Figure 2.2. A third of countries do not consider that jurisdiction and medical liability in telemedicine services are well established and clear, even after the start of the COVID-19 pandemic

Country agreement with statements before and after the start of the COVID-19 pandemic



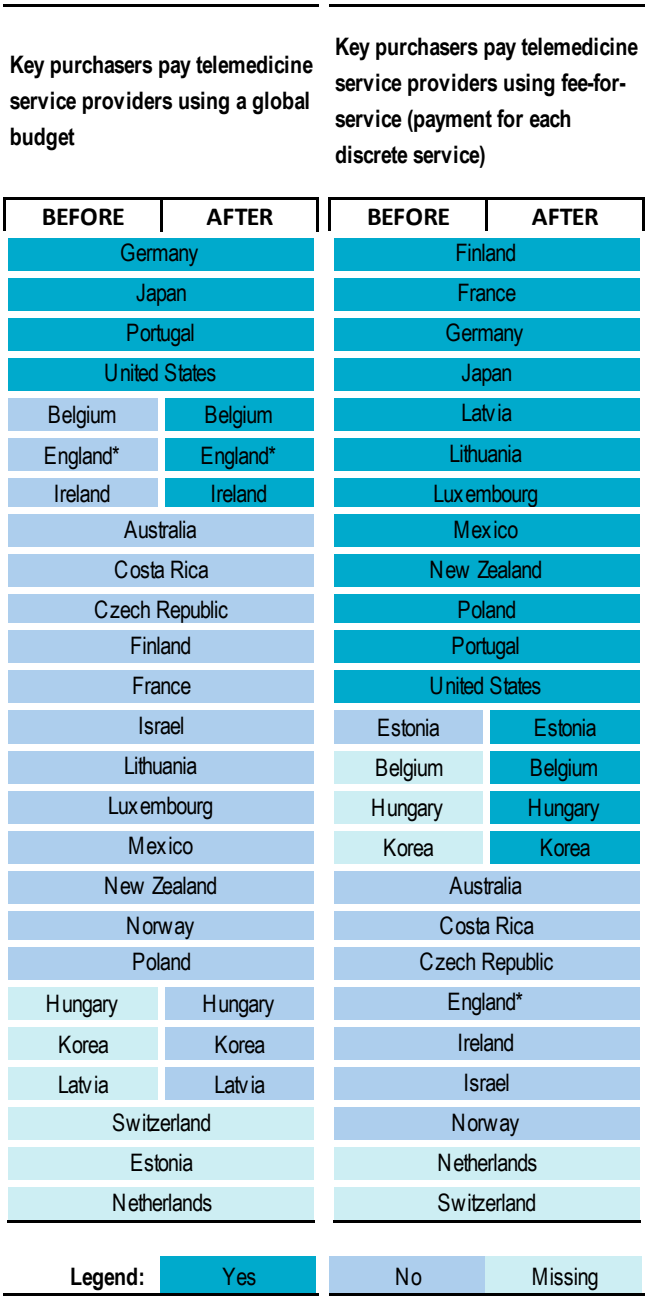
Note: Agreement with statements is shown for both before March 2020 (i.e. before the start of the pandemic) and after March 2020 (i.e. after the start of the pandemic). Finland did not respond to this section of the survey.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

2.2. More funding for telemedicine since the start of the COVID-19 pandemic

Both before and throughout the COVID-19 pandemic, in more OECD countries key purchasers use fee-for-service to pay providers of telemedicine services than use global budgets (see Figure 2.3).

Figure 2.3. Fee-for-service is the preferred model to pay for telemedicine services in the OECD

Country agreement with statements before and after the start of the COVID-19 pandemic



Note: Agreement with statements is shown for both before March 2020 (i.e. before the start of the pandemic) and after March 2020 (i.e. after the start of the pandemic). Austria, Canada, Iceland, Slovenia, Sweden and Türkiye did not respond to this section of the survey. * Answers for England are for Secondary Care only, and for General Practice the answers are "yes" as these services are provided by GPs that are funded by the government.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

Since the start of the pandemic, in 16 OECD countries, key purchasers of telemedicine services use fee-for-service to pay providers, compared to seven OECD countries where key purchasers use global budgets. In Belgium, Germany, Japan, Portugal, and the United States, key purchasers use both fee-for-service and global budgets to pay providers of telemedicine services. This is not uncommon since, as highlighted by Estonia, telemedicine is an umbrella for different types of services, for which financing can vary significantly. In England, only the financing of telemedicine used in the context of secondary care has changed after the start of to the pandemic. Since general practitioners that are funded by the government provide primary care, telemedicine services were and are covered by government financing schemes before and after March 2020. In secondary care, the funding of telemedicine services has been mostly financed through voluntary schemes and out-of-pocket payments before the pandemic, and only changed to government/compulsory financing after the start of the pandemic.

In Australia, Medicare – a national insurance scheme that pays for some or all the costs of necessary health care – is the key purchaser of telemedicine services. The Medical Benefits Schedule under Australia's Medicare, through which most of the funding for medical practitioner and allied health professional services is provided, is for the payment of patient rebates. Health professionals may choose to accept the value of the rebate as the sole payment for a service by bulk billing, or they can charge a co-payment. Health professionals are free to determine their fees and are private businesses that are directly responsible for their own revenue, and the selection of services they offer. In the Czech Republic, there is no systematic approach to assessment and classification of telemedicine services for reimbursement. In Norway, a combination of capitation and global budgets is used.

In Belgium, Hungary, Korea and Latvia, before the COVID-19 pandemic, there were no government payments for telemedicine service providers. All four countries introduced new mechanisms to pay for telemedicine services, including both global budgets and fee-for-service. In Latvia, both global budgets and fee-for-service are used to pay telemedicine providers. Fee-for-service is used by key purchasers to pay for teleconsultations provided by general practitioners and some specialists, while global budgets are used by specific specialists (e.g. specialists providing care for patients with rare diseases, patients with cystic fibrosis, children with mood disorders, among others). In Finland, Israel, and the Netherlands, telemedicine service providers are paid through the same mechanisms that are used to pay providers for in-person care.

In most reporting countries (13 out of 25 countries), telemedicine services are classified for payment using national procedure classification systems (see Figure B.2 in Annex B). In 12 countries, telemedicine services are classified for payment using current procedural terminology, and in five countries ICD-9-CM is used to classify telemedicine services for payment (in Norway, ICD-10-CM is used, in Costa Rica, ICD-10 is used, and Lithuania uses ICD-10-AM). In more than a third of reporting countries (Czech Republic, Estonia, Hungary, Israel, Latvia, Lithuania, New Zealand, Norway, Poland, and the United States) multiple classification systems are used, while Belgium, Finland, Germany, Ireland, the Netherlands and Portugal reported that neither one of the mentioned classification systems is used in their country to classify telemedicine services for payment. In Switzerland, telemedicine service providers seeking coverage from compulsory health insurance must negotiate with payers; and reimbursement schemes, procedural terminology and classification systems may all vary across services. Agreements are typically confidential and are thus outside the purview of the Swiss Federal Office of Public Health.

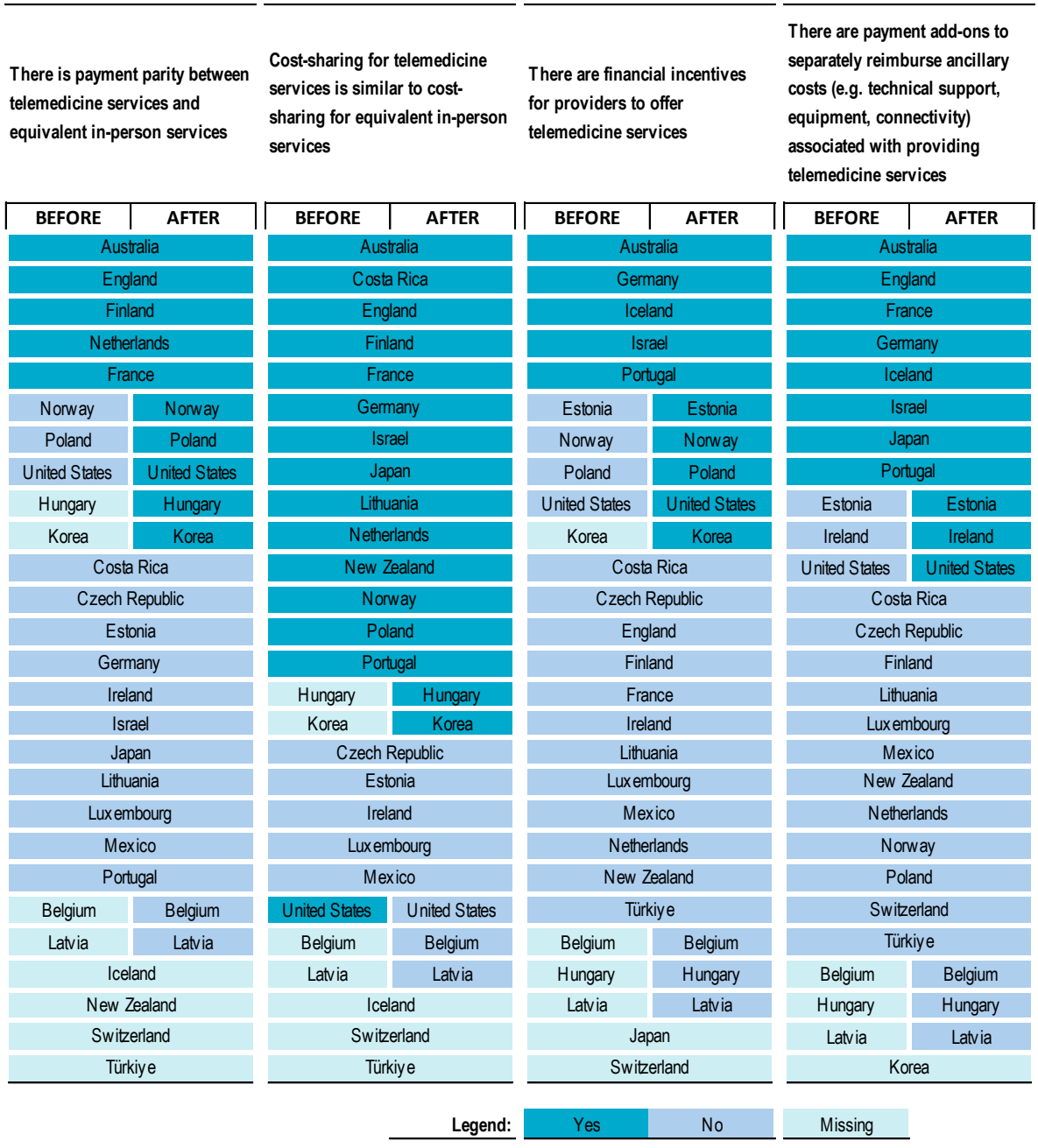
2.2.1. Countries used financial incentives to boost telemedicine during COVID-19

A number of countries adopted financial incentives to promote the use of telemedicine services after the start of the COVID-19 pandemic, from introducing payment parity with equivalent in-person care (i.e. paying for telemedicine and equivalent in-person services at equal rates), to additional fees for teleconsultations and payment add-ons to separately reimburse ancillary costs (e.g. technical support, equipment, connectivity) associated with providing telemedicine services (see Figure 2.4). In five countries

(Australia, England, Finland, France and the Netherlands), there was payment parity between telemedicine services and equivalent in-person care before March 2020. After the start of the pandemic, five more countries (Hungary, Korea, Norway, Poland, and the United States) introduced payment parity. In most countries (13 out of 25 countries), however, there is no payment parity.

Figure 2.4. Some countries used financial incentives to promote telemedicine during COVID-19

Country agreement with statements before and after the start of the COVID-19 pandemic



Note: Agreement with statements is shown for both before March 2020 (i.e. before the start of the pandemic) and after March 2020 (i.e. after the start of the pandemic). Austria, Canada, Slovenia and Sweden did not respond to this section of the survey. Payment parity means paying for telemedicine and equivalent in-person services at equal rates.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

More than half of reporting countries noted that cost-sharing for telemedicine services is similar to cost-sharing for equivalent in-person services both before the start of the pandemic (14 out of 25 countries) and after (16 out of 25 countries). In the United States, the COVID-19 public health emergency waivers allowed federal and state governments as well as private payers to encourage the use of telehealth through reduced patient cost-sharing. In Belgium, the extent of cost-sharing depends on the kind of health care provider. There are plans to introduce new cost-sharing arrangements for teleconsultations to limit the difference between remote and in-person consultations. In New Zealand, hospital based public health services are free, so that telemedicine outpatient visits, in-hospital telemedicine support, and the National Telehealth Service are free to all New Zealanders (and in the case of the National Telehealth Service, free to all residents). Primary care services, on the other hand, have a co-payment, which depends on the primary health organisation and is differentiated by age and income. Private specialists and Allied Health professionals set their own costs but generally, the cost of an in-person consultation and a specialist appointment are similar.

In five countries (Australia, Germany, Iceland, Israel and Portugal), there were financial incentives for providers to offer telemedicine services even before the COVID-19 pandemic. In Portugal, from 2013 onwards, hospital teleconsultations contracted nationally with National Health Service hospitals were priced at a 10% higher rate than in-person consultations. In Germany, there was an additional fee that providers received for video consultations between October 2019 and September 2021. This additional fee was eligible for each video consultation if the medical practice had at least 15 video consultations in a quarter, with a capped budget for a medical practice of 50 video consultations per quarter. After March 2020, financial incentives to telemedicine providers were also adopted in Estonia, Korea, Norway, Poland, and the United States. Australia expanded the range of telemedicine services subsidised on a fee-for-service basis to enable GPs, specialists and other providers to maintain care for patients during the pandemic and temporarily doubled the incentive fee payable for GPs to see certain categories of patients without any upfront cost. Furthermore, there were two additional temporary incentive payments established to provide further incentives for GPs to see patients at risk of COVID-19 without any upfront cost. However, in most reporting countries (15 out of 27 countries), there are no financial incentives for telemedicine service providers.

Eight countries already had payment add-ons to separately reimburse ancillary costs (e.g. technical support, equipment, connectivity) associated with providing telemedicine services before the COVID-19 pandemic. After the start of the pandemic, three more countries (Estonia, Ireland, and the United States) began paying for ancillary costs separately. In France, for example, health insurance finances the equipment of certain health care professionals (e.g. doctors and nurses), via a fixed sum (EUR 350), so that they can carry out telemedicine services. In almost half of reporting countries (11 out of 26 countries), there are neither financial incentives nor payment add-ons offered to telemedicine providers, even after the start of the pandemic.

Since the start of the COVID-19 pandemic, in 10 countries (out of 28 reporting countries) prices for telemedicine services are set unilaterally by payers, while in 13 countries prices for telemedicine services are negotiated between payers and providers (see Annex B, Figure B.3). In the United States, prices can be both set unilaterally and negotiated. There have not been many changes in how countries set prices for telemedicine services since the start of the COVID-19 pandemic.

2.3. In more than half of reporting countries, telemedicine policies introduced at the start of the pandemic are temporary and may end up being reversed

In 16 reporting countries (out of 29 countries) changes to regulations are temporary and subject to ongoing or periodic review, while in 12 countries changes in financing were or are temporary and may be subject to review. In Austria, temporary regulations have been extended multiple times since the onset of the pandemic. In Korea, the use of teleconsultations is strictly limited to exceptional situations such as pandemics and is a temporary service put in place to prevent the spread of infectious diseases in hospitals. In eight countries (Belgium, Costa Rica, Czech Republic, Hungary, Iceland, Lithuania, Mexico, and the

United States), work is ongoing to assess and develop frameworks for legislating and regulating the use of telemedicine services. In Costa Rica, for example, a technical group has been formed to work on long-term telemedicine policies. In the Czech Republic, work on the legislation of telemedicine is part of the national COVID-19 Recovery and Resilience Plan and was expected to start in 2022. In Mexico, different initiatives are seeking to reform the General Health Law or to establish a Digital Health Law. Although they have not yet been approved, they have been influential since the start of the pandemic.

Many regulatory changes were initially introduced as a temporary response to the COVID-19 pandemic (see Box 2.2 for a discussion of changes in the United States). In six countries (Estonia, France, Israel, Luxembourg, Portugal and Türkiye) at least parts of the regulations published after March 2020 are or have become permanent. In Estonia, teleconsultations were implemented temporarily during the first COVID-19 wave in March 2020 but were made permanent as of September 2020. In France, the requirement that patients could only consult a provider via telemedicine if they had seen that provider in-person before was dropped during the pandemic, and eventually permanently removed. Türkiye, where teleconsultations were not allowed before the pandemic, has also permanently adopted the legislative and regulatory changes made after March 2020, although these may be adapted depending on future situations. Australia, England, Estonia, Lithuania, Luxembourg, Poland and Türkiye have all made changes to financing and/or provider payment mechanisms permanent, while in Switzerland, some changes have been made permanent but others have not. In Canada, the provinces and territories have primary jurisdiction over the administration and delivery of health care, which includes financing, so that changes and whether they are permanent or temporary vary by jurisdiction (see Box 2.1).

Box 2.2. Financing and provider payment of telemedicine in the United States

Before the COVID-19 pandemic, telemedicine services were offered on a limited scale and key purchasers of remote care services set important restrictions. The federal Medicare programme restricted interactive telehealth to rural areas and required patients to be in a health care facility. State Medicaid programmes had site and visit type restrictions. Generally, private payers closely follow Medicare policies, although there is some variation across the country and across payers. Pre-pandemic, practitioners were required to be licensed in the state they practice as well as the state where the patient is located. Private insurers may have contracted national telehealth platforms at negotiated prices to offer telemedicine services to their enrolees, but few networks of health care providers would offer telehealth visits to patients. Telehealth visits were not always paid at the same rate as equivalent in-person visits.

During the pandemic, public health emergency waivers allowed federal and state governments, as well as private payers, to encourage the use of telehealth through reduced patient cost sharing, provider payment parity, provider grants for setting up telehealth capabilities, and by relaxing previous restrictions on telemedicine use. Payment parity with equivalent in-person visits was introduced to ensure continued access to care, and pre-pandemic restrictions on licensing were relaxed or waived.

Today, there is a range of financial arrangements in the United States. Health plans with capitation may offer contracted telehealth services as part of member benefits paid through premiums. Providers in value-based payment arrangements may offer telehealth as part of their capitated payment arrangement, or as part of savings from reducing total costs of care. However, the limited use of telehealth pre-pandemic among these providers suggests this was insufficient incentive to offer telehealth. Telehealth financing and coverage waivers are temporary for Medicare and Medicaid. The continuation of some of the flexibilities (e.g. removal of geographic/home restrictions, practitioner type, types of services eligible for telehealth, audio-only visits) are currently under consideration to be made permanent through federal legislation for Medicare and Medicaid, as well by states, after the end of the public health emergency.

Source: OECD Survey on Telemedicine and COVID-19 (2022).

COVID-19 waivers, once lifted, may introduce some barriers to continued use of telemedicine services. In the United States (see Box 2.2), once the end of the COVID-19 Public Health Emergency is declared, the Health Insurance Portability and Accountability Act (HIPAA) waiver – which allows health care providers to use "non-public facing" remote communication products (e.g. Zoom, FaceTime, Skype, Google Hangouts) – may reduce or stop telehealth services if a HIPAA compliant software cannot be afforded and if payment parity is challenged.

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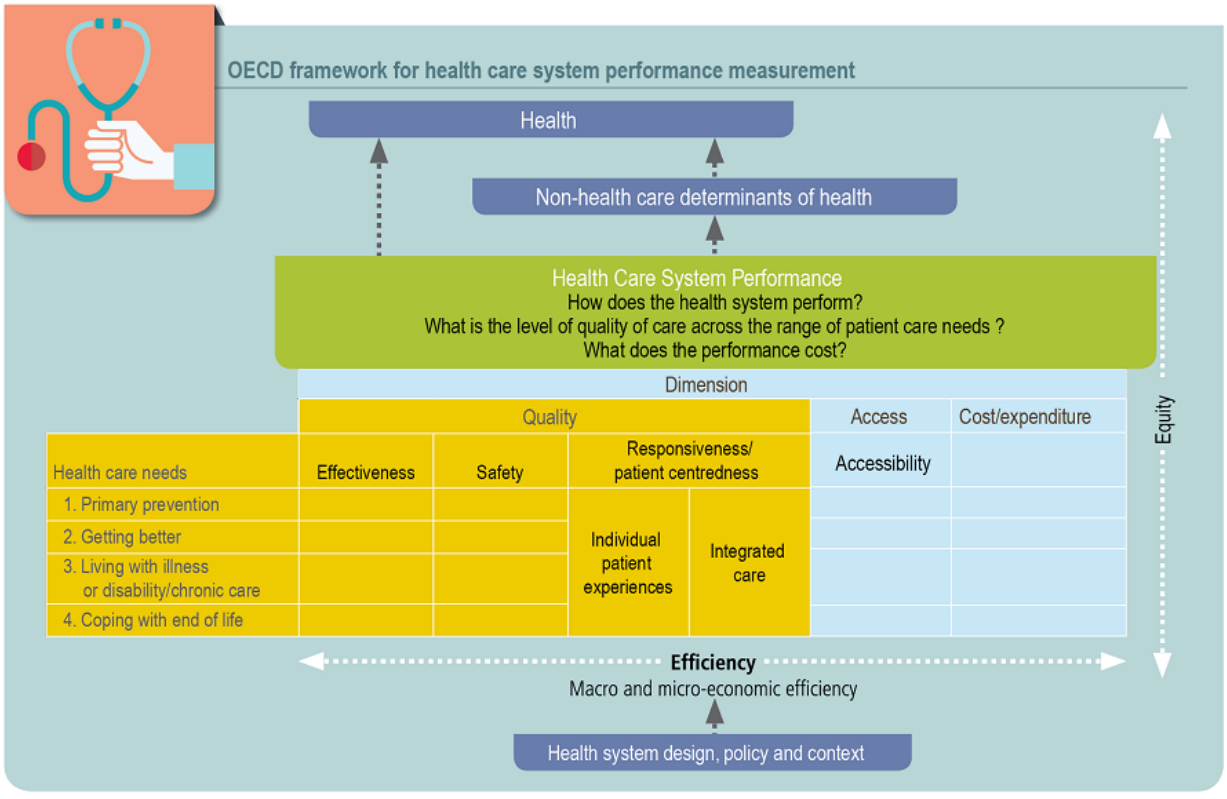
3 The impact of telemedicine on health care system performance

The COVID-19 pandemic has provided a great natural experiment in the utilisation of telemedicine services, creating opportunities to explore the impact of remote care services on different aspects of health care system performance, from quality, to access and cost-effectiveness. Yet only ten OECD countries have collected data or conducted studies on the impact of telemedicine on quality indicators since the start of the pandemic. This chapter provides an overview of how telemedicine services affect health care system performance, showing that there is clear evidence that remote care services are good value for money for patients, but that more work is needed to understand the impact on health system efficiency and waste.

In the last OECD data collection on telemedicine (Oliveira Hashiguchi, 2020[1]), conducted before the COVID-19 pandemic, country experts considered overwhelmingly that telemedicine services have a positive impact on several aspects of health system performance, from access to quality and cost-effectiveness (see Figure 3.1 for a depiction of the OECD Framework for Health Care System Performance used in this report). However, experts also stressed that telemedicine is only a tool and that, like any other tool, it can be well used or misused; it can have benefits but also has the potential to cause harm.

Before the start of the pandemic, there was already a substantial body of evidence showing that, when well used, telemedicine services can be effective, safe, patient-centred (responsive) and cost-effective (Eze, Mateus and Cravo Oliveira Hashiguchi, 2020[2]). The body of evidence has only grown since the start of the pandemic, and the findings of a new systematic literature review confirm that telemedicine services can be very beneficial (see Box 3.1). There are certainly limits to what can be done remotely, and not all uses of telemedicine are effective and/or cost-effective. If used inappropriately, telemedicine services may lead to increased workload for health professionals; increase unnecessary care among younger, healthier, and more affluent populations; promote cherry picking, fraud, and abuse; and put additional pressure on already strained government budgets for health. The key is understanding what are high-quality value-adding uses of telemedicine that should be more widely adopted and made available to patients. Findings from the new literature review indicated that there is no shortage of good uses of remote care services, that are valued by both patients and health care providers, while being also cost-effective.

Figure 3.1. The OECD Framework for Health Care System Performance Measurement



Source: Adapted from OECD (2017[3]), *Caring for Quality in Health: Lessons learnt from 15 reviews of health care quality*, https://doi.org/10.1787/9789264267787-en.

Box 3.1. Systematic review of the literature on telemedicine during COVID-19

A systematic review of the literature on telemedicine published between January 2020 and May 2022 was conducted to capture high quality evidence of the use of telemedicine in OECD countries since the onset of the COVID-19 pandemic, and to clarify the impact of the pandemic on telemedicine use. The following five dimensions were considered most relevant:

- User (e.g. patients, health care workers) satisfaction with telemedicine services.
- Impact of telemedicine services on patient safety.
- Utilisation rates by socio-economic status and demographics.
- Utilisation rates by type of telemedicine (video, remote monitoring, asynchronous).
- Cost analysis and full economic evaluations, and pricing of telemedicine services.

A systematic search of the literature was performed on PubMed/Medline, the Health Management and Policy Database from the Health Information Management Consortium (HMIC), and the Cochrane Library, using controlled terms or free text depending on the database functionality (e.g. "Telemedicine (MESH term)" or "Telemedicine" free text). The keywords "Telemedicine", "Telehealth", and "Teleconsultation" were each searched to maximise results towards ensuring the search picked up all relevant publications in the set timeframe. The OECD countries were used as keywords in the search. A search of grey literature within the same time parameters was undertaken to identify possible additional studies that met the inclusion criteria.

The searches yielded 3 942 results after duplicates were removed, of which 2 646 were not directly relevant to the outcomes of the review and were excluded. Full texts of 1 296 studies were reviewed to assess eligibility, and 272 were eventually included in the review. The grey literature search yielded 5 additional relevant results. More details are provided in Annex C.

3.1. COVID-19 has created opportunities for countries to measure the impact of telemedicine on health system performance, but not all countries have done so

The COVID-19 pandemic has provided a great natural experiment in the utilisation of telemedicine services. The boom in telemedicine use has created opportunities to explore the impact of remote care services on different aspects of health care system performance, but not all countries have taken advantage of these opportunities to collect data and conduct studies (see Figure 3.2).

Almost two in three reporting countries (18 out of 28 countries) stated that their country's Ministry of Health, a governmental agency, or an academic institution collected data or conducted studies on the impact of telemedicine on access to health care during the COVID-19 pandemic. In 16 countries, data on patient and/or provider experience and outcome measures are available, but only nine countries have collected other indicators or metrics to assess the quality of telemedicine services (e.g. safety in telemedicine, telemedicine outcomes compared to in-person outcomes, avoidable admissions). Only nine countries (Belgium, Canada, England, Estonia, France, Israel, Mexico, Norway, and the United States) reported that there are data collections on all three aspects depicted in Figure 3.2: access, experience, and other quality indicators.

As discussed in Chapter 1, Section 1.4, administrative data on teleconsultations are very limited, with fewer than half of 31 OECD countries having data on patient characteristics, type of telemedicine service, reasons for telemedicine use, and subsequent care. Without such data, it is difficult to understand the impact of telemedicine on health care system performance. Rather, most data on access, equity and quality during the pandemic have been collected through surveys. Examples include Canada Health Infoway's

survey *Canadians' Health Care Experiences During COVID-19* from January 2022 and the *Patient and Clinician Survey* conducted in Ireland in October 2020. Some surveys span both the periods before and after the start of the COVID-19 pandemic including, for example, the *General Practice Patient Survey* in England, the *National District Health Board Survey* in New Zealand, and the *National Electronic Health Records Survey* in the United States.

Figure 3.2. Only nine OECD countries have collected data or conducted studies on the impact of telemedicine on quality indicators such as safety, health outcomes and avoidable admissions

Has the ministry of health, a governmental agency or an academic institution collected any data or conducted any studies on the impact of telemedicine on access to health care during the COVID-19 pandemic?	Has the ministry of health, a governmental agency or an academic institution collected patient and/or provider experience and outcome measures related to the use of telemedicine services?	Beyond patient and provider experience and outcome measures, has the ministry of health, a governmental agency or an academic institution collected other indicators or metrics to assess the quality of telemedicine?
Australia	Australia*	Belgium
Austria	Belgium	Canada
Belgium	Canada	England
Canada	Costa Rica	Estonia
England	Czech Republic	France
Estonia	England	Israel
France	Estonia	Mexico
Ireland	Finland	Norway
Israel	France	United States
Japan	Ireland	Costa Rica
Latvia	Israel	Czech Republic
Lithuania	Mexico	Finland
Mexico	Netherlands	Hungary
Netherlands	Norway	Ireland
New Zealand	Poland*	Japan
Norway	United States	Latvia
Sweden	Japan	Luxembourg
United States	Korea	Poland
Costa Rica	Latvia	Portugal
Czech Republic	Lithuania	Slovenia
Finland	Luxembourg	Türkiye
Korea	Portugal	Australia
Luxembourg	Slovenia	Austria
Poland	Türkiye	Korea
Portugal	Austria	Lithuania
Slovenia	Hungary	Netherlands
Türkiye	New Zealand	New Zealand
Hungary	Sweden	Sweden

Legend: Yes | No | Missing

Note: *Australia and Poland collect only data on patient experience and outcomes. Other metrics or indicators of quality include safety in telemedicine, telemedicine outcomes compared to in-person outcomes, avoidable admissions, etc.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

Some examples of the governmental institutions involved in collecting data and conducting studies on telemedicine are the Australian Institute of Health and Welfare, the Belgian National Health Care Knowledge Center, Canada Health Infoway, the French National Health Authority, and The National Telehealth Steering Committee in Ireland. In the Netherlands, there was an e-health monitor set up in 2020 by the Ministry of Health, Welfare and Sport, which monitors the transition to digital health care and collects data on the utilisation, quality, and impact of telemedicine (this was an update to the 2013 e-health monitor). In Canada, Ireland, Mexico, and the United States, there is also research conducted by institutions at a subnational level. While the pandemic certainly increased the level of interest, research on telemedicine was already well established before the pandemic in some OECD countries. For example, in France, the *Cour des comptes*, or Court of Accounts, published a report on telemedicine in 2017 and the Institute for Research and Information in Health Economics (*IRDES* in French) published a systematic review on the experiences of patients and providers with telemedicine in 2019. In Norway, an institute solely dedicated to the research on digital health, the Norwegian Centre for E-health Research, was founded in 2011 and has collected a significant amount of data on telemedicine, even before the start of the COVID-19 pandemic.

3.2. While crucial in maintaining access to care during the pandemic, telemedicine could not completely offset in-person care reductions for everyone

As detailed in Chapter 1, Section 1.3, reductions in the number of in-person health care services provided in OECD countries were partly offset by an unprecedented scale-up of telemedicine services, following government policies to promote remote care. Provisional data from the 2022 OECD Health Statistics and ad-hoc data collection on teleconsultations show that the number of total doctor consultations increased in 2020 compared to 2019 in Australia, Denmark, and Norway (see Figure 3.2). The total number of consultations in Australia was actually 16% higher in April 2020 than in the same period in 2019, partly due to an increase in telephone and video consultations after the introduction of new telehealth Medicare Benefits Schedule items from March 2020 (AIHW, 2021[4]). COVID-19 related in-person consultations dropped by 15.3% to 36.3 million consultations, while telephone consultations increased by 43.1% to 12.7 million consultations, and video conferencing consultations increased by 165.5% from about 615 000 to 1.6 million consultations (ibid). A 10% drop in in-person antenatal care between January and September 2020, compared to 2019, was almost entirely offset by an uptake of 91 000 telehealth services (AIHW, 2021[5]).

In Denmark, the number of in-person doctor consultations went down 0.9% while doctor teleconsultations increased by 8.1% in 2020 compared to 2019, causing the total number of doctor consultations to go up by 3.2%. In Norway, doctor teleconsultations increased 700% making up for a 15.9% drop in in-person doctor consultations and leading to a 2.3% increase in the total number of doctor consultations. In Reykjavik in Iceland, the use of web-based consultations increased by 213% and telephone consultations increased by 93%, while office visits decreased by 41%, leading to an overall increase of 45% in the total number of consultations in primary health care centres and out-of-hours services (Sigurdsson et al., 2020[6]). In Germany, the number of patients receiving psychotherapy services in-person had dropped by 18% by the end of the COVID-19 lockdown, but this drop was completely offset by remote psychotherapy services resulting in an overall increase in the number of patients treated of 12% (Probst et al., 2021[7]). In the Czech Republic, a reduction of 71% in the number of patients receiving psychotherapy was also completely compensated by an increase in psychotherapy delivered via telemedicine (ibid).

Table 3.1. Teleconsultations partly compensated for reductions in in-person consultations

Doctor consultations per capita (total, in-person, and teleconsultations) in 2019 and 2020, and growth rates in doctor consultations per capita between 2019 and 2020, in OECD countries with available data

	Growth between 2019 and 2020		
	Total doctor consultations	In-person doctor consultations	Doctor teleconsultations
Australia	7.33 in 2019 – 7.44 in 2020 (1.5%)	7.32 in 2019 – 6.78 in 2020 (-7.5%)	0.01 in 2019 – 0.66 in 2020 (7 122.4%)
Czech Republic*	8.23 in 2019 – 8.06 in 2020 (2.1%)	7.91 in 2019 – 7.32 in 2020 (-7.5%)	0.32 in 2019 – 0.74 in 2020 (131.3%)
Denmark	7.39 in 2019 – 7.63 in 2020 (3.2%)	4.03 in 2019 – 4.00 in 2020 (-0.9%)	3.36 in 2019 – 3.63 in 2020 (8.1%)
Estonia	6.81 in 2019 – 6.37 in 2020 (-6.4%)	5.45 in 2019 – 4.10 in 2020 (-24.8%)	1.37 in 2019 – 2.27 in 2020 (65.8%)
Finland	4.70 in 2019 – 4.50 in 2020 (-4.3%)	4.40 in 2019 – 4.20 in 2020 (-4.5%)	0.35 in 2019 – 0.37 in 2020 (4.6%)
France	5.75 in 2019 – 5.20 in 2020 (-9.6%)	5.75 in 2019 – 4.95 in 2020 (-13.9%)	0.00 in 2019 – 0.25 in 2020 (inf)
Israel	9.70 in 2019 – 9.60 in 2020 (-1.0%)	8.20 in 2019 – 6.80 in 2020 (-17.1%)	1.50 in 2019 – 2.80 in 2020 (86.7%)
Lithuania	9.54 in 2019 – 8.44 in 2020 (-11.5%)	9.54 in 2019 – 6.26 in 2020 (-34.4%)	0.01 in 2019 – 2.18 in 2020 (43 500.0%)
Norway*	4.40 in 2019 – 4.50 in 2020 (2.3%)	4.40 in 2019 – 3.70 in 2020 (-15.9%)	0.10 in 2019 – 0.80 in 2020 (700.0%)
OECD9	-3.1%	-14.0%	6 452.3%

Note: All values are provisional; * Norway excludes teleconsultations by medical specialists; values for the Czech Republic are estimates. OECD9 shows unweighted averages. In Estonia, 2015-19 data include teleconsultations with family physicians only (funded by the Health Insurance Fund), while from 2020, also specialist medical practitioners' teleconsultations data are available.
Source: OECD Health Statistics (2022); OECD ad-hoc data collection on teleconsultations (2022).

In other countries, the total number of doctor consultations dropped in 2020 compared to 2019, despite the massive growth in the number of doctor teleconsultations. In Lithuania, for example, the number of doctor teleconsultations increased 43 500%; a hike that still could not offset a 34.4% drop in in-person doctor consultations. In England, the number of in-person primary care consultations fell by 2.3 consultations per person per year, only partially offset by an increase in remote consultations of 1.0 consultation per person per year (Watt et al., 2020[8]). In Austria, the number of patients receiving psychotherapy care in-person dropped 81% in the weeks following the introduction of COVID-19 restrictions, while the number of patients receiving care via telephone increased 979% and via the internet 1 561% (Probst et al., 2021[7]). Still, growth in remote psychotherapy was not sufficient to compensate for the drop in in-person care, leading to an overall reduction of 28% in the number of patients receiving psychotherapy in Austria during the first weeks of the COVID-19 lockdown. In the Slovak Republic, the number of in-person psychotherapy patients fell by 76%, and while telemedicine use increased, there was still an overall drop of 25% in the number of patients treated three weeks after the first COVID-19 wave restrictions were relaxed (ibid).

The COVID-19 pandemic has been a reminder that many health care services cannot currently be delivered remotely and require in-person appointments. There is no question that telemedicine played a vital role in ensuring access to, and continuity of, care during the COVID-19 pandemic. However, as detailed in Chapter 1, Section 1.1, the impact of the pandemic on the delivery of care was far-reaching, affecting elective surgeries, preventive and emergency care (OECD, 2021[9]). As senior health officials in Canada, have put it, "there are limits to what can be done virtually" and "there are many patients for whom the standard of care cannot be met in a solely virtual care environment" (CMA, CFPC and RCPSC, 2022[10]). While 84% of the Canadian physicians agree that virtual care improves their patients' access to their care, four in five physicians have experienced challenges with virtually examining patients and over half recognise the inability of some patients and communities to access virtual care (CMA and Canada Health Infoway, 2021[11]). Indeed, telemedicine services cannot currently substitute for many in-person

health care services. One study of claims data in the United States estimated that 20% of all Medicare spending could cover virtual services, leaving a significant 80% of spending to be delivered in-person (Bestsennyy et al., 2021[12]).

3.2.1. Access to telemedicine among certain groups of patients remains a key concern

Previous OECD research argued that while older patients, those on lower incomes and those with lower educational attainment would most stand to benefit from the increased access to health services that telemedicine provides, they are also the most likely to lack the health and digital literacy to use telemedicine (Oliveira Hashiguchi, 2020[1]). While during the pandemic countries moved swiftly to promote the adoption and utilisation of telemedicine services, some barriers to telemedicine use are structural and less amenable to short-term regulatory and financing changes. There is a risk that the rapid uptake of remote care services during the pandemic may have exacerbated pre-pandemic inequalities in access to care. The available evidence from OECD countries suggests that the impact of telemedicine on access to health care services among subgroups of patients after the start of the pandemic has been mixed, and possibly not as clear-cut as before the pandemic. However, access among older, poorer, and rural patients remains concerning, especially in some OECD countries.

The age distribution of telemedicine users varies across countries and, at least in the United States, seems to be changing with the pandemic. In Canada (Ontario), telemedicine use increased across all age groups, with the highest rates of use reported among older adults aged 65 and older (Chu et al., 2021[13]), while in England, patients older than 74 years were up to 28% more likely to have an in-person consultation than those aged 25-44 years (Edge Health, 2021[14]). Data from the United States suggests that younger patient groups (aged under 55 years, especially those aged 31-40 years) were most likely to use telehealth in 2020 (FAIR Health, 2022[15]; Cordina et al., 2022[16]), but that the age distribution of telemedicine patients is changing. Utilisation of telemedicine services among people aged 51 years and older went up and these patients now represent a larger share of all users of telemedicine (FAIR Health, 2022[15]). Furthermore, based on data from the Census Bureau's Household Pulse Survey from April to October 2021, telehealth use rates were similar among most demographic subgroups but were much lower among young adults aged 18 to 24 years (Karimi et al., 2022[17]).

Patients living in rural areas still seem to use telemedicine services less than patients living in urban areas, based on available data, and evidence from the systematic literature review (see Annex C). In the United States, in urban areas, telehealth increased from 0.23% of medical claims in 2019 to 16.1% in 2020, while in rural areas, the increase was from 0.10% in 2019 to 9.8% in 2020 (FAIR Health, 2022[15]). Indeed, the increase in telemedicine use seems to have been greatest among patients in metropolitan areas (Samson et al., 2021[18]). In Canada (Ontario), before the pandemic, telemedicine use was steadily low in 2012-19 for both rural and urban populations, but slightly higher overall for patients living in rural areas (Chu et al., 2021[13]). With the pandemic, the rate of telemedicine use increased among patients living in both rural and urban areas, but more markedly among the latter (ibid). In the first four months of the pandemic, in Canada (Ontario), residents in rural areas had lower use of telemedicine (Glazier et al., 2021[19]).

Patient income remains an important correlate of telemedicine use, although recent data from the United States suggests that the association between income and telemedicine use may be changing. InCanada (Ontario), patients in the highest income quintile had higher proportions of use of telemedicine during the first wave of the pandemic (Glazier et al., 2021[19]). In the United States, the increase in telemedicine use in 2020 was greatest among patients in counties with low poverty levels (Samson et al., 2021[18]). About two-thirds of households with total income of USD 25 000 or more have access to providers that offer telemedicine services, compared to 58% of households with total income below USD 25 000 (Samson et al., 2021[18]). Indeed, over nine in ten beneficiaries with a total household income of USD 25 000 or more have access to the Internet compared to two-thirds of beneficiaries with a total

household income of less than USD 25 000 (ibid). However, more recent data from 2021 suggests that rates of telemedicine use were highest among patients earning less than USD 25 000 (Karimi et al., 2022[17]).

More recent analyses from the United States, using responses to the Census Bureau's Household Pulse Survey from April to October 2021, show that there are significant differences across groups of patients in the use of audio versus video telehealth (Karimi et al., 2022[17]). Young adults, patients earning at least USD 100 000, patients with private insurance and White individuals have higher shares of use of video telehealth. Lower rates of video use were found among patients with a high school diploma, adults ages 65 and older, patients with low incomes, and Latino, Asian and Black individuals. Access to high-speed broadband and a lack of privacy at home or at work, are possible explanations for these differences in the use of audio and video modalities (Karimi et al., 2022[17]).

Language barriers can make it difficult to access health care services, both in-person and remotely, and hinder the quality of the health care delivered (Al Shamsi et al., 2020[20]). In studies from the United States (see Annex C), patients with a primary language other than English and Spanish were less likely to use telemedicine (Haynes et al., 2021[21]; Xiong et al., 2021[22]). However, it has been shown that online translation tools can increase the satisfaction of both medical providers and patients as well as improve the quality of care delivered and patient safety. These tools can likely be used in remote care services as well.

Telemedicine may be the only way to access care for difficult-to-reach patient groups

Some patient groups face significant barriers to accessing health care, be it because of cost, physical access or even privacy. Telemedicine services can help bring down those barriers. Australia, Denmark, France, Germany, Iceland, Italy, the Netherlands, Norway, Spain and Swedenall provide telemedicine services to seafarers on board ships (Oliveira Hashiguchi, 2020[1]). In Australia, the Centre for Antarctic, Remote and Maritime Medicine and the Australian Antarctic Program provide telemedicine services to patients up to 5 500 km away, including monitoring vital signs (ibid), and on-call telemedicine services with a specialist ophthalmologist are available to Aboriginal and Torres Strait Islanders (Nguyen, Baker and Turner, 2020[23]). Indeed, telemedicine services are used to promote better health care among indigenous people in Canada as well, where the Ontario Telemedicine Network provides virtual care to 80% of 133 First Nation Communities, one in four of which are only accessible by air or ice road (Ontario Telemedicine Network, n.d.[24]). Australia, Canada, Greece, Korea, Spain, United Kingdom and the United States all provide health care services to prison populations, reducing the need for potentially costly and risky transfers, and with high patient and provider satisfaction (Cuadrado et al., 2021[25]; Khairat et al., 2021[26]; Tian et al., 2021[27]).

3.3. While some health care workers are still sceptic and worried about quality, patient experiences with telemedicine are positive and satisfaction is very high

3.3.1. Physicians have mixed views of the quality of, and need for, telemedicine services

As stated, there is a substantial body of evidence showing that telemedicine services can be effective, safe, and patient-centred/responsive (Eze, Mateus and Cravo Oliveira Hashiguchi, 2020[2]). For example, in England, the Care Quality Commission – which conducts annual inspection of health care providers – published in 2019 an inspection showing that PushDoctor, a digital primary care provider, delivered safe, effective, and responsive services (CQC, 2019[28]). Yet, physicians' views of the value and quality of health care services delivered through telemedicine vary significantly across and within countries.

In Australia, among fellows of the Royal Australasian College of Surgeons, 77% felt that satisfactory care could be delivered via telehealth in half or more consultations, but only 38% of respondents felt that the quality of care was equivalent to an in-person consultation (Wiadji et al., 2021[29]). Notably, respondents to a patient survey rated their telehealth consultations more highly than their treating surgeons with 93% being happy with the quality of their telehealth consultation and 75% rating it as equivalent to an in-person consultation (ibid). In Canada, 78% of the physicians agree that virtual care enables them to provide quality care for their patients (CMA, CFPC and RCPSC, 2022[10]). Over two-thirds of physicians were satisfied with video visits and 71% were satisfied with telephone consultations (ibid). In Austria, despite the increased use of remote psychotherapy services during the pandemic, and positive experiences reported by physicians, health professionals do not believe that remote psychotherapy can substitute for in-person psychotherapy (Probst et al., 2021[7]). In Sweden, approximately four out of ten doctors do not want to work more with digital care visits at all (Vårdanalys, 2020[30]).

In survey data from 1 000 general practitioners in Norway who have provided video consultations during the pandemic, respondents considered that half of the almost 3 500 video consultations provided were as suitable or even more suitable to assess the main reason of contact, compared to in-person appointments (Johnsen et al., 2021[31]). Doctors considered that telemedicine was most suitable when there was already a relationship with the patient (rather than for a first contact), to follow-up on ongoing care (rather than for a new issue), and for specific conditions such as anxiety, depression, administrative matters and for chronic conditions that require multiple follow-up consultations (ibid). In a survey of 719 health care workers in Ireland (it is unclear how representative the sample is), 87% reported that they were extremely likely, very likely or likely to recommend video consulting to a friend or client and 49% reported unanticipated benefits from their use of the virtual platform (Lane and Clarke, 2021[32]). A third (32%) of respondents reported that it reduced non-attendance rates when compared with in-person consultations, and 29% reported that use of video consultations enabled them to increase the number of appointments offered to patients (ibid).

There is concern among health care professionals that scaling-up remote care services so quickly during the pandemic may have led to unnecessary and substandard care

Even before the pandemic, in 2019, the Swedish Medical Ethics Council expressed concern that a lack of regional integration of information systems could create risks for patients consulting remotely out-of-region (Statens medicinsk-etiska råd, 2019[33]). The Council was also concerned that providers of remote care were promoting their services to patients with health issues that were suitable for self-care, a situation that would likely lead to increased unnecessary health spending, and high opportunity costs in foregone care for patients with more serious health issues (ibid).

In Canada, there has been some concern about the appropriateness of care delivered virtually during the pandemic (CMA, CFPC and RCPSC, 2022[10]). There have been complaints to regulatory authorities from patients unable to access in-person care. Emergency physicians and other specialists have also expressed concern that patients referred to them have not been seen in-person or given an appropriate examination by a primary care physician. The College of Family Physicians of Canada has reported that “for-profit services offering access to episodic care by unfamiliar providers have increasingly been used to fill access gaps, threatening system efficiency and continuity of care” (CFPC, 2021[34]). To ensure that appropriate standards of care were maintained during the pandemic, regulatory authorities in several jurisdictions reviewed and updated remote care guidelines and the Canadian Medical Protective Association made available to their members a collection of articles, podcasts and learning activities related to virtual care (CMA, CFPC and RCPSC, 2022[10]).

3.3.2. Patients are overwhelmingly satisfied with telemedicine services

There is much more agreement on the value of telemedicine services among patients, across and within countries, than among physicians. The Health Foundation, in England, analysed 7.5 million patient-initiated

requests for primary care made using the askmyGP online consultation system between March 2019 and September 2021 at 146 general practices with 1.35 million patients (Clarke, Dias and Wolters, 2022[35]). They found that, before the pandemic, 30% of patients stated a preference for in-person care, but at the start of the pandemic, fewer than 4% of patients did so. After the start of the pandemic, requests for in-person consultations increased but still represented only 10% of all requests by September 2021. There are significant differences among both patients and providers regarding which communication technology to use for remote care services (see Box 3.2).

Box 3.2. More research is needed to understand how different communication technologies, such as video and telephone, are associated with health care quality and patient satisfaction

There is limited understanding of which communication technology – video, telephone, e-mail, text messaging – is most appropriate/desirable for a specific patient, health care setting, specialty, health issue, and health care professional. Based on available data, the choice of communication technology is not clear-cut. For instance, in England, general practitioners consider that video consultations provide little added value over telephone consultations (Greenhalgh et al., 2022[36]). In another study in England, 55% of patients stated a preference for telephone consultations after 2020 (compared to 44% pre-pandemic), a third of patients preferred text messaging or e-mail, and less than 1% of patients asked for a video consultation, with significant subnational variation in these preferences (Clarke, Dias and Wolters, 2022[35]). In Canada, general practitioners are more satisfied with telephone consultations and specialists are more satisfied with video consultations (CMA and Canada Health Infoway, 2021[11]).

In Sweden, people aged 60 years or older prefer telephone consultations to video, text messaging or e-mail, while younger patients prefer video, text messaging and e-mail (Vårdanalys, 2020[30]). As previously mentioned, in the United States, young adults, patients earning at least USD 100 000, patients with private insurance and White individuals have higher shares of use of video telehealth, with lower rates of video use found among patients with a high school diploma, adults ages 65 and older, patients with low incomes, and Latino, Asian and Black individuals. Beyond preferences and potential barriers to access, it is important to understand which communication technology is most cost-effective in which conditions.

In an Australian survey, based on 1 166 consultations, 94% of patients were satisfied with the quality of their surgical telehealth consultation and 75% felt it delivered the same level of care as in-person consultations (Wiadji et al., 2021[29]). Telehealth was considered convenient to use by 96% of respondents. In a survey of 1 000 Austrians, older age groups were more likely to be satisfied with their telephone or video consultation than patients in younger age groups (Kletečka-Pulker et al., 2021[37]). Just 1% of patients in the age group 45-59 and 2% of patients in the age group above 60 years indicated that they were rather unsatisfied with their teleconsultations. Perhaps unexpectedly, only 60% of patients aged 16-29 felt they were sufficiently understood during teleconsultations, compared to 92% of patients over 60 years old. Overall, nine in ten respondents were satisfied or very satisfied with their teleconsultations. In a survey of over 5 000 Belgian patients, around three in four respondents (77%) were generally satisfied or very satisfied with teleconsultations, and only 4% were not satisfied at all (Avalosse et al., 2020[38]). As in Austria, older respondents were more likely to be satisfied.

In Canada, a national poll of 1 800 people conducted by Abacus Data between 14 May-17, 2020, found that 91% of patients who connected with their doctor virtually during COVID-19 were satisfied, which is 17 percentage points higher than the satisfaction rate for in-person emergency room visits (CMA and Abacus Data, 2020[39]). In another Canadian survey of more than 3 000 people with stroke, heart disease or vascular impairment, conducted in the spring of 2021, found that 80% of respondents had a virtual

appointment during the pandemic, with about four in five reporting that they found virtual appointments to be convenient (Heart and Stroke Foundation, 2021[40]). Moreover, 60% or respondents stated that virtual care was as good as in-person appointments. In yet another Canadian survey of over 12 000 people conducted between 14 July and 6 August 2021, nine in ten respondents who had used teleconsultations were satisfied (Canada Health Infoway, 2022[41]). Furthermore, 89% of respondents felt they were involved in the decision making around their care and 88% felt the visit was effective in helping with the health issue they consulted about. For patients using e-mental health services, 84% were satisfied and 81% felt the visit was effective in helping with the health issue they consulted about (ibid). An astounding 74% of users of e-mental health services agreed that remote care had helped them deal with a moment of crisis and distress that would have resulted in physical harm or suicide.

In a survey of 696 patients in Ireland (it is unclear how representative the sample is), 95% of patients reported that they were likely, very likely, or extremely likely to recommend remote care to a friend, and 91% reported that they were able to communicate everything they wanted to their health care professional (Lane and Clarke, 2021[32]). The majority (81%) of patients reported that their experience of video appointments was the same (50%) better (15%) or significantly better (16%) than previous in-person appointments. In a survey of almost 14 000 patients in Poland, over nine in ten respondents who had used teleconsultations reported that their problem was resolved, and 96.8% were satisfied, stating that they had received comprehensive information about their condition and medication (National Health Fund, Department of Patient Services (Departament Obsługi Pacjenta, Narodowy Fundusz Zdrowia), 2020[42]). Concerns that older adults would not be able to manage using telemedicine and that remote care services be inaccessible to wide range of patients were not confirmed (ibid). In the United States, among respondents to multiple waves of McKinsey Physician Surveys and McKinsey Consumer Surveys conducted in 2020 and 2021, two-thirds of physicians and 60% of patients agreed that virtual health is more convenient than in-person care for patients, but only 36% of physicians agreed remote care was more convenient for themselves (Cordina et al., 2022[16]).

3.3.3. Around two in five patients who used remote care services during the pandemic prefer these to in-person consultations, and want to continue using telemedicine

Surveys from across OECD countries indicate a desire from patients who have used telemedicine services during the pandemic to continue using remote care services in the future. In Australia, 41% of patients who participated in telehealth surgical consultations indicated they would prefer telehealth (24% video-link and 17% telephone) over in-person appointments in the future (Wiadji et al., 2021[29]). In Canada, almost half (46%) of respondents who used virtual care after the start of the pandemic stated they would prefer a virtual appointment as a first point of contact with their doctor (CMA and Abacus Data, 2020[39]). In Israel, around 82% of men, 73% of women, around 80% of patients with chronic conditions, and 73% of patients without chronic conditions agreed that they would continue to use telemedicine in the future (Reicher, Sela and Toren, 2021[43]). In Poland, 43% of respondents believe that telehealth should be one of the main ways to contact their primary health care provider in the future (National Health Fund, Department of Patient Services (Departament Obsługi Pacjenta, Narodowy Fundusz Zdrowia), 2020[42]). In the United States, 40% of consumers surveyed in May 2021 said they believe they will continue to use telehealth, while in November 2021, 55% of consumers said they were more satisfied with telehealth visits than with in-person appointments (Cordina et al., 2022[16]). Patients in Belgium consider remote care visits particularly useful for administrative matters, in particular drug prescribing and monitoring of chronic diseases (Avalosse et al., 2020[38]). Around 70% of Belgian respondents indicate that an in-person consultation is the most appropriate and desirable way to see their health care provider and 62% agree that teleconsultation should be the exception rather than the rule (Avalosse et al., 2020[38]).

Compared to patients, physicians have more mixed views of the role of remote care services in a new phase of the pandemic in which most people are vaccinated and in-person services have mostly resumed. Some physicians are interested in continuing to provide remote care. In Australia, 85% of surgeons

surveyed by the Australasian College of Surgeons expressed a desire to continue providing access to telehealth (Wiadji et al., 2021[29]). In Canada, nearly 25% of physicians expect to increase their use of virtual care in the future, 20% expect their use to remain stable, and only 4% expect to stop using remote care (CMA and Canada Health Infoway, 2021[11]). In Norway, general practitioners estimate that they will conduct about one in every five consultations by video in the future (Johnsen et al., 2021[31]). In England, in a June 2020 survey of over 2000 general practitioners, 88% felt that greater use of remote consultations should be maintained in the longer term (Morris, 2020[44]). In Sweden, just over half of doctors surveyed state that they want to work more with digital care visits than they do today (Vårdanalys, 2020[30]).

Some physicians expect to reduce their use of telemedicine services or even stop using them altogether following a period of increased use in 2020. In Sweden, approximately four in ten doctors do not want to work more with digital care visits at all (Vårdanalys, 2020[30]). In the United States, 62% of physicians state that they would recommend in-person care over remote care to patients (Cordina et al., 2022[16]). Furthermore, physicians expect teleconsultations to drop by one-third compared to the number of remote care services they provided during the pandemic. Over half of physicians reported being less likely to provide remote care services if provider payment rates were 15% lower than for equivalent in-person services (ibid). With increasing numbers of patients in the United States demanding telemedicine services, physicians who are reluctant to provide virtual care may lose patients in favour of a growing number of remote care providers that are able to meet patient demand (Cordina et al., 2022[16]).

Evidence from the systematic literature review (see Box 3.1) confirms high user satisfaction, not only among patients but also among providers, although providers do tend to have more mixed views (see Annex C). Several studies, from different OECD countries, indicate that high proportions of patients would be happy to continue using telemedicine services, and would even prefer them over in-person care. Examples include access to early medical abortion care in the United Kingdom (Aiken et al., 2021[45]); follow-up of patients with a stoma in Norway; people receiving mental health care in a panel of OECD countries (Barnett et al., 2021[46]); cancer care in Canada (Berlin et al., 2021[47]); patients with gestational diabetes in a panel of OECD countries (Bertini et al., 2022[48]); older adults with a pacemaker in Norway (Catalan-Matamoros et al., 2020[49]); communications with older adults with hearing loss in Australia (Convery et al., 2020[50]); adults being treated in the general surgery department in Spain (Cremades et al., 2020[51]); community-based gastroenterology in the United States (Dobrusin et al., 2020[52]); populations with chronic neurological dysfunction in multiple OECD countries (Gopal et al., 2022[53]); adults with major depressive disorder in the United States (Guaiana et al., 2021[54]); patients with COVID-19 in Korea (Jang et al., 2021[55]) and the United States (Legler et al., 2021[56]); anaesthesia preoperative evaluations in the United States (Kamdar et al., 2020[57]); urological patients in Spain (Leibar Tamayo et al., 2020[58]); oncology care in rural areas in a panel of OECD countries (Morris, Rossi and Fuemmeler, 2021[59]); patients with rheumatoid arthritis in France (Pers et al., 2021[60]); child neurology outpatient care in the United States (Rametta et al., 2020[61]); patients with a medical diagnosis of schizophrenia and bipolar disorder in Germany (Stentzel et al., 2021[62]); outpatient sports medicine in the United States (Tenforde et al., 2020[63]); women at risk of developing preeclampsia in the Netherlands; and older adults with cognitive impairment in a panel of OECD countries (Yi et al., 2021[64]). Having the choice to use telemedicine services was considered important (Pogorzelska and Chlabicz, 2022[65]).

Technological barriers and service design flaws can limit the benefits of telemedicine services or even make them unsafe and unusable. One study found that 36% of participants experienced anxiety using mobile health technology (Fraser et al., 2022[66]). In another study in the United States, patients highlighted technical difficulties, and were especially concerned with incomplete health information being used to make care decisions (Gomez-Roas et al., 2022[67]). Other technical difficulties mentioned in peer-reviewed studies from a panel of OECD countries included Internet access (especially in rural locations with low connection speeds), the costs of technologies and hardware, and communication barriers (Peden, Mohan and Pagan, 2020[68]). Moreover, it is important to note that some patients prefer in-person appointments (Hadeler, Gitlow and Nouri, 2021[69]; Martinez et al., 2020[70]; Zischke et al., 2021[71]; Taxonera et al.,

2021[72]; Schultz et al., 2021[73]). It is important that patients are offered in-person alternatives, whenever possible, if they are not comfortable receiving care remotely through telemedicine. Furthermore, telemedicine services will not completely substitute for face-to-face care, so the interface between telemedicine and face-to-face care needs to be carefully assessed.

3.3.4. Telemedicine in the context of national policies on quality of health care

According to the OECD Survey on Telemedicine and COVID-19, only 12 countries refer to telemedicine in national legislation or policy on quality of care. Eleven countries report that there is no reference to telemedicine services in legislation on quality of health care while in two countries, Slovenia and Finland, there is no national legislation and/or policy on health care quality in general.[1] In France, Ireland, Japan, Mexico, Norway and Türkiye, the Health Ministry or a similar authority is responsible for overseeing quality of telemedicine services. In England, the National Health Service has published policy and regulatory requirements on telemedicine (the terms used in England are online access or remote consultation). Ireland similarly reported that the Health Service Executive, which is the publicly funded health care system in Ireland, has worked on this. The Netherlands reported that, within their framework on quality of health care, telemedicine services should fulfil the same quality criteria as in-person care, while there are some additional criteria given the specifics of remote care at home.

In some countries, several authorities are involved in assessing quality of telemedicine care services. New Zealand, for instance, reports that the Health Quality and Safety Commission, the Health and Disability Commissioner, and the colleges of medical practitioners are all in some way involved in defining and ensuring health care quality in general, including telemedicine. Likewise, in France, besides the French National Health Authority, the National Consultative Ethics Council also works on the quality of telemedicine services. In Norway, the Norwegian Board of Health Supervision does regular information and communication technology audits. In the United States, the National Quality Forum, a non-profit organisation, has referenced the need for measure development for telehealth and worked on how rural telehealth supports health care system readiness and health outcomes during emergencies. In Canada, provinces and territories have primary jurisdiction over the administration and delivery of health care. The Canada Health Act, which governs the delivery and provision of health care in Canada, does not explicitly reference virtual care and/or telemedicine services.

Professional communities or colleges that represent, support, or regulate different medical groups are also typically involved in discussions surrounding the quality of care delivered via telemedicine. In France, for instance, all the colleges of medical practitioners now have a telehealth statement. In Ireland, the National Health care Communication Programme – designed to support health care staff to learn, develop and maintain their communication skills with patients, their families and with colleagues – has published telehealth guides for clinicians. In Israel, a Telehealth Community was established following the start of the COVID-19 pandemic, which operates ten groups of therapists in various professional fields (e.g. oncology, paediatrics, psychiatry, geriatrics etc.). As part of the activities of the professional groups, there are dialogues between therapists in which patient and/or provider experiences with telemedicine are shared. Belgium, Finland and Poland report that they have plans to make or update guidelines or legislations on health care quality that specifically reference telemedicine.

3.4. Telemedicine services are very good value for money for patients, but more work is needed to understand the impact on health system efficiency and waste

While it is challenging to make broad statements regarding the cost-effectiveness of telemedicine services due to the heterogeneity of applications and differences in how remote care is delivered, there is evidence that telemedicine interventions can be cost-effective (Eze, Mateus and Cravo Oliveira Hashiguchi, 2020[2]). Besides being clinically effective, telemedicine interventions can deliver value for money by reducing the

workload of health care workers, reducing waiting and travelling times, reducing unnecessary in-person care, shortening the length of consultations, and having lower unit costs than in-person care services (Oliveira Hashiguchi, 2020[1]). There is plenty of evidence that telemedicine services reduce patient costs and save patients time, however more research is needed to understand the impact of telemedicine on overall health care utilisation and, especially, on wasteful health spending.

3.4.1. Telemedicine services save patients time and money

As discussed in Section 3.3.2, patient satisfaction with telemedicine services is consistently high across OECD countries, with large majorities of patients stating that they would recommend remote care to friends, that their health issues were well addressed, and that they considered teleconsultations as effective as in-person consultations. Many country surveys, as well as peer-reviewed studies (see Annex C), also show that patients generally save time and money by using remote care, making telemedicine services very good value for money. In an Australian survey, based on 1 166 consultations, 60% of patients reported cost savings due to teleconsultations, and 77% felt that their telehealth appointment was good value for money (Wiadji et al., 2021[29]). Most patients (51%) avoided travelling less than 15 km to see their surgeon in-person, while 13% would have had to travel more than 150 km if teleconsultations were not available and they had to see their surgeon in-person. Besides saving money and time with transportation, patients reported avoiding costs from taking time off work, accommodation, and childcare.

An analysis of responses to a survey of patients who used a video consultation platform, totalling 3 million teleconsultations, in England, between 1 April 2020 and 31 March 2021, estimated that remote care saved patients 2.25 million hours of waiting time, with almost 99 000 hours saved in urgent and emergency care settings (Edge Health, 2021[14]). The same study estimated that video consultations saved patients a combined 530 years of travel and waiting time and GBP 40 million in patient travel costs. As a result, more than 14 200 tonnes of greenhouse gas emissions were avoided, and 3 million work hours potentially added to the economy or GBP 108 million in labour productivity gains. Moreover, while 6% of in-person outpatient appointments resulted in a missed attendance by patients, only 4% of remote attendances were missed, an apparently small difference that is however estimated to have led to nearly 55 800 fewer missed attendances due to use of video consultations (ibid). In another survey conducted between April 2020 and March 2021 in England, video consultations contributed to a 10-fold reduction in the time patients waited immediately before an appointment.

In a survey of 696 patients in Ireland (it is unclear how representative the sample is), there was a 32% reduction in non-attendance rates in teleconsultations compared to in-person appointments (Lane and Clarke, 2021[32]). The majority (86%) of patients reported that they would usually travel to an in-person consultation by private car, on average travelling 33 miles for an in-person appointment. In Israel, the Maccabi Telecare Center, a multi-disciplinary health care service providing remote care to complex chronic patients founded by Maccabi Healthcare Services, entails lower overall average monthly costs for frail patients and is considered to be a cost-effective way to improve care quality and health outcomes in frail older patients (Porath et al., 2017[74]). In Canada, in a survey of over 12 000 people conducted in mid-2021, patients using teleconsultations instead of in-person care reported saving on average CAD 53.28 by not having to arrange for care for a dependent (Canada Health Infoway, 2022[41]). Respondents also saved on average CAD 55.92 by not having to take time off work and CAD 36.76 by avoiding travel and associated costs (e.g. parking expenses). In one study from the United States, teledermatology resulted in average travel savings of 163 minutes, 145 miles and USD 60 per person (Lee, Dana and Newman, 2020[75]). In a systematic review and meta-analysis of virtual preoperative anaesthesia assessments in a panel of OECD countries, studies reported savings of between 24 and 137 minutes, and between USD 60 and USD 67 per patient (Zhang et al., 2021[76]).

3.4.2. It is unclear whether remote care substitutes for or complements in-person care, and if telemedicine is a complement whether it adds value or is wasteful

Spending on telemedicine services is wasteful when it does not deliver benefits (or is even harmful), and when it could be replaced with cheaper alternatives with identical or better outcomes (i.e. alternatives that provide better value for money). On the one hand, there is a good deal of data suggesting that telemedicine services reduce subsequent health care utilisation (especially more costly services like emergency care and hospitalisations) and lower the probability of patients missing appointments (a phenomenon that causes disruption to both health care providers and patients who would have attended). On the other hand, teleconsultations can lead to subsequent in-person care (in which case perhaps an in-person appointment would have been more appropriate than the teleconsultation), and under certain provider payment schemes may lead to higher spending at no extra value for health systems and patients. The evidence on health worker productivity is somewhat mixed, with some studies finding that teleconsultations increase the number of patients that can be seen in the same amount of time (Lane and Clarke, 2021[32]) but that health care workers may have higher workloads (BMA, 2020[77]).

Having granular data on why patients use teleconsultations and on subsequent use of health care services is key to understanding the impact of telemedicine on health system efficiency. A key underlying uncertainty is whether telemedicine services substitute for or complement in-person care, and if remote care is a complement, then whether it is good value for money or wasteful. The answers to these questions are not clear. In a 2021 Canadian survey of over 12 000 people, 81% of people using video consultations and 77.1% of e-mental health patients reported that remote care had avoided them at least one in-person visit to a doctor or emergency room (Canada Health Infoway, 2022[41]). In the same survey, 11% of virtual visits resulted in a patient referral to an in-person appointment with a specialist and 10% in advice to patients to make an in-person appointment with their family doctor. In a national survey of 1 800 people conducted in 2020, 50% believed that remote care will reduce total costs for the health care system, and only 8% expect telemedicine to increase total health spending (CMA and Abacus Data, 2020[39]).

In England, an analysis of what happened to patients who attended outpatient appointments shows that 18% of patients were discharged following a telephone or telemedicine appointment in April 2020, compared to 25% in February 2020, while the proportion of patients discharged after in-person appointments remained consistent at around 22% (Morris, 2020[44]). The same analysis also shows increased prescribing and referrals following a teleconsultation. The reasons behind these trends are unclear (e.g. change in the case mix and/or defensive medicine), and more recent data for 2021 are not yet available.

One challenge, discussed in Chapter 1, Section 1.4.1, is the lack of data collection in OECD countries on the reasons why patients used teleconsultations (available in 17 out of 31 reporting countries) and on subsequent use of health care services following a teleconsultation (available in ten out of 31 reporting countries). Such data represent the first step in understanding whether telemedicine services represent good value for money for health care systems. A survey of over 5 000 Belgian patients (Avalosse et al., 2020[38]) found that the main reason for a teleconsultation was to follow-up on an existing or chronic disease (27% of teleconsultations). Other reasons included asking for a drug prescription (21%), discussing symptoms related to COVID-19 (17%), discussing a new symptom unrelated to COVID-19 (16%), obtaining a medical certificate (15%), and requesting information on the results of a test (5%). Following-up on an existing or chronic condition was frequently cited as a reason for teleconsulting with medical specialists (67%), psychiatrists (80%) and psychologists (72%), while obtaining a drug prescription was often the reason to remotely consult with a general practitioner (24%).

Analyses from Sweden show that, before 2018, users of remote care had lower primary care utilisation rates than users of in-person care services, but that in 2018 the opposite became true (Vårdanalys, 2020[30]). While remote care services did replace some in-person care, overall, they led to higher numbers of total consultations. A more in-depth analysis showed that remote care visits led to a higher number of

follow-up appointments than in-person consultations, and that 10% of remote care users had at least six visits (either teleconsultations or in-person). The difference in follow-up rates between teleconsultations and in-person appointments was clearest in the first month after the appointment, and in a longer time window the differences disappeared. It is unclear, however, whether increased utilisation was a consequence of underlying health care needs that were previously unmet or whether they represented unnecessary demand. Furthermore, subnational variation in provider payment and regulation of remote care services in Sweden also make it difficult to understand whether telemedicine services are good value for money (see Box 3.3).

Box 3.3. Regional variation in provider payment and regulation of remote care services in Sweden may lead to different care provision arrangements and be conducive of variations in outcome

The introduction and expansion of the remote care services in Sweden has mainly taken place in primary care because of legislation and regulations for out-of-region care, that is care provided by a region other than the patient's "home region". Before digital care was accepted as part of out-of-region care, a small number of private companies had agreements on digital platforms with some county councils. With new nationally regulated freedom of choice in outpatient care, including primary care, remote care services established in just a couple of regions became available nationwide. When a person receives out-of-region care from a digital care provider, the patient's "home region" is responsible for payment and is invoiced for the remote consultation. The patient pays a co-payment fee according to the rules and guidelines that apply to digital visits in the region where the remote care companies have an agreement.

In 2016, companies based in the Jönköping region provided most of the remote care in Sweden. Remote care services expanded significantly since 2016 and then, in 2020, most remote care providers moved to the Sörmland region, a move that is believed to have followed an agreement for patients to be charged SEK 0 in that region. This effectively made remote care visits completely free of charge for the entire Swedish patient population.

In March 2018, the board of the Swedish Association of Local Authorities and Regions (SKR in Swedish) recommended that all regions adopt a minimum patient fee for digital visits of SEK 100. The Sörmland region first chose not to follow this recommendation, but since 2019 the patient fee is SEK 100 in the region. Another six Swedish regions have also chosen a patient fee of SEK 100 for digital visits to primary care, while eight regions have chosen SEK 200 and three regions SEK 300. Naturally, these differences in regional patient fees create complicated incentives for providers, and it remains unclear how they affect patient experience and outcomes.

Source: Vårdanalys (2020[30]), "Three perspectives on digital care visits – the perceptions of the population, patients and healthcare".

Several peer-reviewed studies suggest that telemedicine services reduce hospital admissions (see Annex C). A systematic review of the effects of telemonitoring on health care use and costs in patients with chronic heart failure in a panel of OECD countries found cost reductions associated with fewer hospitalisations. In a systematic review of eHealth interventions (including telemedicine and remote consultations) to support patients on peritoneal dialysis and their caregivers, five studies reported lower rates of hospitalisations leading to lower costs (Cartwright et al., 2021[78]). In Spain, a study found that mobile health-enabled integrated care reduced overall expenses because of a reduction in unplanned visits and hospital admissions (Colomina et al., 2021[79]). In Australia, a novel smartphone app-based model of care targeting patients after admissions for acute coronary syndrome and heart failure, resulted in a

statistically significant reduction in six-month readmissions (Indraratna et al., 2021[80]). A systematic review of telemonitoring interventions for chronic obstructive pulmonary disease in various OECD countries found that adding telemonitoring to usual care led to reductions in unnecessary emergency department visits (Jang, Kim and Cho, 2021[81]). In a randomised controlled trial of telerehabilitation for late-stage cancer patients in the United States, the telemedicine service led to total inpatient hospitalisation costs that were significantly lower than those of enhanced usual care (Longacre et al., 2020[82]). Also in the United States, a randomised controlled trial of a telephonic diabetes self-management intervention found reductions in hospital use and costs (Tabaei et al., 2020[83]).

Beyond the question of whether telemedicine services are substitutes or complements to in-person care, estimates from an English study suggest that the use of remote care services during the pandemic may have reduced the number of hospital associated infections, and led to savings of millions of pounds in avoided use of personal protective equipment (Edge Health, 2021[14]).

3.5. Despite considering that the use of remote care is associated with some risks, country experts see most risks as unlikely to materialise

There is concern that the rapid scale-up in telemedicine use during the COVID-19 public health emergency may have led to inappropriate remote care and risks to both patients and health care systems. As part of the OECD Survey on Telemedicine and COVID-19, country experts were asked to assess the likelihood and potential impact of possible risks associated with telemedicine services (see Table 3.2). Experts from 22 OECD countries responded to this section of the questionnaire.

Table 3.2. Country experts tend to rate the likelihood of possible risks of telemedicine materialising as unlikely, but consider that the impact of some risks could be moderate or even high

Agreement among experts (in 22 countries) on the likelihood and expected impact of possible risks of remote care

	Number of countries where experts agree that the likelihood of the risk materialising is:			Number of countries where experts agree that the impact of the risk would be:		
Telemedicine services…	Unlikely	Likely	Very Likely	Low	Moderate	High
… lead to incorrect diagnoses	18	4	-	5	7	10
… promote duplication of care and unnecessary procedures/visits	17	4	1	12	9	1
… increase inappropriate antibiotic prescribing	17	3	1	10	7	4
… are vulnerable to medical fraud and abuse	16	5	1	14	5	3
… compound inequalities in access to care and/or care outcomes	9	10	3	8	12	2
... are vulnerable to data and privacy breaches	10	10	2	3	12	7
… are vulnerable to ransomware attacks that limit provision	11	10	1	5	9	8
… increase the risk of malpractice and medical negligence	17	5	-	10	7	5

Note: Answers from England are for general practice.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

For most potential risks associated with remote care services, most country experts agreed that it was unlikely that these risks would materialise. However, for three of the purported risks, country experts were split on whether the risk was unlikely or likely to materialise. These three risks were related to the potential of telemedicine services to compound inequalities in access to care and/or care outcomes, and the vulnerability of remote care services to data and privacy breaches as well as to ransomware attacks. In

the context of health care system performance, it is noteworthy that a prominent majority of country experts considered it unlikely that telemedicine services promote duplication of care and unnecessary procedures/visits, or that they increase the risk of malpractice and medical negligence.

Expert agreement on the impact of purported risks, should they materialise, was mixed. While the possibility that telemedicine services may result in incorrect diagnoses was considered the most unlikely risk to materialise, it was the only risk for which most country experts rated the expected impact as high. The risk that telemedicine services may be vulnerable to ransomware attacks that limit care provision was considered to have a moderate to high impact, should it materialise. Should telemedicine services compound inequalities or be vulnerable to data and privacy breaches, most country experts considered that this could have a moderate impact.

Combining expert assessments of the likelihood and expected impact of possible risks of telemedicine services shows that experts are most concerned about the potential for telemedicine to compound inequalities and to be vulnerable to data breaches and ransomware attacks. Among the 22 countries that provided responses, experts from Mexico, Slovenia and Sweden considered risks were more likely to materialise than experts in other countries, and experts from Latvia, Slovenia and Sweden rated the expected impact as high more often than experts in other countries. Experts from Costa Rica rated all possible risks of remote care as unlikely and low impact, while experts from Norway considered all risks as very unlikely and the impact of all but two risks as low.

The country expert assessments of risks associated with telemedicine services, elicited through the OECD Survey on Telemedicine and COVID-19, are in broad agreement with evidence from the systematic literature review, which overwhelmingly suggests that telemedicine services are at least as safe as in-person care in a wide range of medical specialties and diseases, and using different remote care technologies (see Annex C). In some cases, telemedicine services – especially remote patient monitoring – have the potential to produce early warnings of deterioration, which can boost patient safety (Breteler et al., 2020[84]).

For the most part, the COVID-19 pandemic does not seem to have had an impact on the safety of health care delivered through telemedicine (Joshi et al., 2021[85]), with most services being as safe as in-person care both before and after the start of the pandemic. However, as with in-person services, telemedicine services need to be well designed to be safe and effective, and well received by both patients and providers. In a systematic review of randomised controlled trials of eHealth interventions aimed at solid organ transplant recipients in a panel of OECD countries, some trials reported failures with the technology used, anxiety, and privacy concerns (Tang et al., 2020[86]). In a retrospective cohort study from the United States, rapid implementation of telemedicine services suffered from poor audio and video quality, with a significant proportion (40%) of encounters being affected (Rametta et al., 2020[61]). Finally, in a cross-sectional study in Germany, satisfaction with video-electroencephalography-monitoring systems at epilepsy centres was low, with hardware or software errors affecting diagnoses (Willems et al., 2021[87]).

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Note

[1] While there is no single act on health care quality and safety in Slovenia, there are resolutions and acts that address the topic. Moreover, a strategy for quality and safety in health care is under preparation and its adoption is expected in early 2023. There is also an independent body within the Ministry of Health responsible for monitoring and managing quality in the health system.

4 Policy priorities for promoting the best use of telemedicine

As OECD countries adapt to a new phase of the COVID-19 pandemic, this is an opportune moment for debate among citizens, health care providers and policy makers on whether to continue using telemedicine services, how to regulate their use, how to pay for them, and how to make sure that they constitute good value for money for all. This chapter puts forth three priorities for policy makers to promote the best use of remote care services. All three priorities rely heavily on data being collected, analysed, and reported. The first policy priority is key to identifying value-adding uses of remote care. The second priority ensures that providers are rewarded for adopting telemedicine services that are good value for money, and that patients have access to these services. The third priority builds on the previous two, appealing to health care workers and policy makers to keep learning and improving the performance of the health care system.

In the beginning of 2020, as governments, societies and economies grappled with the enormous uncertainty surrounding the spread of SARS-CoV-2 and the disease it caused, COVID-19, normal life came to a halt. With health systems focused on preventing and treating COVID-19, and with populations drastically altering their behaviours to limit infections, many in-person health services were postponed or simply cancelled, causing massive disruptions in the delivery of essential health care services, from prevention to curative to palliative care. More than two years after the first wave of COVID-19 cases, most countries are still grappling with the effects of the pandemic on health care delivery.

With the COVID-19 pandemic causing significant disruptions to in-person care, governments and health care providers moved quickly to simplify and promote the use of remote care services. Before March 2020, nine OECD countries allowed medical consultations to be performed only in the physical presence of the patient. After March 2020, all but Korea dropped this requirement (still, Korea made it possible to temporarily use telemedicine services at the highest alert level of COVID-19). After the start of the pandemic, three countries dropped requirements that prescriptions could only be written in the physical presence of the patient, and seven countries relaxed a prerequisite that patients were only allowed to have teleconsultations with physicians with whom they had already consulted in-person before. Countries – such as Estonia and Türkiye – introduced new legislation, or revised existing laws, to authorise or regulate the use of telemedicine after the start of the pandemic. In the United States, through the CARES Act provisions, Medicare telehealth restrictions that previously only allowed rural providers to offer telehealth were waived during the pandemic.

Governments also promoted the use of telemedicine through financing and provider payment. After the start of the COVID-19 pandemic, eight countries began covering real-time (synchronous) teleconsultations through government/compulsory schemes. In Belgium, while there were no significant legislative changes, in March 2020 a new legal base was adopted allowing reimbursement of telemedicine. In England**,** before the pandemic, telemedicine services for secondary care were mostly financed through voluntary schemes and out-of-pocket payments; after the start of the pandemic, they were covered by government/compulsory financing. In the United States, for the first time, audio-only telehealth services were allowed in fee-for-service Medicare during the pandemic. While there have been limited changes to the financing of asynchronous store-and-forward telemedicine services during the pandemic, seven countries (Belgium, Estonia, Germany, Hungary, Ireland, Latvia and Switzerland) began covering remote patient monitoring services after the start of the COVID-19 pandemic.

The number of teleconsultations skyrocketed in the early months of the pandemic, partly offsetting the reduction in in-person care services, and playing a vital role in maintaining access to, and continuity of, care in 2020. Provisional data from the 2022 OECD Health Statistics and ad-hoc data collection on teleconsultations show that, due to the boom in remote doctor consultations, the number of total doctor consultations increased in 2020 compared to 2019 in Australia, Denmark and Norway. If not for teleconsultations, in nine OECD countries, doctor consultations would have dropped on average by 14% in 2020 compared to 2019, and not by 3.1%, as was the case. In Estonia and Lithuania , doctor consultations could have dropped three to four times more if it were not for doctor teleconsultations.

While access to remote care services among older, poorer, and rural patients remains concerning, especially in some OECD countries, available evidence suggests that after the start of the pandemic access to remote care among subgroups has been mixed, and in some ways potentially positive. For example, regarding patient age, in the United States, use of telemedicine among people aged 51 and older went up and these patients now represent a larger share of all users of remote care, and in Canada (Ontario) the highest rates of use were reported among older adults aged 65 and older. Regarding income, 2021 data from the United States suggests that rates of telemedicine use were highest among patients on lower incomes. Based on a recent analysis in the United States, there are significant differences across groups of patients in the use of audio-only versus video telehealth, with lower rates of video use (and higher use of audio-only) found among patients with a high school diploma, adults ages 65 and older, patients with low incomes, and Latino, Asian and Black individuals.

Across the OECD, patients who have used telemedicine services are overwhelmingly satisfied, with broad agreement on the value of remote care services among patients across and within countries. There is also plenty of evidence that telemedicine services save patients money and time. From a patient's perspective, the evidence seems to indicate clearly that telemedicine services represent good value for money. Unsurprisingly, around two in five patients who used remote care services during the pandemic prefer remote to in-person appointments.

Compared to patients, physicians have more mixed views of the role of remote care services in a new phase of the pandemic in which most people are vaccinated and in-person services have mostly resumed. There is concern among health care professionals that scaling-up remote care services so quickly during the pandemic may have led to unnecessary and substandard care. Some physicians expect to reduce their provision of telemedicine services or even stop providing them altogether following a period of increased use in 2020. Moreover, in some OECD countries, telemedicine policies introduced at the start of the pandemic are temporary and may end up being reversed. Changes to regulations in 16 countries, and to financing in 12 countries, are temporary and subject to ongoing or periodic review. Temporary changes have so far been extended multiple times since the onset of the pandemic, but it is possible that despite significant demand from patients for remote care services, these may soon become unavailable or, as before the pandemic, subject to strict regulations.

A key underlying uncertainty for policy makers and health care providers is whether telemedicine services substitute for or complement in-person care, and if they are complements then whether they are cost-effective services. From the perspective of health systems, it is still debated whether remote care is good value for money or wasteful. On the one hand, there is a good deal of data suggesting that telemedicine services reduce subsequent (and more costly) health care utilisation and lower the chances that patients will miss appointments. On the other hand, teleconsultations can lead to subsequent (duplicative) in-person care and, under certain provider payment schemes, may lead to higher spending at no extra value for health systems and patients. Beyond the question of whether telemedicine services are substitutes or complements to in-person care, there is evidence to suggest that the use of remote care services can be beneficial for climate-related policies, by reducing travel and, during the pandemic, avoiding the use of personal protective equipment.

Data are needed to understand whether telemedicine services represent good value for money for health care systems, yet there is a lack of data collection in OECD countries on the reasons why patients use teleconsultations and on subsequent use of health care services following a teleconsultation. Indeed, the COVID-19 pandemic has provided a great natural experiment in the use of telemedicine services, creating opportunities to explore the impact of remote care services on different aspects of health system performance, but not all countries have taken advantage of these opportunities to collect data and conduct studies. Only ten countries reported that there are data collections on quality indicators such as safety, health outcomes and avoidable admissions.

As governments, societies and economies adapt to a new phase of the pandemic, this is an opportune moment for debate among citizens, health care providers and policy makers regarding whether to continue using telemedicine services, how to regulate their use, how to pay for them, and how to make sure that they constitute good value for money for all.

4.1. Promoting high-quality, efficient, and equitable use of telemedicine

Before the COVID-19 pandemic, policies on remote care varied widely both across and within countries, for example regarding the types of telemedicine allowed, the funding and provider payment schemes used, requirements in terms of distance between participants, eligibility of health workers and patients to participate, patient consent, and integration with traditional in-person health care services. After the start of the pandemic, telemedicine services became more widely available due to swift government actions

across the OECD, but this does not mean that there was a homogenisation of regulations concerning care delivered via telemedicine. There are still meaningful differences in how remote care is organised, regulated, and financed across the OECD, and large differences in the importance of telemedicine services as a share of all health care provided in countries and subnational areas. In other words, countries are starting from very different places, needs and preferences.

Notwithstanding, indeed because of, the significant heterogeneity in telemedicine use in the OECD, there are three priorities that policy makers in all countries could consider:

- **Learn more about which patients are using remote care services, why they are using, or not using, these services and what happens after they use them.** This is essential to inform discussions of the impact of telemedicine services on health care system performance. Without data and analysis, it is not possible to determine whether remote care services are reducing or compounding inequalities in access and outcomes, whether they are duplicating care or replacing more costly services, whether they are improving patient experience and health outcomes or risking patient safety. Relevant data include patient characteristics (e.g. employment, location), the reason for a teleconsultation (e.g. requesting a repeat prescription, presenting a new health problem), the outcome of the teleconsultation (e.g. end of episode, referral to in-person appointment), and what would have happened if the patient had not received a teleconsultation (e.g. unmet need, use of emergency department). All these data are crucial to determine whether spending on telemedicine services is improving access, quality (including safety, effectiveness and patient-centredness), equity and cost-effectiveness. Implementing the OECD Recommendation on Health Data Governance would be an important first step in fostering the use of data while protecting privacy and data security (OECD, 2022[1]). The use of electronic health records to share data across providers and allow patients access to their own data is improving (Oderkirk, 2017[2]), but as mentioned data on important indicators is not collected, analysed, or shared.
- **Investigate whether payment for provision of telemedicine services and prices, are creating economic signals and incentives that promote good value for money.** After the start of the pandemic, governments used financial incentives to successfully promote the use of telemedicine services, from introducing payment parity with equivalent in-person care, to additional fees for teleconsultations, and separate payment for ancillary costs. Yet, it is far from clear that current prices (e.g. payment parity) and provider payment mechanisms (e.g. fee-for-service) for remote care services are incentivising and promoting cost-effective uses of telemedicine. Setting prices at an appropriate level involves factoring in the unit costs of providing services, economies of scale and scope, high entry and capital costs, as well as marginal benefits of quality (Lorenzoni, Bunyan and Milstein, 2022[3]). The base for payment should contribute to, rather than detract from, health system objectives: while fee-for-service may be a good model to promote use of telemedicine in early stages of adoption, it may not be the best model to promote efficiency once telemedicine has been scaled up. Presently, there are limited data on costs (e.g. what is the unit cost of a teleconsultation) and utilisation (see previous point) to inform decisions concerning provider payment arrangements and prices.
- **Foster integration between remote and in-person care services so that these are fully co-ordinated and part of a seamless care pathway.** In-person care and telemedicine services are currently fragmented, with some providers going digital-only and others deciding to stop using remote care altogether. This fragmented model of care is not evidence-based and does not serve the interests of patients who must navigate health care services that are not centred on their needs. Integrating remote and in-person care services relies on a strong information system to ensure information sharing between providers and patients across levels of care, financial incentives and payment mechanisms that incentivise sharing of information, and local level involvement from the community, with participation from all stakeholders, to ensure sustainable change.

All three priorities rely heavily on data being collected, analysed, and reported. Presently, the discourse around remote care services is dominated by limited anecdotal evidence and concerns about risks that cannot be quantified due to a lack of data. Every day, throughout the OECD, thousands of patients consult with health workers both in-person and remotely, but most information about these encounters is not collected, not linked, or not analysed. In the case of telemedicine, this lack of data collection and analysis is even more glaring given the medical act itself is only possible due to the use of information and communication technologies.

Telemedicine is only a tool, and, like any other tool, it can be well used or misused. When well used it can be beneficial for patients and health systems. The first policy priority is key to identifying what are value-adding uses of remote care. The second priority ensures that providers are rewarded for adopting remote care services that constitute good value for money, and that patients have access to these services. The third priority builds on the previous two, ensuring that health care workers and policy makers keep learning and improving the performance of the health system. It is worth remembering that the COVID-19 pandemic is not over, and it could become yet again an acute public health crisis. The progress made in the last years should not be wasted.

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Annex A. Country participation in data collection

Table A.1. Participation in OECD Survey on Telemedicine and COVID-19, 2021-22

Country participation as of 18 May 2022

Country	Participation
Australia	Participated
Austria	Participated
Belgium	Participated
Canada	Participated
Chile	Did not participate
Costa Rica	Participated
Colombia	Did not participate
Czech Republic	Participated
Denmark	Did not participate
Estonia	Participated
Finland	Participated
France	Participated
Germany	Participated
Greece	Did not participate
Hungary	Participated
Iceland	Participated
Ireland	Participated
Israel	Participated
Italy	Did not participate
Japan	Participated
Korea	Participated
Latvia	Participated
Lithuania	Participated
Luxembourg	Participated
Mexico	Participated
Netherlands	Participated
New Zealand	Participated *
Norway	Participated
Poland	Participated
Portugal	Participated
Slovak Republic	Did not participate
Slovenia	Participated
Spain	Did not participate
Sweden	Participated
Switzerland	Participated
Türkiye	Participated
United Kingdom (England)	Participated
United States	Participated

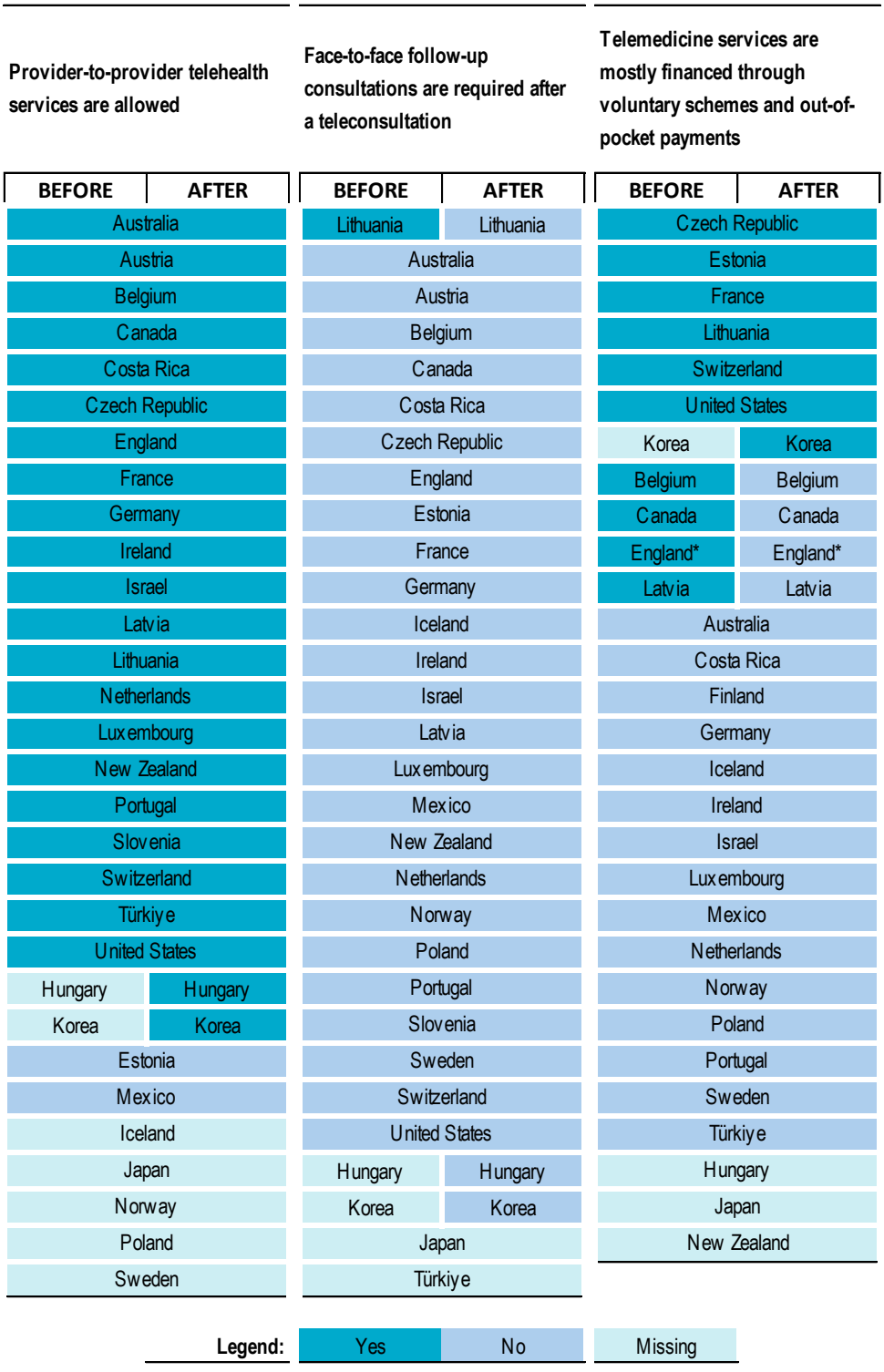
* participated through a semi-structured interview.

Annex B. Supplementary results from the OECD Survey on Telemedicine and COVID-19, 2021-22

The figures below (Figure B.1, Figure B.2 and Figure B.3) provide responses from countries to questions in the OECD Survey on Telemedicine and COVID-19 that are mentioned in the main text of this report but omitted from the main text for readability.

Figure B.1. Changes to regulations and financing to promote use of telemedicine

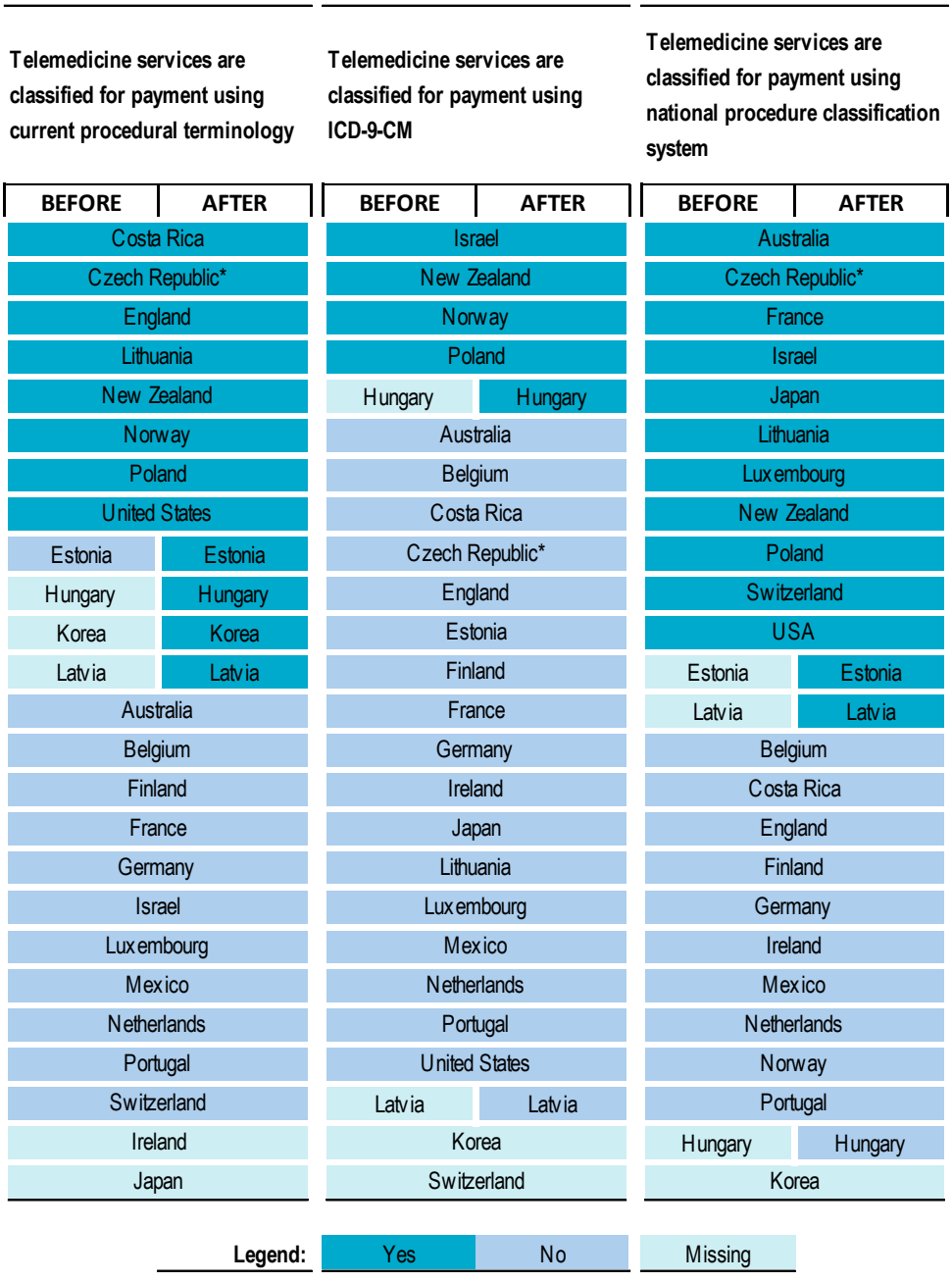
Country agreement with statements before and after the start of the COVID-19 pandemic



Note: * Only applicable for General Practitioners and other Medical Officers practicing in general practice. Agreement with statements is shown for both before March 2020 (i.e. before the start of the pandemic) and after March 2020 (i.e. after the start of the pandemic). Finland did not respond to the first two questions. Austria and Slovenia did not respond to the third question.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

Figure B.2. Classification of telemedicine services for payment

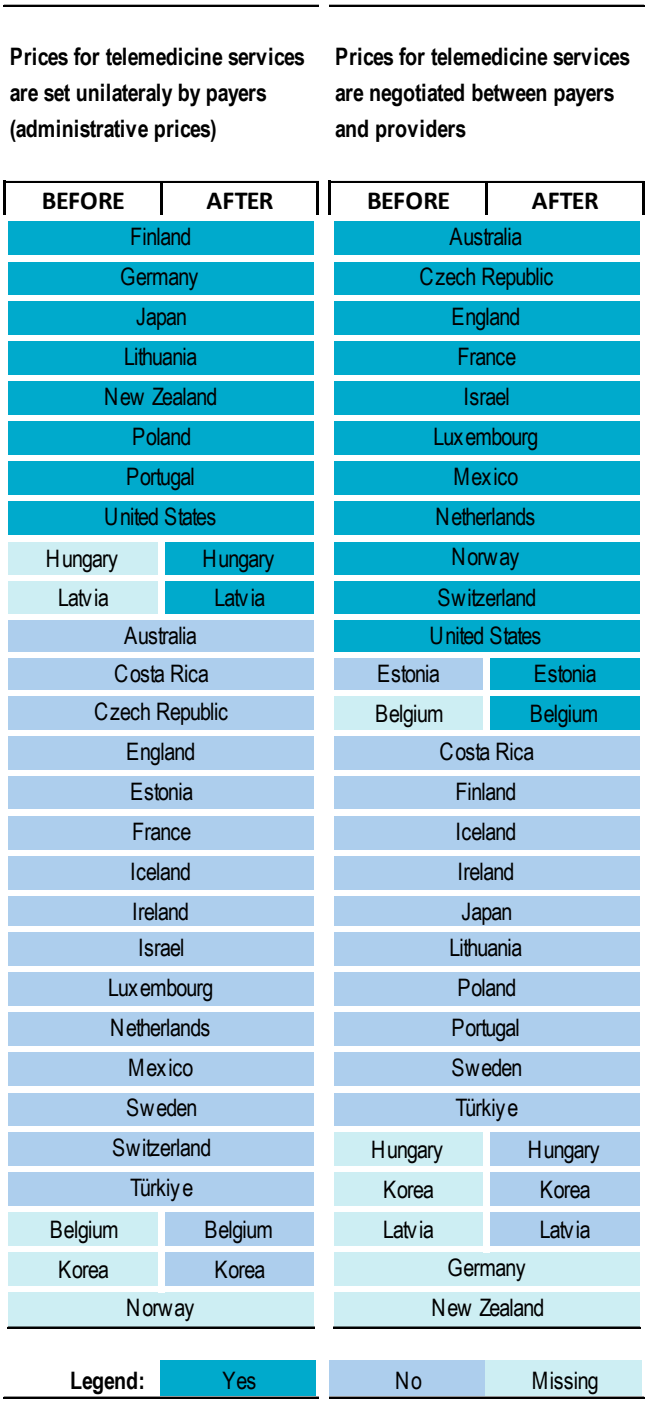
Country agreement with statements before and after the start of the COVID-19 pandemic



Note: * there is no systematic approach to assessment and classification of telemedicine services for reimbursement and the stated answers approximate present practices in reimbursement of medical actions covering some kind of telemedicine services.
Source: OECD Survey on Telemedicine and COVID-19 (2022).

Figure B.3. How prices for telemedicine services are set

Country agreement with statements before and after the start of the COVID-19 pandemic



Source: OECD Survey on Telemedicine and COVID-19 (2022).

Annex C. Systematic review of the literature

Background and motivation

Research undertaken prior to the COVID-19 pandemic highlighted the challenges in the analysis of peer-reviewed articles on telemedicine. The previous search conducted by the OECD was forced to limit the inclusion criteria to only systematic reviews given the high number of records returned when searching the term "telemedicine" in scientific publication databases. Since the COVID-19 pandemic, there has been a significant increase in the use of telemedicine to ensure continued access to health services and to limit the spread of the disease. Health services are now using an increasingly mixed approach to delivering health care, including both in-person and telemedicine services. It is therefore critical to understand the use and impact of telemedicine as a tool for the delivery of patient care. To address this gap in knowledge, a literature review has been undertaken to obtain insights from a wider range of peer-reviewed and grey literature on telemedicine, focusing on evidence published since January 2020.

Definitions

Telemedicine can be defined as "the use of telecommunication systems to deliver health care at a distance" (see Box 1.1). Telemedicine can be split into three categories, which can be combined as appropriate:

- Remote monitoring: This is the use of mobile devices and platforms to conduct routine medical tests, communicate the results to health care professionals in real-time, and potentially launch pre-programmed automated responses.
- Store and forward applications: These systems are used for clinical data that are less time-sensitive and for which a delay between transmission and response is acceptable (e.g. they have been widely used in dermatology and in regions with poor connectivity that precludes real-time transmissions).
- Interactive (real-time) telemedicine: This involves direct and synchronous communication between health care professionals (e.g. in health care facilities or dedicated telemedicine centres) and patients (e.g. at home or in health facilities).

This definition of telemedicine excludes:

- Applications that do not involve any sharing of data or interaction between the patient and a health care provider/professional.
- Physician education and provider-to-provider communications.

Objectives

The aim of this literature review is to capture high quality evidence of the use of telemedicine in OECD countries since the onset of the COVID-19 pandemic, and to clarify the impact of the pandemic on the use of telemedicine. The search has included all OECD countries.

The main objective of this systematic review is to assess the impact of telemedicine services on the following five dimensions related to health care system performance (see Chapter 3):

- Assessment of user (e.g. patients, health care workers) satisfaction with telemedicine services.

- Evaluation of the impact of telemedicine services on patient safety.
- Utilisation rates by socio-economic status and demographics.
- Utilisation rates by type of telemedicine (video, remote monitoring, asynchronous).
- Cost analysis (e.g. economic evaluation) and pricing of telemedicine services.

Review protocol

Study design

A systematic review was performed, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Source*s and search Strategy*

A systematic search of the literature published between January 2020 and May 2022 was performed on PubMed/Medline, the Health Management and Policy Database from the Health Information Management Consortium (HMIC), and the Cochrane Library, using a combination of controlled terms or free text depending on the database functionality (e.g. “Telemedicine (MESH term)” or “Telemedicine” free text). The keywords “Telemedicine” and “Teleconsultation” were each searched to maximise results towards ensuring the search picked up all relevant publications in the set timeframe. The OECD countries were used as keywords in the search. A search of grey literature within the same time parameters was undertaken to identify possible additional studies that meet the inclusion criteria. Searches were conducted on the websites of relevant stakeholder organisations (OECD and World Health Organization (including WHO regional offices and WHO ICTRP Search Portal)), relevant national Departments of Health, and conference proceedings of several related conferences.

Inclusion and exclusion criteria

To be included in the systematic review, individual studies had to adhere to the following criteria:

- Studies will be included if they (1) had an intervention consisting of a telemedicine approach as defined above (alone or part of a complex intervention) and/or (2) evaluated the impact in quality of care, in an OECD country.
- Types of studies considered will include systematic reviews and/or meta-analysis, randomised control trials, cohort studies, case-controlled studies, cross-sectional studies and surveys, or case studies.
- Published between 1 January 2020 and 31 May 2022.
- Published in the English language.

The exclusion criteria for the systematic review included:

- Feasibility studies.
- Non-systematic reviews.
- Commentary and editorial papers.
- Publications for which the full manuscript was unavailable.

Data collection and analysis

Two independent researchers (NO, KL) performed the title, abstract, and full-text screening based on the inclusion criteria. Conflicts were resolved by consensus at each stage of the process.

Data extraction and management

Data from the included studies was downloaded directly from the publication databases by a member of the research team (NO) and uploaded into Covidence, a software for systematic review management. The data extracted for each study included: title, authors, year of publication, characteristics of the intervention, and summary of main outcomes.

Assessment of methodological quality of included reviews

The quality of included publications was not assessed. However, an independent researcher (ALN) reviewed the full list of included publications following full-text screening to ensure that only academic studies and grey literature that met pre-specified criteria of rigour, including the quality of included primary studies, were listed in the results tables.

Data synthesis

The data were synthesised according to the following areas:

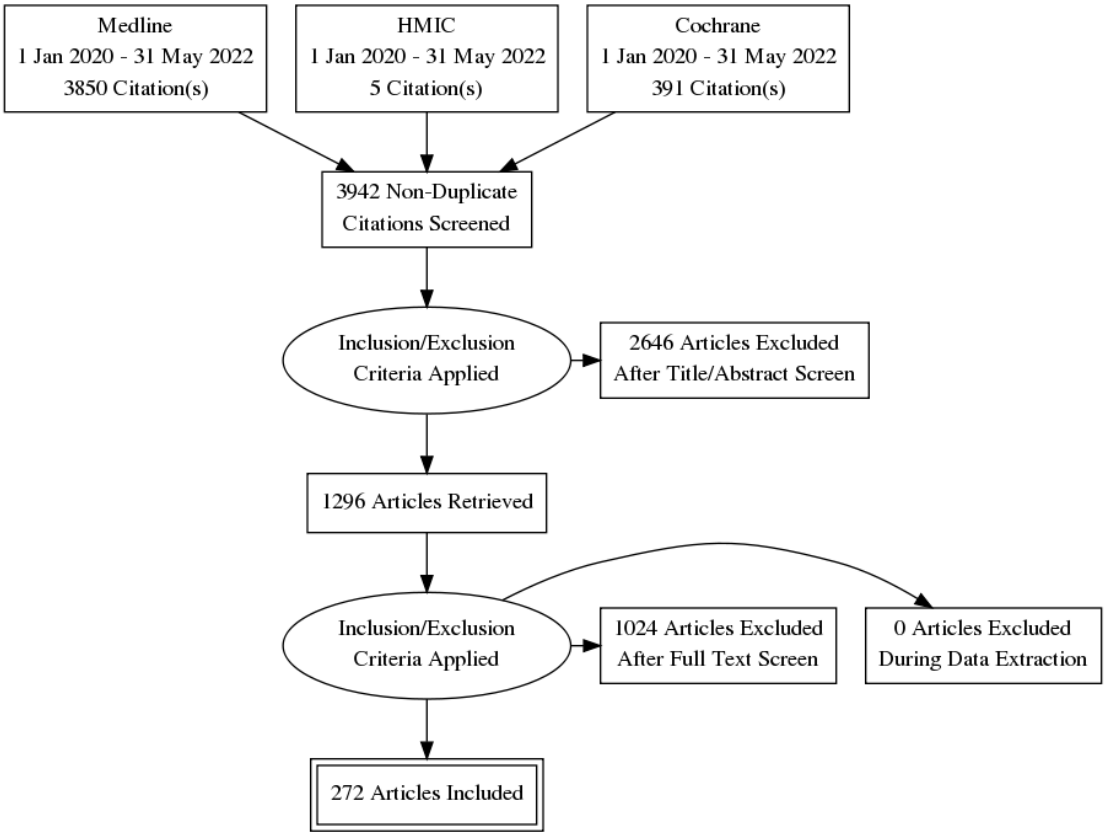
- User satisfaction with telemedicine services;
- Impact of telemedicine services on patient safety;
- Utilisation rates by socio-economic status and demographics;
- Utilisation rates by type of telemedicine and;
- Cost analysis and pricing of telemedicine services.

The focus of data presentation is descriptive, with tabular and graphical presentations where appropriate. Due to heterogeneity of populations, interventions, and outcomes (PICOs) across the included studies, no attempt was made to compare telemedicine interventions across reviews or across review populations.

Results

Figure C.1 summarises the review selection process in a PRIMSA diagram. The searches yielded 3 942 results after duplicates were removed, of which 2 646 were not directly relevant to the outcomes of the review and were excluded at the title and abstract screening stage. Full texts were reviewed for 1 296 studies to assess eligibility, and 272 were eventually included in this review. The grey literature search yielded 5 additional relevant results.

Figure C.1. PRISMA diagram for literature review



Summary of specialty areas

A total of 240 reviews addressed specific specialty or disease areas, while 32 reviews either did not address a specific specialty or addressed more than two areas. Reviews that assessed two diseases or specialty areas were included as double listings in Table C.1 below resulting in a total of 283 entries. The included studies undertook research across 28 medical specialties/specialty groups, with 32 (11.3%) of papers not specifying the medical specialty or covering more than two specialties (Table C.1). The most common specialties in the included reviews were cardiology (9.5%), mental health, psychology, and psychiatry (9.5%), and surgery (7.4%). The least common were dentistry (0.3%), haematology (0.3%), and neonatal care (0.1%).

Table C.1. Summary of specialty areas in included studies

Medical specialty	Number of studies (% of total)
Anaesthesiology	2 (0.7%)
Cardiology	27 (9.5%)
Dentistry	1 (0.3%)
Dermatology	8 (2.8%)
Emergency Medicine	6 (2.1%)
Endocrinology	17 (6%)
Family Medicine	7 (2.4%)
Gastroenterology	8 (2.8%)
Genetics	2 (0.7%)
Haematology	1 (0.3%)

Medical specialty	Number of studies (% of total)
Hepatology	2 (0.7%)
Infectious Disease	4 (1.4%)
Intensive Care Medicine	2 (0.7%)
Mental Health / Psychology / Psychiatry	27 (9.5%)
Neonatal care	1 (0.3%)
Neurology	16 (5.6%)
Not specified/Multiple	32 (11.3%)
Obstetrics / Reproductive Medicine	12 (4.2%)
Oncology	16 (5.6%)
Ophthalmology	5 (1.7%)
Orthopedics	10 (3.5%)
Otolaryngology / Otology	8 (2.8%)
Pediatrics	12 (4.2%)
Pharmacy	4 (1.4%)
Physiotherapy / Rehabilitation	11 (3.8%)
Respiratory	11 (3.8%)
Rheumatology	4 (1.4%)
Surgery	21 (7.4%)
Urology	6 (2.1%)

Note: Reviews that assess two diseases or specialty areas are included as double listings, resulting in a total of 283 entries.

Brief summary of findings

The included studies most commonly reported on user satisfaction with telemedicine (142 studies), which includes patient, carer, and clinician satisfaction. However, many studies reported on the cost of telemedicine (87 studies), the impact of telemedicine on patient safety (45 studies), telemedicine use by socio-economic and demographic group (37 studies), and telemedicine use by type of technology (22 studies). Narrative results of these five areas are presented below.

User satisfaction with telemedicine services

Patient and carer satisfaction with telemedicine

Of the 142 studies included in the systematic review, 110 (77.5%) focused only on patients and 21 (14.8%) examined both patients and clinicians. Ten (7.0%) studies included in the systematic review did not specify the user group in their results. Overall, there were positive findings in relation to patient and carer satisfaction with telemedicine, with 90 (68.7%) of the 131 studies investigating patient and carer satisfaction reporting either positive satisfaction, usability, or acceptability. Two (1.5%) studies reported poor patient and carer satisfaction with telemedicine, and 23 (17.6%) studies found that when telemedicine was compared with a control group, there was no difference in patient and carer satisfaction between options. Twelve (9.2%) studies had mixed results, while four (3.1%) had unclear findings due to inconsistent reporting of patient and carer satisfaction, or unclear results.

Drivers behind patient and carer satisfaction with telemedicine

The primary drivers of patient and carer satisfaction with telemedicine were the ease of use, access, and convenience that it provides to patients. This was particularly so for the management of chronic conditions, reducing the need of patients to attend multiple appointments in-person while in the safety and security of their home. The ability of telemedicine to reach people who may not engage in in-person care, and how it can enhance the clinician-patient relationship, were also discussed. Conversely, a common barrier identified was the heterogeneity of patients and their changing care and service needs. As a result, not all patients would be suitable candidates for telemedicine, especially given their changing needs over time.

Technology infrastructure, particularly user interface, internet connection and software, were highlighted as areas for improvement. One of the two studies found via the grey literature review echoed findings that patient and carer satisfaction was associated with the technical performance of telemedicine systems (Wherton and Greenhalgh, 2020[1]). Health inequities related to telemedicine require further investigation in the future, as one study highlighted higher satisfaction in higher income households.

Clinician satisfaction with telemedicine

Only one (0.8%) study focused solely on clinicians while, as mentioned above, 21 (15.7%) studies examined both patient and clinician satisfaction with telemedicine. Clinician satisfaction follows a similar pattern to patients, with 16 (72.2%) studies reporting positive satisfaction. Mixed results were found in 3 (13.6%) studies as varying satisfaction levels were reported among clinicians, while 1 (4.5%) study found no significant difference in clinician satisfaction. Two studies (9.1%) had unclear results due to inadequate data collection. The grey literature search led to the discovery of an additional paper reporting clinician satisfaction based on a systematic review where 89% of included studies showed moderate to high levels of physician satisfaction with telemedicine (Hoff and Lee, 2022[2]).

Drivers behind clinician satisfaction with telemedicine

Themes identified in clinician satisfaction with telemedicine use were like those identified for patients, such as the need for individualised services and the ability to effectively manage chronic conditions remotely. Factors that were associated with greater satisfaction in clinicians included telemedicine call quality and comfort using telemedicine. Concerns that were unique to clinicians included the fear that telemedicine would result in compromised safety and quality of care, although these perceptions improved over time.

Impact of telemedicine services on patient safety

The patient safety impact of telemedicine services was reported in 45 studies identified through the systematic review. Of these, 20 (44.4%) assessed the adverse events or errors that occurred using telemedicine interventions, 4 (8.8%) assessed hospital readmission and/or deaths, 3 (6.6%) assessed the safety of technology, 3 (6.6%) assessed patient/clinician perceptions of safety, and 2 (4.4%) other safety outcomes not specified. Thirteen (28.8%) papers did not provide clear information on how patient safety was assessed.

Of the 28 original research papers which reported on patient safety, the majority (71.4%) reported positive safety outcomes or outcomes comparable with equivalent in-person treatment. Four (14.2%) of the studies reported negative outcomes or poorer outcomes compared to in-person care. Of these, two studies (from Canada and Germany) related to medication and drug errors (Amkreutz et al., 2020[3]; McGillion et al., 2021[4]) and two studies (from Germany and the United States) were related to technological issues with the potential for patient harm (e.g. poor or missing audio, interrupted sessions, problems with data storage) (Willems et al., 2021[5]; Rametta et al., 2020[6]).

Safety and quality of telehealth interventions was also assessed using subjective reporting by either clinicians or patients. Three systematic reviews reported that the quality was satisfactory, two reported that patients found virtual clinics safe and of good quality (Vinade Chagas et al., 2021[7]; Edison et al., 2020[8]) and one reported that 81% of clinical staff considered the quality of telemedicine good or excellent (Appleton et al., 2021[9]).

Notably, one systematic review found that the impact of electronic visits (involving asynchronous communication between clinicians and patients) on quality of care varied across conditions. It was equivalent or better for chronic conditions, but variable quality was observed in infection management (Nguyen et al., 2021[10]).

Utilisation rates by socio-economic status and demographic group

Telemedicine use by socio-economic status and demographic group was reported in 37 studies. Of these, two were systematic reviews and 35 were original research studies. Twenty-six (74.2%) were undertaken in the United States, and the remaining nine (25.7%) were undertaken in Australia, Chile, Colombia, Finland, France, Germany, Italy, and the Netherlands. Given the heterogeneity of patient cohorts across the studies, further research is required to determine whether the usage trends seen in the results are consistent across OECD countries, medical specialties, and patient groups.

Findings by specific socio-economic and demographic variable

Twenty-five (24.2%) studies reported on utilisation by age. However, based on the heterogeneity of patient cohorts, it is not possible to draw meaningful conclusions on whether telemedicine is used more often by specific age groups.

Twenty-one studies (20.3%) reported utilisation by sex/gender. In this review, the terms sex and gender are used interchangeably as there was no consistency among the studies. Twelve of the studies (57.4%) found that telemedicine was more often used by women, while four (19%) reported telemedicine more often used by men, three (14.2%) reported no difference in utilisation or mixed results, and two studies (9.5%) were unclear or did not make a comparison.

Seventeen studies (16.5%) reported utilisation by race/ethnicity. Again, the terms race and ethnicity are used interchangeably as there was no consistency among the studies. While there were six studies (35.2%) which reported unclear findings or did not make a comparison in usage between ethnic groups, eight studies (47%) found that White patients were more likely to use telemedicine and three studies (17.6%) found no significant difference in telemedicine usage. No studies found greater telemedicine use among ethnic minority groups.

Thirteen studies reported utilisation by location. Of these, three studies (23%), all from the United States, measured differences in use between national geographic regions, three (23%) measured differences based on the patients' distance to medical facilities, and seven (53.8%) measured differences in use between populations living in urban and rural areas. Of these seven studies, six (85.7%) reported greater use of telemedicine among urban dwelling patients and one study reported unclear findings.

Beyond the most explored socio-economic and demographic variables in the systematic review results, nine studies (8.7%) reported results on use of telemedicine by type of health insurance, six (5.8%) by educational attainment level, six (5.8%) by socio-economic status (SES), four (3.8%) by first-language of patients, and two (1.9%) by employment status. One study discovered through the grey literature search also explored telemedicine use by income level and found no significant difference in use (Havasy, 2020[11]).

Several of the included studies noted that through the COVID-19 pandemic, the use of telemedicine increased among men, ethnic minorities, older people, and those from a lower SES.

Utilisation rates by type of telemedicine

Telemedicine use by type of technology was the area of focus least reported in the literature. Of the 22 studies which presented results on telemedicine use by type of technology, 12 (54.5%) were systematic reviews, one (4.5%) was a systematic review and meta-analysis, and nine (40.9%) were original research studies. Six (66.6%) of the original research studies were undertaken in the United States, and the remaining three (44.3%) were undertaken in Australia, Canada, and France.

Of the 22 studies reporting on type of telemedicine, 21 described teleconsultations and seven discussed remote monitoring. Seven (33.3%) of the 21 studies reporting on teleconsultations, reported the use of telephone and video technology in delivering telemedicine only, while 10 (47.62%) reported the use of

telephone and video technology as well as other technologies, including remote monitoring technologies, virtual/augmented reality, online programmes, smartphone applications, Internet/Internet of things (IoT)/cloud computing, and social media/network. One (4.76%) of the studies reported on the broader use of technologies only and three (14.2%) of the studies did not specify the specific technology used to deliver teleconsultations.

Of the three studies that described the type of tele-transmission used to facilitate teleconsultation, all reported the use of a combination of synchronous and asynchronous telemedicine, with synchronous being the primary form of contact. For example, one study (from the United States) noted that, of all telemedicine visits, 179 were synchronous video and audio, 15 were synchronous audio-only, and 4 were asynchronous interprofessional consults (Moss et al., 2021[12]).

Cost analysis and pricing of telemedicine services

The cost of telemedicine services was reported in 87 studies identified through the systematic review. Of these, 45 were original research papers where 31 reported costs only and 14 reported cost-effectiveness. Twenty-five (80.6%) of the 31 papers which only calculated costs reported that telemedicine care reduced costs as compared to usual in-person care (including costs incurred by patients which were measured in four of the studies), 3 (9.6%) reported no significant difference in costs,1 (3.2%) reported increased costs using telemedicine, and two (6.4%) were unclear in their results. On cost-effectiveness, 12 (85.7%) of the 14 studies reported that telemedicine was more cost-effective than usual in-person care, 1 (7.1%) study found no difference in cost-effectiveness, and 1 (7.1%) study was unclear in the reporting of results.

Drivers behind cost reductions and cost-effectiveness results

The primary drivers of cost reductions were time savings for both patient and provider; for the former, time savings included travel time and reduced need to take time off work. This was particularly so for the management of chronic conditions, reducing the need for patients to attend multiple appointments in-person. On the provider side, cost savings were also derived from reduced unplanned hospital visits and admissions, as well as subsequent lower ambulance transportation fees.

Conversely, a common cost barrier identified was the costs required to set up technology to facilitate telemedicine, including virtual consultation platforms, and their longer-term maintenance. As a result, cost-effectiveness analysis is required as cost savings varied substantially between studies, with providers required to consider variables, such as treating a minimum number of patients, or treating patients living a set geographic distance from the health facility, to determine the cost savings from telemedicine use.

Detailed overview of findings

Tables D.1 to D.5 in Annex D provide more detailed information on the studies included in the systematic review.

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Annex D. Overview tables of the literature review

Table D.1. Overview of included papers with results on user satisfaction with telemedicine

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Aiken et al. 2021	Cohort study	United Kingdom		3 largest abortion providers in England	54 142 patients who accessed an early medical abortion	Comparison of outcomes before and after implementation of medical abortion (termination of pregnancy) without ultrasound via telemedicine	Additional dose of misoprostol provided via telemedicine	Additional dose of misoprostol provided via in-person clinic visit	• Acceptability of telemedicine was high (96% satisfied) and 80% reported a future preference for telemedicine See Table D.2 for patient safety results
Al-Arkee et al. 2021	Systematic review and meta-analysis	Austria, Sweden, United States	16	Multiple	Patients with cardiovascular disease (CVD)	A systematic review and meta-analysis of RCTs on mobile apps to improve medication adherence	App in conjunction with a package of participant support	App alone	• One study used a validated System Usability Scale to demonstrate greater usability in the app intervention arm than in the control arm (intervention: mean 87.3, SD 13.9 vs control: mean 78.1, SD 18.9; P =.001) • Three trials evaluated app usability with non-validated questionnaires and obtained positive feedback from 80% or more of the participants • Patients with stroke rated the app extremely good as a medication management tool and as means to improve physician-patient rapport • Patients with atrial fibrillation felt that the study app was user-friendly and helpful with additional positive feedback from physicians
Appleton et al. 2021	Systematic review	Multiple	77	Multiple	Staff working within the field of mental health, people receiving organised mental health care for any condition, family members or carers of people receiving mental health care	Investigation of the adoption and impacts of tele-mental health approaches during the COVID-19 pandemic, and facilitators and barriers to optimal implementation	Any form of spoken or written communication carried out between mental health professionals and service users/family members/unpaid carers	Any mental health communication delivered face-to-face, digitally or remotely, waitlist control, or placebo	• Remote care was seen as satisfactory by the majority of clinicians and service users in most studies • A number of studies also reported that tele-mental health enabled some groups to access care who found it difficult to engage with face-to-face support • While acceptability was high overall, this was not the case for all groups See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Aquilanti et al. 2020	Systematic review	Australia, France, Germany	13	Multiple	Patients and health practitioners	Assessment of the feasibility of teledentistry in communities or in a domiciliary setting where elderly people live	Teledentistry	None	• A high level of acceptability of teledentistry was reported in the majority of the articles included in this review among patients, patients' families, and caregivers • Survey-based studies showed satisfaction among the users because of the increased confidence in residential aged care facilities
Augestad et al. 2020	RCT	Norway		University hospital and 5 medical centres	110 patients with a stoma	Investigation of the QoL of patients with a stoma, followed up in a hospital outpatient setting (controls) or by teleconsultation (intervention)	Teleconsultation (TC)	Hospital outpatient setting	• Overall, there were no significant differences in the experience of hospital versus TC consultation (P = 1·000), and most patients in the TC group chose TC over hospital follow-up as their next consultation option (P < 0·001)
Baltaxe et al. 2020	RCT	Spain		1 hospital clinic	67 adult patients with chronic respiratory failure	RCT of a home-based non-invasive ventilation intervention supported by a mobile health app	Face to face psychologist motivational intervention, followed up by a mobile app that allowed patients to report the number of hours of daily non-invasive ventilation use and problems with the therapy; advice was automatically delivered by the mobile app in case of a reported problem	App use	• The patient satisfaction score was –3 (10/33, 31% promoters; 11/33, 34% passives; 11/33, 34% detractors) • The 3 Likert-scale questions about the general satisfaction with the app that were rated from 1 (very bad) to 10 (very good) resulted in a mean score of 7.5/10 for the general impression of the app, mean score of 8.2/10 for the user friendliness, and mean score of 8.5/10 for usability of the app without assistance

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Banks et al. 2021	Series of cross-sectional surveys	Ireland		2 epilepsy centres	1 180 patients receiving epilepsy care through telemedicine from 23rd Dec 2019 to 23rd Mar 2020 and 21 clinicians providing the care	Exploration of the perceptions of chronic epilepsy management via telephone consultations from a clinician and patient perspective	Telephone consultations	None	• Clinicians expressed strong levels of satisfaction, but some doubted the suitability of new patients to the service or candidates for surgery receiving care via telemedicine • Patients reported positive experiences surrounding telephone appointments comparing them favourably to face-to-face encounters • The survey showed that telemedicine is seen as an effective and satisfactory method of delivering chronic outpatient care
Barnett et al. 2021	Systematic review	Australia, Canada, Colombia, Denmark, France, Germany, Israel, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland the United Kingdom, United States	19	Multiple – Umbrella review	Staff working within the field of mental health, people receiving mental health care or with mental health diagnoses, family members, or carers of people receiving mental health care	Umbrella review of systematic reviews available on the literature and evidence-based guidance on telemental health, including both qualitative and quantitative literature	Any form of spoken or written communication conducted between mental health professionals and patients, service users, family members, carers, or other mental health professionals using either the internet or the telephone	None	• Clinician satisfaction was reported in 5 reviews and patient satisfaction was reported in 7 reviews • Overall, clinicians tend to report a preference for face-to-face interventions for both assessment and treatment. However, some reviews have reported that clinicians find video-based therapies to be acceptable. • High patient satisfaction was generally reported and patients tended to find remote interventions as satisfactory as face-to-face alternatives • One review reported a few studies indicating preference for face-to-face interventions and a review of older people noted that initial scepticism between both service users and providers tended to dissipate following positive experiences of videoconferencing See Table D.2 for patient safety results
Bekkelund et al. 2021	RCT	Norway		1 neurological hospital department	402 headache patients	Examination to determine whether video consultations are noninferior to face-to-face consultations in treating chronic headache patients referred to a specialist in Northern Norway	Video consultations	Face-to-face consultations	• Patient satisfaction with consultations were 86.5% (32/37; video) and 93.3% (28/30; face-to-face; P =.25)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Berlin et al. 2021	Cohort study	Canada		1 hospital cancer centre	3 507 cancer patients and 284 practitioners	Examination of the outcomes of a cancer centre – wide virtual care programme in response to the COVID-19 pandemic	Cancer centre – wide virtual care programme (VC)	None	• Overall, patients were highly satisfied with VC (1 808 [68%] recommended this care model), independent of VC modality • Those undergoing video calls were more likely to consider them better than in-person visits (105 [24%] vs 385 [17%] [telephone]; P = .006) and to request VC for their future appointments (330 [77%] vs 1 478 [66%] [telephone]; P < .001) • Overall practitioner satisfaction was comparable to that of patients. However, a higher proportion of physicians thought that VC led to compromises in patient care compared with in-person visits (46 [36%] in quality and 38 [31%] in safety of care vs 401 [15%] of patients for overall comparison); these perceptions improved over time See Table D.4 for use by technology results
Bertini et al. 2022	Systematic review	Australia, Canada, Israel, Italy, Korea, Norway, Spain, Switzerland, United Kingdom, United States	28	Multiple	Patients with gestational diabetes mellitus	Evaluation of the impact of remote monitoring technologies in assisting patients with gestational diabetes mellitus to achieve glycaemic goals	Remote monitoring technologies for patients with gestational diabetes mellitus	None	• Multi-platform system with Bluetooth glucometer monitoring improved user satisfaction • Many participants appreciated the ease of access (not having to keep a paper diary), ease of use, and convenience of the mobile application • In another study, remote glycemia monitoring, although glycaemic control and maternal and neonatal outcomes were similar, women preferred this model of care • Patients who used the system based on a mobile app and Bluetooth glucometer monitoring, according to a survey at the end of the study, reflect a high degree of satisfaction See Table D.4 for use by technology results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Bisson et al. 2021	Cross-sectional study	United States		1 university-affiliated orthopaedic practice	2 049 patients of all ages (children and adults) who were seen through in-person or telemedicine	Examination of the association between patient satisfaction and mode of visit (telemedicine versus in-person) and (2) predictors of patient satisfaction in a large orthopaedic practice during the onset of the pandemic	Telemedicine in a large orthopaedic practice	In-person care	• No association was found between satisfaction score and mode of visit with and without adjustment for duration of patient-physician relationship, appointment type (new versus follow-up), provider type (physician versus nonphysician), and provider subspecialty (βunadjusted = 0.004 [SE = 0.01], P = 0.44; βadjusted = 0.001 [SE = 0.01], P = 0.92) • Predictors of increased satisfaction score were White race (P = 0.001), >1 year relationship with provider (P1-3 years = 0.01, P3-5 years = 0.04, and P5+ years = 0.002), physician provider (P = 0.004), and foot/ankle provider (P = 0.04), whereas predictors of decreased PSA score were oncology provider (P = 0.02) and spine provider (P = 0.001)
Bizot et al. 2021	Cross-sectional study	France, Italy		18 hospitals and cancer centres	1 299 breast cancer patients who had at least one teleconsultation during the first wave of the COVID-19 pandemic	Examination of the satisfaction of patients with breast cancer (BC) who underwent teleconsultations during this period	Teleconsultation	None	• The mean satisfaction scores were 77.4 and 73.3 for the EORTC OUT-PATSAT 35 survey and Telemedicine Satisfaction Questionnaire scores, respectively • Multivariable analysis showed that the EORTC OUT-PATSAT 35 score correlated to age, anxiety score and teleconsultation modality. The TSQ score correlated to disease status and anxiety score

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Blanco Teres et al. 2022	Cross-sectional study	Spain		1 hospital coloproctology unit	115 patients assisted consecutively in the coloproctology unit	Analysis of patient satisfaction with the tele-assistance given in a Colorectal Surgery Unit	Phone-tele assistance	None	• The average score in each of the survey items was higher than 6 in all the questions but 1. • The factors related to greater willingness to tele-assistance were male gender (37% vs 18.8%; P =.03) and a higher academic preparation level in favour of higher technical studies (35.9%) and university studies (32.4%) opposite to the rest (P =.043) • The rest of variables studied, job status, labour regimen, diagnostic group and consultation type did not show any relationship
Bodle et al. 2021	Systematic review	Austria, Australia, Türkiye, United States	13	Multiple	Patients under treatment for acne vulgaris	Evaluation of acne vulgaris in teledermatology and identification of the differences between teledermatological examinations and face-to-face consultations	Teledermatological examinations	Face-to-face examinations	• In general, patients are mostly positive about online visits • The doctors' satisfaction with the treatment did not vary significantly, regardless of whether teledermatological or conventional treatment was used • In contrast to the patients, who can save a lot of time through teledermatological diagnoses and check-ups,13 this aspect hardly plays a role for doctors
Bonnaud et al. 2021	RCT	France		3 public hospitals and 3 private hospitals	54 patients with Crohn's disease or ulcerative colitis	Comparison of quality of life and disease activity in patients with inflammatory bowel disease monitored using a telemedicine platform versus standard care	Telemedicine platform (MaMICI)	Standard care	• Overall satisfaction with the MaMICI platform was high (mean score 7/10), and 46.2% of remaining patients in the MaMICI group continued to use the platform until 12 months

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Brown et al. 2021	Systematic review	Australia, Netherlands, United Kingdom, United States	13	Multiple	Not specified	Evaluation of the evidence for telegenetics and its applicability to future service development	Videoconferencing to deliver consultations in any area of clinical genetics	None	• Studies evaluating patient satisfaction with genetic counselling via telegenetics (n = 10) reported a high level of satisfaction with all types of counselling • Four studies controlled for participant characteristics to examine whether specific factors were associated with satisfaction. One of these found no significant difference in satisfaction between the telegenetics and the in-person groups when controlling for age, marital status, computer anxiety, Internet use, education status, and genetic testing uptake. Conversely, another found that higher education status was associated with a lower satisfaction with the telemedicine service (p = 0.02)
Brown et al. 2022	Cross-sectional study	Australia		1 tertiary-level persistent pain centre	65 patients aged 18 to 85 years with persistent pain lasting more than 12 months	Exploration of patients' thoughts and satisfaction with using videoconferencing during the COVID-19 pandemic	Videoconference pain clinic appointment	None	• Patient responses indicated that, overall, they were satisfied with the use of videoconferencing for their persistent pain consultations, particularly during the COVID-19 pandemic with lockdown • Convenience of the videoconference service was identified as a subcategory within patient satisfaction • Two patients described how they entered a consultation with another patient within the videoconferencing platform, rather than the intended therapist, contradicting the quantitative outcomes of the patient satisfaction survey, where all patients agreed that their privacy was maintained in the videoconferencing appointment

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Butler et al. 2022	Systematic review and meta-analysis	Canada, Netherlands, United States	15	Multiple	1438 children and young people	Identification of the eHealth and mHealth interventions that have been proven to be effective in supporting health outcomes for children and young people (aged 1-18 years) living with Juvenile idiopathic arthritis	eHealth and mHealth interventions	None	• In one study two paediatric rheumatologists were satisfied with the care they provided for the intervention group (IG) compared with the care they provided for the control group (CG) • Parent satisfaction did not differ between the IG and CG
Carrillo de Albornoz et al. 2022	Systematic review	Australia, Canada, Denmark, Japan, Spain, United Kingdom, United States,	11	Multiple	Not specified	Evaluation of the impact of telephone or video consultations compared to those conducted face-to-face on key patient-relevant outcomes and health care utilisation in primary care, mental health, and allied health services	Telemedicine treatment delivered via telephone or videoconference	The same therapy (as in intervention) delivered face-to-face	• Patient satisfaction with telephone and video consultations and the therapeutic alliance was high across the studies • High discontinuation rates in patients receiving teleconsultations indicated this may not be a suitable modality of health care delivery for all patients
Cartwright et al. 2021	Systematic review	Canada, Italy, Mexico, Spain, United Kingdom, United States	15	Multiple	1 334 patients on peritoneal dialysis (PD)	Identification and assessment of 'active' eHealth-based interventions to support patients and their caregivers in delivering and managing – PD	eHealth interventions	None	• Within all nine studies that reported on patient satisfaction, patients reported they were either satisfied or very satisfied with the eHealth intervention overall • Although five of the studies did not report comparison measures of satisfaction, three reported higher satisfaction than a control group and one noted no significant difference compared with pre-intervention scores

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Catalan-Matamoros et al. 2020	RCT	Norway		1 hospital	49 chronic heart patients with a pacemaker	Exploration of the communication experiences in the remote monitoring of older adults with a pacemaker	Remote monitoring (RM)	None	• In general, participants reported positive experiences about the RM option • Participants also indicated positive experiences about talking to the clinicians from home. • No participant showed any dislike of these remote conversations with clinicians • The majority of the participants (n = 9.75%) did not prefer to meet the clinicians in person. Two patients (16%) mentioned that they would have preferred to meet the clinicians in person only if their health status decreased or some problems occurred. One participant (8%) mentioned his preference to meet the clinicians sometimes in the hospital for specific questions
Champion et al. 2021	RCT	United States		1 institution	47 patients who underwent in-person and telemedicine postoperative appointments following third molar surgery	Comparison of key aspects of patient satisfaction in patients who underwent in-person and telemedicine postoperative appointments following third molar surgery	telemedicine postoperative appointments	In-person postoperative appointments	• The mean total patient satisfaction score (maximum 50) was 46.46 for the in-person group and 48.78 for the telemedicine group; the difference was not statistically significant (P = 0.11) • There were no statistically significant differences in patient satisfaction scores between the two groups with regards to the ease of scheduling the appointment, ease of attending the appointment, perceived usefulness of the appointment, or the quality of patient education received at the appointment. • Perceived cost-effectiveness was higher for patients in the telemedicine group (P = 0.01)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Chaudhry et al. 2021	Systematic review and meta-analysis	Canada, Finland Germany, Norway, United States	12	Multiple	Surgeons and 1 008 surgery patients	Investigation of patient and surgeon satisfaction with the use of telemedicine as a tool for orthopaedic care delivery, differences in patient-reported outcomes between telemedicine visits and in-person visits, differences in time commitment between telemedicine and in-person visits?	Telemedicine (any form of remote or virtual care including, but not limited to, video, telephone, or internet-based care)	In-person assessments performed by orthopaedic surgeons	• There was no difference in the odds of patient 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) • 92% (537 of 581) of patients were satisfied or more than satisfied after telemedicine visits and 93% (489 of 528) were satisfied after in-person visits • There was no difference in the pooled odds of surgeon satisfaction between telemedicine and in-person visits (OR 0.38 [95% CI 0.07 to 2.19]; p = 0.28). • 91% (417 of 457) of surgeon responses were rated as good or very good with the use of telemedicine compared with 94% (384 of 408) of responses with the control visits
Cho et al. 2021	Systematic review	Multiple	33	Multiple	7 382 patients with cancer using electronic symptom self-reporting systems (e-SRS)	Exploration of the acceptance and use of home-based electronic symptom self-reporting systems (e-SRS) by patients with cancer and identification of associated facilitators and barriers	Electronic symptom self-reporting systems (e-SRS) for patients with cancer	None	• High e-SRS acceptance was rated by 69% (59/85) to 77.6% (337/434) of the patients after they used the system See Table D.3 for use by demographic results
Christensen et al. 2020	Systematic review	Australia, Canada, Spain, United States	21	Multiple	Patients' and providers' who used video consultations for depression treatment	A systematic review of the existing research literature, focusing on patients' and providers' experiences of virtual consultations (VCs) used in the treatment of patients 60+ years with unipolar depression	Videoconferencing by an outpatient tele-mental health service (VC)	Face-to-face treatment (FTFT)	• High levels of patient and provider satisfaction and acceptability are frequently reported, and there were no significant differences between face-to-face treatment (FTFT) and the use of video consultations (VCs) in the RCT studies • Only two studies found that results favoured FTFT but they were not significant • Two intervention studies found that VC groups rated the treatment higher than in-person therapy

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Cole et al. 2020	Cross-sectional study	United States		3 wellness centre locations	65 new adult patients enrolling into intensive outpatient programs	Presentation of a novel survey based on an existing framework designed to assess telemedicine-delivered medications for opioid use disorder (tMOUD) satisfaction, and present pilot data (N = 14) acquired from patients engaged in rural tMOUD care	Telemedicine delivered medications for opioid use disorder (tMOUD)	None	• The preliminary findings showed an overall positive experience with tMOUD
Convery et al. 2020	RCT	Australia		Not specified	30 adults ≤85 years of age with a four-frequency average hearing loss between 25 and 75 dB HL and (4) ≥1 year of bilateral hearing aid experience who owned a smartphone	Assessment of the usability of the remote communication feature of the app; and determination of whether hearing aid fitting outcomes are influenced by the mode of patient-provider communication	ReSound Assist™ app	None	• The 11 participants who accessed ReSound Assist rated the feature as highly usable, were satisfied with its question and answer options and the new settings they received from their provider • Participants reported a preference for app-based versus face-to-face post-fitting patient-provider communication • In responses to the open-ended questions about participants' experiences using ReSound Assist there were 6 about satisfaction (4 positive, 2 negative)
Conway et al. 2021	Cross-sectional study	United States		3 health institutions	159 neuro-ophthalmology patients, 157 neuro-ophthalmologists	Analysis of both neuro-ophthalmology physician and patient satisfaction with virtual health visits during the time of the COVID-19 pandemic	Video clinical visits	None	• Among 159 patients, 104 (65.4%) reported that they were satisfied with the visit, and 149 (93.7%) indicated that they were comfortable asking questions. • Potential areas for improvement noted by patients included more detailed preparation instructions and better technology (phone positioning, Internet connection, and software)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Cottrell et al. 2021a	Non-randomised clinical trial	Australia		1 hospital physiotherapy department	71 patients 18 years of age or greater, resided outside of the local health service district, and presented with a non-urgent musculoskeletal spinal condition that was deemed appropriate for a pragmatic course of non-surgical management	Investigation to determine whether clinical outcomes achieved via telerehabilitation are as good as those achieved via in-person care	Telerehabilitation	In-person treatment	• The telerehabilitation group reported significantly higher levels of treatment satisfaction (median: 97 vs. 76.5; p = 0.021)
Cremades et al. 2020	RCT	Spain		1 tertiary care hospital	200 adults aged between 18 and 75 years being treated in the General Surgery department, basic computer knowledge (ability to use e-mail or a social network) and having the necessary equipment (computer with webcam) or having a partner who met these criteria	Evaluation the feasibility of introducing telemedicine in General Surgery	Telemedicine use in outpatient clinics	Conventional outpatient care	• The median global satisfaction score was 5 (range 2-5) in the conventional group and was also 5 (range 1-5) in the telemedicine group, with no statistically significant differences (P = 0.099) • When patients in the telemedicine group were asked if they would accept the use of telemedicine as part of their medical treatment on an ongoing basis, they rated the proposition with a median score of 5 (range 1-5)
Criner et al. 2021	RCT	United States		8 research sites	138 patients aged ≥40 years with moderate to very severe COPD and ≥10 pack-year smoking history	Evaluation of the effects of medication reminders via the BreatheMate device on adherence in patients with chronic obstructive pulmonary disease (COPD)	BreatheMate device, smartphone application, and vouchers to redeem pressurised metered-dose inhalers (pMDIs) for the prescribed 2 puffs of budesonide/formoterol 160/4.5 µg twice daily, as well as twice-daily electronic reminders to take budesonide/formoterol	BreatheMate device, smartphone application, and vouchers to redeem pressurised metered-dose inhalers (pMDIs) for the prescribed 2 puffs of budesonide/formoterol 160/4.5 µg twice daily	• Most patients reported the BreatheMate device and application were easy to use and that they had a clean look and feel, with suitable options and features • In the intervention group, patient satisfaction was similar across all device and application survey questions for patients aged <65 and patients aged ≥65 years See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Cuadrado et al. 2021	Retrospective cohort study	Spain		1 tertiary hospital 43km from 1 prison	75 prison inmate patients who received anti-HCV treatment (May 2016–November 2017)	A cost-minimisation analysis comparing two strategies of HCV treatment in a prison: telemedicine clinical practice (TCP) and the usual clinical practice (UCP)	Telemedicine clinical practice (TCP)	Usual clinical practice (UCP)	• The questionnaire revealed high levels of satisfaction with TCP, with a median score of 5 in each question
Damery et al. 2021	RCT	United Kingdom		4 outpatient liver clinics	54 clinically stable liver transplant patients	Evaluation of the feasibility of using real-time remote consultations for liver transplant patient between patients and secondary care physicians for routine patient follow-up at a large hospital in the United Kingdom and assessment of whether patient satisfaction differs between intervention and usual care patients	Real-time remote consultations	Usual care	• Patient satisfaction at 12 months increased in both the intervention (25 points) and usual care (14 points) groups • Sub-group analysis showed that the increases were significant for both intervention (P <. 001) and usual care (P =.02) patients; however, the between-group difference was not significant after controlling for baseline scores (P =.10)
Danylchuk et al. 2021	Systematic review	Multiple	42	Multiple	Patients and providers of telehealth genetic counselling (THGC)	A systematic evidence review to compare telehealth genetic counselling (THGC), including videoconferencing and telephone counselling, across specialties to in-person genetic counselling (IPGC) for a range of outcomes specific to patient and provider experiences and access to care	Telehealth genetic counselling (THGC), including videoconferencing (VGC) and telephone counselling (TGC)	In-person genetic counselling (IPGC)	• One study of a cancer population showed that, while overall satisfaction was high in both IPGC and TGC arms, the improvement in satisfaction scores was lower in African American participants compared with white participants • Two studies reported comparisons between TGC and VGC. In a study of men with cancer receiving genetic counselling, patients who received VGC had higher mean satisfaction scores and knowledge scores • VGC was also preferred over TGC in Italy by both patients seen for either prenatal or paediatric indications and their providers

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Davis et al. 2021	Systematic review	Australia, Denmark, United Kingdom	18	Multiple	3 323 adults (≥18 years) with inflammatory bowel disease (IBD) in general or any form of IBD (ulcerative colitis or Chron's disease or both)	Systematic review evaluating the efficacy of telehealth and mHealth interventions and explore the benefits and challenges of these interventions in patients with IBD	Telehealth and mHealth interventions	None	• The majority of the participants (>75%) from many studies reported satisfaction with telehealth and mHealth interventions • In contrast to these findings, there was no difference in waiting time between the telemedicine group and the usual care group in one pilot study, and satisfaction did not differ between the groups • None of the qualitative studies explicitly assessed patient satisfaction with telehealth and mHealth interventions
de Boer et al. 2021	Systematic review	Multiple	37	Multiple	Patients using videoconferencing psychotherapy (VCP) as a treatment delivery	Systematic review examining the efficacy, feasibility, and acceptability of using videoconferencing psychotherapy (VCP) as a treatment delivery modality for couple and family therapy (CFT)	Videoconferencing psychotherapy (VCP)	Multiple	• Generally, high satisfaction levels were reported across several of the studies and no significant differences in satisfaction were seen in a number of studies that compared VCP and in-person treatment delivery • When comparing the target intervention to internet recourse comparisons, or minimal intervention groups, significant differences were seen in satisfaction
De Marchi et al. 2021	Cohort study	Italy		1 tertiary Amyotrophic Lateral Sclerosis (ALS) centre	19 adult patients scheduled to visit the centre	Testing of the feasibility of telehealth and to assess patients' satisfaction with the service received by follow-up patients with ALS during the COVID-19 pandemic, compared to outpatient conventional visits	Telehealth follow up patient visits	Conventional outpatient visits	• All patients reported a positive perception of talking with health care professionals and were satisfied with how the team understood their problems

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Diaz-Miron et al. 2022	Cross-sectional study	United States		1 university children's hospital	73 surgeons, 616 surgical patients and caregivers (of patients <18 years old)	Evaluation of surgeon and caregiver perspectives of telemedicine (TMEs) during the pandemic	Telemedicine delivered to paediatric surgical patients	None	• No significant differences were noted in the overall satisfaction • An inverse relationship between surgeon age and satisfaction at the follow-up survey was identified ($p = 0.007$) • Seventy-nine percent of patients or caregivers reported TME as similar to an in-person visit • Audiovisual satisfaction of the TME was higher in greater income households ($p = 0.02$)
Dinuzzi et al. 2021	Retrospective cohort study	Italy		1 university hospital	65 patients who used telemedicine services 1 Jan to 29 Apr 2020	Description of the experience of the Stoma Care Center of the University Hospital Federico II, Naples, Italy, before and during the COVID-19 lockdown	Telehealth services for trauma	None	• Of the 65 patients who completed the questionnaire, 82% indicated being extremely satisfied
Dobrusin et al. 2020	Cross-sectional study	United States		2 community-based gastroenterology (GI) practices	1 492 GI patients, 503 GI providers	Exploration of the impact of the sudden increase in telehealth use during the COVID-19 pandemic on patient and provider satisfaction within community-based gastroenterology (GI) practices	Telehealth	None	• Patients were highly satisfied with their telehealth visits; with greater than 80% indicating that the provider addressed their concern and that they were willing to participate in telehealth visits in the future • High satisfaction was observed in all age groups, with the highest rates in patients older than age 85 • Overall, the authors found a high level of satisfaction (>90%) with telehealth services among providers
Doking et al. 2021	Case study	Netherlands		Not specified	1 colorectal cancer survivor undertaking blended cognitive-behavioural therapy (bCBT)	Evaluation of the COloRectal canceR distrEss reduCTion (CORRECT) intervention, a blended cognitive-behavioural therapy (bCBT) combining face-to-face (F2F) therapy with an interactive self-management website to reduce high distress in colorectal cancer survivors	COloRectal canceR distrEss reduCTion (CORRECT) intervention	None	• The total treatment satisfaction was rated high (8/10) immediately posttreatment • Two questions were rated low (1/4): "The treatment was a fixed part of my daily life" and "The treatment led to less pain"

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Eberle et al. 2021a	Systematic review and meta-analysis	Canada, Italy, Spain, United Kingdom	11	Multiple	563 gestational diabetes mellitus (GDM) patients	Assessment of the current evidence regarding the clinical effectiveness of telemetric interventions in the management of gestational diabetes mellitus (GDM), addressing maternal glycaemic control, scheduled and unscheduled visits, satisfaction, diabetes self-efficacy, compliance, maternal complications in pregnancy and childbirth, as well as foetal and neonatal outcomes	Telemetric interventions	None	• Women were highly satisfied with telemetric therapy treatment (P <. 05)
Edison et al. 2020	Systematic review	Australia, Denmark, Ireland, United Kingdom, United States	18	Multiple	5 813 adult patients exposed to virtual clinics using telehealth strategies	Systematic review identifying the clinical, fiscal and environmental evidence on the use of urological telehealth and/or virtual clinic (VC) strategies, and to highlight research gaps in this rapidly evolving field	Telehealth and/or virtual clinic (VC) strategies	Multiple	• Patient satisfaction was inconsistently reported, and assessments lacked prospective evaluation using validated questionnaires See Table D.2 for patient safety results
Eichberg et al. 2020	Systematic review	Multiple	52	Multiple	45 801 neurosurgical patients	Systematic literature review investigating treatment of neurosurgical patients via telemedicine, and to evaluate barriers and challenges	Telemedicine	None	• While no studies have described patient satisfaction rates with telemedicine visits in the COVID-19 era, prior telemedicine studies reported initially optimistic results • One paper with a sample of 99 patients reported 100% satisfaction with the telemedicine appointment on post visit questionnaires.
Elsner et al. 2020	Systematic review	Italy, Germany, United States	28	Multiple	Dermatology patients receiving care during the COVID-19 pandemic	Systematic review summarising all published studies on teledermatology during the COVID-19 pandemic	Teledermatology	None	• One paper reported a high level of patient satisfaction in the use of teledermatology in the care of acne patients
Erben et al.2021	Cross-sectional study	United States		3 neurological clinics	6 262 vascular surgery patient encounters during the COVID-19 pandemic	Assessment of the introduction of telemedicine as an alternative to the traditional face-to-face encounters with vascular surgery patients in the era of the COVID-19 pandemic	Telemedicine encounters	Face-to-face encounters	• 78.7% of patients rated their overall health care experience during face-to-face encounters as very good and 80.6% of patients rated their health care experience during telemedicine encounters as very good (P =.78)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Eustache et al. 2021	Systematic review	Australia, Canada, Denmark, Italy, Norway Spain, United States	29	Multiple	Patients undergoing surgery	Systematic review investigating whether postoperative telemedicine interventions with a communication feature reduce emergency department visits and readmissions	Postoperative telemedicine interventions	None	• Fifteen studies reported a metric of patient satisfaction regarding utilisation of the telemedicine intervention • All studies demonstrated high levels of satisfaction (> 80%) with the telemedicine intervention
Eze et al. 2020	Systematic review	Multiple	98	Multiple – Umbrella review	Patients providers using telemedicine in Organisation for Economic Co-operation and Development (OECD) countries	Umbrella review of systematic reviews on telemedicine use in OECD countries summarizing findings on four areas of policy relevance: clinical and cost-effectiveness, patient experience, and implementation	Telemedicine	None	• Six reviews addressed patient satisfaction and enablers to the use of telemedicine interventions. For patients with mental health conditions, text-messaging interventions increased patient satisfaction with management and health care services • Mental health patients who had undergone computerised cognitive behavioural therapy (cCBT) reported high treatment satisfaction rates, however more research was advised to address attrition due to dissatisfaction • COPD patients reported that they were satisfied with remote monitoring, and that they found interventions useful to help manage their condition
Fraser et al. 2022	Systematic review	Canada, United States	5	Multiple	603 individuals living in rural areas with cardiovascular diseases (CVD)	Systematic review aiming to understand the types and effects of home-based connected health technologies, used by individuals living in rural areas with cardiovascular diseases	Home-based connected health technologies	None	• One study found 36% of participants experienced anxiety towards the mobile health technology • Another study reported contrasting results where participants displayed 80-92% satisfaction
Fritsch et al. 2020	Systematic review	Australia, Denmark, Finland, France, Korea, Norway, United Kingdom, United States	11	Multiple	People with musculoskeletal pain	Systematic review appraising the literature on the effects of text messages (as an intervention or a component of an intervention) compared with any control on pain and function in people with musculoskeletal pain	Text messages	Any control	• Seven studies reported patients' satisfaction and/or feedback to researchers about the intervention received • Overall, patients were satisfied with treatments when text messages were associated with usual care and would recommend text messages to other patients

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Garcia-Huidobro et al. 2020	Case-control study (using retrospective and concurrent control groups)	Chile		1 private academic health network	3 962 patients who received, and 263 clinicians who provided, telemedicine care in March/April 2019 and March/April 2020	Investigation of the system-wide accelerated implementation of telemedicine, compare patient satisfaction between telemedicine and in-person visits, and report provider perceptions	Telemedicine visits	In-person visits	• Satisfaction was very high with both telemedicine and in-person services • Patients receiving telemedicine services reported similar satisfaction with clinician's services compared to both control groups • Patients using telemedicine care reported less satisfaction with the payment process (5.3% reduction, P <. 001) and infrastructure (web portal, 3.4% reduction, P <. 001) compared to patients receiving in-person visits concurrently • 244 providers reported that they were satisfied or very satisfied with telemedicine (92.8%) See Table D.3 for use by demographic results
Garfan et al. 2021	Systematic review	Multiple	86	Multiple	Patients and providers utilising telehealth during the COVID-19 pandemic	Systematic review presenting insights into the important perspectives in telehealth utilisation during the COVID-19 pandemic	Telehealth	None	• Patient and provider satisfaction was measured in some papers included in the findings
Gomez-Roas et al. 2022	Cross-sectional study	United States		Single academic medical centre	40 low-income postpartum individuals	Identify additional challenges to health care interactions that emerged for low-income postpartum individuals during the pandemic	Telemedicine	None	• Perceived disadvantages of telemedicine included technical difficulties, difficulties establishing rapport with providers, incomplete health information, and lack of resolution to health care problems • Participants commonly attributed their dissatisfaction with telemedicine to incomplete health information
Gonzalez-Plaza et al. 2022	RCT	Spain		1 maternal – foetal department at a hospital clinic	120 pregnant women with obesity	Evaluation of the effectiveness of a complex digital health intervention, using a smartband and app with midwife counselling, on GWG and physical activity (PA) in women who are pregnant and have obesity and analyse its impact on maternal and perinatal outcomes	Digital health intervention, using a smartband and app with midwife counselling	Usual care	• The mean of the satisfaction scale with the health counselling app and midwife support was 4.8/5 (SD 0.6) points

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Gopal et al. 2022	Systematic review	Multiple	72	Multiple	Populations with chronic neurological dysfunction	Systematic review of existing evidence regarding the remote assessment of hand function in populations with chronic neurological dysfunction	Remote assessment	None	• Two studies reported >80% of participant satisfaction with external devices to examine hand tremors • Another study found that 76% of participants using a tablet-based assessment for finger tapping and reaction time found it easy to use, with an additional 63% reporting willingness to use it long term to monitor disease activity
Grau-Pellicer et al. 2020	RCT	Spain		1 hospital	41 chronic stroke survivors	Investigation of the effectiveness of a mobile-health (mHealth) App in improving levels of physical activity (PA) in chronic stroke survivors	Exercise programme and mHealth App	Exercise programme no mHealth App	• Participants' had varying levels of satisfaction with the following items: physical condition (86.4% very satisfied), gait capacity 72.7% very satisfied), balance (36.4% very satisfied), programme satisfaction (90.9%), own effort (77.3%) and QoL (77.3%)
Greenwood et al. 2022	Systematic review and meta-analysis	United States	12	Multiple	931 psychotherapy patients	Evidence synthesis to assess whether there is evidence of differences between telehealth and face-to-face care for the management of less common mental and physical health conditions requiring psychotherapy	Telehealth care	Face-to-face care	• A total of 7 studies reported client satisfaction outcomes (3 meta-analysed, n=131, immediately after treatment) • No evidence of difference in satisfaction between groups (SMD 0.12, 95% CI −0.3 to 0.53; P =.58) was found
Guaiana et al. 2021	Systematic review	United States	14	Multiple	Televideo use for major depressive disorder (MDD) treatment in adults (18 years or older) in any clinical setting, and any health care professional providing care	Exploration of literature on the use of televideo to diagnose and treat major depressive disorder (MDD), particularly acceptability and patient satisfaction, efficacy, and cost-effectiveness	Televideo	None	• All the studies examining acceptability and patient satisfaction showed that there either was no difference between telepsychiatry and in-person care or patients were more satisfied with telepsychiatry
Gupta et al. 2021	Systematic review	Multiple	53	Multiple	Paediatric and adult patients with ear, nose, and throat (ENT) disorders	A systematic review to synthesize the evidence base on outcomes from remote consultation in adult and paediatric ENT services	Remote consultation for paediatric or adult ENT disorder	Multiple	• In most instances, remote consultation was associated with high patient satisfaction See Table D.2 for patient safety results

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Hadeler et al. 2021	Systematic review	Austria, Australia, Italy, United Kingdom, United States	23	Multiple	Teledermatology patients	Analysis of which methods of teledermatology patients prefer by categorizing how recent studies have defined satisfaction, conducted surveys, and concluded patients respond to the different modalities of teledermatology	Different modalities of teledermatology	None	• Definitions of satisfaction varied, but all concluded patients were satisfied with the live-interactive and store-and-forward modalities • All studies, either through surveys or anecdotal evidence, reported overall patient satisfaction with both teledermatology modalities • One study further evaluated preference between the different forms of teledermatology and face-to-face dermatology and demonstrated preference for face-to-face dermatology over both teledermatology modalities
Hall et al., 2022	Randomised effectiveness trial	United States		Twelve Health Centers in rural and/or underserved areas in 3 states	1 004 patients with PTSD and/or bipolar disorder	Given that both approaches were determined equally effective, this study identifies patient and clinician experiences and preferences regarding each approach	Telepsychiatry collaborative care, where telepsychiatrists provided consultation to primary care teams	Referral approach, where telepsychiatrists and telepsychologists assumed responsibility for treatment	• Both Interventions Provided High-Quality Care and Patient Satisfaction • Patients described symptom improvements (e.g. fewer medication side effects and fewer mania, depression, and PTSD symptoms) and satisfying relationships with new care team members (eg, telepsychiatrist, telepsychologist, CM) • Receiving care from telepsychiatrists that were connected to respected institutions influenced patients' perception about the quality of their care
Hanach et al. 2021	Systematic review and meta-analysis	Australia, Canada, Singapore, United States	10	Multiple	2 366 mothers without history or existing mental disorders	Examination of the effectiveness of telemedicine interventions – delivered exclusively during the postnatal period, on postpartum depression symptomatology in women with no history of mental disorders.	Telemedicine interventions	None	• Three studies reporting participants' satisfaction revealed that the participants were highly satisfied with the technology-based interventions.

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Harkey et al. 2021a	RCT	United States		1 large integrated health care system	289 patients undergoing laparoscopic appendectomy or cholecystectomy	Exploration of surgical patient perception of post-discharge video-based visits VVs compared with traditional in-person visits (IPVs) post-discharge	Video-based post discharge visits	In-person post discharge visits	• There was no difference in patient-reported satisfaction in the VV group compared to the control group • Many patients were satisfied with the care they received during their medical appointments • Several patients in each group described positive experiences with clinicians and staff
Hazenberg et al. 2020	Systematic review	Multiple	61	Multiple	Not specified	Assessment of the peer-reviewed literature on the psychometric properties, feasibility, effectiveness, costs, and current limitations of using telehealth and telemedicine approaches for prevention and management of diabetic foot disease	Telemedicine and telehealth approaches	None	• Patients were satisfied with the treatment support because it was timesaving, nurses were capable of handling the technical skills, and physicians found the equipment easy to use and feasible for distance-treatment • Patients were satisfied and felt safe with remote treatment support, the visiting nurse felt supported, and physicians felt a good basis for decisions with using the tool
Helleman et al. 2020	Systematic review	Australia, Italy, Portugal, United Kingdom, United States	16	Multiple	429 patients with amyotrophic lateral sclerosis (ALS)	Overview of telehealth used in the care for patients with amyotrophic lateral sclerosis (ALS), and identification of the barriers to and facilitators of its implementation	Telehealth	None	• Three studies reported that patients were satisfied with videoconferencing • One study reported that satisfaction with telehealth was not related to disease severity or travel distance
Herrero et al. 2021	RCT	United States		Not specified	122 patients ≥18 years old, consented to isolated arthroscopic meniscal repair or meniscectomy, and were able to properly utilise telemedicine software on a computer, tablet, or smartphone with a built-in camera	Exploration to determine whether patient satisfaction with overall care is equivalent for telemedicine follow-up (i.e. synchronous face-to-face video) and office-based follow-up after arthroscopic meniscectomy and repair	Telemedicine follow up	Office-based follow up	• There were no significant differences between groups in terms of patient demographics or satisfaction scores • Patient satisfaction with overall care was equivalent based on the results of two 1-sided t-test analysis for equivalence (9.77 ± 0.60 in the office-based group versus 9.79 ± 0.53 in the telemedicine group; $p < 0.001$)

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Hopstaken et al. 2021	Systematic review	Australia, Belgium, Canada, Germany, Netherlands, Norway, United States	17	Multiple	Oncology patients	A review of the effect of a digital care platform for oncology patients on quality of care parameters such as enhancement of available information, self-efficacy, continuity of care, and patient- and health care provider – reported experiences	Digital care platform	None	• Patient satisfaction with the studied platform was considerably high in three intermediate/high-quality studies, with a mean rating of 3.9 (range 3.8-4.09) on a 1-5 scale • Only two clinical studies reported the experiences by health care providers
Indraratna et al. 2021	RCT	Australia		2 sites	102 patients with acute coronary syndrome or heart failure	Description of the implementation of a novel smartphone app within an RCT, the impact of the COVID-19 pandemic on the conduct of the trial, and how the experience with TeleClinical Care-Cardiac (TCC-Cardiac) guided and informed the development of two telemonitoring programs during the pandemic	TeleClinical Care-Cardiac (TCC-Cardiac) app alongside standard care	Standard care alone	• User satisfaction with the app was high, with the average rating being 4.56 out of 5 • There was no significant difference between the user satisfaction score in those aged 70 or above (n=16, average rating 4.62), compared to those younger than 70 (n=50, average rating 4.54) See Table D.2 for patient safety results
Itamura et al. 2021	Cross-sectional study	United States		1 medical centre	1 284 patient responses following in-person visit, 221 patient responses following virtual visit	Exploration to compare the patient experience of a virtual otolaryngology clinic visit to an in-person visit, especially with its significantly increased implementation during the COVID-19 pandemic	Virtual otolaryngology clinic visit	In-person otolaryngology clinic visit	• Some survey questions overlapped between in-person and virtual visits. In all 5 overlapping questions, there was a lower percentage of responses for virtual visits that reported more satisfactory evaluations of “Yes, definitely” and “Yes, mostly” or “10” compared to those of in-person visits • Student’s t-test demonstrated that the lower overall provider rating for virtual visits (9.3 ± 1.6) compared to in-person visits (9.6 ± 1.1) was significant, P = .003

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Jang et al. 2021a	Retrospective cohort study	Korea		1 telemedicine centre	2 324 patients with COVID-19	Describes the results of the Korean Medicine (KM) telemedicine centre and the clinical possibility of using herbal medicines for COVID-19	Telemedicine consultation	None	• The patient satisfaction score for treatment was 8.3 (SD 1.78) out of 10 and the convenience of the KM telemedicine centre system was rated 9.3 (SD 1.27) out of 10 • Patients gave high scores when asked about their willingness to recommend the KM telemedicine centre to acquaintances (9.2, SD 1.58) and use Korean Medicine treatments (9.1, SD 1.54)
Jang et al. 2021b	Systematic review and meta-analysis	Australia, Denmark, Canada, Italy, Netherlands, Spain, United Kingdom, United States	22	Multiple	2 906 patients utilising telemonitoring interventions on severe chronic obstructive pulmonary disease (COPD) exacerbations	Systematic review and meta-analysis providing current evidence regarding the effectiveness of telemonitoring for preventing COPD exacerbations, focusing on severe exacerbations requiring hospitalisation or emergency room visits	Telemonitoring for preventing COPD exacerbations	None	• All eight studies that surveyed participant satisfaction reported high satisfaction levels
Janjua et al. 2021	Systematic review and meta-analysis	Belgium, Canada, France, Germany, Italy, Korea, Netherlands, Spain, United Kingdom, United States	14	Multiple	1 518 chronic obstructive pulmonary disease (COPD) patients	Systematic review and meta-analysis of the benefits and harms of digital interventions for managing COPD and applying Behaviour Change Technique (BCT) taxonomy to describe and explore intervention content	Digital technology interventions with or without routine supported self-management to usual care	None	• Three studies reported the differential rates of satisfaction were unclear • Evidence for participant satisfaction was limited, so no determination could be made whether participants were satisfied with digital intervention or control
Junkins et al. 2021	RCT	United States		4 HIV care outpatient clinics	22 African American female patients living with HIV aged 19 years or older	Testing of the feasibility and acceptability of a telemedicine-administered cognitive behavioural therapy (CBT) for depression and antiretroviral therapy adherence (CBT-AD) approach using videoconferencing among African American (AA) women living with HIV in the rural South	CBT-AD intervention	Supportive psychotherapy	• Participants rated their overall satisfaction as very high; the average CSQ-8 score was 30.8 of a maximum score of 32, indicating very high satisfaction and acceptability of the intervention

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Kamdar et al. 2020	Retrospective cohort study	United States		1 Academic medical centre	2 204 patients scheduled for surgery by telemedicine or evaluated in person	Description of the implementation of a telemedicine-based anaesthesia preoperative evaluation and report the program's patient satisfaction, clinical case cancellation rate outcomes, and cost savings	telemedicine-based preoperative anaesthesia evaluation process	In person evaluation	• The majority of patients who responded to the survey (>90%) either agreed or strongly agreed with statements regarding what to expect from the video visit, confidence heading into it, clarity of video, meeting patient needs, overall satisfaction, and having more in the future 83% of patients agreed or strongly agreed the technical process of joining was easy
Kane et al. 2020	RCT	United States		1 single subspecialised institution	66 postoperative patients following rotator cuff repair	Evaluation the safety, efficacy, and socio-economic benefits of telehealth as a platform for postoperative follow-up	Telemedicine for postoperative visits	Office-based visits	• No difference was found in patients' level of satisfaction with quality of care (P =.304)
Khairat et al. 2021	Cross-sectional study	United States		55 prison facilities	1 584 surveys from specialty care patients and telemedicine presenters; 60 practitioners	Evaluation of the implementation of a telemedicine programme for specialty care in North Carolina prisons during the COVID-19 pandemic	Telemedicine	None	• 453 patients (94.0%) reported a positive overall telemedicine experience • 272 practitioners (86.1%) were satisfied with the telemedicine visits and 284 practitioners (89.9%) felt comfortable using telemedicine • Physicians were significantly less satisfied with the overall telemedicine experience (mean [SD] rating, 3.68 [1.24] points) compared with physician assistants (mean [SD] rating, 4.63 [0.94] points) and NPs (mean [SD] rating, 3.76 [0.99] points) ($\chi 24 = 20.86$; P < .001). • The aspect of telemedicine with the highest rating among telepresenters was telemedicine call quality (mean [SD] rating, 4.34 [0.84] points), and comfort using telemedicine was rated the lowest (mean [SD] rating, 4.17 [0.96] points)

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Kolcun et al. 2020	Systematic review	Canada, Denmark, France, United States	12	Multiple	Spine surgery patients	Systematic review examining the current utilisation of telemedicine (TM) for spine surgery	Telemedicine ™	None	• 1 paper reported patient satisfaction • In a study of 60 patients undergoing lumbar discectomy who were given a mobile app with daily postoperative questionnaires regarding pain, temperature, neurological symptoms, and wound status for 15 days, in addition to a telephone call on postoperative day 1, most patients did use the app (55/60), with a high average satisfaction rate (3.5/4)
Kraepelien et al. 2020	RCT	Sweden		None – recruited through the Parkinson's society	77 Parkinson's disease patients with self-reported problems with general function	Exploration of whether guided individually-tailored internet-based cognitive behavioural therapy (ICBT) provide additional value to standard medical treatment for Parkinson's disease (PD)	Individually-tailored internet-based cognitive behavioural therapy (ICBT) combined with standard medical treatment	Standard medical treatment plus being on waitlist to ICBT	• Treatment satisfaction in the intervention group was 26.25 (4.52) [24.62-27.88] and in the control group was 22.80 (5.20) [20.66-24.94] t=2.67 p=0.010
Kruse et al. 2022	Systematic review	Multiple	46	Multiple	Not specified	Systematic review evaluating the facilitators and barriers to the adoption of telemedicine worldwide, including an analysis of health outcomes and patient satisfaction	Telemedicine adoption during the first year of the COVID-19 pandemic	None	Overall, 22% of the articles analysed reported strong satisfaction or satisfaction (zero reported a decline in satisfaction)

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La Valle et al. 2022	Systematic review	Belgium, Canada, France, Italy, Netherlands, Poland, United Kingdom, United States,	9	Multiple	Children aged 0-5 years with developmental concerns	Assessment of study characteristics and type of diagnostic evaluation) comparison of telehealth technologies to in-person diagnostic methods; feasibility and acceptability of telehealth technologies; and methodological quality	Telehealth methods	None	• Across the six studies, overall high levels of satisfaction were reported by providers and families, yet some nuanced differences were found when surveying different types of providers and specialists • Studies which included telehealth methods to facilitate a psychiatric diagnosis for children with suspected mental health/social-emotional concerns found that overall providers endorsed high levels of satisfaction with tele-psychiatric diagnostic care, indicating high acceptability • Nonetheless, paediatricians were more satisfied than family physicians, suggesting that physicians felt that their patients needed more than telepsychiatry could provide
Lee et al. 2021	RCT	United States		Female pelvic medicine and reconstructive surgery (FPMRS) clinics of a tertiary academic health system	52 women undergoing surgery for pelvic organ prolapse	Exploration of whether patient satisfaction of virtual clinical encounters is noninferior to traditional in-office clinical encounters for postoperative follow-up after reconstructive surgery for pelvic organ prolapse	virtual (via video conference technology) clinical encounters for their 30-day postoperative follow-up visits	in-office clinical encounters for their 30-day postoperative follow-up visits	• The mean patient satisfaction score was 80.7 ± 2.6 in the virtual group and 81.2 ± 2.8 in the office group (difference, −0.46 points; 95% confidence interval, −1.95 to 1.03), which was consistent with noninferiority
Legler et al. 2021	Prospective cohort study	United States		3 medical units in a dedicated COVID-19 hospital	43 patients admitted for COVID-19	Evaluation of an intrahospital telemedicine programme (virtual care) for patients admitted with COVID-19, along with its impact on exposure risk and communication	intrahospital telemedicine programme (termed virtual care)	None	• Patients' perceptions of virtual care were positive overall and felt it was a good idea to continue using virtual visits in the hospital
Leibar Tamayo et al. 2020	Prospective cross-sectional study	Spain		Urology outpatient clinic of a tertiary care hospital	200 urology clinic patients	Evaluation of urological patient satisfaction with teleconsultation during the COVID-19 pandemic	Urological teleconsultation	None	Teleconsultation overall satisfaction level was 9 (IQI 8-10), and 61.5% of respondents would consider teleconsultation as a health care option in the future

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Lemelin et al. 2020	Controlled clinical trial	Canada		Obstetric clinic at 1 university hospital	161 women with gestational diabetes mellitus (GDM)	Evaluation of the cost-effectiveness of the telehomecare (THCa) initiative by assessing the direct costs, including the related reduction in medical visits, evaluate the impact of THCa on diabetes control, GDM-related complications, and patient satisfaction	THCa system for transmission and online analysis of capillary glucose data	Usual care in the clinic	• Global satisfaction with care was similar in both intervention (THCa) and control groups (8.9/10 in the THCa group and 8.5/10 in the control group, P =0.128) • Satisfaction with educational support was significantly increased in the THCa group (9.0/10 for the THCa group and 8.5/10 in controls P =0.028). See Table D.5 for cost results
Lester et al. 2020	RCT	United States		1 neurofibromatosis clinic in a hospital setting	45 adolescent patients (aged 12-17) with neurofibromatosis	Examination of the feasibility, acceptability, preliminary effect, and durability of a mind-body videoconferencing programme for youth with neurofibromatosis (Resilient Youth with NF; RY-NF) against an experimental educational control (Health Education for NF; HE-NF)	Resilient Youth with NF (RY-NF)	Health Education for NF (HE-NF)	Satisfaction with participation in the programme was high and similar between the intervention (RY-NF, 4.08 of 5) and the control (HE-NF, 3.49 of 5)
Livingston et al. 2020	RCT	Australia		1 private and 2 public health services or hospitals	82 patients newly diagnosed with cancer	Trial to determine the impact of an app-based, 4-month intervention for newly diagnosed cancer patients	The ACE smartphone app	No intervention	• Nearly two-thirds of participants (63%) reported that they strongly agreed or agreed that people would learn to use the app very quickly • 74% of participants reported they found the DT easy to complete on the app • 61% reported feeling confident or very confident using the app, with only one person reporting not being confident using the app
Marquez-Algaba et al. 2022	RCT	Spain		1 university hospital	150 patients aged 18 years or older discharged from the hospital after admission for COVID-19 diagnosed by real-time polymerase chain reaction (RT-PCR)	To adapt and validate the use of Farmalarm, a smartphone application (app) originally developed by the Stroke Unit at Hospital Universitari Vall d'Hebron in Barcelona, Spain	Farmalarm app	Usual care	• Satisfaction with outpatient monitoring was rated higher by the intervention group (5 vs. 4 points; $p < 0.001$)

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Martinez et al. 2020	Cross-sectional study	Colombia		Patients using the Telepsychiatry programme On univariate analyses, the VV cohort across 8 towns	111 telepsychiatry patients	Description of the experience of physicians and patients in the Telepsychiatry programme at the University of Antioquia's Faculty of Medicine in the first 12 months after its implementation	Telepsychiatry programme	None	• The majority of respondents (82.3%) provided positive comments • 1 person (5.9%) reported problems with medication delivery management on the part of the health care provider and 2 (11.8%) indicated that they would prefer an appointment in person See Table D.3 for use by demographic results
Martinez et al. 2020	Cross-sectional study	United States		Large nationwide direct to consumer telemedicine platform	Patients seeking care through a direct-to-consumer telemedicine platform	Assessment of differences in patient satisfaction by physician race/ethnicity	Telemedicine platform	None	• Encounters with South Asian physicians (aOR 0.70; 95% CI 0.54-0.91) and East Asian physicians (aOR 0.72; 95% CI 0.53-0.99) were significantly less likely than those with White American physicians to result in top-box satisfaction Compared to encounters with White American physicians, those with Black American physicians (aOR 1.72; 95% CI 1.12-2.64), South Asian physicians (aOR 1.77; 95% CI 1.23-2.56), and East Asian physicians (aOR 2.10; 95% CI 1.38-3.20) were more likely to result in patient dissatisfaction
McKeon et al. 2021	Systematic review	Australia, Canada, Netherlands, United States	28	Multiple	Patients using smart-device technology and telehealth programs to guide and monitor postoperative rehabilitation following total joint arthroplasty	Systematic review of the currently available evidence on the use of smart-device technology and telehealth programs to guide and monitor postoperative rehabilitation following total joint arthroplasty and to assess their impact on outcomes following surgery	smart-device technology and telehealth programs to guide and monitor postoperative rehabilitation	None	• Seven studies assessed patient satisfaction • Six studies found that patients in telerehabilitation and in-person physical therapy groups reported equivalent satisfaction levels with their physical therapy treatment

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Minguez Clemente et al. 2021	RCT	Spain		1 university teaching hospital	116 patients with chronic obstructive pulmonary disease (COPD) exacerbation	Trial to evaluate the effectiveness/efficiency of and satisfaction with a home telemedicine programme focusing on patients with COPD exacerbation after early hospital discharge and compare it with early discharge and follow-up with traditional home hospitalisation	Telemedicine with monitoring with patients required to transmit data on vital constants and ECGs twice per day, with a subsequent telephone call and 2 home visits by health care staff (intermediate and at discharge)	Daily visits	• Satisfaction scores were similar across the telemedicine and control groups • In the telemedicine group, on a scale 1-5, participants felt the equipment seemed easy to use (4.62) and having the equipment at home gave them a sense of safety and security (4.57)
Mohammadzadeh et al. 2021	Systematic review	Multiple	50	Multiple	Patients with cardiovascular disease treated with cardiology interventions	Review of the effectiveness of implemented telecardiology services	Telecardiology services	None	• The items studied in this as part of "patient report effects" were patient satisfaction, improving quality of life, reducing depression and anxiety, reducing waiting time, and improving patient self-care • Fifteen investigations reported positive effects for this category. Three studies reported no effect of telecardiology • The most effects of telecardiology in "patient reported effects" were improving the patient's quality of life and enhancing patient satisfaction See Table D.4 for use by technology results
Moor et al. 2020	RCT	Netherlands		4 sites	90 newly treated patients with idiopathic pulmonary fibrosis (IPF)	Investigation of whether a home monitoring programme improves health related quality of life (HRQOL) and medication use for patients with idiopathic pulmonary fibrosis (IPF)	Home monitoring programme on top of standard care	Standard care	• In general, patients were relatively satisfied with their antifibrotic medication, with a mean (±SD) score of 2.06 (1.89) on a scale of −5 to 5 • Satisfaction with medication regarding efficacy, side effects, and ease of use was similar in both groups The number of side effects was not significantly correlated with patients' experiences with side effects (r = 0.27; P = 0.06) and only weakly correlated with satisfaction with medication (r = 0.28; P = 0.02)

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Morris et al. 2021	Systematic review	Multiple	54	Multiple	Not specified	Review of how digital technologies have been used to support rural oncology care	Digital technologies to support oncology care	None	• High patient satisfaction was reported with the quality of the video consultation and in establishing rapport with the specialist • Patients overall preferred video conferences to face-to-face consultations and were satisfied with the care received • Health care professionals reported high satisfaction, including patient convenience, interprofessional communication, expanded scope of practice, continuity of care, and maintenance of patient safety See Table D.4 for use by technology results.
Murase et al. 2020	RCT	Japan		17 sleep centres	473 patients who had used continuous positive airway pressure (CPAP) for >3 months and were receiving face-to-face follow-up by physicians every 1 or 2 months	Examination of the effects of a telemedicine intervention on adherence in long-term continuous positive airway pressure (CPAP) users.	Telemedicine intervention (TM)	1M and 3M groups where patients were seen in-person every month or 3 months respectively	Satisfaction with the obstructive sleep apnea care was more frequently seen in the TM- and 3M-groups than in the 1M-group (TM-group, 55.7%; 3M-group: 53.7%; and 1M-group: 11.8%; P = 0.01)
Murphy et al. 2022	Systematic review	Canada, Germany, Italy, Spain, United Kingdom, United States	32	Hospital and community setting	Adult cancer patients	Examination of the impact of the COVID-19 pandemic on adult cancer patients	COVID-19 pandemic	None	• Many studies found a high satisfaction rate with telehealth amongst patients, caregivers, and clinicians • Telehealth reduced travel time and expenses and increased convenience • Concerns about access barriers were also discussed. These included technical difficulties with internet access, costs of technologies/hardware, and communication barriers
Nelson et al. 2020	RCT	Australia		1 hospital	70 patients receiving total hip replacement	Exploration of whether outpatient physiotherapy care via telerehabilitation is as effective as in-person physiotherapy care after total hip replacement.	Remotely delivered telerehabilitation directly into their homes and a technology-based home exercise programme using an iPad application	In-person outpatient physiotherapy and a paper-based home exercise programme	• Overall satisfaction was high across both groups • The intervention group scored higher for ease of attending appointments (intervention 95 (10), control 86 (18), mean difference 9 (95% CI 2 to 16), P = 0.017.

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Nguyen et al. 2022	Systematic review	Denmark, Ireland, Netherlands, New Zealand Spain, United Kingdom, United States	14	Multiple	Patients being treated for Inflammatory bowel diseases (IBD)	Systemic review of randomised controlled trials (RCTs) on digital health technologies in patients with Inflammatory bowel diseases (IBD)	Digital health technologies	None	• Eight studies evaluated outcomes on patient/parent satisfaction, work productivity and activity of daily living, acceptability and usability of digital health technologies, self-efficacy, school absence, and knowledge base • Overall, patients, parents, and providers were satisfied and willing to adopt digital health technologies
Ning et al. 2021	Systematic review	Multiple	32	Multiple	Patients and providers using telemedicine in otolaryngology	Evaluation of existing literature on telemedicine in otolaryngology and assess overall image quality, diagnostic concordance, and patient and provider satisfaction with telemedicine technologies	Telemedicine	None	• Eleven articles reported outcomes relevant to patient satisfaction • In five studies evaluating satisfaction with synchronous models, 95% to 100% of patients reported being satisfied with their experience • Six studies evaluated provider attitudes towards telemedicine • In three studies providers reported a 92% to 100% satisfaction rate
Oatley et al. 2020	Cross sectional study	Australia		1 tertiary referral hospital	157 adult (over 16 years) medical oncology patients receiving active treatment	Investigate whether a nurse practitioner (NP)–led model of care could improve cancer service integration and reduce hospital presentations	NP-led oncology telephone helpline service, urgent assessment clinic, and a consultation service for the Day Treatment Unit (DTU)	None	• The survey respondents reported being “very satisfied” with the telephone helpline service, and 43 (91.5%) reported instructions were clear
Pang et al. 2022	Systematic review and meta-analysis	Denmark, Ireland, Netherlands, New Zealand, Spain, Türkiye, United Kingdom, United States	17	Multiple	Patients with inflammatory bowel disease (IBD)	Systematic review and meta-analysis comparing the impact of telemedicine with that of standard care on the management of inflammatory bowel disease (IBD)	Telemedicine	Standard care	• 3 studies reported patient satisfaction • Patient satisfaction was not significantly different between the telemedicine and standard care groups (SMD 0.21, 95% CI −0.12 to 0.54; I2=14; P =0.21)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Peden et al. 2020	Case study	United States		15 clinics	470 patients who received services via telemedicine at one of the clinics	Description of how a large academic medical system with a high case mix index and diverse racial profile scaled up a telemedicine programme within a few weeks during the COVID-19 pandemic, providing information on lessons learnt and patient experience	Telemedicine (synchronous live consultation)	None	• 83% of patients would recommend virtual visits to family and friends,77% would like to use virtual visits for other types of care, and 86% reported that virtual visits met needs and expectations for standards of care • 17% of patients reported that the audio and visual communication was not appropriate for clear communication
Pers et al. 2021	RCT	France		Not specified	89 rheumatoid arthritis patients with high to moderate disease activity starting new disease-modifying anti-rheumatic drug (DMARD) therapy	Assessment of whether use of a connected monitoring interface on a smartphone reduces the number of physical visits in a six-month period following the initiation of a DMARD therapy compared with conventional monitoring	Connected monitoring	Conventional monitoring	• There was a high satisfaction rate with all facets of the application (technical, safety, availability) • Most patients (80%) were eager to continue the 'connected monitoring' and 93.2% of patients would recommend the 'connected monitoring' to their family and friends
Piro et al. 2020	Prospective cohort study	Italy		1 university hospital	1 114 with cardiac electronic implantable devices	Report the efficacy and patient satisfaction with the new cardiac implantable electronic devices (CIED) management protocol adopted during the COVID-19-related Italian lockdown.	Remote monitoring at home	Remote monitoring in the office (officeRM)	• A trend toward a higher satisfaction and a better relationship with health care providers, even if not statistically significant, resulted from the answers of patients in Group officeRM.
Pogorzelska et al. 2022	Systematic review	Multiple	51	Multiple	Patients – not otherwise specified	Patient perspective and the level of satisfaction among patients suffering from different medical conditions with telemedicine during the COVID-19 pandemic	Telemedicine	None	• A high level of satisfaction with telehealth was observed in each study across every medical specialty • In largest study, patient satisfaction with video consultations was significantly higher in comparison to in-person visits (94.9% vs. 93.0%, $p < 0.001$) • Preference for future telehealth visits was reported by a significant number of the reviewed studies – many would like choice

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Ramaswamy et al. 2020	Retrospective cohort study	United States		1 academic medical centre	38 609 patient satisfaction surveys collected at the institution	Exploration of whether patient satisfaction differs between video and in-person visits	Video visits	In-person visits	• Video visit satisfaction scores were significantly higher than in-person visits (94.9% vs 92.5%; P <. 001) • Video visits (parameter estimate [PE] 2.18; 95% CI 1.20-3.16) and the COVID-19 period (PE 0.55; 95% CI 0.04-1.06) were associated with higher patient satisfaction • Younger age (PE –2.05; 95% CI –2.66 to –1.22), female gender (PE –0.73; 95% CI –0.96 to –0.50), and new visit type (PE –0.75; 95% CI –1.00 to –0.49) were associated with lower patient satisfaction
Rametta et al. 2020	Retrospective cohort study	United States		1 paediatric specialty care network composed of an urban quaternary care hospital, an ambulatory centre, and an additional 8 satellite locations	All in-person and telehealth encounters during study period	Assessment of the rapid implementation of child neurology telehealth outpatient care with the onset of the COVID-2019 pandemic	Telemedicine, exclusively referring to patient encounters performed through the audio and video software	In-person encounters	• Clinicians considered telemedicine satisfactory in 93% of encounters and suggested telemedicine as a component for follow-up care in 89% of encounters See Table D.2 for patient safety results See Table D.3 for use by demographic results
Rassouli et al. 2021	RCT	Germany, Switzerland		6 centres in Germany and Switzerland	150 patients with chronic obstructive pulmonary disease (COPD) aged 40 or over	Investigation of the impact of a telehealth care (TC) procedure on the course of chronic obstructive pulmonary disease (COPD) and health-related quality of life (HRQOL) as assessed by the slope of individual COPD assessment test (CAT) changes over the study periods	Telehealth care	Standard care	• Satisfaction with care at baseline was 8.2; at the end of standard care (SC), 8.5 (P = 0.062); and after telehealth care (TC), 8.8 (P < 0.001)
Reid et al. 2021	Prospective cohort study	Canada		1 tertiary paediatric hospital	1 036 paediatric patients (< 18 years old) seeking Virtual Paediatric emergency department (ED) services (V-PED)	Investigation to understand the feasibility, utilisation rate, and satisfaction of the first Virtual Paediatric ED (V-PED)	Virtual Paediatric ED (V-PED)	None	Overall satisfaction with V-PED was rated as excellent (9 or 10 out of 10) in 87% of respondents

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Sadeghi et al. 2022	RCT	Belgium		1 specialised Multiple Sclerosis (MS) centre	60 patients with Multiple Sclerosis (MS) and their caregiver if applicable	Assessment of the feasibility of multiple planned synchronous teleconsultations (TCs), using an audiovisual Internet platform, in the longitudinal clinical monitoring of patients with MS	Four TCs using an audiovisual Internet platform	Standard care	• The proportion of patients in the intervention group – who completed the study – declaring themselves to be satisfied or highly satisfied was • 26/26 for global quality of care • 19/26 for technical quality of the TCs • 24/26 for convenience of the TCs • 24/26 for quality of care of the TCs • 23/26 for added value of the TCs to medical care
Schultz et al. 2021	Cohort study	Australia		1 large metropolitan health service	238 COVID-19 patients	Description and evaluation of the implementation of a virtual ward as a COVID-19 hospital avoidance response strategy and identify opportunities for improvement and future applicability	Virtual ward	None	• The majority of patients reported their experience was very good (61.7%) or good (34.8%) ○ Patient experience feedback highlighted some levels of dissatisfaction with the lack of physical face-to-face assessment and follow up
Sekhon et al. 2021	Systematic review	Australia, Canada, Korea, United States	12	Multiple	Geriatric populations affected by dementia living in rural areas	Systematic review examining the impact of telemedicine on health outcomes in elderly individuals with dementia living in rural areas	Telemedicine	None	• Overall, both patients and physicians reported satisfaction with telemedicine • There were mixed results regarding the reliability of cognitive tests and the infrastructure required
Shah et al. 2021a	Systematic review	Italy, Finland, United States	11	Multiple	Paediatric patients and care providers who have utilised telemedicine services	Systematic evaluation of the most recent evidence on the feasibility and accessibility of telemedicine services, patients' and care providers' satisfaction with these services, and treatment outcomes related to telemedicine service use among paediatric populations with different health conditions	Telemedicine services	None	• Some included studies reported varying results on satisfaction, with some reporting higher satisfaction scores in telemedicine groups and others reporting little difference between telemedicine and in-person satisfaction

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Shah et al. 2021b	Systematic review	Multiple	32	Multiple	Not specified	Systematic review to synthesize and analyse information regarding the feasibility, acceptability, and potential benefits of telemedicine interventions in malignant and non-malignant haematology	Telemedicine interventions	None	• Seven papers reported results related to patient and/or provider satisfaction
Smith et al. 2021a	Systematic review	Multiple – umbrella review	17	Multiple	Surgeons, and patients who were undergoing or recently underwent surgery	Evaluation of patient and provider satisfaction with and perceptions towards telehealth, and to identify the barriers and facilitators associated with its utilisation both prior to and during the COVID-19 pandemic	Synchronous telehealth modalities (e.g. live interactive videoconference or telephone consultations) used perioperatively	Multiple	• Thirteen studies evaluated patient satisfaction with telehealth • 80-100% of patients rated their service as 'good' or 'very good' or were 'very satisfied' with delivery. • Few studies reported dissatisfaction • Telehealth was generally no difference in patient satisfaction when compared to usual care via meta-analyses or narrative syntheses • Patient satisfaction was similar across surgical specialties See Table D.2 for patient safety results See Table D.5 for cost results
Stentzel et al. 2021	RCT	Germany		1 integrated telemedicine centre	118 patients a medical diagnosis of any form of schizophrenia (ICD-10 F20), schizoaffective disorders (ICD-10 F25), or bipolar disorders (ICD-10 F31), and age ≥ 18 years	Examination of whether a telemedical care programme can improve QoL in patients with schizophrenia and bipolar disorder	Regular telephone calls and text messages as well as usual care	Usual care	• Participants perceived the telemedical care mostly as moderately to very helpful (97.5%) • 73.2% reported they would like to continue the telemedical care 34.2% could imagine, that the tele medical care could make contacts to doctors or psychologists less necessary or could partly replace them
Stephen et al. 2022	Systematic review	Australia, Czech Republic, Italy, Korea, New Zealand, Norway the Netherlands, United States	14	Multiple	Adults aged 18 years and over with type 1 diabetes in any context	Review and synthesize available evidence in the literature regarding perception of adults with type 1 diabetes on the features of mHealth apps that help promote diabetes self-care, as well as facilitators and barriers to their use	mHealth app	None	• Diabetes treatment satisfaction was found to significantly improve with mHealth app use

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Sultan et al. 2020	Cross-sectional study	United States		Not specified	189 paediatric spinal deformity (PSD) orthopaedic patients	Evaluation of the feasibility and patient satisfaction associated with virtual visits (VV) utilisation in paediatric spinal deformity (PSD) patients in comparison to general paediatric orthopaedic indications	Virtual PSD visits	Virtual general paediatric orthopaedic visits	• PSD patients demonstrated similarly high satisfaction scores with surgeon performance (PSD: 5±0 points vs. general: 4.8±0.1 points; P =0.08) • Scores with the telemedicine service were similarly comparable between the groups (3±2.4 vs. 3.5±2.1; P =0.23)
Taxonera et al. 2021	Cross-sectional study	Spain		1 university hospital	171 patients with an established diagnosis of inflammatory bowel disease (IBD) followed at an IBD referral unit in the Madrid region of Spain	Assessment of the feasibility of a strategy based on the conversion of face-to-face visits to remote telephone consultations to improve care of patients with IBD during the COVID-19 pandemic, and to evaluate satisfaction of patients with telephone consultations	Remote telephone consultations	None	• In closed questions, patients reported a very high degree of satisfaction with telephone consultations, with no differences between scheduled (n = 123) and urgent consultations (n = 48; P = NS) • 94% and 93% of patients were satisfied with teleconsultation for scheduled and urgent consultations, respectively (P < 0.82) • Fewer than 20% of patients would have preferred a face-to-face visit to the teleconsultation at the time
Tenforde et al. 2020	Cross-sectional study	United States		4 hospital systems under a single academic department	119 patients and physician	Description of a quality improvement initiative during the rapid adoptive phase of telemedicine in outpatient sports medicine practices during the COVID-19 pandemic	Synchronous audiovisual telemedicine visits	None	• Overall, patients appeared to be highly satisfied (defined as “excellent” or “very good” responses) with their telehealth visits across all patient-centred outcome measures • 92.4% reported the telehealth visit addressed concerns and questions • 84.9% reported they would value in having a future telehealth visit See Table D.2 for patient safety results
Thiele et al.2022	RCT	Germany		1 university outpatient clinic, 1 rheumatology practice	112 patients with rheumatoid arthritis, psoriatic arthritis or spondylarthritis without a change in therapy since the last presentation	Evaluation of the satisfaction of stable patients from clinics and practices with rheumatoid arthritis (RA), spondylarthritis (axSpA) and psoriatic arthritis (PsA) with telemedical consultation	Telemedical consultation	None	• Patient satisfaction was good (mean 4.3/5.0 modified FAPI, n=88) independent of the institution, the duration of the consultation and the consultation partner Patients with a high pain intensity were the least satisfied (p = 0.036)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Tian et al. 2021	Systematic review	Australia, Korea, Spain, United Kingdom, United States	29	Multiple	Prison populations	Systematic review synthesizing the evidence base to date for the impacts of, and outcomes from, telehealth delivered in prisons	Telehealth	None	• Findings were mixed in terms of participants' satisfaction with telehealth delivered in prisons • Seven studies reported that participants were generally satisfied with the delivery of telehealth consultations • One study reported that their satisfied participants also felt comfortable asking questions
Tiozzo et al. 2021	Prospective cohort study	Italy		1 children's hospital	124 paediatric cancer patients	Evaluation of the intensity and characteristics of pain, which was assessed at home by children with cancer or their parents using an app for mobile devices	Pain assessment app	None	• Most patients were satisfied with the app, and the information they had received about app usage • The overall opinion of the app, on a scale from 1 = very poor to 10 = excellent, was on average 8.66 (SD = 1.36)
Titov et al. 2020	Cross-sectional study	Australia		MindSpot Clinic, an online clinic funded by the Australian Department of Health	Not specified	Identification of demographic characteristics and treatment outcomes of patients registered with MindSpot over the first 7 years of clinic operation	MindSpot services	None	• Patient satisfaction rates were high • 12 452 [96·6%] of 12 895 respondents would recommend the course and 12 433 [96·7%] of 12 860 reported the course worthwhile See Table D.3 for patient safety results
Treskes et al. 2020	RCT	Netherlands		1 university medical centre	200 patients who were admitted with either ST-segment elevation myocardial infarction or non – ST-segment acute coronary syndrome	Investigation of whether smart technology in clinical practice can improve blood pressure (BP) regulation and to evaluate the feasibility of such an intervention	1-month and 6-month follow up visits facilitated electronically (e-visits)	Follow-up visits at the outpatient clinic	• General satisfaction scores were comparable across groups: 82.6 (14.1) in the intervention group and 82.0 (15.1) in the control group (P = .88)
van den Heuvel et al. 2020a	Cross-sectional study or survey	Netherlands		73 hospitals with pregnancy and childbirth care departments	57 obstetric professionals	Assessment of the current practice and attitudes concerning home-based monitoring (with daily home visits by professionals) and telemonitoring (using devices and the internet for daily self-recorded measurements) in high-risk pregnancies requiring maternal and foetal monitoring in the Netherlands	Home based monitoring and telemonitoring	None	• 59% (10/17) of centres using telemonitoring did not investigate perinatal outcomes, safety, and patient satisfaction prior to implementation 6/17 (35%) telemonitoring centres are participating in an ongoing multicentre RCT comparing patient safety, satisfaction, and costs of telemonitoring with standard hospital admission

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
van den Heuvel et al. 2020b	Case-controlled study	Netherlands		2 perinatal centres in urban areas: one university hospital and one general teaching hospital	109 women at risk of developing preeclampsia	Evaluation of the use of a digital health platform for telemonitoring blood pressure and symptoms combined with a minimal antenatal visit schedule	Reduced antenatal visits enhanced with a digital platform (SAFE@HOME) for daily blood pressure and symptom monitoring	Antenatal care without the use of home blood pressure measurements	• Most women were satisfied with the use of the app and platform (92%, 47/51) and especially parous participants would recommend it to other women (96.9% of multiparous vs. 73.7% of nulliparous women)
Vaughan et al. 2021	RCT	United States		1 non-profit clinic	89 low-income Latino(a) adults with type 2 diabetes	Compare HbA1c outcomes for individuals randomised to TIME, a Telehealth-supported, Integrated care with CHWs (Community Health Workers), and MEdication-access programme (intervention) versus usual care (wait-list control)	Telehealth-supported, Integrated care with CHWs, and MEdication-access (TIME)	Usual care (wait list control)	• TIME participants recorded high satisfaction levels (3.8/4.0 + 0.5) • Most participants agreed that the programme met their needs (3.8/4.0 + 0.4), CHW-participant interaction was beneficial (9.8/10 + 0.7), their health was better (9.7/10 + 0.7), and they would come in the future and recommend the class (3.8/4.0 + 0.5, 9.9/10 + 0.4; respectively)
Vellata et al. 2021	Systematic review	Australia, Germany, Italy, Slovenia, United Kingdom, United States	15	Multiple	421 patients with Parkinson's disease	Systematic review investigating whether telerehabilitation leads to improvements in global or specific motor tasks (gait and balance, hand function) and non-motor dysfunction (motor speech disorder, dysphagia). The impact of TR on quality of life and patient satisfaction, were also assessed	Telerehabilitation	None	• Only one study investigated satisfaction after a telehealth programme in people with PD as a primary outcome • Greater satisfaction with the telehealth modality was detected in the assessments of convenience and accessibility/distance • Patient satisfaction was investigated in several studies as a secondary outcome • Almost all studies reported high levels of patient satisfaction, only one study found no significant difference in satisfaction level
Vimalananda et al. 2020	Systematic review	Multiple	63	Multiple	Not specified	Systematic review of on the effect of e-consults on access, cost, quality, and patient and clinician experience and identified the gaps in existing research on these outcomes	e-consults	None	• Most studies reported high primary care provider (PCP) satisfaction with e-consults • Newer studies using PCP surveys supported these findings, and 2 qualitative studies also reported generally high PCP satisfaction

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Vinade Chagas et al. 2021	Systematic review and meta- analysis	Canada, Colombia, United States	10	Multiple	Not specified	Systematic review and meta-analysis evaluating whether telemedicine in the paediatric intensive care unit (PICU) has the potential to improve clinical and non-clinical outcomes	Telemedicine	None	• 5/10 studies evaluated PICU staff satisfaction with the use of telemedicine in patient care, while 2 studies also evaluated family satisfaction • Satisfaction was mainly related to efficient communication, high quality of care, and audiovisual quality • Health care teams reported satisfaction with the use of telemedicine, since the technology employed proved to be easy to use, contributed to improving the care provided to the patient, and reduced their level of anxiety
von Sengbusch et al. 2020	Quasi RCT	Germany		2 paediatric diabetes centres	240 paediatric patients (aged 1-16 years) with type 1 diabetes	Testing of video consultation as a new care concept as the basis for consultation for children with type 1 diabetes mellitus (T1DM) who use a continuous glucose monitoring (CGM) system	Monthly video consultations in addition to regular care	Regular care for six months before starting with video consultations	• Parental treatment satisfaction was significantly higher in the intervention group than that in the waitlist control group
von Sengbusch et al. 2021	Cohort study	Germany		2 paediatric diabetes centres	Parents of children aged 1 – 16 years, who have had type 1 diabetes for at least 6 months	To explore parents' expectations of the perceived barriers to and benefits of 1 year of monthly video consultations combined with regular outpatient care of children with type 1 diabetes	Monthly video consultations in addition to regular care	None	• Overall, parents expressed high satisfaction with video consultations after 12 months. • The flexibility in appointments and the time saved compared with regular outpatient visits were considered to be benefits Addressing inconveniences and barriers to video consultations, such as technical problems with data or internet stability, would make this type of consultation feasible for families in rural areas with low internet speeds

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Widberg et al. 2020	Systematic review	Australia, Canada, Germany, Italy, Netherlands, New Zealand, Portugal, Switzerland, United States	12	Multiple	397 palliative care patients	Description patients' experiences of eHealth in palliative care	eHealth	None	• Most participants in two studies were very satisfied with video meetings, preferring them to physical meetings • Contradictory findings were found in two studies; one where patients favoured the personal encounter and found that a deeper personal connection could not be achieved, and in another study, some patients and families felt that they were satisfied with telephone calls and information by letter, since they found new technology difficult
Wignall et al. 2020	Cohort study	United Kingdom		1 university hospital	70 patients who received a urology follow-up telephone appointment	Exploration of opinions on routine telephone consultations for urological follow-up and whether they could be implemented as COVID-19 pressures change	Telephone follow-up	None	• Patient reported a positive response for the outcomes in the telephone follow-up clinic • Over 95% scored the telephone appointment four or five (on a scale of one to five with five being excellent) • Over 95% of patients felt listened to and that their problem was adequately addressed over the telephone
Willems et al. 2021	Cross-sectional study	Germany		16 epilepsy centres	Patients at epilepsy centres	Analysis of satisfaction with and reliability of video-electroencephalography-monitoring systems (VEMS) in epilepsy diagnostics	Video-electroencephalography-monitoring systems (VEMS)	None	• Satisfaction with VEMS at 16 centres was low • Only 50% of users were satisfied with the overall performance of their VEMS, and a low 18% were satisfied with the manufacturer's customer service • User interface, software stability, lack of regular updates, and missing customer-oriented improvements were reported as frequent problems jeopardizing diagnosis in approximately 1 in every 10 patients See Table D.2 for patient safety results
Wong et al. 2020	Systematic review	Canada, Germany, Korea, Netherlands, Sweden Switzerland, United Kingdom, United States	24	Multiple	All patients except patients with mental health conditions	Systematic review of RCTs to investigate how eHealth impacts the outcomes of patients' self-medication management	eHealth for medication management for at least six months	None	• Among the 4 studies measuring patient satisfaction, 1 observed a difference when compared with the control See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Yi et al. 2021	Systematic review	Australia, Canada, Italy, Portugal, South Korea, United States	17	Multiple	Older adults with cognitive impairment	Systematic review to understand the state of the literature on synchronous in-home or clinic video-based telemedicine visits for older adults with Alzheimer's Disease Related Dementias or mild cognitive impairment and characterise technological barriers and facilitators in providing care that is responsive to their needs, including sensory related	Synchronous in-home or clinic video-based telemedicine	None	• 13 studies reported participant satisfaction with telemedicine, with favourable satisfaction ratings but overall low response rates • Studies did not use uniform scoring system for satisfaction questionnaires One study reported that 65% of patients and 91% of care partners responding to surveys preferred to see the specialist via telemedicine than in person
Zhang et al. 2021	Systematic review and meta-analysis	Australia, Belgium, Canada, Ireland, United States	12	Multiple	Patients aged 18 years and older undergoing virtual preoperative anaesthesia assessment	Systematic review and meta-analysis reviewing the effectiveness of virtual preoperative assessment for the evaluation of surgical patients, with a focus on surgery cancellation rates and patient experience	Virtual preoperative assessment	None	• One study reported that all anaesthesiologists surveyed were satisfied or highly satisfied with virtual care, while one study reported no difference in staff satisfaction
Zimmerman et al. 2021	Cohort study	United States		1 adult hospital	240 patients who were treated virtually from May 2020 to October 2020, and a comparison group of 240 patients who were treated in the in-person partial programme a year earlier	Comparison of satisfaction with partial hospital programme (PHP) services delivered via telehealth to in-person treatment provided to patients treated prior to the COVID-19 outbreak	Telehealth treatment	In-person treatment	• For both the in-person and telehealth methods, patients were highly satisfied with the initial diagnostic evaluation and were optimistic at admission that treatment would be helpful • Both groups were highly satisfied with all components of the treatment programme and almost all would recommend treatment to a friend or family member

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Zischke et al. 2021	Systematic review	Multiple	39	Multiple	Not specified	Determination of the current clinometric value of performing physiotherapy assessments using synchronous forms of telehealth across all areas of physiotherapy practice	Simulated or real-world physiotherapy assessments using synchronous forms of telehealth	None	• Satisfaction with physiotherapy telehealth assessments was reported in 19 out of 39 studies, with most stating they were satisfied with the telehealth assessment and consultation process • Nine studies conducted similar satisfaction surveys, with questions asked rated on a visual analogue scale (VAS) • Most questions asked rated highly in each of these nine studies (>6/10 VAS) • If given the choice, many preferred the face-to-face method of assessment

Table D.2. Overview of included papers with results on the patient safety of telemedicine

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Aiken et al. 2021	Cohort study	United Kingdom		3 largest abortion providers in England	54 142 patients who accessed an early medical abortion	Comparison of outcomes before and after implementation of medical abortion (termination of pregnancy) without ultrasound via telemedicine	Additional dose of misoprostol provided via telemedicine	Additional dose of misoprostol provided via in-person clinic visit	• Significant adverse events in both cohorts were rare • No evidence that significant adverse events were higher in the telemedicine-hybrid cohort See Table D.1 for user satisfaction results
Amkreutz et al. 2020	Prospective cohort study	Germany		1 telemedicine centre in a university hospital	103 tele-intensive care unit (ICU) patients who received tele pharmaceutical consultation	Implementation and evaluation of an additional telepharmaceutical expert consultation as part of tele-ICU services	Store-and-forward-technology with real-time audio-videoconferencing for tele-rounds	None	• The additional pharmaceutical expert consultation as part of tele-ICU services was successfully implemented • A high number of previously not detected drug related problems were identified in tele-ICU patients during the implementation period

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Appleton et al. 2021	Systematic review	Multiple	77	Multiple	Staff working within the field of mental health, people receiving organised mental health care for any condition, family members or carers of people receiving mental health care	Investigation of the adoption and impacts of tele-mental health approaches during the COVID-19 pandemic, and facilitators and barriers to optimal implementation	Any form of spoken or written communication carried out between mental health professionals and service users/family members/unpaid carers	Any mental health communication delivered face-to-face, digitally or remotely, waitlist control, or placebo	• 81% of clinical staff considered the quality of telemedicine consultations to be either good or excellent • The main barriers for clinicians to deliver quality therapy were picking up on adaptability, trialability, and nonverbal cues, assessing mental health symptoms, keeping service users engaged See Table D.1 for user satisfaction results See Table D.5 for cost results
Barnett et al. 2021	Systematic review	Australia, Canada, Colombia, Denmark, France, Germany, Israel, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States	19	Multiple – Umbrella review	Staff working within the field of mental health, people receiving mental health care or with mental health diagnoses, family members, or carers of people receiving mental health care	Umbrella review of systematic reviews available on the literature and evidence-based guidance on telemental health, including both qualitative and quantitative literature	Any form of spoken or written communication conducted between mental health professionals and patients, service users, family members, carers, or other mental health professionals using either the internet or the telephone	None	• Patient safety while using remote interventions has been reported only in the reviews of populations with post-traumatic stress disorder (PTSD) • Two reviews agreed that safety was acceptable See Table D.1 for user satisfaction results See Table D.5 for cost results
Bauer et al. 2022	RCT	Germany, Austria		33 tertiary centres	400 patients exhibiting signs of cardiac autonomic dysfunction	Prospective investigator-initiated, randomised, multicenter, open-label, diagnostic trial on early detection of subclinical but prognostically relevant arrhythmic events	Telemedical monitoring using implantable cardiac monitors	Conventional follow-up	• No evidence of difference in safety outcomes between intervention and control group (thrombolysis in myocardial infarction major bleeding)
Berglund et al. 2020	Retrospective cohort study	Sweden		1 university hospital	686 patients with atypical melanocytic lesion	Retrospective analysis of electronic health records evaluating the diagnostic accuracy and safety of short-term teledermoscopic monitoring (STTM)	Short-term teledermoscopic monitoring (STTM)	None	• Results show that short-term monitoring of atypical melanocytic lesions with a teledermoscopic approach is safe and provides high diagnostic accuracy

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Breteler et al. 2020	Retrospective cohort study	Netherlands		Traumatology or surgical oncology wards in 1 university hospital	31 patients scheduled for major surgery with an indication for postoperative monitoring	Analysis of patients who developed adverse events during vital signs recordings during an observational methods comparison study of wearable sensors for vital signs monitoring	Wearable patch sensors and a patient- worn monitor	None	• Remote patient monitoring may have potential to improve patient safety by generating early warnings for deterioration to nursing staff
Chagas et al. 2021	Systematic review and meta-analysis	Canada, Colombia, United States	10	Multiple	Paediatric patients admitted to a general paediatric intensive care unit (PICU), cardiac PICU, or adult ICU with beds for paediatric patients	Evaluation of whether telemedicine in the PICU has the potential to improve clinical and non-clinical outcomes	Telemedicine in ICU	Multiple	• Satisfaction was mainly related to efficient communication, high quality of care, and audiovisual quality
Chappell et al. 2022	RCT	United Kingdom		15 maternity hospital units	850 individuals with chronic hypertension or gestational hypertension	Evaluation of the effect of blood pressure self-monitoring, compared with usual care alone, on blood pressure control and other related maternal and infant outcomes, in individuals with pregnancy hypertension	Blood pressure self-monitoring and usual care	Usual care alone	• There were 8 serious adverse events in the self-monitoring group (4 in each cohort) and 3 in the usual care group (2 in the chronic hypertension cohort and 1 in the gestational hypertension cohort)
Collins et al., 2020	RCT	United States		15 academically affiliated emergency departments (ED)	479 patients with signs or symptoms of acute heart failure	Assessment of the impact of a self-care intervention on 90-day outcomes in patients who are discharged from the emergency department (ED)	Home visit within 7 days of discharge and twice-monthly telephone-based self-care coaching for 3 months	Usual care	• There were no significant differences in all-cause death or ED revisit or hospital admission

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Corso et al. 2022	Systematic review	Multiple	9 RCTs	Multiple	Children and adults with musculoskeletal conditions	Evaluation to determine whether nonpharmacologic interventions delivered through synchronous telehealth are as effective and safe compared with in-person interventions for the management of patients with musculoskeletal conditions	Nonpharmacologic interventions used by health care providers through synchronous telehealth	Clinic-based nonpharmacologic interventions delivered in person	• The available evidence suggests that synchronous telehealth alone or combined with in-person care is as effective and safe as in-person care alone for the nonpharmacologic management of chronic headaches; nonspecific low back pain; and knee, hip, and generalised osteoarthritis in adults
Cottrell et al. 2021b	Audit study	Australia		1 tertiary hospital	Patients referred to the hospital's orthopaedic or neurosurgery department for a specialist medical consultation	Description of the economic- and service-related outcomes of these two methods of service delivery through retrospective audit of electronic medical records	Remote delivery of "fly in fly out" model of care	In-person delivery of "fly in fly out"	• No safety incidents were reported for either service delivery model during the audit time period See Table D.5 for cost results
Cox et al. 2021	Systematic review	Australia, Canada, Denmark, Greece, Italy, Korea, Netherlands, Norway, Spain, United Kingdom, United States	15	Multiple	1 904 adults with a diagnosis of a chronic respiratory disease (according to relevant established criteria) of any disease severity, in stable state	Evaluation to determine the effectiveness and safety of telerehabilitation for people with chronic respiratory disease	Telerehabilitation which makes use of information and communication technologies to provide clinical rehabilitation services from a distance	Traditional, centre-based pulmonary rehabilitation or no rehabilitation control	• No safety issues have been identified

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Criner et al. 2021	RCT	United States		8 research sites	138 patients aged ≥40 years with moderate to very severe chronic obstructive pulmonary disease (COPD) and ≥10 pack-year smoking history	Evaluation of the effects of medication reminders via the BreatheMate device on adherence in patients with chronic obstructive pulmonary disease (COPD)	BreatheMate device, smartphone application, and vouchers to redeem pressurised metered-dose inhalers (pMDIs) for the prescribed 2 puffs of budesonide/formoterol 160/4.5 µg twice daily, as well as twice-daily electronic reminders to take budesonide/formoterol	BreatheMate device, smartphone application, and vouchers to redeem pressurised metered-dose inhalers (pMDIs) for the prescribed 2 puffs of budesonide/formoterol 160/4.5 µg twice daily	• Similar percentages of patients who experienced adverse events (AEs) and serious AEs were observed between the control (31.3% and 11.9%, respectively) and the intervention group (30% and 7.1%, respectively) See Table D.1 for user satisfaction results
Edison et al. 2020	Systematic review	Australia, Denmark, Ireland, United Kingdom, United States	18	Multiple	5 813 adult patients exposed to virtual clinics using telehealth strategies	Systematic review identifying the clinical, fiscal, and environmental evidence on the use of urological telehealth and/or virtual clinic (VC) strategies, and to highlight research gaps in this rapidly evolving field	Telehealth and/or virtual clinic (VC) strategies	Multiple	• Far from being concerned, patients welcomed the offer for virtual clinics and felt it was safe, thorough, and professional See Table D.1 for user satisfaction results See Table D.5 for cost results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Gingold et al. 2021	Retrospective cohort study	United States		1 large academic medical centre and an affiliated community hospital	464 patients discharged from hospitals	Analysis to measure the effect of a mobile integrated health community paramedicine (MIH-CP) transitional care programme	Multidisciplinary team involving real-time medication reconciliation with the pharmacist over videoconference and other videoconferencing/text messaging	Not receiving multidisciplinary team care	• No difference in 30-day inpatient readmissions between intervention and control groups See Table D.5 for cost results
Gonzales et al. 2021	RCT	United States		Not specified	136 adults (≥18 years old at time of transplant) kidney recipients 6-36 months post-transplant	Examination of the efficacy of improving medication safety through a pharmacist-led, mobile health – based intervention	Usual care + pharmacist-led, mobile health – based intervention	Usual care	• All 68 participants in both arms experienced at least one medication error during the study. • In the multivariable model, total adjusted medication errors were reduced by an average of 0.11 per month in the intervention arm (95% confidence interval [95% CI], 0.05 to 0.17; P <0.001), as compared with the control arm, leading to a 61% reduction in the risk rate of medication errors over the 12-month study (incident risk ratio [IRR], 0.39; 95% CI, 0.28 to 0.55; P <0.001) • Common administrative errors included omissions, additions, and prescribing errors. Clinical errors were largely due to non- or undertreated conditions, primarily electrolyte abnormalities
Gupta et al. 2021	Systematic review	Multiple	53	Multiple	Paediatric and adult patients with ear, nose, and throat (ENT) disorders	A systematic review to synthesize the evidence base on outcomes from remote consultation in adult and paediatric ENT services	Remote consultation for paediatric or adult ENT disorder	Multiple	• Safety outcomes including ethical and legal implications were reviewed • Remote consultation has potential for improving patient pathway efficiency, and reducing financial and environmental costs, whilst maintaining safe practice and patient satisfaction See Table D.1 for user satisfaction results See Table D.5 for cost results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Hadar et al. 2022	Cohort study	Israel		1 maternal – foetal medicine unit in a hospital	100 women who were carrying a singleton foetus at 14 +0 to 39+ 6 gestational weeks	Evaluation of whether it is feasible to use remote foetal assessment during pregnancy	A mobile self-operated ultrasound transducer controlled through a smartphone which can record and transmit images and videos of the foetus for remote telemedicine consultation	None	• Only a single event, considered to be a non-serious adverse event, was categorised as device related. This event was a heating sensation caused directly by the device that was felt briefly by the participant
Hardman et al. 2021	Prospective cohort study	United Kingdom		41 ear, nose, and throat (ENT) departments	4 568 patients who were referred on the suspected HNC pathway to secondary care	Investigation of a service evaluation of remote triage of suspected HNC referrals conducted during the initial peak of the COVID-19 pandemic	Remote triage over a telephone consultation	None	• Appropriately implemented, remote triage, augmented by risk stratification, may facilitate more targeted investigations for high-risk patients and prevent unnecessary hospital attendance for the lowest risk patients
Harkey et al. 2021b	RCT	United States		1 small community hospital and a large tertiary care hospital	432 patients who underwent minimally invasive appendectomy or cholecystectomy	Assessment of the noninferiority of post discharge virtual care visits as measured by the rate of 30-day hospital encounters	Video-based virtual visit	In-person visit	• Post discharge video-based virtual visits did not increase hospital encounter proportions and provided shorter overall time commitment but equal time with the surgical team member
Hauffman et al. 2020	RCT	Sweden		1 university psychosocial care programme	15 patients with cancer and concurrent symptoms of anxiety and depression	Exploration of the participants' perceptions of the relevance and benefits of an internet-based stepped care programme	An internet-based interactive health communication application, including a stepped care intervention for symptoms of anxiety and depression	None	• The internet-based interactive health communication application was experienced as a safe and reliable source of information and support

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Hollis et al. 2021	RCT	United Kingdom		2 child and adolescent mental health services sites	224 patients aged 9-17 years with Tourette syndrome or chronic tic disorder, and severe tics	Evaluation of the effectiveness of internet-delivered, therapist-supported, and parent-assisted Exposure and Response Prevention (ERP) for treatment of tics in children and young people	10 weeks of online, remotely delivered, therapist-supported ERP for tics	10 weeks of online therapist-supported education about tics	• Two serious adverse events occurred, both in the psychoeducation group, neither of which were related to study treatment. See Table D.5 for cost results
Indraratna et al. 2021	RCT	Australia		2 sites	102 patients with acute coronary syndrome or heart failure	Description of the implementation of a novel smartphone app within an RCT, the impact of the COVID-19 pandemic on the conduct of the trial, and how the experience with TeleClinical Care-Cardiac (TCC-Cardiac) guided and informed the development of two telemonitoring programs during the pandemic	TeleClinical Care-Cardiac app (TCC-Cardiac) alongside standard care	Standard care alone	• All participants have been safely monitored, with no adverse events since enrolment began See Table D.1 for user satisfaction results See Table D.5 for cost results
Jansson et al. 2022	Systematic review	Australia, Canada, Spain, United States	9	Multiple	Adults	Examination of the effects of telerehabilitation on physical functioning and resource utilisation in patients following discharge from hospital	Telerehabilitation	Conventional in-person outpatient physical therapy	• Patients who completed telerehabilitation showed improvement in physical functioning similar to that of patients completing conventional in-person outpatient physical therapy, without an increase in adverse events or resource utilisation
Jansson et al. 2020	Systematic review	Italy, Spain, United States	6	Multiple	Patients with orthopaedic conditions	A systematic review to describe the current literature of computer- and telephone-delivered interventions on patient outcomes and resource utilisation in patients	Computer- and telephone-delivered interventions	Multiple	• Compared with the control group, computer- and telephone-delivered interventions showed no significant difference in adverse events
Joshi et al. 2021	Cohort study	United States		Not specified	All telemedicine encounters between 26 March 2020, and 1 June 2020, that were followed by an encounter in the emergency department or admission within eight weeks	Assessment of neurology telemedicine visits in reducing the risk of admission to emergency room/impatient service	Home-based telemedicine visits during COVID-19	None	• Telemedicine is safe, with a similar likelihood of emergency department or hospital admission during the pandemic in 2020 versus before the pandemic in 2019

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Kim et al. 2020	RCT	Korea		3 sites	60 acute ischemic stroke patients with mean SBP > 135 mm Hg during the two consecutive days, for >24 hours after onset of stroke	Evaluation of the effects of an intensive mobile blood pressure (BP) management strategy versus usual care in acute ischemic stroke patients	Bluetooth-equipped sphygmomanometer, with behavioural intensification, telephone contacts, breakthrough visit calls, and prescription algorithm	Bluetooth-equipped sphygmomanometer only	• No difference in adverse effects between intervention and control
Lewis et al. 2020	RCT	United Kingdom		2 mental health hospital groups	81 patients with schizophrenia and related disorders	Assessment of the safety and feasibility of a personalised smartphone-based app	Smartphone-based active symptom management	Usual care	• The active symptom monitoring intervention was safe and acceptable
Lopez-Liria et al. 2020	Non-randomised controlled trial	Spain		1 hospital	55 patients implanted with a Medtronic pacemaker	Investigation to compare the long-term effectiveness and safety of RM plus a clinic visit versus clinic visits alone	Internet-based RM service for patients with Medtronic implantable heart devices	Conventional monitoring	• The study concluded that it was safe and feasible with follow-up for 6 months
McGillion et al. 2021	RCT	Canada		8 acute care hospitals	905 adults to be discharged from hospital after non-elective surgery	Investigation to determine whether virtual care with remote automated monitoring (RAM) compared with standard care increases days alive at home within 31 days of discharge after non-elective surgery	Virtual care with remote automated monitoring (RAM) technology	Standard care	• More participants in the virtual care group than standard care group had a drug error corrected by a doctor or nurse (102 (22.6%) v 6 participants (1.3%); absolute difference 21.3%, 17.3% to 25.3%); among these participants, 173 and nine drug errors
Metcalfe et al., 2021	Systematic review	Denmark, Finland, France, Israel, Sweden, United States	17	Multiple	Adults and children	Systematic review to describe and evaluate the current literature on remote otological assessment using videootoscopy with regards to reliability and potential applications	Video-otoscopy for remote otological assessment	Multiple	• Remote otological assessment using video-otoscopy shows potential as a safe and effective method for detecting the presence of ear disease in a wide range of health care settings.

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Nguyen et al. 2021	Systematic review	United States	19	Multiple	Not specified	Systematic review to examine how e-visits have impacted clinical outcomes and health care quality, access, utilisation, and costs.	Electronic visits (e-visits) involving asynchronous communication between clinicians and patients through a secure web-based platform	Multiple	• The impact on quality of care varied across conditions. Quality of care was equivalent or better for chronic conditions, but variable quality was observed in infection management (e.g. appropriate antibiotic prescribing) See Table D.5 for cost results
Pabinger et al. 2021	Prospective cohort study	Austria		General surgery department at 1 university hospital	225 outpatients at the department for general surgery	Evaluation of whether a mobile health care communication app could be used to identify the correct (ICD-10) diagnosis and the correct therapy	An onsite treatment (ONSITE group) and a telemedical treatment (TELEMEDICAL group)	Each participant served as own control	• There was no single wrong telemedical diagnosis related to insufficient quality of medical images or issues with the software of the viewer or browser, regardless of the device used
Rametta et al. 2020	Retrospective cohort study	United States		1 paediatric specialty care network composed of an urban quaternary care hospital, an ambulatory centre, and an additional 8 satellite locations	All in-person and telehealth encounters during study period	Assessment of the rapid implementation of child neurology telehealth outpatient care with the onset of the COVID-19 pandemic	Telemedicine, exclusively referring to patient encounters performed through the audio and video software	In-person encounters	• In 40% of encounters, the technical quality was impaired, and the most frequent single causes affecting quality were poor audio (19%), poor video (13%), and interruption of the encounter (9%). In 5% of encounters, providers documented additional technical quality problems in free-text notes. See Table D.1 for user satisfaction results See Table D.3 for use by demographic results
Schopfer et al. 2020	Pragmatic trial	United States		3 veterans Administration (VA) medical centres	237 patients with a recent ischemic heart disease (IHD) event	Investigation to compare the effects of home-based and facility-based cardiac rehabilitation in patients with IHD	Home-based cardiac rehabilitation, involving telephone calls by clinical staff	Facility-based cardiac rehabilitation	• Home-based cardiac rehabilitation could be efficiently and safely provided to patients with a wide range of clinical indications and comorbidities

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Smith et al. 2021a	Systematic review	Multiple – umbrella review	17	Multiple	Surgeons, and patients who were undergoing or recently underwent surgery	Evaluation of patient and provider satisfaction with and perceptions towards telehealth, and to identify the barriers and facilitators associated with its utilisation both prior to and during the COVID-19 pandemic	Synchronous telehealth modalities (e.g. live interactive videoconference or telephone consultations) used perioperatively	Multiple	• Two studies reported no difference in the number of complications between telehealth and usual care; one noted a slightly higher incidence of adverse events with telehealth compared to face-to-face care See Table D.1 for user satisfaction results See Table D.5 for cost results
Taguchi et al. 2021	RCT	Japan		1 cognitive behavioural therapy centre	30 patients with chronic pain	Examination of the effectiveness of an integrated cognitive behavioural therapy programme with new components (attention-shift, memory work, video feedback, and image training) delivered via videoconferencing (videoconference-based CBT).	Videoconference -based CBT	Treatment as usual (TAU)	• 4 adverse events were reported by 4 different patients in the vCBT group. The first patient was hospitalised owning to worsening Behcet disease and declined to participate in the study for the fourth session. The second patient had sudden difficulty opening his eyes due to medically unexplained eyelid pain and declined to participate in the study for the fifth session. The third patient had a common cold and the fourth patient had temporomandibular joint disorders See Table D.5 for cost results
Tang et al. 2020	Systematic review	Canada, Germany, Sweden, United States	21	Multiple	RCT of eHealth interventions aimed at any solid organ transplant recipient	Assessment of the totality of published evidence for the benefits and harms of eHealth interventions among solid organ transplant list	eHealth interventions among solid organ transplant recipients	Multiple comparators (standard of care, or no comparator)	• Adverse event: 3 trials; anxiety, electronic monitoring burdensome, experience failure of intervention, did not like pill boxes, not interested, concerned about privacy, technological failure • Safety: hospitalisation / outpatient services 2-4 trials
Tenforde et al. 2020	Cross-sectional study	United States		4 hospital systems under a single academic department	119 patients and physicians	Description of a quality improvement initiative during the rapid adoptive phase of telemedicine in outpatient sports medicine practices during the COVID-19 pandemic	Synchronous audiovisual telemedicine visits	None	• Adverse event: vasovagal syncope • Safety: No relevant safety data See Table D.1 for user satisfaction results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Tune et al. 2022	Systematic review	Australia, Korea, Spain, United Kingdom, United States	7	Multiple	Multiple – umbrella review	Umbrella review to identify how quality of mHealth interventions for cancer survivors is described and measured	mHealth interventions	None	• Increased adverse event reporting was among positive outcomes reported
Vimalananda et al. 2020	Systematic review	Multiple	63	Multiple	Multiple	Systematic review of the recent peer-reviewed literature on the effect of e-consults on access, cost, quality, and patient and clinician experience and identified the gaps in existing research on these outcomes	e-consults	None	• Several studies reported on adverse events or emergency department (ED) utilisation following e-consultation • Several studies employing manual review of the medical record found no increase in adverse events (e.g. ED visits, hospitalisations, and/or death within 1-6 months) following e-consult. See Table D.1 for user satisfaction results See Table D.5 for cost results
Vodicka et al. 2020	Systematic review	Australia, Canada, Denmark, Germany, Italy, Slovenia, United Kingdom, United States	19	Multiple	Telecardiology, especially with adults that suffer from cardiovascular diseases such as heart rhythm disorders or chest pain, excluding heart failure and or observation of activity of pacemakers or defibrillators	Evaluation of the state of activity in telemedicine on the primary level in Slovenia and around the world and to review the existing literature about the use and experience of telecardiology at the primary health care level	Telecardiology at primary and secondary health care levels	None	• The use of telecardiological techniques increases the quality and safety of work in managing patients with cardiovascular disease in FP practice
Willems et al. 2021	Cross-sectional study	Germany		16 epilepsy centres	Patients at epilepsy centres	Analysis of satisfaction with and reliability of video-electroencephalography-monitoring systems (VEMS) in epilepsy diagnostics	Video-electroencephalography-monitoring systems (VEMS)	None	• Safety grading: Frequent VEMS issues and their effects on criticality and the potential to pose patient hazards are reported in table and figure See Table D.1 for user satisfaction results
Wong et al. 2020	Systematic review	Canada, Germany, Korea, Netherlands, Sweden, Switzerland, United Kingdom, United States	24	Multiple	All patients except patients with mental health conditions	Systematic review of RCTs to investigate how eHealth impacts the outcomes of patients' self-medication management.	eHealth for medication management for at least six months	None	• Among the 2 studies reporting adverse events relating to the interventions (or safety outcome), no statistically meaningful difference between the intervention and control was found See Table D.1 for user satisfaction results

Table D.3. Overview of included papers with results on telemedicine use by demographic

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Abrashkin et al. 2021	Retrospective cohort study	United States		1 community paramedicine programme	Not specified	Analysis of data from a telemedicine-capable community paramedicine programme	Emergency department (ED) transport with telephonic communication	ED transport with telephonic communication	• The median patient age was 88 years, 63.3% were women, and 66.5% listed Medicare as their primary insurance status See Table D.4 for use by technology results
Ahmed et al. 2020	Retrospective cohort study	United States		Primary and specialty care practices at 2 large academic and 2 community hospitals of an integrated health system	Patients across five medical specialties	Assessment of novel metrics of e-consult appropriateness and utility	e-consult services	None	• There were important variations in mean age, sex, and race of patients analysed in this study • Dermatology e-consult patients were younger (mean age, 38.6 years) than those with e-consults in other specialties, and a lower percentage were female (55.3%)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Alexander et al. 2020	Cross-sectional study	United States		Stratified nationally representative audit of outpatient care	Patients accessing primary care	Analysis of national changes in the volume, type, and content of primary care delivered during the COVID-19 pandemic, especially regarding office-based vs telemedicine encounters	Telemedicine	Office-based care	• During the first 2 quarters of 2018, there were 158.8 million (95% CI, 152.1-165.4 million) patient visits among White individuals (85.6% of visits among White or Black individuals) and 26.7 million (95% CI, 24.6-28.7 million) patient visits among Black individuals (14.4%) • Visits for Black individuals accounted for between 14.4% and 17.4% of visits of the period examined, and increases in telemedicine visits were similar among White individuals and Black individuals, with telemedicine visits accounting for 19.3% of 2020 treatment visits among White individuals and 20.5% of those of Black individuals • Whereas individuals aged 19 to 35 years and aged 36 to 55 years accounted for 12.4% and 19.8% of office-based visits, respectively, in Q1/Q2 of 2020, they accounted for 17.8% and 26.1% of telemedicine visits, respectively, during this period, indicating substantial adoption of telemedicine compared with their younger or older counterparts • The proportion of visits delivered by telemedicine varied from a low of 15.1% in the East North Central region to a high of 26.8% in the Pacific region
Bhargava et al. 2021	Cohort study	United States		Not specified	21 070 patients	Evaluation of patients' adoption and success of primary care e-visits within an integrated health care delivery system	Primary care e-visits	None	• Among 21 070 total patient e-visits, 17 014 (80.75%) were women, 10 728 (50.92%) were White, and they had a mean (SD) age of 36 (12.6) years • Patient characteristics varied significantly by e-visit concern (all P <. 001)
Bohm et al. 2020	Cohort study	United States		Not specified	9 051 app users	Analysis of the extent to which users engage with mHealth for diabetes and identification of patient characteristics that are associated with engagement	mHealth diabetes support app	None	• Among app users who shared information about their gender, 56.86% (2075/3649) reported to be female • More than half of the users were aged 50 years or older, and the average age of users was 50.4 years

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Bourdon et al. 2020	Prospective cohort study	France		1 primary and 1 secondary emergency ophthalmology clinic	500 patients	Description of the population and diagnoses and evaluation of the main judgment criteria, defined as the 'ability of teleconsultation to properly indicate a physical consultation for fair diagnosis and treatment in eye emergencies'	Emergency ophthalmology teleconsultation	None	• Among 500 patients, 303 (60.6%) were men and 197 (39.4%) • The distribution based on age was: 105 (21%) under 25, 184 (37%) 25-45, 151 (30%), 45-65, 60 (12%) over 65 • 434 (87%) lived in Paris and surrounding suburbs, 66 (13%) lived in the rest of France
Brenk-Franz et al. 2022	Cross-sectional study	Germany		1 family medicine practice	192 patients treated by general practitioners	Investigation of whether attachment and patient activation are potential predictors of the interest in and the use of e-health applications in primary care patients	eHealth applications	Usual care	• There was no influence of age, education or gender or influences of health factors in interest in telehealth applications • Younger patients and patients with a higher degree of avoidant attachment reported more e-health usage behaviour
Cantor et al. 2021	Cross-sectional study	United States		8 860 outpatient treatment facilities	n/a	Examination of the availability of telehealth services at outpatient mental health treatment facilities in the United States at the outset of the COVID-19 pandemic, and identification of facility-level characteristics and state-level policies associated with the availability	Telehealth services at outpatient mental health treatment facilities	None	• Controlling for other factors, regression adjusted means indicate that telehealth services were more prevalent in the South (53.7%), West (47.8%), and Midwest (40.6%) compared with Northeast (26.8%, P <0.001), and in nonmetropolitan (53.2%) compared with metropolitan counties (40.3%, P <0.001) • Facilities with public sector ownership (59.4%) versus non-profit (41.0%) or for-profit (36.2%) private facilities, facilities providing care to children and adults (45.2%) versus adults only (38.2%, P <0.001), and facilities not accepting Medicaid (54.0%) were also more likely to provide telehealth services (P <0.001)
Cho et al. 2021	Systematic review	Multiple	33	Multiple	7 382 patients with cancer using electronic symptom self-reporting systems (e-SRS)	Exploration of the acceptance and use of home-based electronic symptom self-reporting systems (e-SRS) by patients with cancer and identification of associated facilitators and barriers	Electronic symptom self-reporting systems (e-SRS) for patients with cancer	None	• Younger age, higher education level, White race, and male sex were associated with higher acceptance and use of e-SRS. • Evidence regarding the influence of employment status was mixed See Table D.1 for user satisfaction results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Chunara et al. 2021	Prospective cohort study	United States		1 academic medical centre	494 322 patients	Assessment of disparities in those who accessed health care via telemedicine for COVID-19 in a large academic health care system	Telemedicine clinical visits	In-person clinical visits	• The mean age of patients using telemedicine in 2020 went up from 40.7 years (standard deviation [SD]: 13.7) in 2019 to 47.3 years (SD: 19.8) a difference of 6.5 years (95% CI, 5.6-7.4 years) • The proportion of men using telemedicine increased from 33.3% to 39.3% a difference of 5.9% (95% CI, 2.9% to 9.0%) • The proportion of telemedicine visits by white patients decreased from 2019 to 2020, from 53.3% to 51.1%, a difference of −2.2% (95% CI, −5.5% to 1.0%), while those by Black patients increased from 8.0% to 12.9%, a difference of 4.9% (95% CI, 3.1% to 6.7%) respectively
Coley et al. 2022	RCT	Finland, France, Netherlands		Multiple	1.389 dementia-free community dwellers aged ≥65 years with at least basic computer literacy and either 2 or more CVD risk factors	Description of older adults' engagement with an eHealth intervention, identify factors associated with engagement, and examine associations between engagement and changes in cardiovascular and dementia risk factors	eHealth intervention (a multicomponent internet-based platform to encourage lifestyle changes, with remote support from a lifestyle coach)	Simple static internet platform containing only basic health information and no coach support	• At baseline, participants in the low engagement category were younger, had a lower level of education, had poorer cognitive and physical performance, and had more depressive symptoms than those who engaged more. • Participants were more often from the Netherlands, more likely to be smokers, and less likely to have used a computer in the preceding 4 weeks or be planning or already acting on lifestyle change
Creedon et al. 2020	Cross-sectional study	United States		Claims data from the IBM MarketScan Multi-State Medicaid Database	1 335 138 unique beneficiaries aged 18-64	Exploration of rural-nonrural trends in the prevalence and amount of mental and substance use disorder telemedicine received by adult Medicaid beneficiaries	Telemedicine for mental and substance use disorder	None	• In 2012, 5.8% of rural beneficiaries had a telemedicine visit for mental disorder treatment, compared with 7.0% of nonrural beneficiaries. • By 2017, rural beneficiaries overtook their nonrural counterparts, with 11.7% and 10.8%, respectively, having any telemedicine visits for mental disorder treatment • Rural beneficiaries were more likely than nonrural beneficiaries to be non-Hispanic white (81.8% and 63.5%, respectively) and less likely to have a Medicaid managed care health plan (57.4% and 62.3%, respectively)
Daniel et al. 2020	Retrospective cohort study	United States		Data from Planned Parenthood Association of Utah (PPAU)	Not specified	Evaluation of demographic and service delivery differences between patients using telemedicine before abortion	Telemedicine for informed consent visit prior to abortion	In-person visit for informed consent visit prior to abortion	• Compared to in-person patients, telemedicine patients were slightly older (27 vs 25 median years, $p < 0.001$), more likely to live out of state (47% vs 4%, $p < 0.001$) and further away from PPAU clinics offering informed consent visits (104 miles vs 10 median miles, $p < 0.001$)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
El-Nahal et al. 2022	Cohort study	United States		1 academic HIV centre	5 773 patients	Exploration of the impact of telemedicine on access to care for people with HIV (PWH) by comparing the proportion of PWH engaged in care prior to and during the COVID-19 pandemic	Telemedicine visits	In-person visits	• Participants age at least 60 years were 0.60 (95% CI 0.49-0.75) times as likely as those aged 20-39 years to complete a video visit (23 vs. 42%) • Male participants were 0.76 (95% CI 0.62-0.94) times as likely as female participants to complete a video visit • Video visit completion among black participants was 0.60 (95% CI 0.42-0.87] times as likely as among white participants (25 vs. 46%)
Eruchalu et al. 2022	Retrospective cohort study	United States		1 academic medical centre	4 908 patients	Investigation of racial/ethnic and socio-economic disparities in telemedicine compared with in-person surgical consultation during the COVID-19 pandemic	Telemedicine visits	In-person visits	• There were no significant differences demonstrated in virtual compared with in-person visit use across racial/ethnic groups • Among patients using virtual visits, Latinx patients were less likely to have video compared with audio-only visits than White patients (OR, 0.46; 95% CI 0.22-0.96) • Black race and insurance type were not significant predictors of video use. During Phase II, multivariable modelling demonstrated that Black patients (OR, 1.52; 95% CI 1.12-2.06) were more likely to have virtual visits than White patients • No significant differences were observed across insurance types
Garcia-Huidobro et al. 2020	Case-control study (using retrospective and concurrent control groups)	Chile		1 private academic health network	3 962 patients who received, and 263 clinicians who provided, telemedicine care in March/April 2019 and March/April 2020	Investigation of the system-wide accelerated implementation of telemedicine, compare patient satisfaction between telemedicine and in-person visits, and report provider perceptions	Telemedicine visits	In-person visits	• Patients accessing telemedicine were more likely to be female and have private insurance, and less likely to be children or older adults, or residents of the Santiago Metropolitan Region compared to both in-person control groups (P <. 01 for all comparisons) See Table D.1 for user satisfaction results
Haynes et al. 2021	Retrospective cohort study and cross-sectional study	United States		1 academic medical centre	1 292 patients	Identification of patient-level factors associated with adoption of telemedicine for subspecialty diabetes care during the COVID-19 pandemic	Video telemedicine visits	In-person or telephone visits	• Patients over age 65 were less likely to use telemedicine (OR: 0.34, 95% CI: 0.22-0.52, P <. 001), as were patients with a primary language other than English (OR: 0.53, 95% CI: 0.31-0.91, P =.02), and patients with public insurance (OR: 0.64, 95% CI: 0.49-0.84, P =.001)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Hsueh et al. 2021	Cross-sectional study	United States		1 regional, multi-centre medical group	642 370 patients	Exploration of video use compared with telephone, for patients with limited English proficiency (LEP) self-scheduling a primary care visit during the COVID-19 pandemic	Video telemedicine visits	Telephone telemedicine visits	• Across all telemedicine visits, 454 741 patients were with (47.6%) White patients, 216 788 (22.7%) Asian patients, and 196 483 (20.6%) Hispanic patients • 409 632 (42.4%) patients were with men • 195 612 (20.2%) patients were from low socio-economic status (SES) neighbourhoods. • 2.4% telemedicine visits were with EHR-documented interpreter need. After multivariate adjustment, LEP vs no LEP was associated with lower video visit use (OR, 0.77; 95% CI, 0.74-0.80; adjusted video visit frequency of 34.7% for LEP vs 39.8% for no LEP)
Jain et al. 2020	Cross-sectional study	United States		Users of a direct-to-consumer (DTC) telemedicine service	n/a	Exploration of the use of a direct-to-consumer (DTC) telemedicine service	DTC telemedicine service	None	• Among the 35 131 DTC telemedicine visits in our sample, 25 162 (73.9%; 95% CI, 73.4%-74.4%) were from female users, and the mean (SD) user age was 36 (12) years • Compared with the overall population in these 20 states, direct-to-consumer (DTC) telemedicine patients were more likely to live in urban areas (85.0% vs 75.4%; P < .001) and areas with a higher income (32.8% vs 25.0% of the top quartile of zip code median household income; P < .001) • Of all DTC telemedicine visits, 14.4% (95% CI, 14.0%-14.8%) were for patients living in a primary care health professional shortage area
Jiang et al. 2021	Case study	United States		1 paediatric otolaryngology clinic	3 478 patients	Assessment of equal access to telemedicine for specialty care and identification of potential barriers that may negatively impact telemedicine utilisation	Paediatric otolaryngology service telemedicine visits	Paediatric otolaryngology service in-person visits	• There was no difference in patient age and gender between telemedicine and in-person groups. • The proportions of Spanish-speaking families were similar (15.8% in 2019 vs. 14.4% in 2020, P =.96), though Spanish-speaking families were statistically more likely to require rescheduling of their telemedicine visits (17.2%) when compared to the overall rescheduling rate of 11.9% (P =.0083) • The percentage of Medi-Cal-insured patients (51.4% in 2019 vs. 49.8% in 2020, P =.73) and the mean poverty level (12.6% in 2019 vs. 12.2% in 2020, P =.38) also remained the same

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Lattimore et al. 2021	Prospective cohort study	United States		1 academic tertiary care centre	14 792 patients	Examination of demographic and socio-economic differences in surgical patient telemedicine usage during the COVID-19 pandemic	Telemedicine visits during the pandemic	In-person visits pre-pandemic and during the pandemic	• Compared to visits before the pandemic, telemedicine visits during COVID-19 were more likely to be with patients from the least socio-economically distressed communities (OR, 1.31; 95% CI, 1.08,1.58; P = 0.005), and with non-government or commercial insurance (OR, 2.33; 95% CI, 1.84-2.94; P <. 001) • Adjusted comparison of telemedicine visits to in person visits during COVID-19 revealed telemedicine users were more likely to be female (OR, 1.38, 95% CI, 1.10-1.73; P = 0.005) and pay with non-government or commercial insurance (OR, 2.77; 95% CI, 1.85-4.16; P <. 001)
Martinez et al. 2020	Cross-sectional study	Colombia		Patients using the Telepsychiatry programme across 8 towns	111 telepsychiatry patients	Description of the experience of physicians and patients in the Telepsychiatry programme at the University of Antioquia's Faculty of Medicine in the first 12 months after its implementation	Telepsychiatry programme	None	• Patients seen by telepsychiatry were predominantly 27-59 years old (55.9%), women (69.4%), educated to the secondary school level (33.4%), and living in an urban area (93.8%) See Table D.1 for user satisfaction results
Moss et al. 2021	Retrospective cohort study	United States		3 neuro-ophthalmology outpatient practices	1 167 patients	Evaluation of the impact of COVID-19 on outpatient neuro-ophthalmic care by comparing clinical visits in 3 practices	Neuro-ophthalmic care delivery during the early COVID-19 pandemic	None	• Synchronous telehealth visits were more likely to be accessed by older patients (51.0±18.3) as compared to in office visits (49.7 ± 18.9), and patients who lived closer. See Table D.4 for use by technology results
Nguyen et al. 2020	Retrospective cohort study	Australia		Rural and remote communities in Western Australia	Not specified	Exploration of observational trends related to the availability of on-call telehealth services for Aboriginal and Torres Strait Islander	On-call telemedicine services with a specialist ophthalmologist	Online booking with in-person teleophthalmology consultation	• The proportion of Aboriginal and Torres Strait Islander patients in the on-call telehealth cohort was 51.4% (n = 147), compared to the online-booking telehealth group at 8.7% (n = 65) (p < 0.01). This represents an odds ratio for Aboriginal and Torres Strait Islanders accessing on-call services compared to online booking of 11.03 (7.82-15.56) • Remoteness of the patient increased with the availability of on-call telehealth

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Omboni et al. 2021	Retrospective cross-sectional study	Italy		Telehealth platform used at scale to manage chronic disease patients in the Italian community	13 613 patients	Outlining of the experience of a telehealth platform used at scale to manage chronic disease patients in the Italian community during the COVID-19 pandemic	Remote monitoring of blood pressure, heart rate, blood oxygen saturation, body temperature, body weight, waist circumference, blood glucose, and lipids at home through a dedicated smartphone app	None	• During the lockdown period, patients performing tests and transmitting readings were older (mean 49.1) and more often males (68.2%) than during the period preceding the lockdown
Rametta et al. 2020	Retrospective cohort study	United States		1 paediatric specialty care network composed of an urban quaternary care hospital, an ambulatory centre, and an additional 8 satellite locations offering child neurology care	All in-person and telehealth encounters during study period	Assessment of the rapid implementation of child neurology telehealth outpatient care with the onset of the COVID-19 pandemic	Telemedicine, exclusively referring to patient encounters performed through the audio and video software	In-person encounters	• Self-reported ethnicity and race were not different between the cohorts except for a small increase in the number of individuals self-reporting as multiple races in the telehealth cohort. MHI was identical between the cohorts. • There were no differences in age, self-reported ethnicity, race, and MHI when the in-person cohort was compared to only the telemedicine component of the telehealth cohort (excluding telephone encounters) See Table D.1 for user satisfaction results See Table D.2 for patient safety results
Rastogi et al. 2020	Cross-sectional study	United States		Large, national, direct-to-consumer telemedicine system	20 600 patients	Description of urinary tract infection (UTI) management in a large nationwide direct to consume (DTC) telemedicine platform	direct to consume (DTC) telemedicine service	None	• The majority of patients were female (96%), and 53% were between the ages of 18-39 years, and 1% were 65 years and older. • Most patients (34%) were from the South, followed by the Midwest (31%), West (22%), and Northeast (12%) • Eighty-eight percent reported insurance information

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Rodriguez et al. 2021	Retrospective cohort study	United States		1 tertiary care centre	Not specified	Examination of the patient characteristics associated with completion of in-person (IPV) and telemedicine visits in a high-volume gastroenterology (GI) clinic	Videoconferencing visits (VV) and telephone visits (TV)	In person visits (IPV)	• Comparing in-person visits (IPV) from 2019 and all telemedicine visits, videoconferencing visits (VV) and telephone visits (TV) in 2020, there were no significant differences in mean age, racial/ethnic distribution, median income by zip code, insurance, or appointment type (new vs return) • On univariate analyses, the VV cohort was significantly younger than the IPV group (46.0 ± 17.0 vs 53.1 ± 17.8 years; P < .0001) • The VV cohort had a lower proportion of black (3.48% vs 7.02%; P < .0001) and Latino (3.48% vs 9.92%; P <. 0001) patients, more private commercial insurance coverage (74.1% vs 54.6%; P = 0.0001), and higher income by zip code (USD 75 850 vs USD 72 292; P < .0001) compared with the IPV group
Rowe et al. 2021	Cohort study	Australia		1 tertiary hospital	1 515 patients	Identification of characteristics contributing to choosing telephone (TP) versus video consultation (VC) and assess patient outcomes between telehealth modalities	Video consultations (VC)	Telephone consultations (TP)	• Patients choosing TP over VC were older (P < 0.001), more likely to be female (P = 0.005), non-English-speaking (P = 0.041), living in metropolitan Melbourne (P < 0.0001), undertaking a first appointment (P = 0.002) and seeing particular cardiologists (P < 0.001) See Table D.4 for use by technology results
Sammour et al. 2021	Retrospective cohort study	United States		1 institute	3 570 patients with heart failure	Identification of telehealth visits for patients with primary or secondary diagnosis of heart failure or cardiomyopathy	Telehealth interventions for heart failure or cardiomyopathy patients	None	• The mean age of patients seen via outpatient telehealth visits was 70.8 ± 14.1 years, 55% were males, 82% were Caucasians • Older age, African American race, lack of spouse or significant other (i.e. single, divorced, or widowed), lack of college education, and lower median household income by zip code were predictors of decreased use of video capabilities See Table D.4 for use by technology results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Sen et al. 2022	Retrospective cohort study	United States		1 largest private insurance provider	Patients enrolled in Alabama's s Children's Health Insurance Program (CHIP), ALL Kids	Examination of disparities in telehealth utilisation in a population of publicly insured children	Telehealth	In person care	• Compared to the reference category of Non-Hispanic (NH) White, NH Black and Hispanic children had lower odds of telehealth use (odds ratio [OR]: 0.81, 95%confidence interval [CI] [0.76-0.86]; OR: 0.68, 95% CI[0.60-0.76], respectively) • Compared with NH White, NH Black and Native American children had higher odds of no medical claims (OR: 1.11, 95% CI [1.08-1.19];OR: 1.73, 95% CI [1.46-2.10], respectively).Compared with children with an Urban RUCA (Rural Urban Communing Area) designation, those in Large Rural, Small Rural, and Isolated designations had lower odds of telehealth use (OR: 0.76, 95%CI [0.71-0.81]; OR: 0.71, 95% CI [0.65-0.75]; OR: 0.68,95% CI [0.65-0.71], respectively), and those in Large Rural designations also had lower odds of no medical claims (OR:0.88, 95% CI [0.85-0.91]) • In comparison to the reference low-fee group, the expansion and no-fee groups had statistically higher odds of telehealth use (OR: 1.10, 95%CI[1.06-1.20]; OR: 1.43, 95% CI [1.16-1.78], respectively); the fee, expansion, and no-fee groups all had statistically lower odds of no medical claims (OR: 0.84, 95% CI [0.80-0.88]; OR: 0.68, 95% CI [0.65-0.71]; OR: 0.45, 95% CI[0.37-0.55], respectively). • There were no significant differences between female and male children in telehealth use, but female patients had lower odds of no medical claims
Smith et al. 2021b	Retrospective cohort study	United States		1 academic centre	18 278 adult patients	Assessment of quality aspects of rapid expansion of a virtual urgent care (VUC) telehealth system and the effects of a secondary telephonic screening initiative during the COVID-19 pandemic.	Virtual urgent care (VUC) visits	None	• The virtual urgent care (VUC) median age was 40 years (interquartile range [IQR] = 32-53 years), which was slightly older than the median age of 39 years (IQR = 31-50 years, p = 0.006) in the VUC cohort from one year prior • The VUC median age was slightly younger than the age of ED discharged patients (43 years; IQR = 31-58 years, p < 0.001)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Stephen et al. 2022	Systematic review	Australia, Greece, Italy, Korea, Netherlands, New Zealand, Norway, United States	14	Multiple	Diabetes patients	review of literature on changes in patient reported outcome measures (PROMs) in the same population while using mHealth apps for diabetes self-care	mHealth apps	None	• In one study, the lowest percentage of app users was found in the age group 56 years or above. However, another study found that increased mHealth app usage has been positively correlated with increasing age • One study reported that mHealth app interventions that did not cater to diverse socio-economic backgrounds including those who have access to fewer resources would lead to lower rates of use
Titov et al. 2020	Cross-sectional study	Australia		MindSpot Clinic, an online clinic funded by the Australian Department of Health	Not specified	Identification of demographic characteristics and treatment outcomes of patients registered with MindSpot over the first 7 years of clinic operation	MindSpot Services	None	• The mean age of patients in the total sample was 35.7 years (SD 13·8) and 88 702 (72·9%) were women • During the 7 years of clinic operation, small but significant changes were observed in the age, sex, Indigenous status, employment, education, and marital status of people initiating an assessment See Table D.1 for user satisfaction results
Xiong et al. 2021	Retrospective cohort study	United States		2 academic medical centres	11 056 patients	Evaluation of changes in patients' use of telemedicine for elective orthopaedic care based on race or ethnicity, primary language, and insurance status	Telemedicine use of orthopaedic services among new patients in 2020	In-person use of orthopaedic services in 2019	• After adjusting for age, gender, subspecialty, insurance, and median household income, patients who were Hispanic (odds ratio 0.59 [95% confidence interval 0.39 to 0.91]; p = 0.02) or Asian were less likely (OR 0.73 [95% CI 0.53 to 0.99]; p = 0.04) to be seen through telemedicine than were patients who were white • Speakers of languages other than English or Spanish were less likely to have a telemedicine visit than were people whose primary language was English (OR 0.34 [95% CI 0.18 to 0.65]; p = 0.001) • Patients insured through Medicaid were less likely to be seen via telemedicine than were patients who were privately insured (OR 0.83 [95% CI 0.69 to 0.98]; p = 0.03)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Yuan et al. 2021	Cohort study	United States		1 multi-site health system	Not specified	Exploration of whether remote visits for heart failure care were associated with different patient usage, clinician practice patterns, and outcomes	Remote care visits for heart failure care	In-person heart failure care	• During the COVID-19 era, video and telephone visits were more likely to be with non-White patients (35.8% video, 37.0% telephone versus 33.2% in-person) • Those seen by video visits were more likely to be younger (64.7 years old [14.5] video versus 74.2 [14.1] in-person), male (68.3% versus 61.4%), and privately insured (45.9% versus 28.9%), while those seen by telephone visits were more likely to be female (42.4% telephone versus 38.6% in-person; P<0.05 for all comparisons) See Table D.4 for use by technology results
Zachrison et al. 2022	Retrospective cohort study	United States		National emergency department (ED) Inventory data	n/a	Examination of data to determine an association between emergency department (ED) payer mix and receipt of telehealth services	Telemedicine services	No telemedicine services	• Rural location, academic status, and annual ED visit volume were not significantly associated with odds of ED telehealth receipt in the adjusted model • Medicaid and self-pay patients had decreased odds of telehealth receipt (odds ratio 0.87 per 5% increase, 95% CI, 0.77-0.99)

Table D.4. Overview of included papers with results on telemedicine use by type of technology

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Agastiya 2022	Systematic review	Korea, Netherlands	6	Multiple	Patients with type 2 diabetes (T2D)	Investigation of the impact of telehealth on self-management among patients with type 2 diabetes	Telehealth	None	• The application of telehealth as a treatment for patients with T2D was conducted using e-health and mHealth, either developing a particular application, online platform, or text/video messages
Abrashkin et al. 2018	Retrospective cohort study	United States		1 community paramedicine programme	Not specified	Analysis of data from a telemedicine-capable community paramedicine programme	Emergency department (ED) transport with video communication	ED transport with telephonic communication	• Of 1 707 community paramedicine responses between 2015 and 2017, 899 (53%) successfully used video; 808 (47%) used telephonic communication See Table D.3 for use by demographic results
Behmanesh et al. 2022	Systematic review	Multiple	77	Multiple	Multiple	Systematic identification and classification of tele-orthopaedic applications and services	Tele-orthopaedic applications and services	None	• Most of the articles (36%) discussed the use of tele-orthopaedic services after orthopaedic interventions • Telemonitoring (telemetry and teleconsultation) have always been used in all periods of care. Robotics, virtual reality (VR) and augmented reality (AR) technologies in telesurgery (telemetry and telementoring) have been used in the perioperative period
Ben-Assuli 2022	Systematic review	Australia, Canada, Denmark, Finland, Germany, Israel, Japan, Mexico, Spain, United Kingdom, United States	22	Multiple	Diabetes patients	Survey of the recent literature on the implementation of telehealth for diabetes management that incorporates cost-effectiveness analyses	Telehealth	None	• The main type of telemedicine was the telephone followed by teleopthalmology and telemonitoring • Two articles focused on teleconsultations and apps or mobile software apps. One paper explored the use of telemedicine via the web
Berlin et al. 2021	Cohort study	Canada		1 hospital cancer centre	3 507 cancer patients and 284 practitioners	Examination of the outcomes of a cancer centre – wide virtual care programme in response to the COVID-19 pandemic	Cancer centre – wide virtual care programme	None	• During the study period, 22 085 virtual care visits occurred, including 17 888 telephone visits and 4 197 video visits See Table D.1for user satisfaction results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Bertini et al. 2022	Systematic review	Australia, Canada, Israel, Italy, Korea, Norway, Spain, Switzerland, United Kingdom, United States	28	Multiple	Patients with gestational diabetes mellitus	Evaluation of the impact of remote monitoring technologies in assisting patients with gestational diabetes mellitus to achieve glycaemic goals	Remote monitoring technologies for patients with gestational diabetes mellitus	None	• 11 articles did not specify which device they used • The glucometer BlueTooth was used in 6 articles (22.2%) of the total number of articles chosen. Three articles (11%) used the Smart Glucometer, two articles used a glucometer with an infrared port, which emits the information to a device reader, and two articles used a continuous glucose monitor See Table D.1 for user satisfaction results
Cher et al. 2021	Cohort study	United States		1 university medical centre	n/a	A longitudinal study to describe the COVID-19 telephone triage hotline used by a large academic medical centre in the midwestern the United States	A telephone hotline to triage inbound patient calls related to COVID-19	None	• Callers were most often directed to the institutional patient portal (1654/3929, 42%), nursing hotlines (1338/3929, 34%), or Occupational Health Services (709/3929, 18%) • Incoming call volumes were highest between 6 AM and 11 AM and steadily decreased throughout the remainder of the day with the exception of a brief resurgence between 6 PM and 12 AM • Hourly call volumes were lower on the weekends than during weekdays, but volumes were similarly distributed throughout the day
Haimi et al. 2022	Systematic review	Ireland, Italy, Netherlands, Poland, Türkiye, United States,	11	Multiple	Multiple	Exploration of the availability, application, and implementation of telehealth services during the COVID-19 era, designed for the aged population (age 65 and more)	Telehealth services for the aged population	None	• In the included studies, different types of telehealth applications were applied, including telephone calls (n = 1), live video conferencing (n = 3), both telephone and video (n = 3), online programme (n = 1), smartphone application (n = 1), IoT (internet of things) and cloud computing (n = 1), and “regular” social networks (n = 1)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Jacomet et al. 2020	Case-control led study	France		46 co-ordinated care clinics	288 patients	Evaluation of use and perceived benefits and barriers to health/wellness applications (apps) and smart devices among people living with HIV (PLHIV) and their physicians	Health/wellness applications (apps) and smart devices	None	• 10% of participants (30/288) used wellness apps and 18% (52/288) used fitness tracking apps • Only 12 patients (4%) used health-related apps (HIV and/or others) to feel more confident in their health and have more firmly documented discussions with their physician (67%), or to improve their general health and be more self-managing (58%)
Khoo et al. 2021	Systematic review	Australia, Canada, France, Germany, Netherlands, Korea, Spain, United Kingdom, United States	31	Multiple	1 977 patients	Identification and evaluation of scientific literature on mobile health (mHealth) interventions to promote physical activity (PA) or reduce sedentary behaviour (SB) in cancer survivors	mHealth interventions for physical activity promotion in cancer survivors	None	• The most commonly used mHealth technology was activity trackers with ten studies using only activity trackers, six studies using activity trackers and affiliated app, and four studies combined activity trackers with text messages • Eight studies featured a smartphone app in their interventions, whereas three studies used text messages • One study combined multiple mHealth components, e.g. activity trackers, app, and text messages
Kirakalapr athapan 2022	Systematic review	Germany, Greece, Israel, Italy, Japan the Netherlands, Spain, Switzerland, United States	12	Multiple	Multimorbid, older adults with cardiovascular disease (CVD)	Assessment of the comparative efficacy of integrated telehealth versus other strategies of chronic disease management in older, multimorbid adults with heart failure in primary care and community settings	Telehealth	Other strategies	• All studies used telephones in their integrated care (n = 22), with most also using remote monitoring (RM; n = 17) and computers (n = 11) • Fewer studies incorporated video (n = 6), electronic patient records (EPR; n = 5), websites (n = 2), or wearable technologies (n = 1) • The most common combination of telehealth modalities was telephone and RM (n = 5) • Out of the six studies demonstrating negative effects of integrated telehealth, almost all of these studies (n = 5) considered multimodal interventions

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Mohammadzadeh et al. 2021	Systematic review	Multiple	50	Multiple	Patients with cardiovascular disease treated with cardiology interventions	Review of the effectiveness of implemented telecardiology services	Telecardiology services	None	• Telecardiology has been used in most studies for Tele-monitoring (n = 21, 42%) and tele-consultation (n = 17, 34%) • In 29 studies (58%), • telemedicine technology was applied for ECG transmission and in 13 studies (26%) for echocardiogram transmission See Table D.1 for user satisfaction results See Table D.5 for cost results
Morris et al. 2021	Systematic review	Multiple	54	Multiple	Not specified	Review of how digital technologies have been used to support rural oncology care	Digital technologies to support oncology care	None	• Technology utilised in the 54 articles was categorised as Telemedicine (n=32), phone calls (n=11), Internet (n=9), and mobile phone (n=2) See Table D.1 for user satisfaction results See Table D.5 for cost results
Moss et al. 2021	Retrospective cohort study	United States		3 neuro-ophthalmology outpatient practices	1 167 patients	Evaluation of the impact of COVID-19 on outpatient neuro-ophthalmic care by comparing clinical visits in 3 practices	Neuro-ophthalmic care delivery during the early COVID-19 pandemic	None	• Nine hundred 60-nine (83%) of visits were in-office, 179 (15.3%) were synchronous video + audio, 15 (1.3%) were synchronous audio only, and 4 (0.3%) were asynchronous interprofessional consults See Table D.3 for use by demographic results
Ning et al. 2021	Systematic review	Multiple	32	Multiple	Multiple	Evaluation of existing literature on telemedicine in otolaryngology and assess overall image quality, diagnostic concordance, and patient and provider satisfaction with telemedicine technologies	Telemedicine	None	• Nineteen studies employed asynchronous or store-and-forward models • Eleven studies used synchronous telemedicine • The remaining two articles compared both types
Philippe 2022	Systematic review	Multiple	304	Multiple	Patients with mental health conditions	Systematic meta-review of the literature to assess the state of digital health interventions for the treatment of mental health conditions	Digital health interventions	None	• Synchronous contact remains the primary form of treatment where other forms of digitally enabled treatment are only supplementary
Rowe et al. 2021	Cohort study	Australia		1 tertiary hospital	1 515 patients	Identification of characteristics contributing to choosing telephone (TP) versus video consultation (VC) and assess patient outcomes between telehealth modalities	Video consultations (VC)	Telephone consolations (TP)	• Overall, 1 188 (78.4%) patients were seen by telephone (TP) and 327 (21.6%) patients by video consultation (VC) appointment See Table D.3 for use by demographic results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Sammour et al. 2021	Retrospective cohort study	United States		1 institute	3 570 patients with heart failure	Identification of telehealth visits for patients with primary or secondary diagnosis of heart failure or cardiomyopathy	Telehealth interventions for heart failure or cardiomyopathy patients	None	• 30% of the telehealth visits were videos, while 70% were telephone visits, with increasing use of video visits throughout the study period See Table D.3 for use by demographic results
Snoswell et al. 2021	Systematic review and meta-analysis	Australia, Canada, Denmark, Korea, Netherlands, Portugal, United Kingdom, United States	17	Multiple	2 015 patients	Examination of the change in quality of life for patients with asthma who use interactive telehealth interventions	Telehealth interventions used by asthma patients	None	• The type and duration of the telehealth interventions varied in the included studies. • Seven studies evaluated interactive web-based portals that combined a number of strategies and provided feedback • Four studies described an asthma management intervention that was delivered through a smartphone app • Remote monitoring with asynchronous management was used in 5 studies that describe 4 different interventions
Turk et al. 2022	Systematic review	United States	7	Multiple	1 347 986 patient visits for acute respiratory tract infections (ARTIs)	Systematic review exploring antibiotic prescribing patterns for ARTIs among adults in virtual urgent care settings	Virtual visits	None	• One study conducted virtual visits with an audio and video – enabled monitor • In three studies, virtual visits were preferentially performed using live interactive video; however, visits were conducted by phone if patients were unable to connect by video • One study conducted virtual visits using a text-based format available from a smartphone or computer • Two studies assessed Teladoc, which primarily conducts telephone visits
Yuan et al. 2021	Cohort study	United States		1 multi-site health system	Not specified	Exploration of whether remote visits for heart failure care were associated with different patient usage, clinician practice patterns, and outcomes	Remote care visits for heart failure care	In-person heart failure care	• 7 775 (70.0%) outpatient cardiology visits were conducted in person, 1 009 (9.1%) by video, and 2 322 (20.9%) by telephone See Table D.3 for use by demographic results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Zachrison et al. 2021	Cross-sectional study	United States		1 multi-site health system	1 530 772 patients	Evaluation of the association between the growth of virtual care and health care utilisation in an integrated delivery network	Virtual ambulatory care visits	In-person at home and in-person on site ambulatory care visits	• 811 309 (53%) patients had only in-person ambulatory visits; 627 617 (41%) had in-person and virtual; and 91 846 (6%) had only virtual visits • Among patients with both in-person and virtual visits, most conducted fewer than half of the visits virtually (median, 33%; IQR, 20%-50%) • Of all encounters, 23.8% were virtual, 8.2% were in-person at home, and 68.0% were in-person onsite

Table D.5. Overview of included papers with results on the cost of telemedicine

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Absolom et al. 2021	RCT	United Kingdom		1 cancer centre	508 consenting patients and 55 health professionals	Evaluation of the impact of eRAPID on symptom control, health care use, patient self-efficacy, and quality of life (QOL) in a patient population treated predominantly with curative intent	Mobile health app	Usual care	• Impact on hospital services led to high cost-effectiveness of the use of an mHealth app • The analysis of hospital workload showed that improved patients' physical well-being in the curative treatment setting can be achieved in a cost-effective way
Amici et al. 2021	Cohort study	Italy			21 automated peritoneal dialysis (APD) patients aged 69 ± 13 years	Exploration of the impact of Remote patient monitoring (RPM) compared to traditional technology, in clinical, organisational, social, and economic terms in a single centre	Remote patient monitoring (RPM)	Usual care	• The analysis highlighted how the RPM system led to relevant economic savings, which for the health system have been calculated EUR 335 (mean per patient-month) • With the social costs represented by the waste of time of the patient and the caregiver, we calculated EUR 685 (mean per patient-month)
Andrees et al. 2020	Systematic review	Canada, Norway, New Zealand, Spain, United Kingdom, United States	23	Multiple	Dermatology patients	Overview of effectiveness, costs, feasibility, and accuracy of live interactive (LI) applications compared to standard care is missing. The present systematic review provides this overview on LI teledermatology.	Live interactive teledermatology	None	• LI applications can be a time effective substitute of or supplement to standard dermatological care • Results demonstrated that LI and standard care are comparable regarding feasibility and accuracy • No clear tendencies can be reported regarding costs. However, there is a lack of current comparative studies

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Appleton et al. 2021	Systematic review	Multiple	77	Multiple	Staff working within the field of mental health, people receiving organised mental health care for any condition, family members or carers of people receiving mental health care	Investigation of the adoption and impacts of tele-mental health approaches during the COVID-19 pandemic, and facilitators and barriers to optimal implementation	Any form of spoken or written communication carried out between mental health professionals and service users/family members/unpaid carers	Any mental health communication delivered face-to-face, digitally or remotely, waitlist control, or placebo	• Initial evidence suggests remote care is not a costly intervention, with 1 paper stating that telemental health is "cost-effective", while another mentions the use of "low-cost technologies" by clinicians • There was limited information about costs of implementation of remote care in the included studies and no actual costs of telemental health were reported in the papers See Table D.1 for user satisfaction results See Table D.2 for patient safety results
Aquilanti et al. 2020	Systematic review	Australia, France, Germany	13	Multiple	Patients and health practitioners	Assessment of the feasibility of teledentistry in communities or in a domiciliary setting where elderly people live	Teledentistry	None	• Three studies reported a cost analysis and cost description; one study showed that 28% of the residents asserted that the most valuable element of Teledentistry was convenience in terms of costs savings and disruption and difficulty avoidance • The application of Teledentistry in the provision of the oral care of elderly people could allow savings in terms of travel (via car or ambulance), caregiver escort time to accompany the patient, and patient disruption • The additional cost of Teledentistry is associated with training, increasing the total cost amount. However, new skill development among caregivers and the strengthening of health team capacities could be achieved through supportive environments and remote learning sessions See Table D.1 for user satisfaction results
Auener et al. 2021	Systematic review	Canada, Belgium, Denmark, Finland, Israel, Italy, Japan, Netherlands, Spain, Sweden, United Kingdom, United States	29	Multiple	Patients with chronic heart failure	This systematic review aims to study the effect of telemonitoring programs on health care utilisation and costs in patients with chronic heart failure	Telemonitoring programs	None	• Health care costs showed ambiguous results, with 3 studies reporting an increase in health care costs, 3 studies reporting a reduction, and 4 studies reporting no significant differences • Health care cost reductions were realised through a reduction in hospitalisations, whereas increases were caused by the high costs of the telemonitoring programme or increased health care utilisation

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Avidor et al. 2020	Systematic review	Canada, United States	7	Multiple	Not specified	Review of the most recent published literature on economic evaluations of telemedicine in diabetic retinopathy (DR) screening and summarise the evidence on the cost-effectiveness of this technology	Telemedicine for DR	None	• DR telemedicine technology has the potential to provide significant cost savings, especially in low-income populations and rural patients with high transportation costs
Barnett et al. 2021	Systematic review	Australia, Canada, Colombia, Denmark, France, Germany, Israel, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States	19	Multiple – Umbrella review	Staff working within the field of mental health, people receiving mental health care or with mental health diagnoses, family members, or carers of people receiving mental health care	Umbrella review of systematic reviews available on the literature and evidence-based guidance on telemental health, including both qualitative and quantitative literature	Any form of spoken or written communication conducted between mental health professionals and patients, service users, family members, carers, or other mental health professionals using either the internet or the telephone	None	• 2 reviews reported cost-effectiveness, one on this topic only and the other in combination with clinical effectiveness • One review concluded that telepsychiatry can be cost-effective as compared with face-to-face interventions, particularly in rural areas • The second review reported that 60% (15/25) of the included studies found telepsychiatry programs to be less expensive than standard in-person care, due to savings such as the travel time and reduced need for patients and their families to take time off work • The cost-effectiveness analyses suggested telepsychiatry was less cost-effective than face-to-face alternatives. Accordingly, the review concluded that variation was due to a large disparity in the reporting of costs See Table D.2 for patient safety results
Basit et al. 2020	Systematic review	Germany, Spain, United Kingdom, United States	17	Multiple	Persons with depression, bipolar disorder, or schizophrenia	Assessment of the evidence for telemedicine interventions for pharmacologic adherence in persons with depression, bipolar disorder, or schizophrenia	Telemedicine	Usual care	• Cost information was reported for 2 studies • One showed telephone calls instead of face-to-face appointments for a year resulted in costs of USD 239.5 per participants, not including overheads • The 2nd reported that a telemonitoring and telephone consultation programme resulted in the average cost of treatment per patient per month to be USD 180 for PharmCAT and USD 130 for an electronic medication monitor
Bautista-Mesa et al. 2020	Clinical trial	Spain		1 hospital	83 patients with pacemakers were initially selected. After five years of follow-up, a total of 55 patients completed the study	A cost-utility analysis comparing remote monitoring (RM) versus conventional monitoring (CM) in hospital of older patients with pacemakers, 5 years after implant	Remote monitoring (RM)	Conventional monitoring (CM)	• After the five-year follow-up period results revealed that total costs per patient were 23.02% lower for the RM group than the CM group, corresponding to a saving of EUR 82.10 per patient

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Ben-Assuli 2022	Systematic review	Australia, Canada, Denmark, Finland, Germany, Israel, Japan, Mexico, Spain, United Kingdom, United States	22	Multiple	Diabetes patients	Survey of the recent literature on the implementation of telehealth for diabetes management that incorporates cost-effectiveness analyses	Telehealth	None	• Most (9 papers) of the cost-effectiveness analyses dealt with direct cost care per patient • The measurement approaches to evaluating telemedicine also considered system costs, health coaching and prospective analyses, and time spent by medical staff on treatment • The Markov model was most often used, followed by Decision trees • 4 papers did not describe the models
Ben-Zeev et al. 2021	Cost analysis nested in an RCT	United states		3 pychiatric centres	163 participants	Comparison of the costs of implementing a smartphone-delivered mobile health (mHealth) intervention (called FOCUS) with the costs of implementing a clinic-based group intervention (Wellness Recovery Action Planning [WRAP]) for serious mental illness	mHealth intervention (FOCUS) / Wellness Recovery Action Planning (WRAP)	Usual care	• The average annual cost to providers was USD 78 212 for WRAP and USD 40 439 for FOCUS • In both groups, labour accounted for the largest cost, followed by indirect costs and overhead costs • When indirect costs were excluded, WRAP cost USD 520 per client per month, compared with USD 256 for FOCUS
Brown et al. 2021	Systematic review	Australia, Netherlands, United Kingdom, United States	13	Multiple	Not specified	Evaluation of the evidence for telegenetics and its applicability to future service development	Videoconferencing to deliver consultations in any area of clinical genetics	None	• Considering the costs to set up virtual consultation platforms and their maintenance, as well as the labour time, virtual methods were reportedly more cost effective See Table D.1 for user satisfaction results
Cabrera et al. 2021	Systematic review	Australia, United States	9	Multiple	Not specified	Evaluation of published literature for cost related to the implementation of telemedicine across otolaryngology, and to determine cost minimisation (CM) when compared to in-person visits	Telehealth	None	• CM in the United States ranged from USD 68 to USD 900 per visit • Cost was evaluated in general otolaryngology, sleep medicine, otology, and head and neck cancer surgery, the latter had the most benefit
Cartwright et al. 2021	Systematic review	Canada, Italy, Mexico, Spain, United Kingdom, United States	15	Multiple	1 334 patients on peritoneal dialysis	Identification and assessment of 'active' eHealth-based interventions to support patients and their caregivers in delivering and managing -peritoneal dialysis (PD)	eHealth interventions	None	• eHealth interventions in PD have shown to lower hospitalisation costs with decreased visits See Table D.1 for user satisfaction results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Chen et al. 2022	Systematic review	Multiple	112	Multiple	3 825 children and adolescents diagnosed with autism spectrum disorder (ASD)	Systematic review to verify the efficacy and validity of Extended Reality (XR) and Telehealth interventions for children and adolescents with ASD	Extended Reality (XR) and Telehealth interventions	None	• There were 3 articles conducted to address cost reduction with children with ASD, and one article was conducted to address Insomnia with autistic children and adolescents. • For cost reduction, the main technology used was home-based telehealth. One study pointed out that home-based telehealth was the least costly treatment intervention compared to clinic-based and in home therapy
Chua et al. 2022	Systematic review	Australia, Belgium, Italy, Korea, Norway, United Kingdom, United States	11	Multiple	Patients with chronic diseases	Systematic review to describe the willingness to pay (WTP) for telemedicine interventions and to identify the factors influencing WTP among patients with chronic diseases in high-income settings	Telemedicine interventions	None	• The proportion of people willing to pay for telemedicine ranged from 19% to 70% across the studies, whereas the values for WTP amounts ranged from USD 0.89 to USD 821.25 • A statistically significant correlation was found based on age and distance to a preferred health facility with the WTP for telemedicine • Higher age was associated with a lower WTP, whereas longer travel distance was associated with a higher WTP
Colomina et al. 2021	Implementation trial	Spain		1 university hospital	59 patients undergoing primary total hip or knee arthroplasty	Assessment of the effectiveness and cost-effectiveness of implementing a mobile health (mHealth)-enabled integrated care (IC) model for complex chronic patients undergoing primary total hip or knee arthroplasty	Mobile health enabled integrated care model	Usual care	• The IC programme generated savings from EUR 109.88 (USD 132.96) to EUR 126.99 (USD 153.66) per patient, depending on the nature of unplanned visits and hospitalisations • The IC programme was cost-effective according to incremental cost-effectiveness ratio, performing similar in terms of QoL gain while reducing overall expenses because of the reduction of unplanned visits and hospital admissions
Cottrell et al. 2021b	Audit study	Australia		1 tertiary hospital	Patients referred to the hospital's orthopaedic or neurosurgery department for a specialist medical consultation	Description of the economic- and service-related outcomes of these two methods of service delivery through retrospective audit of electronic medical records	Remote delivery of "fly in fly out" model of care (FIFO)	In-person delivery of "fly in fly out" (FIFO)	• An estimated cost-savings of 13% for the telehealth model could be achieved when compared to the FIFO model See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Cuadrado et al. 2021	Retrospective cohort study	Spain		1 tertiary hospital 43km from 1 prison	75 prison inmate patients who received anti-HCV treatment (May 2016–November 2017)	A cost-minimisation analysis comparing two strategies of HCV treatment in a prison: telemedicine clinical practice (TCP) and the usual clinical practice (UCP)	Telemedicine clinical practice (TCP)	Usual clinical practice (UCP)	• Telemedicine consultation practice produced savings of EUR 516 (30.6%) per patient, with total savings of EUR 38 677 • The transfer costs from prison to hospital represented the most important saving item, accounting for 99.3% of the TCP-related savings See Table D.1 for user satisfaction results
de Jong et al. 2020	RCT	Netherlands		2 academic and 2 non-academic hospitals	909 patients with IBD	Economic evaluation of telemedicine interventions in patients with inflammatory bowel disease (IBD), comparing the cost-utility of telemedicine vs standard care	Telemedicine (myIBDcoach)	Usual care	• Telemedicine resulted in lower mean annual costs of EUR 547/patient [USD 612]; mean costs of EUR 9 481 for standard care and EUR 8 924 for telemedicine) without changing quality adjusted life years • At the Dutch threshold of EUR 80 000 per quality adjusted life year, the intervention had increased incremental cost-effectiveness over standard care in 83% of replications and an incremental net monetary benefit of EUR 707/patient
Dear et al. 2021	RCT	Australia		Not specified	490 chronic pain patients	Examination of the cost-effectiveness of an internet delivered PMP for a mixed group chronic pain patients provided with different levels of clinician support	Internet-delivered pain management programs	Usual care	• The findings indicated that each additional clinical outcome (defined as a ≥ 30% reduction in disability, depression, anxiety, and pain) was associated with cost-savings when the intervention was provided in a self-guided format (ICER range: −AUD 404–−AUD 808) or an optional-guided format (ICER range: −AUD 314–−AUD 541), and a relatively small fixed cost when provided in the clinician-guided format (ICER range: AUD 88–AUD 225) • The results were driven by a reduction in service use costs among the treatment groups, which offset the costs of providing the internet-delivered PMP in the self-guided and optional-guided formats. The same general pattern of results was found when more stringent clinical outcomes (defined as a ≥ 50% reduction) were employed

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Dineen-Griffin et al. 2020	RCT	Australia		30 community pharmacies	894 patients	Assessment of the cost utility of minor ailment service (MAS) compared with usual pharmacist care (UC)	Video consultation minor ailment service (MAS)	Usual care (UC)	• On average, MAS was more costly but also more effective (in terms of symptom resolution and quality adjusted life year (QALY) gains) compared to UC • MAS patients (n = 524) gained an additional 0.003 QALYs at an incremental cost of AUD 7.14, compared to UC (n = 370) which resulted in an incremental cost-effectiveness ratio of AUD 277
Duiverman	RCT	Netherlands		1 university medical centre	67 stable hypercapnic Chronic Obstructive Pulmonary Disease (COPD) patients	Investigation to explore whether home initiation of non-invasive ventilation (NIV) with the use of telemedicine in stable hypercapnic COPD is non-inferior to in-hospital NIV initiation	Home initiation of non-invasive ventilation via telemedicine	Hospital non-invasive ventilation	• Home initiation of chronic NIV in stable hypercapnic COPD patients, with the use of telemedicine reduces costs by over 50%. • Home NiV initiation was significantly cheaper (home: median EUR 3 768 (IQR EUR 3 546–EUR 4 163) vs in-hospital: median EUR 8 537 (IQR EUR 7 540 to EUR 9 175)
Eberle et al. 2021b	Systematic meta-revies	Germany, Greece, Italy, Israel, Netherlands, Spain, United States	17	Multiple	Type 1 diabetes mellitus (T1DM) patients	Review to summarise the current evidence available on the effectiveness of telemetric approaches in type 1 diabetes management	Telemedicine for type 1 diabetes management	None	• 2 studies reported a cost reduction through telemedicine (no significance reported) • Direct expenses were 24% lesser in the intervention group, while indirect costs diminished by 22% One studies also mentioned that patients saved time for each visit (mean 115 [SD 86] min)
Eberle et al. 2021c	Systematic review	Australia, Greece Israel, United Kingdom, United States	31	Multiple	Patients with type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM)	Examination of whether telemedical interventions effectively improve diabetes control using studies that pooled patients with type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM), and whether the benefits are greater in patients diagnosed with T2DM than in those diagnosed with T1DM	Telemedical interventions	None	• According to 4 papers telemedical interventions can be viewed cost effectively. 1 paper noted an incremental cost-effectiveness ratio (ICER) in 3 studies of USD 490, USD 29 869, and USD 464, per capita for each unit reduction in HbA1c. 1 paper found a moderate cost-effectiveness in 7 telephone interventions of USD 4744.32- USD 86 276.50/quality-adjusted life year (ICER) • Only 1 paper reported that telemedicine was not cost effective at all (based on 3 studies)
Edison et al. 2020	Systematic review	Australia, Denmark, Ireland, United Kingdom, United States	18	Multiple	5 813 adult patients exposed to virtual clinics using telehealth strategies	Systematic review identifying the clinical, fiscal, and environmental evidence on the use of urological telehealth and/or virtual clinic (VC) strategies, and to highlight research gaps in this rapidly evolving field	Telehealth and/or virtual clinic (VC) strategies	Multiple	• Direct cost analysis demonstrated median (IQR) annual cost savings of GBP 56 232 (GBP 46 260-GBP 61 116) See Table D.1 for user satisfaction results See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Eze et al. 2020	Systematic review	Multiple	98	Multiple – umbrella review	Patients providers using telemedicine in Organisation for Economic Co-operation and Development (OECD) countries	Umbrella review of systematic reviews on telemedicine use in OECD countries summarising findings on four areas of policy relevance: clinical and cost-effectiveness, patient experience, and implementation	Telemedicine	None	• 39% of cost-effectiveness reviews found telemedicine to be cost saving or cost-effective • Patients reported high acceptance of telemedicine and the most common barriers to implementation were usability and lack of reimbursement See Table D.1 for user satisfaction results
Farabi et al. 2020	Systematic review	Australia, Belgium, Netherlands, New Zealand, United Kingdom, United States	20	Multiple	Patients with cardiovascular disease	Systematic review of economic evaluation studies that compared telemedicine with usual care for cardiovascular patients	Telemedicine	None	• Telemedicine improves the clinical outcomes and results in considerable saving in costs • The highest and lowest values of Incremental Cost-effectiveness Ratio were USD 515 082 and USD 2099 that had been reported in the UK and New Zealand, respectively • Utilising telemedicine concurrent with the usual care for service delivery is more cost-effective
Flemming et al. 2021	Systematic review	United States	17	Multiple	Care home residing adults	Assessment of the cost-effectiveness of alternative programs within home care	Enhanced home care interventions	None	• Cost-effective interventions were found in two areas including alternative nursing care and reablement/restorative care
Fraser et al. 2022	Systematic review	Canada, United States	5	Multiple	603 individuals living in rural areas with cardiovascular diseases (CVD)	Systematic review aiming to understand the types and effects of home-based connected health technologies, used by individuals living in rural areas with cardiovascular diseases (CVD)	Home-based connected health technologies	None	• All interventions which used a form of telehealth found a reduction in overall health care utilisation resulting in cost savings, and one study found improvements in CVD risk factors See Table D.1 for user satisfaction results
Gingold et al. 2021	Retrospective cohort study	United States		1 large academic medical centre and an affiliated community hospital	464 patients discharged from hospitals	Analysis to measure the effect of a mobile integrated health community paramedicine (MIH-CP) transitional care programme	Multidisciplinary team involving real-time medication reconciliation with the pharmacist over videoconference and other videoconferencing/text messaging	No multidisciplinary team care	• A trend toward fewer emergency department visits but increased cost among programme participants • Some studies report large effects on readmissions and/or cost, but frequently these evaluations either lack a control group and compare treatment groups to implausible counterfactuals, or have poorly matched controls that are subject to selection bias and regression to the mean See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Guaiana et al. 2021	Systematic review	United States	14	Multiple	Televideo use for major depressive disorder (MDD) treatment in adults (18 years or older) in any clinical setting, and any health care professional providing care	Exploration of literature on the use of televideo to diagnose and treat MDD, particularly acceptability and patient satisfaction, efficacy, and cost-effectiveness	Televideo	None	• Despite increased cost upfront for televideo due to the technology required, televideo would eventually be more cost-effective due to reducing travel expenses See Table D.1 for user satisfaction results
Gupta et al. 2021	Systematic review	Multiple	53	Multiple	Pediatric and adult patients with ear, nose and throat (ENT) disorders	A systematic review to synthesize the evidence base on outcomes from remote consultation in adult and pediatric ENT services	Remote consultation for pediatric or adult ENT disorder	Multiple	• In most instances, remote consultation reduced costs • Two head and neck studies reported cost analysis, with one reporting savings of GBP 306 per patient (and 123 kg CO2 emissions), but the other demonstrating no cost reduction • One study on remote preoperative assessment found Mean travel costs were reduced by USD 900 per patient See Table D.1 for user satisfaction results See Table D.2 for patient safety results
Hazenberg et al. 2020	Systematic review	Multiple	61	Multiple	Not specified	Assessment of the peer-reviewed literature on the psychometric properties, feasibility, effectiveness, costs, and current limitations of using telehealth and telemedicine approaches for prevention and management of diabetic foot disease	Telemedicine and telehealth approaches	None	• Two randomised controlled trials show no benefit in costs between the telemedicine and control groups See Table D.1 for user satisfaction results
Hollis et al. 2021	RCT	United Kingdom		2 child and adolescent mental health services sites	224 patients aged 9-17 years with Tourette syndrome or chronic tic disorder, and severe tics	Evaluation of the effectiveness of internet-delivered, therapist-sup-ported, and parent-assisted Exposure and Response Prevention (ERP) for treatment of tics in children and young people	10 weeks of online, remotely delivered, therapist-supported ERP for tics	10 weeks of online therapist-supported education about tics	• Remotely delivered, online ERP with minimal therapist contact time represents a cost efficient public mental health approach to improve access to behavioural therapy for tics in children and adolescents • The fixed yearly cost of delivering the intervention was GBP 103·64 per participant (yearly cost of online platform GBP 8 494 and total cost of supervision and training GBP 14 719·78) See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Indraratna et al. 2021	RCT	Australia		2 sites	102 patients with acute coronary syndrome or heart failure	Description of the implementation of a novel smartphone app within an RCT, the impact of the COVID-19 pandemic on the conduct of the trial, and how the experience with TeleClinical Care-Cardiac (TCC-Cardiac) guided and informed the development of two telemonitoring programs during the pandemic	TeleClinical Care-Cardiac app (TCC-Cardiac) alongside standard care	Standard care alone	• The intervention cost AUS 6 028 (USD 4342.26) per cardiac readmission saved. • When modeled in a mainstream clinical setting, enrollment of 237 patients was projected to have the same expenditure compared with usual care, and enrollment of 500 patients was projected to save approximately AUS 100 000 (approximately USD 70 000) annually See Table D.1 for user satisfaction results See Table D.2 for patient safety results
Jang et al. 2021b	Systematic review and meta-analysis	Australia, Denmark, Canada, Italy, Netherlands, Spain, United Kingdom, United States	22	Multiple	2 906 patients utilising telemonitoring interventions on severe chronic obstructive pulmonary disease (COPD) exacerbations	Systematic review and meta-analysis providing current evidence regarding the effectiveness of telemonitoring for preventing COPD exacerbations, focusing on severe exacerbations requiring hospitalisation or emergency room (ER) visits	Telemonitoring for preventing COPD exacerbations	None	• Most studies reported no benefit in mortality, quality of life, or cost-effectiveness • The review found that adding telemonitoring to usual care reduced unnecessary ER visits but was unlikely to prevent hospitalisations due to COPD exacerbations See Table D.1 for user satisfaction results
Joseph et al. 2020	Retrospective cohort study	United states		6 urban skilled nursing facilities (SNFs)	4 606 patients were evaluated in both the SNF-based intervention and emergency departments (ED)-based comparison groups	Investigation of skilled nursing facility (SNF)-based telemedicine services provided by emergency physicians (EP). The study compared this on-site emergency care option to traditional ED-based care, evaluating hospital admission rates following care by an EP	Skilled nursing facility telehealth	Traditional emergency department-based care	• The average cost of the telemedicine service in this study was USD 816 per episode • Considering the added expenses of ambulance transportation and EP fees, this enhanced telemedicine service would be cost-effective if it averted 10% of hospitalisations. • The data from this programme suggests an 80% reduction in care escalation, suggesting this is a worthwhile investment, irrespective of the clinical benefits from avoiding unnecessary admissions
Kamdar et al. 2020	Retrospective cohort study	United States		1 Academic medical centre	2 204 patients scheduled for surgery by telemedicine or evaluated in person	Description of the implementation of a telemedicine-based anaesthesia preoperative evaluation and report the program's patient satisfaction, clinical case cancellation rate outcomes, and cost savings	telemedicine-based preoperative anaesthesia evaluation process	In person evaluation	• Patients experienced time-based savings, particularly from traveling across a metropolitan area, which amounted to USD 67 of direct and opportunity cost savings. See Table D.1 for user satisfaction results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Kolcun et al. 2020	Systematic review	Canada, Denmark, France, United States	12	Multiple	Spine surgery patients	Systematic review examining the current utilisation of telemedicine (TM) for spine surgery	Telemedicine	None	• One study looked at costs finding that TM visits were approximately one-third the average cost of in-person clinic visits • This model was sustainable even if 50% of the TM visits were failures requiring subsequent in-person evaluation See Table D.1 for user satisfaction results
Lee et al. 2020	Retrospective cohort study	United states		1 large integrated health system	Mohs micrographic surgery (MMS) patients	Evaluation of the use of teledermatology for preoperative consultation for MMS	Telemedicine	Usual care	• Teledermatology resulted in average travel savings of 162.7 minutes, 144.5 miles, and USD 60.00 per person
Lemelin et al. 2020	Controlled clinical trial	Canada		Obstetric clinic at 1 university hospital	161 women with gestational diabetes mellitus (GDM)	Evaluation of the cost-effectiveness of the telehomecare (THCa) initiative by assessing the direct costs, including the related reduction in medical visits, evaluate the impact of THCa on diabetes control, GDM-related complications, and patient satisfaction	THCa system for transmission and online analysis of capillary glucose data	Usual care in the clinic	• Direct cost analysis revealed savings of 16% in patients followed by THCa compared with the control group See Table D.1 for user satisfaction results
Longacre et al. 2020	RCT	United states		3 academic medical centres	516 patients	Determination of the cost-effectiveness of a Collaborative Care Model (CCM)-based, centralised telecare approach to delivering rehabilitation services to late-stage cancer patients experiencing functional limitations	Tele-rehabilitation (arm B) and tele-rehabilitation plus pharmacological pain management (arm C)	Usual care (arm A)	• Tele-rehabilitation was found to be cost saving compared to enhanced usual care once downstream hospitalisation costs were considered • In the total cost analysis, total inpatient hospitalisation costs were significantly lower in both tele-rehabilitation (arm B) and tele-rehabilitation plus pain management (arm C) compared to control (arm A)
Lopez-Liria et al. 2020	Systematic review	France, Netherlands, Spain, United States	8	Multiple	16 539 patients	Comparison of the cost-effectiveness of two follow-up methods (face-to-face and telemedicine) used in dermatology in the last ten years	Telemedicine in dermatology	Face-to-face care	• All of the included articles indicate that teledermatology lowers costs and proves satisfactory care to both patients and professionals

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Lopez-Villegas et al. 2020	RCT	Norway		Not specified	50 patients	Economic assessment to determine whether or not telemonitoring of users with pacemakers offers a cost-effective alternative to traditional follow-up in outpatient clinics	Telemonitoring	Conventional monitoring	• Effectiveness was similar between alternatives (TM: 0.7804 [CI: 0.6864 to 0.8745] vs. CM: 0.7465 [CI: 0.6543 to 0.8387]), while cost per patient was higher in the RM group, both from the Norwegian NHS perspective (TM: EUR 2079.84 [CI: 0.00 to 4 610.58] vs. EUR 271.97 [CI: 158.18 to 385.76]; p = 0.147) and including the patient/family perspective (TM: EUR 2 295.91 [CI: 0.00 to 4 843.28] vs. CM: EUR 430.39 [CI: 0.00 to 4 841.48]), although these large differences –mainly due to a few patients being hospitalised in the TM group, as opposed to none in the CM group –did not reach statistical significance • The Incremental Cost – Effectiveness Ratio (ICER) from the Norwegian NHS perspective (EUR 53 345.27/QALY) and including the patient/caregiver perspective (EUR 55 046.40/QALY), as well as the Incremental Net Benefit (INB), favors the CM alternative, albeit with very broad 95%CIs
Lopez-Villegas et al. 2021	Systematic review		11	Multiple	3372 enrolled patients with pacemakers	Systematic review to explore the differences in the medium-and long-term effectiveness of telemonitoring ™ and conventional monitoring (CM) in relation to costs and health outcomes	Telemonitoring (TM)	Conventional monitoring (CM)	• The cost of TM was up to 87% lower than that of CM • Both formal and informal costs are significantly reduced in the medium and long term
Lovell et al. 2020	Cross-sectional study	United states		1 national university hospital	1531 virtual visit claims	Review of a virtual care programme using insurance claims data for virtual, urgent, primary, and emergency care delivered between 1 April 2016 – 31 March 2017	Virtual telemedicine	Usual care	• This study affirmed lower cost for virtual care without an associated increase in overall follow-up rates or antibiotic use when compared with urgent or primary care • This suggests that virtual visits can be used to lower the total cost of care for applicable conditions • The implications are that virtual visits help lower operational costs of providing care, particularly in integrated systems with capitated reimbursement • Under the right circumstances, the increased adoption of virtual care should lead to greater savings

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Minguez Clemente et al. 2021	RCT	Spain		1 university teaching hospital	116 patients with chronic obstructive pulmonary disease (COPD) exacerbation	Trial to evaluate the effectiveness/efficiency of and satisfaction with a home telemedicine programme focusing on patients with COPD exacerbation after early hospital discharge and compare it with early discharge and follow-up with traditional home hospitalisation	Telemedicine with monitoring with patients required to transmit data twice per day, with a subsequent telephone call and 2 home visits by health care staff	Daily visits	• A significant decrease in the number of visits was observed in the intervention versus the control group, 3.8 ± 1 vs 5.1 ± 2(p = 0.001), without significant differences in the number of exacerbations which resulted in cost savings • However, overall the cost of either strategy not significantly different See Table D.1 for user satisfaction results
McKeon et al. 2021	Systematic review	Australia, Canada, United States	28	Multiple	Not specified	Systematic review of the currently available evidence on the use of smart-device technology and telehealth programs to guide and monitor postoperative rehabilitation following total joint arthroplasty and to assess their impact on outcomes following surgery	Virtual physical therapy	None	• Virtual physical therapy resulted in cost savings ranging from USD 206 to USD 4 100 per patient compared with in-person physical therapy • Telerehabilitation following lower-extremity joint replacement is less expensive compared with in-person physical therapy, with equivalent outcomes and patient satisfaction • Telerehabilitation and electronic health adjuncts can be used to substitute for traditional rehabilitation and augment postoperative care following total joint arthroplasty, respectively
McManus et al. 2021	RCT	United Kingdom		76 general practices	622 people with treated but poorly controlled hypertension (>140/90 mm Hg) and access to the internet.	Testing of a digital intervention (HOME BP) for hypertension management in primary care by combining self-monitoring of blood pressure with guided self-management	HOME BP Digital intervention	Usual care	• The HOME BP digital intervention for the management of hypertension by using self-monitored blood pressure led to low incremental costs • Within trial costs showed an incremental cost effectiveness ratio of GBP 11 (USD 15, EUR 12; 95% confidence interval GBP 6 to GBP 29) per mm Hg reduction
Mohammadzadeh et al. 2021	Systematic review	Multiple	50	Multiple	Patients with cardiovascular disease treated with cardiology interventions	Review of the effectiveness of implemented telecardiology services	Telecardiology services	None	• The economic effects of telecardiology were examined in 50% of the included studies • Telecardiology reduced the cost of care and cost savings, the number of travels, the number of visits, and the number of patients referred to specialised centres See Table D.1 for user satisfaction results See Table D.4 for use by technology results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Morris et al. 2021	Systematic review	Multiple	54	Multiple	Not specified	Review of how digital technologies have been used to support rural oncology care	Digital technologies to support oncology care	None	• The studies conducted were able to establish that tele-oncology was feasible, acceptable to patients and health care workers, and cost-effective See Table D.1 for user satisfaction results See Table D.4 for use by technology results
Mosquera et al. 2021	RCT	United States		1 university health centre	422 medically complex children	Assessment of whether telemedicine can further improve outcomes and reduce costs of comprehensive care (CC) for medically complex children	Telemedicine with comprehensive care	Comprehensive care (CC alone)	• The probability that telemedicine reduced mean total health system costs per child-year was 91% (USD 33 718 with telemedicine vs USD 41 281 with CC alone; Bayesian cost ratio, 0.85 [0.67-1.08]), owing mainly to reduced costs for hospital and emergency department services (USD 26 759 with telemedicine vs USD 34 419 with CC alone; cost ratio, 0.77 [0.54-1.10])
Mourad et al. 2022	RCT	Sweden		Cardiac clinics in 4 hospitals	144 participants	Evaluation of cost-effectiveness of psychological interventions, such as internet-delivered cognitive behavioural therapy (iCBT) programs, in patients with cardiovascular disease (CVD)	internet-delivered cognitive behavioural therapy (iCBT)	Online discussion forum (ODF)	• Incremental cost-effectiveness ratio (ICER) for iCBT versus ODF was EUR 18 865 per QALY saved • The cost-effectiveness plane indicated that iCBT is a cheaper and more effective intervention in 24.5% of the cases, and in 75% a costlier and more effective intervention than ODF • Only in about 0.5% of the cases, there was an indication of a costlier, but less effective intervention compared with ODF
Murphy et al. 2021	Prospective cohort study	Ireland		1 large paediatric hospital	1002 patients	Description of a virtual developmental dysplasia of the hip (DDH) clinic and provide an overview of DDH referral reasons, treatment outcomes, and adverse events associated with it	Virtual developmental dysplasia of the hip (DDH) clinic	Face-to-face	• This clinic has encountered cost savings of EUR 588 504 based upon the virtual model of delivery over the 3.5 years it has been running • Changing the method of initial review can result in savings of EUR 168 144 per year on initial visits only
Murphy et al. 2020	Systematic review	Ireland, United Kingdom	18	Multiple	Fracture patients	Review to determine if virtual fracture clinics can provide an acceptable alternative in these challenging times	Virtual clinic	None	• Cost reductions compared with estimates derived from conventional fracture clinics varied from USD 53 to USD 297 and USD 39 125 to USD 305 876 compared with traditional fracture clinic visits
Mustonen et al. 2020	RCT	Finland		Not specified	1 535 patients (≥45 years)	Evaluation of the long-term effect of telephone health coaching on health care and long-term care (LTC) costs in type 2 diabetes (T2D) and coronary artery disease (CAD) patients	Telephone health coaching	Usual care	• Intention-to-treat analysis showed no significant change in total health and long-term care costs (intervention effect EUR 1 248 [3% reduction]) in the intervention compared to the control group

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Nelson et al. 2021	RCT	Australia		1 hospital	70 patients receiving total hip replacement	Exploration of whether outpatient physiotherapy care via telerehabilitation is as effective as in-person physiotherapy care after total hip replacement	Remotely delivered telerehabilitation directly into their homes and a technology-based home exercise programme using an iPad application	In-person outpatient physiotherapy and a paper-based home exercise programme	• The estimated mean difference in cost of telerehabilitation versus in-person was USD -28.90, favouring the telerehabilitation group • Telerehabilitation in the total hip replacement population incurred similar costs and yielded similar effects to traditional in-person care • Telerehabilitation significantly reduced the time burden for patients and carers See Table D.1 for user satisfaction results
Nguyen et al. 2022	Systematic review	Denmark, Ireland, Netherlands, New Zealand Spain, United Kingdom, United States	14	Multiple	Patients being treated for Inflammatory bowel diseases (IBD)	Systemic review of randomised controlled trials (RCTs) on digital health technologies in patients with Inflammatory bowel diseases (IBD)	Digital health technologies	None	• Ten studies evaluated the impact of digital health technologies on health care utilisation and cost-effectiveness, with many of the studies evaluating these outcomes as secondary aims • Digital health interventions were associated with lower rate of health care utilisation and health care costs (low certainty of evidence) See Table D.1 for user satisfaction results
Nguyen et al. 2021	Systematic review	United States	19	Multiple	Not specified	Systematic review to examine how e-visits have impacted clinical outcomes and health care quality, access, utilisation, and costs	Electronic visits (e-visits) involving asynchronous communication between clinicians and patients through a secure web-based platform	Multiple	• Three studies found e-visit usage was associated with lower overall treatment costs than those for in-person visits See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Nordh et al. 2021	RCT	Sweden		Child and adolescent mental health services	103 young people	Assessment of the efficacy and cost-effectiveness of therapist-guided internet-delivered cognitive behavioural therapy (ICBT) for SAD in youths vs an active comparator, internet-delivered supportive therapy (ISUPPORT)	Internet delivered support therapy	Usual care	• The average societal cost was EUR 2426.2 for the ICBT group and EUR 3502.5 for the ISUPPORT group • The incremental cost-effectiveness ratio regarding total societal cost differences and differences in remitter status was EUR -17 900.7, indicating that ICBT was associated with cost savings while generating more participants free of SAD compared with ISUPPORT • Subtotal cost analyses demonstrated that the main drivers of the cost differences between the groups were decreases in medication use and decreases of school productivity losses in the ICBT group
Petersen et al. 2021	Systematic review	Australia, Canada, Denmark, Finland, Germany, Norway, Spain	14	Multiple	Orthopaedic patients	Systematic review to explore scientific evidence for the use of telemedicine in the orthopaedic field	Telemedical applications in orthopaedics	None	• Two studies showed that cost effectiveness of telemedicine applications for video consultations depends on the workload. In the Norwegian study, video consultation was more cost effective after 151 patient consultations per year and in the Finish study, the cost of the video consultation was lower after a workload of more than 80 patients per year • One study examined the cost effectiveness of telerehabilitation for knee arthroplasty and showed that the cost of telerehabilitation was lower than face-to-face treatments when the distance to the hospital was 30 km or more
Rasmussen et al. 2020	Cohort study	Denmark		1 children's hospital	374 preterm infants and their parents who met the inclusion criteria	Assessment of the costs of neonatal homecare (NTH) compared to regular neonatal hospital care, from the health service perspective	Telehealth service (My Hospital app)	Usual care	• The costs of NTH resource utilisation were, on average, EUR 695 per infant, and the total costs per infant, on average, were EUR 12 200 and EUR 4 200 for infants at/under and over 32 weeks, respectively • The corresponding costs of the control group were EUR 14 300 and EUR 4 400 • The difference in total costs showed statistical significance for the group of infants under 32 weeks ($p < 0.001$)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Raso et al. 2021	RCT	Italy		1 institution	22 traumatic brain injury patients	Exploration of the effectiveness of a new telemonitoring system, for monitoring Vegetative State (VS) and Minimally Conscious State (MCS) patients	Telemonitoring	Usual care	• The mean total cost per patient in the LSH group was EUR 262, whereas in the telemonitoring group cost was approximately EUR 93 • The major component of cost for the LSH programme was human resources focused on staff time dedicated to patient care, whereas for telehealth programme approximately half of the health costs relied on the equipment (i.e. medical devices)
Rinaldi et al. 2020	Systematic review	United Kingdom, others not specified	23	Multiple	Type 2 Diabetes Mellitus (T2DM) patients	Systematic review to summarise and evaluate the quality of the published evidence on cost and cost-effectiveness of mHealth interventions for Type 2 Diabetes Mellitus (T2DM)	mHealth Interventions	None	• The studies which presented cost effectiveness results demonstrated highly cost-effective interventions, with cost per QALY gained ranging from 0.4% to 62.5% of GDP per capita of the country • The quality of partial economic evaluations was on average lower than that of full economic evaluations • The cost of mHealth interventions varied substantially based on type and combination of technology used, however, where cost-effectiveness results were reported, the intervention was cost-effective
Romjin et al. 2021	RCT	Netherlands		Outpatient departments of 4 specialised mental health care centres	Patients with panic disorder, social phobia or generalised anxiety disorder in routine specialised mental health care	Examination of the acceptability, effectiveness and cost-effectiveness of blended CBT (bCBT) versus Face-to-face (ftfCBT) in outpatient specialised care to patients with panic disorder, social anxiety disorder and generalised anxiety disorder	Blended CBT (bCBT)	Face-to-face CTB (ftfCBT)	• The modelled point estimates of societal costs (bCBT EUR 10 945, ftfCBT EUR 10 937) were higher and modelled point estimates of direct medical costs (bCBT EUR 3 748, ftfCBT EUR 3 841) were lower in bCBT. • The acceptability curves showed that bCBT was expected to be a cost-effective intervention
Sellars et al. 2020	Prospective cohort study	United Kingdom		1 hospital	50 patients attending a video consultation (VC) clinic appointment as a new colorectal referral between March 2019 to February 2020	Assessment of outcomes, including the economic and environmental impact, of a video consultation (VC) clinic for new colorectal referrals	Video consultations (VC)	Face-to-face care	• The use of VC resulted in significant savings related to travel and reduced time and costs for patients who chose to use the service • However, there is no conclusive evidence of cost benefit for the service provider

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Sequeira et al. 2020	Systematic review and meta-analysis	Australia, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Israel, Latvia, Netherlands, Spain, Switzerland, United Kingdom, United States	17	Multiple	Patients with implantable cardioverter-defibrillators (ICDs)	Assessment of the economic burden, and to develop an integrated economic model evaluating the efficiency of the remote monitoring (RM) strategy vs. current standard of care (SC) in the context of French health care	Remote monitoring (RM)	Standard of care (SC)	• A three-state Markov Model showed that RM resulted in cost-savings of EUR 4 142 per patient over a 5-year time horizon, with a quality-adjusted life year (QALY) gain of 0.29 • The incremental cost-effectiveness ratio was −14 136 EUR/QALY, in favour of RM
Serhal et al. 2020	Cost-minimisation analysis	Canada		1 province	Residents who received psychiatric services through telepsychiatry, the outreach psychiatry programme (OPP), and/or the primary care provider (PRP) between 1 April 2014 and 31 March 2016	Determination of the cost difference between three programme models: (1) telepsychiatry; (2) psychiatrists traveling to underserved areas; and (3) reimbursing patients for travel to a psychiatrist	Telepsychiatry	Psychiatrists travelling to patients and reimbursing patients to travel to psychiatrists	• Costs per visit were lowest in telepsychiatry (CAD 360) followed by traveling physicians (CAD 558) and patient reimbursement (CAD 620) • Among the 100 000 Monte Carlo simulations, results showed telepsychiatry was the least costly programme in 71.2% of the simulations, while the reimbursement and outreach programs were least costly in 15.1% and 13.7% of simulations, respectively • The break-even analysis found telepsychiatry was the least costly programme after an annual patient visit threshold of approximately 76 visits (compared to traveling psychiatrists) and 126 visits (compared to reimbursed patients)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Smith et al. 2021a	Systematic review	Multiple – umbrella review	17	Multiple	Surgeons, and patients who were undergoing or recently underwent surgery	Evaluation of patient and provider satisfaction with and perceptions towards telehealth, and to identify the barriers and facilitators associated with its utilisation both prior to and during the COVID-19 pandemic	Synchronous telehealth modalities (e.g. live interactive videoconference or telephone consultations) used perioperatively	Multiple	• Telehealth was generally associated with reduced resource utilisation and costs • Reduced health care resource utilisation was attributed to a greater ability to triage patients, and reductions in wait times, delays from initial consultation to follow-up care and unnecessary visits. It was unclear whether consultation time was altered by telehealth, with some studies demonstrating a reduction and others, no effect • A reduction in unnecessary visits underscored much of the cost-savings • Additional cost-savings were attributed to reduced administration and nursing costs See Table D.1 for user satisfaction results See Table D.2 for patient safety results
Stanimirovic et al. 2020	Cohort study	Canada		Toronto tele-retina screening programme	566 patients accessing tele-retina services	Assessment of the cost-effectiveness of the pilot Toronto tele-retina screening programme in comparison with existing standard of care (SOC) diabetic retinopathy screening for patients with diabetes mellitus and in a simulated Pan-Ontarian cohort	Tele-retina screening	Existing standard of care (SOC)	• The cost per case correctly detected was USD 281.10 with tele-retina and USD 982.00 with SOC, and the cost per case correctly diagnosed was USD 82.21 and USD 314.14, respectively • For both pilot and Pan-Ontarian sensitivity analyses, tele-retina remained the dominant strategy (ICER <0) • Comparing tele-retina with SOC was shown to be more cost-effective with USD 16 514 per 18.73 QALYs gained versus USD 17 590 per 18.58 QALYs gained for non-tele-retina • In a rural health clinical environment tele-retina would save USD 150 per patient over 7 years
Tabaei et al. 2020	RCT	United States		City borough	816 cases of health care utilisation for Bronx A1C participants using an administrative data set containing all hospital discharges for New York State	Assessment of the impact of telephonic diabetes self-management intervention (Bronx A1C) in reducing health care utilisation and costs over 4 years	Telephonic diabetes intervention (Tele/Pr)	Print-only (PrO)	• The Tele/Pr arm compared with PrO arm were statistically significant for odds of hospital use (odds ratio [OR] 0.89; 95% CI 0.82, 0.97; P < 0.01), number of hospital stays (rate ratio [RR] 0.90; 95% CI 0.81, 0.99; P = 0.04), and hospital costs (RR 0.90; 95% CI 0.84, 0.98; P = 0.01) • Reductions in hospital use and costs were even stronger for diabetes-related hospitalisations

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Taber et al. 2021	RCT	United States		1 university hospital	136 adult (≥18 years) kidney transplant recipients Adult (≥18 years) kidney recipients 6 months to 3 years posttransplant	Economic analysis of a 12-month, parallel arm, randomised controlled trial in adult kidney recipients 6 to 36 months posttransplant	Usual care + clinical pharmacist-led medication therapy monitoring and management, via a smartphone-enabled mHealth app, integrated with risk-based televisits	Usual care	• From a payer or societal perspective, the net estimated cost savings, after accounting for intervention delivery costs, was USD 368 839 • There was a return on investment (ROI) of USD 4.30 for every USD 1 spent • These results demonstrate that a mHealth-enabled, pharmacist-led intervention significantly reduced hospitalisation costs for payers over a 12-month period and has a positive ROI
Taguchi et al. 2021	RCT	Japan		1 cognitive behavioural therapy centre	30 patients with chronic pain	Examination of the effectiveness of an integrated cognitive behavioural therapy programme with new components (attention-shift, memory work, video feedback, and image training) delivered via videoconferencing (videoconference-based CBT).	Videoconference-based CBT	Treatment as usual (TAU)	• A cost-benefit analysis based on the data showed that the incremental cost-effectiveness ratio (ICER) was almost 2.9 million (yen/QALY=96 000 yen divided by 0.033 QALY) • Previous research that used willingness to pay (WTP) to obtain the criterion of the ICER showed that 5.0 million yen (USD 48 158) per QALY gained is considered an acceptable threshold in Japan Therefore, it was suggested that vCBT is more cost-effective than TAU, even though it was a minimum effect case, as the improvement in quality of life returned to the baseline in 1 year See Table D.2 for patient safety results
Theiler et al. 2021	RCT	United states		1 tertiary academic centre	300 expectant mothers between 18 and 36 years old, < 13 weeks gestation, who had their pregnancy documented as low risk by an obstetrician and had the ability to provide informed consent	Investigation of whether the use of OB Nest, a telemedicine-enhanced programme with a reduced frequency of in-person prenatal visits, would decrease the cost of prenatal care delivery	Telemedicine prenatal service (OB Nest)	Usual care	• Total provider cost was decreased caring for the OB Nest participants, but nursing cost was increased • OB Nest care required an average of 160.8 (+/− 45.0) minutes provider time and 237 (+/− 25.1) minutes nursing time, compared to 215.0 (+/− 71.6) and 99.6 (+/− 29.7) minutes for traditional prenatal care ($P < 0.01$) • This translated into decreased provider cost and increased nursing cost ($P < 0.01$). • Supply costs increased, travel costs declined, and overhead costs declined in the OB Nest model

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Tian et al. 2021	Systematic review	Australia, Korea, Spain, United Kingdom, United States	29	Multiple	Prison populations	Systematic review synthesizing the evidence base to date for the impacts of, and outcomes from, telehealth delivered in prisons	Telehealth	None	• The findings on costs associated with implementation of telehealth in prisons were mixed • One study indicated an overall increased service utilisation across all cost measures after using telehealth, suggesting increased cost associated with telehealth. This was corroborated with a 2nd study in which the cost associated with telecardiology consultations was higher than the in-person cardiology service during the first year, but cost savings occurred with increased use of telecardiology in the second and third year of implementation • Another 4 studies showed a net saving per visit of using telehealth compared to conventional care • Cost savings accumulated as a result of averted trips (to local specialists) and transfers (by aircraft) associated with using telehealth See Table D.1 for user satisfaction results
Treskes et al. 2022	RCT	Netherlands		1 university medical centre	200 patients	Description of a cost-utility analysis of an eHealth intervention compared to regular follow-up in patients with acute myocardial infarction (AMI)	eHealth intervention (The Box)	Usual care	• Mean costs per patient were EUR 2 417±2043 (USD 2 657±2246) for the intervention and EUR 2 888±2961 (USD 3 175±3255) for the control group. This yielded a cost reduction of EUR 471 (USD 518) per patient but it was not statistically significant (95% CI EUR -275 to EUR 1217; P =.22, USD -302 to USD 1 338) • The average quality-adjusted life years in the first year of follow-up was 0.74 for the intervention group and 0.69 for the control (difference –0.05, 95% CI –0.09 to –0.01; P =.01)

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Tully et al. 2021	RCT	Ireland		1 weight management service	109 adolescent participants with clinical obesity	Assessment of the direct costs of delivering the mHealth intervention to participants in the trial relative to usual care participants to inform future designs of mHealth trials to assess effectiveness and cost-effectiveness within this population as well as contribute to the evidence base for the economic viability of integrating mHealth into paediatric weight management services	mHealth app	Face-to-face care	• Accounting for partial completion and attrition costs, the mean cost incurred for those in the usual care arm was EUR 142 (SD 23.7) (group participants: mean EUR 133, SD 12.2; one-to-one participants: mean EUR 177, SD 22.4). The mean cost for those randomised to use mHealth was estimated to be EUR 722 (SD 221) • Although this mHealth approach was substantially more expensive than usual care, although modifications to the intervention may offer opportunities to reduce the mHealth costs
Ullah et al. 2020	Systematic review and meta-analysis	Multiple	33	Multiple	Diabetic retinopathy (DR) patients	To determine cost-effectiveness and the diagnostic accuracy of teleophthalmology (TO) in the detection of macular-edema (ME) and various grades of diabetic retinopathy (DR)	Teleophthalmology	None	• A total of 28 studies were identified assessing the cost-effectiveness of teleophthalmology screening of DR and ME in these clinical settings • Populations screened at a younger age, higher blood glucose, using insulin, or with high transportation costs derive most of the benefit from Teleretinal screening • Compared with conventional screening, Teleretinal screening was cost-effective at a high workload, but teleophthalmology (TO) was not economic in patients >80 years of age and in population >3 500 patients
van den Biggelaar et al. 2020	RCT	Netherlands		1 centre for home mechanical ventilation (HMV)	96 patients with a of diagnosis neuromuscular disease (NMD) or thoracic cage disorder	Investigation of whether home mechanical ventilation (HMV) initiation at home, using a telemonitoring approach is noninferior to in-hospital initiation	Home mechanical ventilation with telemonitoring	Usual care	• Starting HMV at home saves over EUR 3 200 (USD 3 793) per patient over a 6-month period
Vimalananda et al. 2020	Systematic review	Multiple	63	Multiple	Multiple	Systematic review of the recent peer-reviewed literature on the effect of e-consults on access, cost, quality, and patient and clinician experience and identified the gaps in existing research on these outcomes	e-consults	None	• e-consult programs are generally cost-saving to payers • Costs were reduced for patients associated to travel • Costs were shown to be reduced compared to face-to-face referrals See Table D.1 for user satisfaction results See Table D.2 for patient safety results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Wallut et al. 2020	Retrospective cohort study	France		13 local hospitals (spokes) and two stroke units (hubs).	742 adult patients hospitalised for ischemic stroke, confirmed by imaging or a neurologist	Evaluation of the cost-effectiveness of a French Telestroke network	Telestroke	Usual care	• The Telestroke strategy was more effective and slightly more costly than the reference strategy (25 disability cases avoided per 1 000 at 3 months, 6.7 avoided hospital deaths, and 13 avoided deaths at 3 months for an extra cost of EUR 97, EUR 138, and EUR 154, respectively)
Watanabe et al. 2020	RCT	Japan		85 academic and non-academic hospitals	1274 pacemaker patients	Exploration of the safety and resource consumption of exclusive remote follow-up (RFU) in pacemaker patients for 2 years	Remote monitoring for cardiac implantable electronic devices (RFU)	Conventional follow-up (CFU)	• The median (IQR) patient-individual follow-up costs per year were 18 800 Yen in RFU and 21 400 Yen in CFU • Total costs connected to pacemaker follow-up were reduced by 11.0% • Follow-up reimbursement per year in RFU was slightly higher because of the slightly higher rate of total (remote and in-office) follow-ups, but the costs associated with additional diagnostic procedures were lower
Winward et al. 2021	Retrospective cohort study	United Kingdom		358 practices and 49 primary care networks	Patients registered to a 24/7, digital-first model of NHS primary care (Babylon GP at Hand) and patients registered to all other practices in Northwest London Collaboration of Clinical Commissioning Groups	Evaluation of the impact of highly accessible, digital-first primary care on acute hospital spending	Digital-first primary care	Usual care	• The spending on acute care per weighted patient for Babylon GP at Hand members was 12%, 31%, and 54% (GBP 93, P =.047; GBP 223, P <. 001; and GBP 389, P <. 001) lower than the regional average in FY18/19 for the 3 weighting methodologies used. In FY19/20, it was 15%, 35%, and 51% (GBP 114, P =.006; GBP 246, P <. 001; and GBP 362, P <. 001) lower • The Babylon GP at Hand population had lower costs of GBP 1.37, GBP 4.40 million, and GBP 11.6 million, respectively, in FY18/19; and GBP 3.26 million, GBP 9.54 million, and GBP 18.8 million, respectively, in FY19/20
Zhang et al. 2021	Systematic review and meta-analysis	Australia, Belgium, Canada, Ireland, United States	12	Multiple	Patients aged 18 years and older undergoing virtual preoperative anaesthesia assessment	Systematic review and meta-analysis reviewing the effectiveness of virtual preoperative assessment for the evaluation of surgical patients, with a focus on surgery cancellation rates and patient experience	Virtual preoperative assessment	None	• Virtual preoperative assessment resulted in similar surgery cancellation rates compared to in-person evaluation, with a pooled cancellation rate of 2% so resources were not saved in this way • There was a high success rate in using the information collected with virtual care, in the range of 92-100%, to diagnose and manage patients resulting in time and cost savings in the range of 24-137 min and USD 60-67 per patient See Table D.1 for user satisfaction results

Author	Design	OECD Country(s)	Primary studies (if applicable)	Setting	Patients/Clinicians	Description of study	Intervention	Comparator	Relevant findings and conclusions
Zischke et al. 2021	Systematic review	Multiple	39	Multiple	Not specified	Determination of the current clinometric value of performing physiotherapy assessments using synchronous forms of telehealth across all areas of physiotherapy practice	Simulated or real-world physiotherapy assessments using synchronous forms of telehealth	None	• The economic impact was investigated in two utility studies. One study involved a cost audit comparing a video conference telehealth physiotherapy service with a fly-in, fly-out physiotherapy service • Telehealth appeared to be a cost-effective option for rural services, with an estimated 12-month cost of AUD 66518.00 compared to AUD 76384.00 for a fly-in, fly-out service • The other study compared cost-effectiveness of a telephone-based telehealth physiotherapy service (PD) with usual face-to-face care (UC). The authors found the difference between the PD and UC groups was minimal in terms of cost, finding PD is probably more cost-effective if the physiotherapist's time is productive See Table D.1 for user satisfaction results

OECD Health Policy Studies

The COVID-19 Pandemic and the Future of Telemedicine

The use of telemedicine was quite limited in most OECD countries before the COVID-19 pandemic, held back by regulatory barriers and hesitancy from patients and providers. In early 2020, as COVID-19 massively disrupted in-person care, governments moved quickly to promote the use of telemedicine. The number of teleconsultations skyrocketed, playing a vital role in maintaining access to care, but only partly offsetting reductions in in-person care. This report provides an overview of the use of telemedicine in OECD countries, describing how governments scaled up remote care during the pandemic and exploring the impact that this massive shift to remote care has had on health care system performance. Telemedicine may be here to stay, but questions remain concerning how to regulate its use, how to pay for it, how to integrate it with in-person care, and how to make sure that it constitutes good value for money for all. This report puts forth priorities for policy makers to inform the discussion and to promote the best use of remote care services in the future.

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