CHCF

Telehealth Outcomes and Impact on Care Delivery

A Review of Evidence

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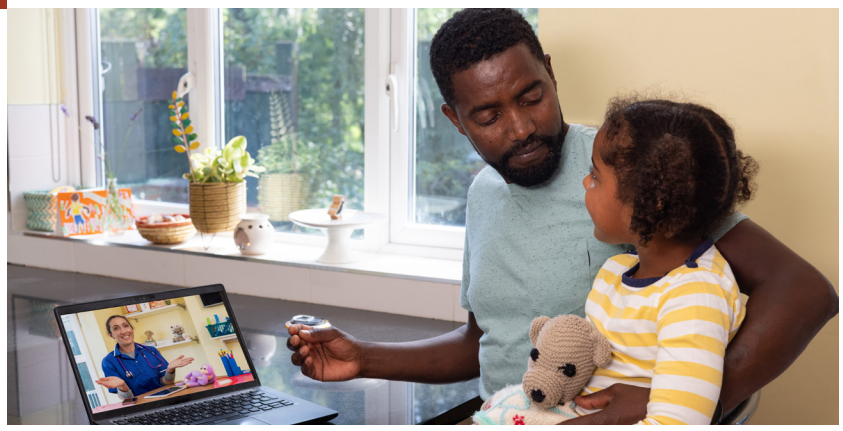

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About the Authors

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Founded in 1972, IHPS is an interdisciplinary group of researchers whose mission is to improve health and transform health care in America by working across competing interests, collecting evidence, informing policy, and improving practice.

CHBRP was established in 2002. Per its authorizing statute, CHBRP provides the California Legislature with independent analysis of the medical, financial, and public health impacts of proposed legislation related to health insurance benefits.

About the Foundation

The California Health Care Foundation is an independent, nonprofit philanthropy that works to improve the health care system so that all Californians have the care they need. We focus especially on making sure the system works for Californians with low incomes and for communities who have traditionally faced the greatest barriers to care. We partner with leaders across the health care safety net to ensure they have the data and resources to make care more just and to drive improvement in a complex system. For more information, visit www.chcf.org.

CHCF informs policymakers and industry leaders, invests in ideas and innovations, and connects with changemakers to create a more responsive, patient-centered health care system.

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Executive Summary

The COVID-19 pandemic transformed health care delivery in many ways, including by leading to a substantial increase in the use of telehealth. To reduce the risk of transmitting the virus to patients and health care workers, the entire system rapidly adopted telehealth services — with a big push from changes in Medicare and Medicaid reimbursement rates.

Along with this transformation has come a flood of new research that studied the impact of telehealth on health outcomes and health care delivery. What normally would have taken many years of research took place in only a couple of years. More than 80 relevant studies, including meta-analyses or systematic reviews (studies that summarize studies), were published from 2021 to 2022. Many studies examined major telehealth modalities such as live video, telephone, and e-visit care delivery, as well as hybrid health care delivery, in which patients receive both in-person and telehealth services from the same providers or provider group.

The authors reviewed these studies and summarized their findings in this report. The analysis will be particularly interesting to (1) health care policymakers and payers interested in learning about the effectiveness of telehealth relative to in-person care in terms of health outcomes, processes of care, and utilization of other health care services; (2) delivery system practitioners developing practice guidelines for when to use telehealth (please download the Supplement to find even greater detail); and (3) researchers wanting to understand where further study is needed.

In terms of the effectiveness of telehealth and when to use it, a particularly large body of evidence has emerged about telehealth's role in treating several conditions. For example, a preponderance of evidence shows that live video is equivalent to in-person care for treating mental health conditions like attention deficit hyperactivity disorder (ADHD), depression, and post-traumatic stress disorder (PTSD). In addition, dermatology diagnoses made via live video are as accurate as diagnoses made via in-person visits, thanks to the high quality of many digital cameras.

At the same time, several studies found that live video and in-person visits resulted in the same amount of utilization of other health care services after an initial treatment among persons needing urology, infectious disease, diabetes, and postsurgical care.

Until recently, telephone was not considered a legitimate telehealth modality, and therefore providers did not receive reimbursement for services provided via telephone. Since the pandemic began, however, telephone-based care has become a critical source of care for people who do not have access to live video. Despite the high use of telephone-based care, there is only a limited amount of new evidence evaluating whether the telephone is just as effective as in-person care in terms of health outcomes. However, for the diseases, conditions, and care categories studied, the benefits of telephone-based care are clear for a range of health conditions, including prenatal care, cystic fibrosis, and pancreatitis.

Hybrid care, where care is delivered both in person and via telehealth, was found to be just as effective as in-person or telehealth services alone. Hybrid care has been found to be effective for rheumatoid arthritis, reproductive health services, and behavioral health care. Even when studies have not distinguished results for different modalities, video and telephone services have been found to be effective for numerous conditions.

Telehealth stakeholders should note that despite the extraordinary amount of research produced over a short amount of time, gaps in knowledge

remain. Studies have incorporated widely different methodologies, patient populations, and payment policies for telehealth services, which makes it challenging to draw high-level conclusions about the effectiveness of any particular modality.

It's disappointing how little of this literature examines differences among patient demographic groups. Few studies address the effectiveness of telehealth services for lower- versus higher-income people, older versus younger people, non-English speakers versus English speakers, and different racial and ethnic groups.

Other notable gaps in the literature include the following:

- Research on the impact of telephone-based care; hybrid care; multimodal telehealth; and email, text, and chat on health care delivery processes and utilization of other health care services
- Research on the use of email, text, and chat in chronic conditions other than diabetes
- Research on the overall effectiveness of the "store and forward" modality, which typically involves a patient sending an image or other medical information to a clinician for evaluation

Ultimately, future research should address the need for practical information that can guide policy and practice decisions throughout the health care delivery system. The lack of studies on disparities in the effectiveness of telehealth services is striking and detrimental to the goals of improving access and equity. The future of telehealth depends on these insights.

Introduction

Even prior to the transformation in telehealth due to the pandemic, California was one of the most active states in terms of adopting telehealth legislation and regulation. The State Legislature has introduced a multitude of telehealth-related bills since 1996, and more than 20 telehealth-related bills have been signed into California law.[1]

Along with the rapid adoption of telehealth has come the need for policymakers, payers, and providers to understand its effectiveness in order to inform new policies and implementation.

The California Health Benefits Review Program (CHBRP) has provided independent and rigorous analysis of five telehealth-related bills to the California legislature, including an analysis of the literature about telehealth's effectiveness for patient care as part of Assembly Bill (AB) 32 in the 2021–22 session, which includes the requirement for Medi-Cal managed care plans to cover and reimburse at parity with the equivalent in-person service for synchronous telehealth, including live video and telephone (audio-only) visits.[2]

The California Health Care Foundation asked CHBRP to update that literature review with emerging evidence in order to answer the following research questions:

1. What is the effectiveness of services provided via different telehealth modalities like telephone and video compared with services provided in person?

2. What is the effectiveness of hybrid models of telehealth, in which health services are provided to patients both in person and via at least one modality of telehealth, compared with services provided using telehealth or in-person visits alone?

3. To what extent have studies of telehealth services assessed disparities in access along the lines of race, ethnicity, age, insurance coverage type, language, digital literacy, socioeconomic status, or geographic location?

The following telehealth modalities were included in this review: live video; telephone; email, text, and chat; e-visits; store and forward; and hybrid care.*

Definitions of Telehealth Modalities

Live video: Two-way, real-time interactive video to facilitate interactions between a patient and a provider.

Telephone: Two-way, interactive audio via a landline or cell phone to facilitate interactions between a patient and a provider.

Email, text, and chat: Providers communicate with patients via services that involve email, text, and chat applications, whether asynchronously or in real time.

E-visit: Typically a series of two-way messages between the patient and provider, or a short questionnaire on a health portal, used to diagnose a condition without a phone or video appointment.

Store and forward: Patients capture photos, audio or video recordings, and other medical information and transmit these data to a remote provider for review.

Hybrid care: Patients receive a combination of in-person and telehealth services from the same providers or network of providers.

Methodology

The literature review included studies published between January 2021 and October 2022, picking up from when CHBRP's previous review of telehealth literature was concluded.

A search of key words within six databases returned more than 5,400 articles. The authors performed a title and abstract review, followed by full-text review of 180 articles for potential inclusion in this report. Studies were eliminated because they did not report findings from clinical research studies, were of poor quality, or did not focus on the previously described telehealth modalities or research questions. In total, 80 studies that examine the use of telehealth modalities as a substitute for in-person care were included in the analysis for this report. These studies evaluated whether telehealth care resulted in equal or better outcomes and processes of care than care delivered in person, and whether telehealth improved access to care. Some studies assessed the effects of telehealth as part of a hybrid care plan, evaluating whether the combination of in-person and telehealth care improved health outcomes and processes of care compared with receiving in-person care alone.

In determining the strength of evidence for each outcome measure, the authors considered the number of studies and evaluated the evidence for each outcome measured using a grading system with the following categories: research design, statistical significance, direction of effect, size of effect, and generalizability of findings. Further information

Inclusion Criteria

Studies that were included in the analysis met the following criteria:

- Addressed telehealth services between providers and patients
- Included a comparison group
- Addressed services that could be equivalent to in-person services
- Addressed services delivered by billable providers
- Addressed the specified research questions and modalities

* "Hybrid care" is not a telehealth modality per se, but a combination of telehealth services and in-person care. However, for the sake of convenience and easier comparison, it is listed as a modality in the sidebar and tables below.

Levels of Evidence

The authors use the following terms to characterize the body of evidence regarding an outcome:

- **Clear and convincing evidence** indicates that there are multiple studies and that the large majority of studies are of high quality and consistently find that the treatment is either effective or not effective.
- **Preponderance of evidence** indicates that the majority of the studies reviewed are consistent in their findings that treatment is either effective or not effective.
- **Limited evidence** indicates that the studies have limited generalizability to the population of interest, and/or the studies have a fatal flaw in research design or implementation.
- **Inconclusive evidence** indicates that although some studies included in the medical effectiveness review find effectiveness, a similar number of studies of equal quality suggest lack of effectiveness.
- **Insufficient evidence** indicates that there is not enough evidence available to determine whether or not a modality is effective, either because there are too few studies of the treatment or because the available studies are not of high quality. It does not indicate that a modality is not effective.

about the criteria CHBRP uses to evaluate evidence of medical effectiveness can be found in CHBRP's *Medical Effectiveness Analysis and Research Approach*.[3]

The conclusions presented in Table 5 below incorporate findings from previous CHBRP analyses.

Limitations

A major limitation of the literature is that the rate of change in telehealth technology and use outpaces the publication of studies of telehealth. Another important limitation of some studies is the inability to disaggregate the telehealth services from other interventions, such as an integrated web portal that includes e-mails as well as information about self-care, access to test results, and the ability to refill prescriptions. Additionally, the data analyzed for many of these studies were collected prior to the COVID-19 pandemic. Findings regarding utilization may include the early months of the pandemic, when people were discouraged from seeking in-person care unless necessary, and therefore are not completely representative of the typical health care setting and utilization patterns. Additionally, compensation for telehealth visits also changed during the COVID-19 pandemic, which may have affected access to care because providers had stronger financial incentives to use telehealth.

Evidence of Effectiveness by Telehealth Modality

To examine whether services delivered via telehealth are of the same quality as in-person services, the authors examined three sets of outcomes: health outcomes, processes of care, and utilization of other health care services (see the sidebar box for definitions and examples of each). These three types of outcomes were identified as the outcomes of interest because policymakers and other stakeholders are interested in whether, as compared with in-person care, telehealth results in the same or better health outcomes; whether patients receive similar care; and whether telehealth results in additional, the same, or less utilization of health services. For example, stakeholders are interested in whether a patient with diabetes who receives care via telehealth is able to maintain their blood glucose levels (health outcome), receives the medically indicated screenings (process of care), and avoids preventable visits to the emergency department (ED; utilization) at similar rates as a patient with diabetes who receives in-person care.

Definitions of Outcomes

Health outcomes: Physiological measures and patient-reported outcomes (e.g., hemoglobin A1c, side effects, rate of complications, disease progression).

Processes of care: Treatment adherence, accuracy of diagnoses, and alignment of treatment plans with clinical practice guidelines.

Utilization of other health care services: Wait time for specialty care, and numbers of outpatient visits, emergency department visits, and hospitalizations.

Diseases, Conditions, and Care Categories Studied

The amount of evidence regarding whether telehealth modalities and services result in equal, better, or worse outcomes than care delivered in person varies depending on the disease, condition, and care category; telehealth modality; and type of outcome studied. Findings may not be generalizable outside of the specific diseases, conditions, and care categories studied. Table 1 includes a summary of telehealth modalities included in this literature review and the disease/condition/care category for which evidence was published between January

Table 1. Amount of Evidence by Disease/Condition/Care Category and Telehealth Modality, 2021–2022

● 5 or more studies have been published
● 1–4 studies have been published
● No studies have been published

DISEASE/CONDITION/CARE CATEGORY	TELEHEALTH MODALITY					
	LIVE VIDEO	TELEPHONE	EMAIL, TEXT, AND CHAT	E-VISITS	STORE AND FORWARD	HYBRID CARE
Antibiotic prescribing	●	○	○	●	○	○
Behavioral health	●	●	○	○	○	●
Chronic conditions	●	○	○	○	○	●
Dermatology	○	○	○	●	●	○
Eating disorder management	○	○	●	○	○	○
Examinations for Respiratory Illnesses	●	○	○	○	○	○
Gastroenterology	●	○	○	○	○	○
Infectious diseases	●	○	○	○	○	○
Multiple conditions	●	○	○	●	○	○
Neuropsychology and cognitive assessments	●	○	○	○	○	○
Ophthalmology	●	○	○	○	●	○
Orthopedics	●	○	○	○	○	○
Other specialty care	●	○	○	○	○	○
Otolaryngology	●	●	○	○	○	○
Primary care	●	○	○	○	○	●
Reproductive health	●	●	○	○	○	●
Surgical care	●	○	○	○	○	○
Weight management	●	○	○	○	○	○
Wound care	○	●	○	○	●	○

Sources: This table reflects literature published between January 2021 and October 2022 (see the Methodology section for further details). Systematic reviews and meta-analyses published during this time may have included single studies published in prior years.

2021 and October 2022. Systematic reviews and meta-analyses published during this time period included studies published in prior years, and are included in the table.

Generally, there is substantially less peer-reviewed literature published about the effectiveness of email, text, and chat; e-visits; and store-and-forward telehealth modalities used during patient and provider interactions compared with in-person care. One potential reason for this is that these modalities are not typically fully substitutable for in-person care and require additional health care interactions. These modalities may more commonly be used as complements to in-person care or other forms of telehealth such as telephone and live video.

Overview of Evidence of the Effectiveness of Telehealth on Health Outcomes, Processes of Care, and Utilization of Other Health Care Services, 2021–2022

Tables 2–4 summarize the evidence of the effectiveness of telehealth for major diseases, conditions, and care categories, by type of outcome (health outcomes, processes of care, and utilization of other health care services, respectively) and modality. Only diseases, conditions, and care categories for which literature was published between January 2021 and October 2022 are included in these tables.

Table 2. Evidence of the Effectiveness of Telehealth on Health Outcomes

TELEHEALTH MODALITY	DISEASE/CONDITION/CARE CATEGORY BY LEVEL OF EVIDENCE				
	EFFECTIVE — CLEAR AND CONVINCING EVIDENCE	EFFECTIVE — PREPONDERANCE OF EVIDENCE	EFFECTIVE — LIMITED EVIDENCE	INCONCLUSIVE EVIDENCE	INSUFFICIENT EVIDENCE
Live video	Orthopedics Chronic conditions Behavioral health, including PTSD and depression and anxiety	Multiple conditions Weight management			Surgical care Ophthalmology Reproductive Health Infectious Disease Examinations for Respiratory Illnesses
Telephone			Behavioral health		Reproductive health
Email, text, and chat			Eating disorder management		
E-visits			Dermatology Multiple conditions		
Store and forward			Dermatology Ophthalmology	Wound care	
Hybrid care			Reproductive health		Chronic conditions Behavioral health

Sources: This table reflects literature published between January 2021 and October 2022 (see the Methodology section for further details). Systematic reviews and meta-analyses published during this time may have included single studies published in prior years.

Notes: *HIV* is human immunodeficiency virus. *PTSD* is post-traumatic stress disorder.

Table 3. Evidence of the Effectiveness of Telehealth on Processes of Care

TELEHEALTH MODALITY	DISEASE/CONDITION/CARE CATEGORY BY LEVEL OF EVIDENCE				
	EFFECTIVE — CLEAR AND CONVINCING EVIDENCE	EFFECTIVE — PREPONDERANCE OF EVIDENCE	EFFECTIVE — LIMITED EVIDENCE	INCONCLUSIVE EVIDENCE	INSUFFICIENT EVIDENCE
Live video		Orthopedics Surgical care	Primary care Examination of common respiratory illnesses Neuropsychology and cognitive assessments Diabetes management	Antibiotic prescribing	Other specialty care
Telephone					Otolaryngology
Email, text, and chat					
E-visits			Antibiotic prescribing	Multiple conditions	
Store and forward					
Hybrid care					Chronic conditions Primary care

Sources: This table reflects literature published between January 2021 and October 2022 (see the Methodology section for further details). Systematic reviews and meta-analyses published during this time may have included single studies published in prior years.

Table 4. Evidence of the Effectiveness of Telehealth on Utilization of Other Health Care Services

TELEHEALTH MODALITY	DISEASE/CONDITION/CARE CATEGORY BY LEVEL OF EVIDENCE				
	EFFECTIVE — CLEAR AND CONVINCING EVIDENCE	EFFECTIVE — PREPONDERANCE OF EVIDENCE	EFFECTIVE — LIMITED EVIDENCE	INCONCLUSIVE EVIDENCE	INSUFFICIENT EVIDENCE
Live video		Infectious diseases	Chronic conditions Orthopedics Surgical care	Ophthalmology	Reproductive health Gastroenterology
Telephone					Wound care
Email, text, and chat				Multiple conditions	
E-visits				Multiple conditions	
Store and forward					
Hybrid care					Behavioral health

Sources: This table reflects literature published between January 2021 and October 2022 (see the Methodology section for further details). Systematic reviews and meta-analyses published during this time may have included single studies published in prior years.

Overview of Evidence of the Effectiveness of Telehealth by Modality and Type of Outcome

Table 5 summarizes the overall evidence of telehealth's effectiveness for health outcomes, processes of care, and utilization of other health care services by incorporating findings from this literature review with findings from previous literature reviews. Additionally, these conclusions examine the evidence across all diseases, conditions, and care categories.

The level of evidence of effectiveness is mixed for services delivered via telehealth. Among the telehealth modalities and services reviewed, the evidence shows that most modalities and services result in similar health outcomes compared with in-person care. Evidence regarding the effects on processes of care and utilization of other health care services is limited for most modalities and services.

Appendix A in the Supplement includes a more detailed discussion of the medical literature by dis-ease, condition, and care category.

Spotlight on Telerehabilitation

Telerehabilitation modalities can include video-based therapy programs, remote patient monitoring, telephone calls, and live video meetings with providers, including physiotherapists, physical therapists, occupational therapists, neurologists, or physicians. Care is distinct from standard rehabilitation or home-based exercise programs.

- A preponderance of evidence shows that telerehabilitation is effective at improving *health outcomes* in areas such as activities of daily living, motor function, and physical activity.
- Evidence is insufficient to determine whether *processes of care* are similar when services are provided by telerehabilitation versus in person. However, the absence of evidence does not mean there is no effect; it simply means the effect remains unknown.
- A preponderance of evidence shows that services provided by telerehabilitation are as effective as rehabilitation services provided in person in reducing the *utilization of other health care services.*

More details about these studies are included in the Supplement, Appendix B.

Table 5. Evidence of the Effectiveness of Telehealth by Modality and Type of Outcome

● Effective — preponderance of evidence
● Effective — limited evidence
● Inconclusive evidence
● Insufficient evidence

TELEHEALTH MODALITY	LEVEL OF EVIDENCE BY TYPE OF OUTCOME		
	HEALTH OUTCOMES	PROCESSES OF CARE	UTILIZATION OF OTHER HEALTH CARE SERVICES
Live video	●	●	●
Telephone	●	●	●
Email, text, and chat	●	●	●
E-visits	●	●	●
Store and forward	●	●	○
Hybrid care	●	○	○

Sources: This table reflects not only findings from the current literature review (see the Methodology section for further details), but also findings from previous literature reviews conducted by CHBRP.

Studies Combining Findings for Multiple Telehealth Modalities

Traditionally, telehealth has been discussed as distinct modalities. However, as telehealth use and technology have changed through the years, findings regarding the effectiveness of modalities are more frequently reported together. Numerous articles, including observational studies and systematic reviews, combine modalities when reporting outcomes. For example, multiple studies on telehealth modalities have jointly reported findings for telephone and video. A few studies have jointly reported findings for additional telehealth modalities.

Definition of combined reporting:

Studies in which the reporting of effectiveness of telehealth combines multiple modalities even though patients received only one form of telehealth (e.g., patients received care via live video or telephone, but the study outcomes were not described separately).

Outcomes for combined reporting:

- A preponderance of evidence shows that services provided via telehealth are as effective as in-person care on *health outcomes*.
- Evidence is inconclusive as to whether telehealth results in similar *processes of care*.
- Limited evidence shows that telehealth results in higher *utilization of other health care services* for primary care services and for antibiotic prescribing, such as follow-up visits. However, studies that have examined a single telehealth modality or report effectiveness by modality instead of combined have found evidence of effectiveness for services provided via telehealth.

More details about these studies are included in the Supplement, Appendix B.

Disparities Identified Within Literature

Concerns have been raised that telehealth and existing telehealth policies could benefit younger, commercially insured, urban adults with low-acuity conditions who can easily access technology, while exacerbating disparities in outcomes for individuals who are older, have lower incomes, have low digital literacy, or need interpreter services or other accommodations and may therefore not be able to access care via telehealth. CHBRP examined studies included in this literature review to identify information on disparities and found that only a handful of them included information about the effectiveness of telehealth by patient and community characteristics, and generally these were limited to sex, age, and geographic location. **As such, this body of literature provides *insufficient evidence* as to whether there are disparities in telehealth effectiveness across patients and communities whose demographic or socioeconomic characteristics differ.** Several systematic reviews included in this literature review also mentioned the dearth of studies examining the effectiveness of telehealth by patient characteristics.

Implications for the Future

Telehealth is at a turning point. Traditionally, policy and reimbursement practices have focused on separate telehealth modalities in comparison with in-person care. Now many stakeholders on the front lines of health care are focused on integrating telehealth into the standard of care. They are often using telehealth as a complement to, rather than a substitute for, in-person care.

This current review of the recent literature found that services provided via telehealth generally result in similar outcomes as services provided in person. Research examining the effectiveness of hybrid

Live Video vs. Telephone Telehealth Services

Some research has compared common telehealth modalities, such as live video and telephone. There is a preponderance of evidence demonstrating that the impact on health outcomes of *behavioral health services* delivered by live video is similar to the impact of such services delivered by telephone consultation. However, there is insufficient evidence whether care for other health conditions provided via live video versus telephone results in similar health outcomes. There is also insufficient evidence whether behavioral or other health care services delivered by live video versus telephone result in similar processes of care or utilization of other health care services.

care is emerging and demonstrates the evolution of telehealth toward combining in-person care and telehealth services. In addition, once-strong divisions between telehealth modalities have more recently become blurred.

The authors convened a small group of California policy stakeholders to discuss the findings f rom the literature review and discuss future telehealth research priorities (see the list of attendees in the Supplement, Appendix C). These stakeholders emphasized the lack of current research regard-ing how telehealth effectiveness varies according to specific patient characteristics and populations. Some were interested in continued research about hybrid care as well as research that compared the effectiveness of different modalities with each other. More information was also desired about the effec-tiveness of telehealth for specific conditions and diseases. While the authors found some evidence in the current literature review, policy stakehold-ers are seeking more detailed literature reviews to improve workflows and clinical decision making.

Ultimately, future research should address the need for practical information that can guide policy and practice decisions throughout the health care delivery system. The lack of studies on disparities in the effectiveness of telehealth services is striking and detrimental to the goals of improving access and equity. The future of telehealth depends on these insights.

Endnotes

1. "Telehealth in California: Legislative History" (PDF), Center for Connected Health Policy, November 2022.
2. AB 32 was amended after CHBRP's analysis and was signed by the governor in 2022. Previous analyses include *Background Brief: Telehealth: Current State of the Evidence* (PDF), California Health Benefits Review Program (CHBRP), February 11, 2021; as well as analyses of AB 744 (2019), AB 2507 (2016), and SB 289 (2015), which are available at https://www.chbrp.org/analysis/completed-analyses.
3. *Medical Effectiveness Analysis and Research Approach* (PDF), California Health Benefits Review Program (CHBRP), current as of January 4, 2023.