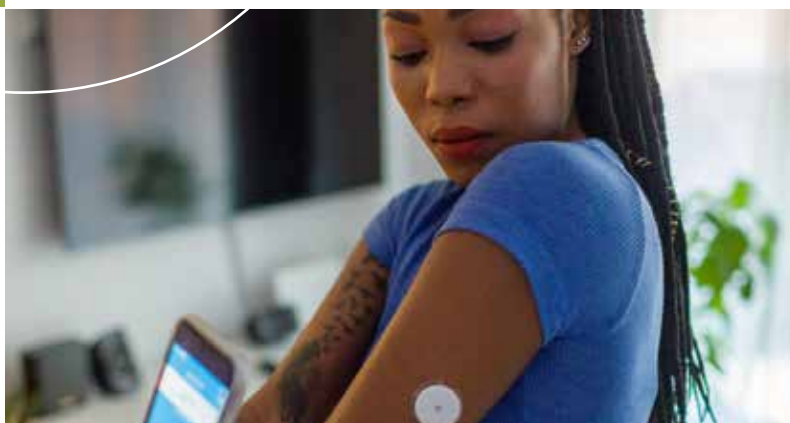**CHCF**

Remote Patient Monitoring in the Safety Net:
What Payers and Providers Need to Know

JULY 2021

AUTHORS
Andrew Broderick, Valerie Steinmetz, Michael Benzinou,
Sarah Carroll, and Hanna Helms

About the Authors

Andrew Broderick, MBA, is research program director at the Public Health Institute (PHI); Valerie Steinmetz, MPH, is program director at PHI; and Michael Benzinou, PhD, is founder of Elements Innovation. The **Public Health Institute**, an independent nonprofit organization, is dedicated to promoting health, well-being, and quality of life for people throughout California, across the nation, and around the world.

Sarah Carroll, MPH, is senior director, and Hanna Helms is senior manager at the Center for Care Transformation, AVIA. A leading digital transformation partner for health care organizations, **AVIA** provides unique market intelligence, proven collaborative tools across a network of 50+ leading health systems, and results-based consulting to help solve health care's biggest strategic challenges.

About the Foundation

The **California Health Care Foundation** is dedicated to advancing meaningful, measurable improvements in the way the health care delivery system provides care to the people of California, particularly those with low incomes and those whose needs are not well served by the status quo. We work to ensure that people have access to the care they need, when they need it, at a price they can afford.

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.

Contents

Treatment and prevention of chronic illness threatens to overwhelm California's health care safety net — the provider and payer organizations that serve people with low incomes. Long stressed by workforce shortages, the safety net is under increasing strain due to the rising prevalence of chronic conditions such as heart disease and diabetes in the patient population. Encouraged by positive experiences with telehealth modalities during the COVID-19 pandemic, providers and payers are interested in additional ways to use technology for greater efficiency and access, including to facilitate chronic condition care and prevention.

Remote patient monitoring is a type of telehealth that involves the secure transfer of personal health and medical data to a provider for remote monitoring, care, and support.

To do so, some providers across the health care spectrum have incorporated remote patient monitoring (RPM) into their workflows. RPM is a type of telehealth that involves the secure transfer of personal health and medical data to a provider for remote monitoring, care, and support. Although not yet widely used among California's safety-net providers — in part because of current Medicaid reimbursement policy — RPM offers potential for mitigating access barriers and facilitating care management for patients who have chronic conditions or have warning signs of such illnesses. Providers see the potential for RPM to improve connections with patients outside clinic walls, integrate services across the continuum of care, maximize workforce efficiency, expand access to care, and reduce health inequities.

This report was commissioned by the California Health Care Foundation (CHCF) to offer providers, payers, and policymakers basic information about RPM and its potential application in the safety net. The report is based on research conducted separately by Public Health Institute and AVIA, including literature searches, stakeholder interviews, and focus groups of safety-net patients and others. The report includes a landscape scan of some of the available tools geared to chronic condition management. The research was done between November 2020 and February 2021 in an extremely fast-evolving marketplace, so the information shown is not complete. The report addresses several questions:

➤ What problems can RPM help solve?

➤ What do providers want and need from RPM?

➤ What are patients' needs and perspectives?

➤ How is RPM currently reimbursed in Medicaid and Medicare?

➤ What should providers know about starting or scaling up a program?

➤ What is the outlook for RPM in the safety net?

➤ What is the landscape of emerging companies focused on RPM?

What Problems Can RPM Help Solve?

Some 14 million Californians are living with at least one chronic condition, and more than half of this group have multiple chronic illnesses. Cardiovascular disease is the most common, affecting 36.4% of the population; this condition is also the most costly, accounting for 16% of all health care costs in the state. More than 2.3 million California adults report having been diagnosed with diabetes, representing one out of every 12 adults in the state. Among patients with type 2 diabetes, cardiovascular disease remains the main cause of mortality and morbidity.[1] Three in 10 adult Californians are affected by high blood pressure.[2]

A disproportionate share of Californians with chronic illness depend on Medi-Cal, the nation's largest Medicaid program, for their health coverage. One in three of the state's residents — 13 million people

— are enrolled. Unfortunately, patients seeking care in the safety net are disproportionately affected by transportation, technology, language, cultural, and other barriers.[3] The pandemic further hampered their care; while an estimated 41% of all US adults delayed or avoided medical care because of COVID-19 concerns, these rates were higher among communities of color and people with disabilities.[4]

Safety-net providers are hindered in their ability to comprehensively manage and prevent chronic illness as a result of inadequate resources, including an insufficient supply of health professionals and frontline workers, especially in primary care and prevention. The system is further constrained by imbalanced geographic distribution of health workers in rural regions and inner-city urban areas and by limited cultural and language concordance between providers and populations.[5]

Nearly 700 hospitalizations per 100,000 people are potentially preventable through effective chronic care management and access to primary care.

Rates of avoidable hospitalizations in California are highest among Medi-Cal beneficiaries; nearly 700 hospitalizations per 100,000 people are potentially preventable through effective chronic care management and access to primary care.[6] Such numbers point to unnecessary suffering for people with chronic conditions as well as unnecessary expense for the safety-net system. Providers, payers, and all Californians have an interest in leveraging technologies that can assist in the management of chronic illnesses.

Providers and patients, while they share the same overall goal for RPM tools — better management of chronic conditions — also bring separate perspectives about the best means to get there. Some specifics are discussed in the following two sections.

What Do Providers Want and Need from RPM?

Safety-net providers have observed the effectiveness of telehealth in facilitating care for patients with diabetes, hypertension, and heart disease, as well as the positive impact of telehealth on mortality, quality of life, and preventable hospitalizations. Research shows that RPM solutions are particularly beneficial in serving the overlapping population health needs of people with chronic conditions, individuals over 65, and those who have difficulty accessing health services on a regular basis because of transportation or other barriers.[7]

Benefits of RPM include maximizing the roles of non-physician members of the care team, such as nurses or medical assistants; shifting care to a progressively lower acuity setting; and supporting patient self-care. Organizational experience with the adoption of RPM at scale in the US health care system indicates RPM can lead to significant improvements in the quality and cost of care and enhance performance on key outcome measures.[8] Providers, therefore, are interested in the potential for RPM to address resource and capacity challenges while improving the ability to manage chronic illness care. However, while a number of small-scale pilots and use cases have demonstrated the effectiveness of RPM, it has largely remained an underutilized resource in the safety net.

Literature searches, stakeholder interviews, and focus group findings point to factors that may advance acceptance and widespread use of RPM among safety-net providers. These factors are summarized here.

Integration into electronic health records. Clinicians note that applications should be compatible with electronic health records (EHRs) to facilitate uploading of patient health data at clinic appointments and sharing data remotely when adjustments to medications are needed. Integration with EHRs ensures that RPM data are not stored in separate silos of information that may complicate access. "It needs to show up in front of my eyeballs when I'm seeing patients, and it has to be delivered to me in a way that I don't have to

jump through hoops to sign into a different website," asserted Dr. Ida Sim from the University of California, San Francisco (UCSF). "It's got to be right within the workflow."

> *"It needs to show up in front of my eyeballs when I'm seeing patients, and it has to be delivered to me in a way that I don't have to jump through hoops."*
>
> — Dr. Ida Sim, UCSF

Many applications and vendors (including all of those included in the RPM landscape scan in Appendix A) do have the ability to exchange information with various EHR systems. However, integration may be costly and time-consuming for providers. While acknowledging that integration is ideal, many of the providers interviewed for this report — including those featured in the case studies — were willing to pilot RPM solutions prior to beginning an EHR integration.

Clinical decision support. Providers value the potential for RPM to allow them to see their patients' health data from outside of the clinical setting and to see these data more regularly. The use of algorithms can enhance monitoring by providing trend information and alerting clinicians of the need for patient follow-up when readings are out of range. EHR data capture can be continuous but is more often encounter-based, especially in the safety net. Dr. Danielle Oryn from Redwood Community Health Coalition (RCHC) explained: "Right now, patients can enter data to the portal, but an encounter is what triggers providers receiving it. Patients could take 600 values between visits and we don't know about it." Because some providers lack staff or resources to manage RPM programs, including drawing real-time insights from the data, certain vendors offer clinical care management services along with devices and software.

Providers noted that the automation of data flowing into the physician office, together with algorithms that surface important insights for the physician, can help alleviate patient concerns and allow them to maintain or improve their quality of life. Interviewees reported that such data monitoring is most useful with diabetes, hypertension, and to a lesser extent heart failure, based on evidence in literature reviews.

Connected versus nonconnected devices. Safety-net providers often weigh the pros and cons of using "connected" or "nonconnected" devices:

➤ *Connected RPM devices* automatically transmit data through the internet or a cell phone into an analytics platform that providers and patients use to view the data and manage care. Such connected devices lessen the number of manual steps required for patients and providers to collect and deliver data. However, the connected devices are more expensive than nonconnected devices — in some cases twice as expensive — with integration into the provider's EHR system being yet another expense.

➤ *Nonconnected devices* require patients to manually report health measures such as blood sugar and blood pressure through a patient web portal, by text message, or during a visit with their provider. Many clinics choose such low-tech RPM methods because of cost factors and limited access to internet or cellular data. However, these solutions require the provider to develop workflows to capture data and may present additional challenges if readings are not accurately reported by patients.

Providers and other stakeholders emphasized the need for RPM program operations and workflows to be thoroughly considered before a technology is selected. Cindy Keltner of the California Primary Care Association noted, "Our clinics are very concerned with the workflow implications in terms of monitoring, managing, and acting on data as it streams in electronically."

Figure 1 illustrates the difference between a connected and nonconnected device for remote patient monitoring. The box on page 7 includes two case studies detailing the use of connected and nonconnected devices.

Figure 1. Patients Communicating with Their Health Care Providers: Connected Versus Nonconnected Devices
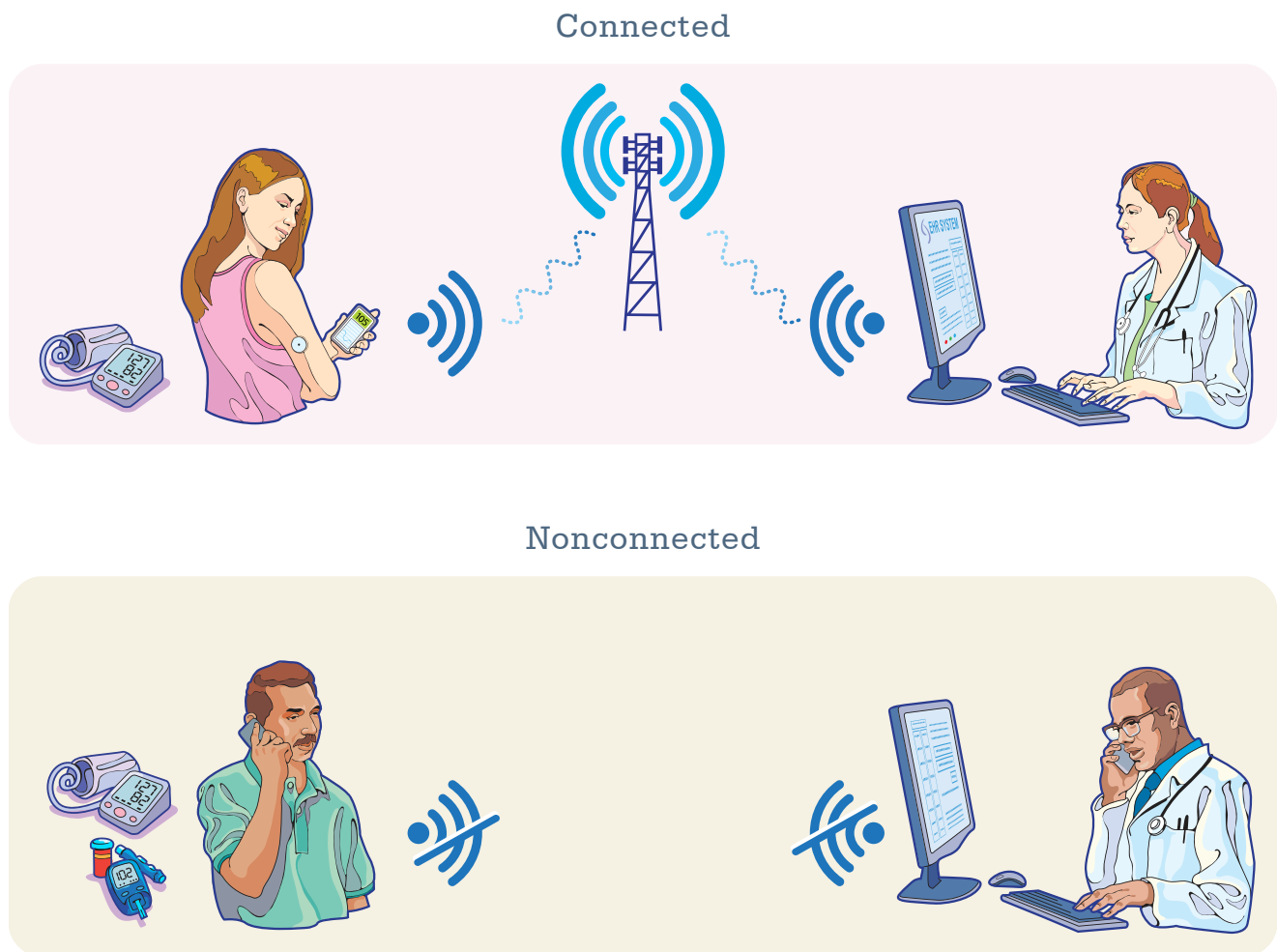
Connected

Nonconnected

Nonconnected Versus Connected Solutions for Hypertension Management

Axis Community Health (Axis). In 2020, Alameda County–based Axis, which serves more than 15,000 patients annually, partnered with CareSignal, a remote patient monitoring company. The project's aim was to reduce blood pressure in patients with hypertension, avert emergency department (ED) visits, and advance health equity. Axis began outreach to their highest-risk patients beginning in 2017, using community health workers, medical assistants, and nurses. Axis discovered that patients were ready for simple technology after observing that appointment reminder texts achieved a more than 95% continuous engagement rate and a dropout rate of less than 5%.*

Axis created an algorithm that identifies patients at risk for poor health outcomes and sends an SMS text message inviting them to enroll in CareSignal. Using nonconnected devices, patients text their blood pressure when prompted by CareSignal and receive educational nudges, evidence-based check-ins, and targeted feedback. Messages are in English or Spanish. Patients do not need to download an app or be concerned about excessive data plan usage. To address the racial health inequity gap, Axis's identification algorithm incorporates patient race and ethnicity.

The program was financed through grant support. Early results will be measured in mid-2021. Axis expects improved hypertension control after one year of data comparing Uniform Data System (UDS) and the National Committee for Quality Assurance's Healthcare Effectiveness Data and Information Set (HEDIS) rates year over year. Axis plans to enroll up to 4,000 patients in phases over the next two years and sees potential to scale the solution to other chronic conditions in the future.

Northeast Valley Health Corporation (NEVHC). Providing comprehensive primary health care annually to more than 83,000 medically underserved residents of Los Angeles County, NEVHC is piloting a project focusing on patients diagnosed with uncontrolled hypertension. NEVHC is partnering with Rimidi, a cloud-based software platform that combines patient-generated health data with clinical data from the EHR system to drive patient-specific clinical insights and actions. The pilot, which has a goal of reaching 50 patients in 2021, is financed through a one-time grant.

Unlike NEVHC's previous RPM efforts, which relied on patient self-reporting, this pilot will test a more automated and integrated RPM system while using connected devices. Under the supervision of the director of quality and health education, NEVHC staff will enroll patients in the program, review daily alerts of elevated blood pressure based on established algorithms, communicate blood pressure values and recommendations to providers, and conduct patient follow-up.

The aim is to reduce patients' cardiovascular disease scores, improve HEDIS measures, and reap financial savings through a decrease in the need for in-person visits and higher levels of care. The program will also make it easier for providers to share educational resources and to determine when to further engage patients to keep them on a healthy track. Outcome measures to assess the effectiveness of the pilot include baseline blood pressure values; values at monthly intervals; duration to get blood pressure under control; medication adjustments; lifestyle recommendations; and patient, provider, and care team satisfaction. NEVHC plans to use the pilot outcomes to secure future funding and scale the program.

*See more at R. M. Peters et al., "Assessing the Utility of a Novel SMS- and Phone-Based System for Blood Pressure Control in Hypertensive Patients: Feasibility Study," *JMIR Cardio* 1, no. 2 (2017): e2; and "Case Study: How the Largest FQHC in Colorado Prepared for the Shift from Fee-for-Service to Value-Based Care," CareSignal, accessed May 23, 2021.

What Are Patients' Needs and Perspectives?

RPM enables patients to track their health data over time, identify trends, access educational information, and conveniently stay in touch with providers between visits. Focus groups conducted for this report confirmed that patients feel empowered by being able to see data trends and patterns and connecting these with what is happening with their health. Providers noted that patients become more engaged as they better understand their results — like how blood pressure or blood glucose readings can improve over time. Providers also observed that patients are often more willing to change medication or dosing based on better understanding their home monitoring results. "This has proved to an unexpected positive," noted Debra Rosen of Northeast Valley Health Corporation (NEVHC).

Focus groups confirmed that patients feel empowered by being able to see data trends and patterns and connecting these with what is happening with their health.

Research confirms that many people served in the safety net are interested in using RPM innovations. One study found that the overwhelming majority of people of color in an urban, underserved area with access to digital health-compatible devices were either using or were interested in using such technology in managing their health.[9] Another study demonstrated high adherence within vulnerable populations. A Federally Qualified Health Center (FQHC) successfully used an automated identification and outreach system to deliver tailored self-management education to a population that was high-risk and low-income.[10]

Literature searches, stakeholder interviews, and focus group findings point to factors that may drive or hinder acceptance and widespread engagement with RPM among patients in the safety net. Some of the factors affecting patient engagement with RPM are summarized here.

Barriers to technology use. Despite their growing interest in using telehealth and RPM, potential users in the safety net face significant obstacles to benefiting from digital technology.[11] Such "digital exclusion" poses great problems among specific groups, including people over 65, individuals with disabilities, and people of color. Nearly a quarter of adults lack basic digital skills, and 10% have never used the internet.[12] Many patients in the safety net lack connectivity and internet/Wi-Fi at home, and rural access to broadband is often a serious challenge. In fact, rural counties are 10 times as likely as urban areas to have little broadband access, to be located in areas where diabetes is widespread, and to experience physician shortages that are more than double the national average. Further, households with fewer devices and limited broadband may prioritize applications for school or work over those for telehealth and RPM.

Such obstacles make it critical that people's living situations and languages, and the social determinants of health such as health literacy and digital access, are factored into decisions about RPM adoption. Fortunately, as noted by Dr. Oryn of RCHC, "most patients have cell phones," which are more common than computers or Wi-Fi access. "A significant portion of our patients just got computers at home when their kids started online school because of COVID," Oryn added. However, even those with cell phones may face problems such as having service cut off, data plans exceeded, or phone numbers changed. In selecting communication modalities for populations, it is important to note that SMS,[13] text, and phone do not require the patient to have internet access to engage — unlike digital applications, portals, and websites. Appendix A lists vendor solutions that use SMS, text, and phone.

SMS, text, and phone approaches do not require the patient to have internet access in order to engage — unlike digital applications, portals, and websites.

Debra Rosen of NEVHC underscored the value of texting modalities in the safety net. "Texting is a key part of the patient-provider-clinic interaction," she said. "Whatever can be done through texting with patients is preferred. We send links to sign up for classes via text; we text all the time with our patients."

Supporting patient enrollment and training. Introducing patients to RPM devices, helping them understand the data, and providing education on chronic disease management can lead to more engaged patients, the research shows. Many vendors (and all of the vendors listed in Appendix A) offer enrollment and technical support for onboarding new patients. Provider staff can play a critical role. For example, the diabetes-focused RPM program at the University of Mississippi uses registered nurses (RNs) to work with caseloads of 200 patients each. The RNs, who are skilled in motivational interviewing, provide support and encourage engagement. Such skills have proved crucial for this initiative. Patients' HbA1c levels have dropped an average of 1.7 percentage points, patients' weight has decreased, and no patients have been hospitalized or visited the ED.[14]

Sustaining patient engagement over time. Technologies hold little benefit if they cannot maintain user involvement, which can erode over time as a result of problems like requirements for repetitive data entry. The research underscores the importance of identifying users' needs and involving them in the design of new technologies as a strategy to drive higher adoption and sustained engagement, which are directly correlated with effectiveness. For example, in a study involving patients with diabetes, high levels of patient activation and engagement with RPM were associated with better glycemic control outcomes.

Specific features of RPM programs have been shown to correlate with sustained engagement. For example, studies found that smartphone notifications can motivate users toward reaching their health targets and that enabling connectivity to diabetes care teams for remote blood glucose monitoring and medication adjustments in real time can be effective.[15] Multimodal content, including videos, and the ability to have direct contact with the provider were found to be predictors of a higher adherence level. Research also points to the effectiveness of diabetes education videos, patient forums, support groups, and live chat with health coaches.[16] Applications related to diabetes, research shows, are most effective if they are comprehensive — not focused on a single aspect of diabetes management such as food choice.[17] Training staff in motivational interviewing also has been found to encourage continued patient engagement.

Providing patients a sense of support. The focus groups and literature provide many examples of the critical importance of users' perception of support. For instance, this was a key driver of adherence with an automated text-messaging platform, with participants reporting that they received emotional support from reading and responding to the messages; this was particularly true among participants who spoke Spanish.[18]

How Is RPM Currently Reimbursed in Medicaid and Medicare?

The cost of starting and sustaining a RPM program is a crucial concern for safety-net providers. Costs include staffing, software, devices, and integration with the EHR system and workflow. Expenses are often covered by grants over a limited time frame to secure devices and pay for staffing. But without sustained RPM reimbursement tied to cost savings or improved clinical outcomes, providers may not be able to continue programs after grant support has ended. Reimbursement policies nationwide, in the various states, and in California are briefly discussed in this section.

Without sustained RPM reimbursement tied to cost savings or improved clinical outcomes, providers may not be able to continue programs after grant support has ended.

Medicare. In 2019, the Centers for Medicare & Medicaid Services (CMS) introduced new Chronic Care Remote Physiologic Monitoring codes in Medicare, including codes for setting up the RPM equipment, monitoring the data, interacting with patients, and reimbursing for 20-minute segments. A year later, the Medicare policy was expanded to include additional reimbursement for more than 20 minutes per month of RPM services.[19] In 2021, CMS further specified billing requirements and identified which providers may bill for RPM: namely, only physicians and other provider types eligible to provide evaluation and management services, including care teams under the supervision of a physician.[20] RPM is covered for individuals who are dually eligible for both Medicare and Medicaid. In California, 11 percent of the population (1.4 million people) are dually eligible; safety-net providers may be reluctant to implement RPM solutions that could be offered only to a small portion of their patient population.[21]

Medicaid state policies. Medicaid telehealth policy varies from state to state, and coverage for RPM is lacking in most states. As of September 2020, only 21 states provided some form of reimbursement for RPM in their Medicaid programs: Alabama, Alaska, Arizona, Arkansas, Colorado, Illinois, Indiana, Kansas, Louisiana, Maine, Maryland, Minnesota, Mississippi, Missouri, Nebraska, New York, Oregon, Texas, Utah, Vermont, and Virginia. Two states (South Carolina and Washington) eliminated sections of their manuals that provided reimbursement for remote patient monitoring. Two additional states (Hawaii and New Jersey) have laws requiring Medicaid reimbursement for RPM, but no official written policies. Further, many of the states that offer RPM reimbursement have restrictions associated with its use. The most common of these restrictions include offering reimbursement only to home health agencies, restricting the clinical conditions for which symptoms can be monitored, and limiting the type of monitoring device that can be used and the type of information that can be collected.[22]

Payer Seizes Opportunity

Partnership HealthPlan of California (PHC) is working to make RPM available to patients with diabetes despite the exclusion of FQHCs from reimbursement under Medi-Cal. In its model, the plan primarily pays for the RPM solution and works with primary care providers to implement it. Currently, PHC is conducting a small-scale pilot of Gojji, a tech-driven chronic condition management program focused on diabetes.

Patients can obtain a variety of nonconnected devices at any pharmacy with a prescription from the provider, and in response to the pandemic, the health plan added direct distribution by mail. Distribution to patients has increased from 100 devices per month to 500 per month. Dr. Robert Moore, PHC's chief medical officer, said the health plan's goal is to improve patient outcomes through better diabetes control. Nonconnected diagnostic devices available through direct distribution include scales, blood pressure monitors, pulse oximeters, and thermometers. Therapeutic devices available include nebulizers, humidifiers, and vaporizers.

Medicaid reimbursement in California. Medi-Cal does not currently reimburse provider time spent on RPM. Certain devices, such as blood pressure cuffs and glucose meters, are covered by Medi-Cal as durable medical equipment. The most recently passed California state budget (FY 2020–21) authorized remote patient monitoring as a telehealth modality and allows DHCS to determine payment. More details will be available once DHCS releases guidance about how this new modality will be implemented. In his January 2021 budget proposal, Governor Gavin Newsom proposed coverage of RPM for chronic health conditions if the intervention is intended to improve outcomes and quality of life and reduce mortality and hospital and nursing facility admissions. Proposed reimbursement would include one-time setup and education, remote monitoring of physiological parameters, and interpretation and communication back to the patient. Although FQHCs and rural health centers (RHCs) may be excluded from reimbursement, DHCS is considering the use of RPM services in the context of an alternative payment methodology.[23] Some Medi-Cal health plans have begun partnering with primary care providers to pilot RPM interventions; test technology solutions; and evaluate cost, outcomes, and return on investment.

What Should Providers Know About Starting or Scaling up a Program?

Literature searches, stakeholder interviews, and focus groups conducted for this report offer some guidance for starting RPM programs and sustaining them over time.

Use RPM as a tool within a wider program. Numerous experts pointed to the need for RPM to be integrated within a fully developed chronic disease management program that includes appropriate staffing. "RPM is a tool you use that is part of your bigger program. If you don't build a good program, technology is not going to help you," observed consultant Kathy Duckett.

Dr. Tearsanee Davis, who participated in an RPM pilot program at the University of Mississippi — leading to reimbursement from Medicaid in that state — noted that the education piece set the program apart from what was already out there. She said that the university built its RPM program on top of a successful educational program from the American Diabetes Association. Dr. Davis cautioned: "Do not approach this work as what technology solution is the best. Layer the technology aspect onto the program. It's more about the individual wanting to keep the connection to their nurse or health coach."

> *"Do not approach this work as what technology solution is the best. Layer the technology aspect onto the program."*
>
> — Dr. Tearsanee Davis, University of Mississippi

Invest in organizational change management. Despite the commonly acknowledged benefits of RPM, it has not been broadly deployed at scale. A criticism has been that technology is generally introduced conservatively in health services with the aim of delivering small improvements rather than transforming how services are delivered. Technology interventions like RPM require health systems to have an organizational culture that supports innovation, in addition to the necessary technical resources. Early RPM adopters found that facilitating change management was key to effective implementation. Providers may need to adapt their operating model by redefining care pathways, staff roles, and care protocols. All of this requires the development of new workforce competencies to implement the cultural, legal, financial, and technological changes required to adopt and sustain RPM at scale.

Identify key performance indicators. Because the value proposition for RPM spans virtually all patient populations and types of care, providers have a wide range of choices in piloting and scaling services. In the planning process, providers will need to identify and prioritize short-term and long-term use cases, target populations, and measurable goals. Data analysis can identify unmet needs, priority populations, untapped revenue potential, quality score improvements, and patient appetite for simple technology solutions. These data can be used to establish key performance indicators, which are then employed to measure specific results of the program. Table 1 provides examples of key performance indicators often measured by stakeholders.

For example, a safety-net provider may be motivated to increase primary care visits and reduce no-shows among patients with more than one chronic illness; a neighboring hospital may be interested in reducing avoidable ED visits and readmissions among its Medi-Cal population; and a regional health plan may want to improve HEDIS quality scores and reduce total cost of care for some or all members. This systematic approach to goal setting can lead to supportive partnerships and sustainable change. Safety-net providers may find health plans to be a natural place to start, given their accountability for outcomes.

Build a business case. It is important to determine the size of the population that will be impacted so that RPM companies can estimate the expected enrollment and continued engagement rates. The monetized value of the key performance indicators can be calculated by estimating what would be lost through inaction; for example, inaction may result in lost revenue, continued no-shows, or other such outcomes. Also estimate what would be gained through the intervention, such as patient engagement and retention. Data extraction, EHR integration, and results analysis should be taken into account.

Providers can share their business case with nearby hospitals, health systems, and health plans to justify a collaborative approach to funding and implementing RPM.

Providers can use their business case to discuss partnership opportunities with RPM companies, hospitals, health plans, and community health centers.

Test the value of RPM solutions. In fee-for-service models, providers can use at least three levers to test RPM in the absence of Medi-Cal reimbursement: (1) greater care team efficiency; (2) increase in preventive and follow-up appointments; and (3) added revenue for dually eligible patients. Achieving any of these outcomes can improve access, convenience, satisfaction, and clinical outcomes for patients, while yielding stronger relationships and deeper loyalty to the health center. Serving dually eligible patients with RPM is now encouraged by CMS with Medicare reimbursement.

Table 1. Key Performance Indicators

SAFETY-NET PROVIDERS	HOSPITALS/HEALTH SYSTEMS	PAYERS/HEALTH PLANS
▶ Primary care visits and no-show rates	▶ Avoidable ED visits	▶ HEDIS quality measures
▶ Patient satisfaction and retention	▶ Avoidable hospitalizations	▶ Star quality and service measures
▶ Provider satisfaction and retention	▶ Length of stay	▶ Member satisfaction
▶ Patient safety from exposure to viruses in clinic	▶ Readmissions	▶ Medical loss ratio
▶ Incentives for payer-established outcomes	▶ Inpatient capacity	▶ Total cost of care
▶ Clinical outcomes (e.g., blood pressure, HbA1C)	▶ Provider satisfaction and retention	

In risk-bearing models, providers have tested RPM in value-based demonstrations. For example, in New York State, the Staten Island Performing Provider System partnered with Wellth to reach out to the highest-risk Medicaid and uninsured patients with diabetes. Enrollees reduced their average HbA1c level by 1.29 percentage points, from 10.05 to 8.76. In addition, ED services decreased by 92%, and preventable short-term diabetes complications dropped by 77%.[24] Providers wishing to build a financial impact estimate with this example can estimate a yearly savings per enrolled patient of $1,056, or $88 per person per month, and multiply by the number of enrollees expected or observed to experience fewer emergencies and complications.[25]

Ensure interoperability. The transition toward a digital health system requires the support of interoperability between existing technologies, including data communication between hospitals, pharmacies, laboratories, and other health services. Because vendors may change over time, it can be useful to ensure reproducible pathways for data to be written into the EHR system. One solution is the use of SMART on FHIR, which allows interoperability of RPM vendor data from the vendors' applications directly to the EHR system.[26]

Match technologies with patients. Engagement and success require identifying patients who need and can benefit from RPM tools and matching these patients with the most appropriate technologies. For example, providers may want to start with nonconnected devices and SMS text-based solutions if broadband is limited,[27] patients are more mobile, homelessness is prevalent, or the population is especially difficult to reach and engage.

The Veterans Administration (VA) credits its patient identification algorithm for the VA's high rate of success (see sidebar). Because adherence to RPM tools varies widely among patient subgroups, there is potential benefit from first deploying tools that assess baseline health literacy and digital health literacy levels, which may affect patients' acceptance of technology use in their health care. UCSF S.O.L.V.E. Health Tech (Surmounting Obstacles for Low-Income and Vulnerable Populations Everyday Using Health Technology) published sample questions for screening patients' digital needs (PDF).[28]

The VA Systematized RPM at Scale

The VA routinized virtual care, including RPM, into standard care delivery practice for patients with chronic conditions. Virtual care has been shown to support patient self-management, shift responsibilities to nonclinical providers, and reduce hospitalizations for target populations.

The VA developed a patient classification system to help categorize patients on the basis of the complexity of their care and an algorithm to assign RPM solutions accordingly. The algorithm uses indicators related to physical and cognitive abilities, such as manual dexterity and literacy level. Patients are reassessed on a quarterly basis.

Care coordinators credit the use of the algorithm in reaching high levels of patient satisfaction and compliance with the VA's home telemonitoring care model.*

*See "Connected Care Programs," US Department of Veterans Affairs; Andrew Broderick, "The Veterans Health Administration: Taking Home Telehealth Services to Scale Nationally," *Case Studies in Telehealth Adoption*, January 2013, Commonwealth Fund; and Adam Darkins et al., "Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions," *Telemedicine Journal and E-Health* 14, no. 10 (December 2008): 1118–26; and *Home Telehealth Operations Manual*, Veterans Health Administration, Office of Connected Care, December 2017.

Promote equitable solutions. Stakeholders affirmed the importance of ensuring that vulnerable populations are not left behind. Cultural responsiveness is critical in designing solutions that reflect the linguistic, health literacy, and cultural norms of the populations they are intended to benefit. In addition, solutions should take into account physical limitations such as vision or hearing loss, tremors, and neuropathy among users. It is important to train staff to support a varied population of individuals in the use of the technology.

> ### How-Tos for Equitable Access
> A toolkit developed by UCSF's Center for Vulnerable Populations and the Commonwealth Fund offers guidance in equitably expanding digital health tools: "*Telemedicine for Health Equity Toolkit*," Center for Care Innovations, October 17, 2020.

Enable patient control. The research for this report underscored the importance of patient trust. Since they provide personal health data voluntarily, patients need to have a sense of control over the data, as well as clarity about what the health care organization will do with the data. Cautioned Dr. Ida Sim of UCSF, "Without that kind of transparency and accountability, I think that we have trouble with maintaining trust." Kyle Zebley from the American Telemedicine Association emphasized the centrality of patient trust. "It is going to be a huge leading indicator for how private insurance and state Medicaid agencies will be able to begin to empower their own patients with that kind of ownership," he said.

What Is the Outlook for RPM in the Safety Net?

The limited research that exists indicates that RPM programs can deliver strong clinical outcomes when applied to safety-net populations.

But for such solutions to reach their potential, basic barriers must be resolved to make these technologies available to more people. Broadband infrastructure needs improvement, especially in rural areas that are home to many people who are vulnerable and isolated. Health information technology grants can help. For example, the Connected Care Pilot Program will provide up to $100 million to support the provision of connected care services, including costs of broadband connectivity, network equipment, and information services necessary to provide care to the intended patient population.[29]

Another pressing need is for additional research, especially for studies with larger sample sizes, more diverse geographic and population representation, and deployment in primary care settings. Research is also needed on implementation practices and integration into new care and payment models. The Agency for Healthcare Research and Quality recommended that future research promote broader implementation and practice-based studies.

The most valuable information, experts said, would come from rigorous, large-scale evaluations of the clinical impact and cost-effectiveness of RPM programs, conducted by provider organizations with research funding. Such a fiscal impact analysis would support changes in coverage and payment that would in turn facilitate broader market adoption.

Appendix A. RPM Landscape Scan

Overview of Use Cases and Capabilities for Remote Patient Monitoring

RPM solutions have been designed for a wide range of uses, with chronic condition management (the focus of this report) being just one. Connected and nonconnected devices that convey clinical and educational information between patients and providers are also helpful for diagnostic purposes, to help patients monitor their health after a hospital stay, and to support people who are frail or elderly with living independently at home; see Table A1.

Table A1. Remote Patient Monitoring Use Cases

	DIAGNOSTIC	POST-ACUTE TRANSITIONS	CHRONIC CONDITION MANAGEMENT	ACTIVITIES OF DAILY LIVING
Patient population of focus	*Healthy individuals with potential risk:* cardiology, pregnancy, sleep	*People recovering from surgeries:* defined rehabilitation, postsurgical recovery, hospital-level care in home	*People with chronic diseases:* condition management for heart failure, diabetes, hypertension, and pulmonary disease	*People who are frail or elderly:* support for aging at home
Value of RPM	Improve patient convenience and access	Improve convenience for patients, decrease inpatient costs, and increase capacity within hospitals	Improve patient convenience, reduce costs related to readmissions and length of stay, improve population health	Improve patient convenience and ability to live at home, reduce costs related to readmissions and length of stay
Company examples	Babyscripts, iRhythm	Current Health, Reflexion Health	CareSignal, Health Recovery Solutions, Rimidi	Care Innovations, VitalTech

The design and capabilities that RPM solutions offer can be simple or very comprehensive; see Table A2.

Table A2. RPM Solutions for Chronic Care Management: Basic and Advanced Capabilities

	BASIC CAPABILITIES	ADVANCED CAPABILITIES
Provider workflow	▶ Collect clinically relevant information ▶ Leverage a variety of Food and Drug Administration–approved, patient-centered biometric devices and measurement tools ▶ Support condition- and patient-specific workflows and care pathways ▶ Deliver alerts for patients and caregivers by condition based on predetermined parameters ▶ Leverage predictive algorithms to identify potential health conditions and levels of risk ▶ Provide dashboards for providers, patients, and caregivers ▶ Support broad range of use cases	▶ Offer evidence-based guidance on care navigation ▶ Provide a dedicated implementation team for training and workflow change management ▶ Deliver clinical support through a multidisciplinary team (e.g., health coach, community health worker) ▶ Triage and treat patients (e.g., virtual or in-person visit, increased education, medication changes) ▶ Customize reporting metrics specific to care plans or conditions ▶ Document clinical and financial data and trends ▶ Integrate into workflow through EHR systems, care management, or population health platform ▶ Offer pricing flexibility and ability to support risk-based contracting ▶ Automated time tracking and billing support
Patient engagement	▶ Deliver reminders to collect and share data ▶ Acquire information from users through simple interactions with limited steps ▶ Offer culturally responsive, condition-specific education	▶ Offer users logistical, onboarding, and technology support (e.g., kit delivery, device support, training to use) ▶ Connect to patient-owned devices ▶ Built with incentives to drive adoption, usage, adherence to care plan, and goal completion (e.g., gamification) ▶ Support multimodal communication (e.g., click to call, text, chat) with artificial intelligence capabilities

RPM Solutions for Chronic Care Management: Vendor Landscape

Tables A3 and A4 provide examples of vendors that offer remote patient monitoring solutions. Table A3 highlights whether those vendors offer features that providers consider important, as noted in the research, interviews, and focus groups conducted for this report. Table A4 highlights whether those vendors offer the features considered important by patients themselves (see page 17). This is not an exhaustive list of companies.

Table A3. RPM Vendors: A Provider Perspective

COMPANY	IMPORTANT FEATURES FOR PROVIDERS				
	CLINICAL CARE MANAGEMENT SUPPORT	CLINICAL DECISION SUPPORT	CONNECTED DEVICE	NONCONNECTED DEVICE	EHR INTEGRATION
Alertive Healthcare*	✔	✔	✔		✔
Care Innovations	✔	✔	✔		✔
CareSignal		✔		✔	✔
Certintell Telehealth*	✔		✔		✔
Health Recovery Solutions		✔	✔		✔
LucidAct Health*	✔		✔		✔
m.Care		✔	✔		✔
Memora Health*		✔	✔	✔	✔
Optimize Health*			✔		✔
Pack Health*				✔	✔
Rimidi		✔	✔		✔
VitalTech	✔	✔	✔		✔
Wellth*		✔		✔	✔

*Company with founders identifying as women and/or people of color.

Note: Solution company features, functions, and other comparable characteristics were collected by AVIA in vendor interviews, written responses to questions, qualitative customer interviews, and online research performed in fall/winter 2020.

Table A4. RPM Vendors: A Patient Perspective

COMPANY	SMS TEXT	PHONE: LIVE OR INTERACTIVE VOICE RECORDING (IVR)	LANGUAGE(S)	ENROLLMENT AND TECHNICAL SUPPORT
	IMPORTANT FEATURES FOR PATIENTS			
Alertive Healthcare*	✔	✔	English and Spanish	✔
Care Innovations			English and Spanish	✔
CareSignal	✔	✔	English, Spanish	✔
Certintell Telehealth*	✔	✔	English and Spanish	✔
Health Recovery Solutions	✔	✔	English, Chinese, French, German, Hebrew, Hindi, Italian, Japanese, Korean, Polish, Portuguese, Russian, Spanish, Vietnamese	✔
LucidAct Health*	✔	✔	English, Cantonese, Korean, Mandarin, Spanish	✔
m.Care	✔		English and Spanish	✔
Memora Health*	✔	✔	English, Creole, Mandarin, Spanish, Swahili, Vietnamese	✔
Optimize Health*	✔	✔	English only	✔
Pack Health*	✔	✔	English, Spanish	✔
Rimidi	✔		English and Spanish	✔
VitalTech		✔	English only	✔
Wellth*	✔		English, Russian Spanish	✔

*Company with founders identifying as women and/or people of color.

Note: Solution company features, functions, and other comparable characteristics were collected by AVIA in vendor interviews, written responses to questions, qualitative customer interviews, and online research performed in fall/winter 2020.

Appendix B. Patient Focus Group Findings

The research for this report included five focus groups with patient advisory boards and patients in the safety net in California. Two gatherings were conducted in Spanish and three in English. They were held in Los Angeles, San Francisco, Kern, Santa Clara, and Alameda counties. Nineteen participants provided feedback on connected and non-connected RPM solutions, discussing what they liked and disliked about each solution and if they found it appealing and the information trustworthy. Participants were also asked what types of individuals would benefit most from these types of technologies and if they would be interested in using a solution like this. Answers were on a scale from 1 to 10 (1 being not interested at all and 10 being very interested).

Non-Connected Devices

Pros. Participants felt more familiar with non-connected devices and some already had glucometers and blood pressure cuffs. Overall, they felt the process of writing down their recordings and self-reporting is easy. Patients reported feeling empowered by being able to see data trends and patterns and connecting that with what is happening in their bodies. Due to TV advertising, patients in the Los Angeles County area were already aware of and interested in blood sugar testing devices that do not require a finger prick, a continuous glucose monitor (CGM) that requires subcutaneous insertion of sensor and attachment of a transmitter for sending data to an external device reader, allowing them to check their blood sugar anytime. They said testing with this device occurred more frequently, helping the person understand the relationship between how they were feeling and their blood sugar level. Such a device can keep track of glucose readings longer than the traditional meter, which was also a plus. Patients with grandchildren said they felt more at ease without the potential harm from sharps being around the house. Automation of some devices, like the inflation of the blood pressure cuff is preferred by some participants because there is less chance for user error.

Cons. Some results, especially if out of range, made participants unsure if they could trust the device. When blood pressure readings were high, for example, some said they would rest for 5 to 10 minutes and test again. Some individuals noticed differences between a glucose meter and a CGM, making them question the accuracy of the CGM.

Another concern was the need to carry an extra device, like a glucometer or a reader for a CGM, at all times. If the device were connected to a phone, they would just need to bring their phone with them, which many do anyway. Some did not want to manually enter data into the device to transmit to a clinician, preferring to record their data in a notebook and call in or bring in their results. One person said they would prefer to self-report by phone or video rather than manually enter data, concerned with their typing skills and potential to make errors.

Participants felt that individuals who would benefit the most from unconnected devices are those who are more active. Most focus group participants rated these devices as something participants would be very interested in using (mean: 9.6; range: 5 to 10).

Connected Devices

Pros. Participants felt that using a connected device enabling their clinician to see their data would lead to less frequent visits. One participant put it this way: "Don't waste my time and I won't waste your time." Some found benefit in how connected devices could store data in the cloud, making data accessible in an emergency or if a device or logbook were lost or stolen. Many thought that the automation of data communication reduced the chance of human error. Others said they would save time by not having to record and document data in logbooks.

Cons. A concern of patients about connected devices was that the care team could see the device readings anytime. The care team might notice if the patient with diabetes, for example, was "bad" and had a sweet dessert, spiking blood sugar. "The device would be

telling on me," said one participant. There were also concerns that many people do not have Wi-Fi or internet connectivity at home, and it would be costly for patients to get this service. Many commented that some patients, particularly those over 65, may not be comfortable using devices or connecting them to Wi-Fi or hotspots and that such solutions may be harder to use than those with nonconnected devices. Participants also had privacy concerns about who received the data with connected devices. Most were comfortable with the health care providers having access to the information but did not want device companies or outside groups having access. Participants wanted to be sure their personal identifying information was safe, along with sensitive information such as HIV/AIDS status.

Participants felt that those who would benefit the most from connected devices would be individuals who are unable to leave their home often. Most focus group participants rated these devices as something participants would be interested in using (mean: 8.5; range 7 to 10).

Key Takeaways

The top requirement for all types of devices was user friendliness and the availability of training from the health organization. Cost was noted as a significant barrier, and most people associated connected devices with higher cost. One participant felt that the higher cost of a connected device could be offset by feeling empowered by the knowledge of one's health status. Similarly, in reference to connected devices, some participants said that their health is "numero uno" in priority and that the cost could be offset by the benefit of not having to prick one's finger with a traditional glucometer and by having more continuous monitoring and direct communication with providers.

With either solution, participants strongly felt that trainings and hosted classes on how to use the devices would be needed. All preferred the option of having access to staff or a health coach to provide support. All agreed they would have greater confidence using a device that their clinician recommended over choosing one on their own at a retail pharmacy. Some participants reported the desire to send and/or receive data via text message regardless of whether they used a connected or nonconnected device.

Finally, participants were concerned about the lack of instructions, prompts, and support for devices in languages other than English (e.g., Spanish and Chinese).

Appendix C. Key Informant Interviews

NAME	ORGANIZATION
Veenu Aulakh, MSPH	Center for Care Innovations
Alexis Auman	American Telemedicine Association
Kirk Barnes	Rimidi
Steve Berman	AMC Health
Sebastien Blanchard	Noteworth
Anita Browning	Mid-Atlantic Telehealth Resource Center
Howard Chapman	Tri-Area Community Health
Grace Chen	LucidAct Health
Amber Christ, JD	Justice in Aging
Tearsanee Davis, DNP, FNP-BC, FAANP	University of Mississippi Medical Center
Kathy Duckett	K. Duckett Consulting
Rashann Duvall, JD	Federal Communications Commission
Pramod Gaur, PhD	Pace University Seidenberg School of CSIS
Ray Goforth	SilverCloud Health
Brian Greene	Care Innovations
Cheryl Hammil, MS, RN	Medical University of South Carolina
Steve Hendrix	m.Care
Eric Ido-Bruce	Vivify Health
Aisha Iqbal	Community Clinic Association of LA County
Brantley Jolly, MD	Department of Health and Human Services
Shadi Kanaan	California Primary Care Association
Cindy Keltner, MPA	California Primary Care Association
Elaine Khoong, MD, MS	Center for Vulnerable Populations, UCSF
Kathryn King, MD	Medical University of South Carolina
Elizabeth Kirkland, MD	Medical University of South Carolina
Joe Kvedar, MD	American Telemedicine Association
Mei Kwong	Center for Connected Health Policy
Doug Lang	Health Recovery Solutions
Trong Le	California Primary Care Association
Carlin Lee	Optimize Health
Ben Lefever	Certintell Telehealth

NAME	ORGANIZATION
Patrice Little	San Fernando Community Health Center
Robert Longyear	Avenue Healthcare
Matt Loper	Wellth
Shameet Luhar	Vheda Health
Blake Marggraff	CareSignal
India McGee, JD	Federal Communications Commission
Robert Moore, MD, MPH, MBA	Partnership HealthPlan of California
Matt Moyer, MPH	Community Clinic Association of LA County
Anitha Mullangi, MD, MHCM	St. John's Well Child & Family Center
David Ofman, MD	SF Community Clinic Consortium
Danielle Oryn, DO	Redwood Community Health Coalition
Amit Pabla	Axis Community Health
Dhiren Patel	Pack Health
Sunita Patolia, PharmD, PhD	Decimal.health
Mike Rakotz, MD, FAHA, FAAFP	American Medical Association
Karen Rheuban, MD	Mid-Atlantic Telehealth Resource Center
Beth Rittenhouse-Dhesi, MS	SF Community Clinic Consortium
Debra Rosen, RN, MPH	Northeast Valley Health Corporation (NEVHC)
Kian Saneii	Independa
Manav Sevak	Memora Health
Nirav Shah	Alertive Healthcare
Ida Sim, MD, PhD, FACMI	UCSF
Matt Stark	Current Health
Tanya Tucker	University of Mississippi Medical Center
Lori Uscher-Pines, PhD, MSc	RAND Corporation
Irene Walela	California Department of Aging, Long-Term Care and Aging Services Division
Victor Wang	care.coach
Kathy Hsu Wibberly, PhD	Mid-Atlantic Telehealth Resource Center
Greg Wozniak, PhD	American Medical Association
Charlotte Yeh, MD	AARP Services
Peter Yellowlees, MBBS, MD	UC Davis Health
Kyle Zebley	American Telemedicine Association

Endnotes

1. Paul M. Brown, Mariaelena Gonzalez, and Ritem Sandhu Dhaul, "Cost of Chronic Disease in California: Estimates at the County Level," *Journal of Public Health Management and Practice* 21, no. 1 (January/February 2015).

2. Jen Joynt, "2020 Edition — Quality of Care: Chronic Conditions," California Health Care Foundation (CHCF), July 22, 2020.

3. "Medi-Cal Monthly Eligible Fast Facts" (PDF), California Department of Health Care Services (DHCS), November 2020.

4. Mark E. Czeisler et al., "Delay or Avoidance of Medical Care Because of COVID-19–Related Concerns — United States, June 2020," Centers for Disease Control and Prevention, September 11, 2020.

5. *Meeting the Demand for Health: Final Report of the California Future Health Workforce Commission* (PDF), California Future Health Workforce Commission, February 2019.

6. Joynt, "2020 Edition — Quality of Care: Chronic Conditions."

7. Andrew Broderick and David Lindeman, "Scaling Telehealth Programs: Lessons from Early Adopters," Commonwealth Fund, January 30, 2013.

8. Broderick and Lindeman, "Scaling Telehealth Programs"; and Rashid Bashshur et al., "The Empirical Foundations of Telemedicine Interventions for Chronic Disease Management," *Telemedicine and e-Health* 20, no. 9 (September 2014): 769–800.

9. Mary-Catherine Stockman, Katherine Modzelewski, and Devin Steenkamp, "Mobile Health and Technology Usage by Patients in the Diabetes, Nutrition, and Weight Management Clinic at an Urban Academic Medical Center," *Diabetes Technology & Therapeutics* 21, no. 7 (July 2019): 400–5.

10. Alison A. Lewinski et al., "Addressing Diabetes and Poorly Controlled Hypertension: Pragmatic mHealth Self-Management Intervention," J*ournal of Medical Internet Research* 21, no. 4 (April 9, 2019): e12541.

11. Matthew Honeyman, Phoebe Dunn, and Helen McKenna, *A Digital NHS? An Introduction to the Digital Agenda and Plans for Implementation* (PDF), King's Fund, September 2016.

12. Honeyman, Dunn, and McKenna, *A Digital NHS?*.

13. Note that SMS texts are limited to 160 characters/spaces and cannot include pictures, audio, or video.

14. From an interview with Tearsanee Carlisle Davis, DNP, FNP-BC, Center for Telehealth, University of Mississippi Medical Center, Jackson, December 3, 2021.

15. Sahar Ashrafzadeh and Osama Hamdy, "Patient-Driven Diabetes Care of the Future in the Technology Era," *Cell Metabolism* 29, no. 3 (March 5, 2019): 564–75.

16. Frank J. Snoek and T. Chas Skinner, "Psychological Aspects of Diabetes Management," *Medicine*, vol. 34 issue 2 (February 1, 2006): 61–2.

17. Sherry Pagoto et al., "Evidence-Based Strategies in Weight-Loss Mobile Apps," *American Journal of Preventive Medicine* 45, no. 5 (2013): 576–82.

18. Jessica L. Watterson et al., "Improved Diabetes Care Management Through a Text-Message Intervention for Low-Income Patients: Mixed-Methods Pilot Study," *JMIR Diabetes* 3, no. 4 (October–December 2018): e15.

19. Nathaniel M. Lacktman, "Medicare Remote Patient Monitoring: CMS Finalizes New Code and General Supervision," *Health Care Law Today* (blog), Foley & Lardner LLP, November 5, 2019.

20. *State Telehealth Laws and Reimbursement Policies* (PDF), Center for Connected Health Policy, Fall 2020.

21. As of June 2020, there are 1,421,612 full-benefit dually eligible enrollees in California. California Health and Human Services (CHHS), CHHS Open Data Portal, "Month of Eligibility, Dual Status, by County, Medi-Cal Certified Eligibility" (2010 to the most recent reportable month), June 2020.

22. *State Telehealth Laws and Reimbursement Policies.*

23. "Post-COVID-19 Public Health Emergency Telehealth Policy Recommendations: Public Document" (PDF), State of California — Health and Human Services Agency, DHCS, February 2, 2021.

24. Wellth reduces HbA1c level by 1.29 percentage pointsin high-risk diabetes population. "Outcomes: The Impact of Wellth," Wellth case study, accessed May 24, 2021.

25. Christopher M. Whaley et al., "Reduced Medical Spending Associated with Increased Use of a Remote Diabetes Management Program and Lower Mean Blood Glucose Values," *Journal of Medical Economics* 22, no. 9 (May 8, 2019).

26. "A Decade of Smart," Boston Children's Hospital Computational Health Informatics Program, accessed May 24, 2021.

27. Note that open source sites like speedtest.net and Ookla.com show broadband access and usage down to the neighborhood level.

28. Sample Questions (PDF), University of California, San Francisco, Center for Vulnerable Populations, Zuckerberg San Francisco General Hospital, accessed May 23, 2021.

29. "Connected Care Pilot Program," Federal Communications Commission, accessed June 1, 2021.