EXECUTIVE SUMMARY

The following report contains a systematic literature review on telehealth and primary care by the Robert Graham Center. Although telehealth has been a subject of academic study for many years, there are relatively few studies that focus specifically on telehealth in the context of a primary care setting.

Patients accept telehealth as a mode of service provision and are satisfied when they receive services remotely via telehealth. There is some reluctance and concern among patients who have not used health care services remotely. Evidence of providers' acceptance of telehealth shows that many primary care physicians accept telehealth, although some have less confidence in their telemedicine diagnoses compared with in-person diagnoses. Administrative and technological barriers are also cited by providers as challenges to using telehealth.

The evidence for the impact of telehealth on clinical outcomes is mixed. Many studies found no difference between the telehealth intervention group and the usual care group, although a few found improvements in clinical outcomes among the telehealth intervention group. None of the studies found that providing care remotely worsens clinical outcomes.

Studies that have measured costs have used a variety of approaches, and the findings are affected by the perspective of the analysis. The literature to date does not allow us to say definitively what the impact of telehealth on health care costs. The potential benefits of telehealth clearly accrue to patients, as shown by studies that measure costs in terms of time and travel.

Barriers to telehealth adoption are not widely discussed in the peer-reviewed literature that we reviewed, but key informant interviews show that reimbursement, state licensure requirements and physician reticence are all key barriers to broad adoption of telehealth.

Overall, we found that there are few well-designed studies with adequate sample sizes of the impact of telehealth in primary care settings. To remedy this, programs in primary care settings must be established or located and then evaluated for their impact on clinical outcomes, costs to the patients, and costs to the health care system.
INTRODUCTION

The Robert Graham Center was awarded a contract by Anthem Inc. in August, 2013 to conduct a comprehensive project on telehealth in primary care. The project consists of a literature review, key informant interviews, a convening of telehealth experts and stakeholders, and a survey of family physicians who are members of the American Academy of Family Physicians.

The literature review that follows is intended to describe the landscape of telehealth in the United States as it occurs in the context of primary care. We sought to describe the types of delivery models that exist, the populations who use telehealth, the extent to which patients and providers accept telehealth services in lieu of in-person services, and the impact on cost, quality and access. An overview of current reimbursement rules under Medicare and Medicaid is also provided.

METHODS

To understand what is known about telehealth in the published literature, we conducted a systematic review. Using the PubMed search engine, we used predetermined search terms (e.g., “telehealth and access and United States”) to identify relevant articles. We then limited the articles to those that were relevant to primary care. For example, an article testing the impact of an e-ICU (remote monitoring of ICU patients) on patients' health would not be considered closely tied to primary care and would therefore not be included in the review. Knowing that direct videoconferencing between a patient at home and their provider was exceedingly rare, we sought to cast a wide enough net with our search terms so that we would understand what evidence existed that would likely be relevant to primary care without overly restricting the review. This led us to use relatively broad search terms and then to select relevant articles “by hand.”

Academic journal articles are not the best source of information about health policy, especially reimbursement policy, primarily because they are often at least a year out of date, due to the time it takes to get an article published. We therefore used Google Scholar and Google to search for sources of information about current reimbursement policy for telehealth. As such, we have relied on information from the Centers for Medicare and Medicaid Services, the Health Resource Services Administration, the American Telemedicine Association, the Center for Telehealth and e-Health Law, and the National Conference of State Legislatures. A complete list of citations is listed at the end of this review.
TELEHEALTH SERVICE DELIVERY MODELS

There are several telehealth service delivery models as defined by the American Telemedicine Association [1]; these include direct patient care with teleconsultation, store and forward- services, hospital care transitions, workplace site telehealth portal or kiosk, school site telehealth portal or kiosk and specialist/primary care provider co-management of chronic and complex diseases [1]. Most studies in this primary care-focused literature review used direct patient care, store-and-forward, telehealth portals and kiosks, and specialist/primary care provider disease co-management models.

DIRECT PATIENT CARE WITH TELECONSULTATION

Direct patient care with teleconsultation refers to video-conferencing systems that facilitate remote participation of medical personnel for consultation purposes. The most common format for video conferencing is two-way interactive, real-time video sessions with high bandwidth [1]. This literature review identified studies that used video conferencing to provide direct patient care and found that this delivery model is frequently utilized by specialists such as dermatologists and neurologists [2], [3].

Direct patient care is also used for patients in need of mental health care, particularly for populations that do not historically use available psychiatric services such as people with low-income and who live in rural areas [4], [5]. For these interventions, direct patient care has been provided via Skype video call in some instances [1].

We identified one apparently unique direct care program, Health-E-Access at the University of Rochester Children's Hospital in Rochester, New York, that provides direct services to children who become sick while they are at daycare [6]. This program connects the sick child and a telehealth assistant and the childcare center to a pediatrician at the Children's Hospital. Tools for examination such as endoscopes, stethoscopes and a camera that can display high quality still images for skin and eye problems are all available at the centers. The program is currently taking place at 3 inner-city childcare centers and has 578 participating children. Parents of children who took part in a telehealth encounter reported that the telehealth allowed them to stay at work and saved missing an estimated five hours of work (a significant amount of time to lose from work for people who work for hourly wages.

STORE AND FORWARD SERVICES

Store and forward services are delivered with telecommunications technology but patients do not need to be physically present. This type of technology includes digital cameras to capture and transmit still images and is primarily used for skin lesions, radiographic and pathologic images, and ECG strips [1]. Store and forward services are increasingly used in teledermatology; one study found that the majority of teledermatologists relied on store and forward, while only a small percentage, 6%, practiced live-interactive direct patient care [7]. Another study conducted hour-long, one-on-one interviews with ten primary care providers and found that they primarily used store and forward consultations to communicate with dermatologists [2].
WORKPLACE AND SCHOOL SITE KIOSKS

Workplace and school site kiosks both involve fully interactive video consultations. According to the ATA, workplace site kiosks are usually located in the employee health office with a nurse practitioner on-site and are supported remotely by a primary care provider [1]. A stand alone workplace kiosk without a nurse can also be used. A school site telehealth portal is similar to the workplace site kiosks and is intended to reduce doctor’s appointments during school hours.

SPECIALIST/PRIMARY CARE PROVIDER CO-MANAGEMENT OF DISEASE

Specialist/primary care provider co-management of chronic and complex diseases refers to videoconferencing systems that are used to connect live meetings between specialists and providers [1], [8]. This appears to be the most common application of telehealth: when a patient and primary care physician or nurse are in one location (often in a rural area) and are connected to specialist in another location (often an academic medical center, though not always). There are many examples of this type of model; we describe two well-known programs below.

Arkansas ANGELS program Arkansas’ Antenatal and Neonatal Guidelines, Education and Learning System (ANGELS) program was developed in 2003 to reduce infant mortality in Arkansas by connecting physicians and patients across the state with the University of Arkansas for Medical Sciences’ high-risk pregnancy services and maternal-fetal medicine specialists [9], [10]. The program consists of high risk obstetrical consultation and case management, around-the-clock consultation availability through a call center, creation of evidence-based guidelines for treating high risk pregnancies, and education and support for physicians, nurses and other providers on caring for women with high risk pregnancies.

Open Door Community Health Center The Open Door Community Health Center in Eureka, California offers many services through their telehealth clinics [11]. Prior to opening the telehealth clinic, many patients at Open Door faced financial or other barriers to receiving specialty care because they had to travel to San Francisco or Sacramento to see a specialist. As part of the Telehealth and Visiting Specialist Center, patients can now access the care they need through videoconferencing. They also use videoconferencing to connect remote patients to the specialists who are at the Eureka clinic and to provide group sessions for diabetic patients.

PATIENTS’ AND PROVIDERS’ ACCEPTANCE OF TELEHEALTH

PATIENTS’ PERSPECTIVES

There is a fairly large body of literature that tests whether telehealth is acceptable to patients. These studies find that generally, telehealth is considered to be an acceptable way to receive healthcare by people of different races and ethnicities, ages, incomes, and with different levels of severity of illness. Shea and his colleagues test this in a randomized controlled clinical trial case management services for Medicare
beneficiaries in New York City and Upstate New York with diabetes. The participants who received case management services via telemedicine found high levels of satisfaction among participants [12]. Patients rated their satisfaction with different aspects of the diabetes intervention with a level of 4 or higher out of 5 in all areas. For example, participants reported that they were more involved in their care using the telemedicine system, that the telemedicine equipment was easy to use, that it was easy to learn to use the equipment, that video visits save time and talking to a nurse during a video visit is as satisfying as talking in person [13]. This is particularly notable because 95% of the patient in New York City and 67% of the patients in Upstate New York did not know how to use a computer before the trial began.

In a study of primary care patients with depression who were recruited from five Federally Qualified Health Centers, free telepsychotherapy was offered as a way to increase access to treatment. Most patients (76%) reported finding the idea of receiving psychotherapy was acceptable. However, only 38% actually scheduled a psychotherapy session, 17% successfully completed at least one session and 8% attended at least 8 sessions [14]. The disconnect between perception of telehealth and actual use of services for this study was not attributable to barriers such as long travel, wait time, or cost but rather patient initiative to follow through with scheduled appointments. This finding highlights that patients decline to receive treatment for many reasons, and that reducing barriers to accessing care does not necessarily lead to high rates of service receipt.

A study of the Health-E-Access program in Rochester, New York (described above), found that few parents had substantial worries or concerns about a physician’s ability to examine their child or about communicating with the physician [15]. Worries that parents had about telemedicine before their child received treatment via telemedicine decreased after telemedicine exposure, and in a qualitative analysis, positive statements were far more common than negative statements about telemedicine [15].

Another study surveyed a sample of 190 urban and rural primary care patients about their attitudes towards medical and mental health care delivered through videoconferencing [16]. There were no statistically significant differences between the rural and urban groups in their concerns about telepsychiatry. More than half of the patients in each group (64.3% of rural and 67.9% of urban) expected that telepsychiatry would not be as helpful as in-person treatment, although about one-third of the respondents reported being “quite a bit” or “extremely” comfortable with the idea of using telepsychiatry from home, and almost half reported being “quite a bit” or “extremely” likely to use telepsychiatry if it would save them a 2-hour drive. This study asked patients to hypothesize about their comfort level with telehealth; it did not test attitudes among patients actually treated using telehealth technologies.
PROVIDERS’ PERSPECTIVES

Some providers are optimistic about telehealth and its potential to increase access to health care, although many have reservations. A telephone survey of the primary care providers who were part of Shea and his colleagues’ RCT (described above) providing care to Medicare beneficiaries in New York State showed high levels of satisfaction with telehealth interventions [12]. A phone survey was completed by 116 of the primary care providers with patients with diabetes who were in the telemedicine treatment arm of the study at 12 and 24 months after the providers’ first patient was entered into the study [17]. Providers reported that patient knowledge, ability to manage their diabetes, and compliance in managing their diabetes improved after the intervention. Providers also believed that patients had more control and motivation to manage their diabetes, found the additional patient data helpful, and appreciated the involvement of nurses and dieticians. Providers also stated that there was excessive paperwork and duplication that took more of their time than usual care, and that there was conflicting advice to the patient from the telemedicine team, in some cases without informing the primary care provider [17].

A study of 25 patients with diabetes in a rural community received glycemic management advice by endocrinologists through a telemedicine program found high levels of satisfaction among the patients’ primary care providers [18]. This program combined the telemedicine consultation with on-site care from a nurse trained in diabetes care. The primary care physicians, who were satisfied with the program overall, felt they were able to effectively communicate a treatment plan together with the endocrinologist, that they received timely information from the endocrinologist, would use the program again, and felt assured that they could provide continuity of care to their patients with diabetes. [18].

In interviews with 37 direct telemedicine providers, primary care providers and hospital administrators in a network of Veterans Health Administration hospitals, the providers generally agreed that telemedicine improves access to care, productivity of physicians, and the quality and coordination of care [19]. Direct telemedicine providers generally believed that telemedicine improved rapport with patients. The respondents believed that telemedicine improves the ability to better manage chronic diseases, provides an opportunity for more frequent clinician contact, facilitates quick responses to patient needs, and provide care in patient’s homes.

McConnochie and colleagues assessed perspectives among 40 providers who participated in the Health e-Access program [20]. Generally, providers reported that telemedicine visits took about the same amount of time for medical decision making as an in-person visit, and reported that it took more time overall for the telemedicine visit (this included all of the necessary paperwork and communication with other providers.
and the parents. Providers reported that they generally received sufficient information and felt comfortable collaborating with the telehealth assistants, but they did not feel as confident in the diagnoses made during a telemedicine visit compared to an in-person visit.

A qualitative study of dermatologists who use teledermatology found that they believed that it led to increased efficiency (59%), increased access (47%), increased patient satisfaction (38%), and a smaller proportion believed it led to timely and quality patient care (18%) and cost-effective care (12%) [7]. They reported a number of challenges to providing teledermatology services as well, including difficulty obtaining reimbursement (71%), technology-related issues (65%), communicating with referring providers effectively (41%), setting up the teledermatology facilities and training staff (41%) and following up with medically complex patients (12%).

**IMPACT ON CLINICAL OUTCOMES AND HEALTH CARE UTILIZATION**

Existing studies of the impact of telehealth on clinical outcomes in primary care show that telehealth does not worsen morbidity or mortality, and in some cases has been found to improve outcomes. The two studies that measured health care utilization among the intervention and control groups found no differences.

A study of home telemonitoring of 205 adults 60 years and over who were at high risk of hospitalization found that telemonitoring did not result in statistically significantly fewer hospitalizations or emergency department visits after 12 months of follow-up [21]. Secondary outcomes, including emergency department visits per person, total hospital days per person, hospitalizations per person, and the total number of hospitalizations were not found to be significantly different between the telemonitoring and usual care groups. Investigators did find that the telemonitoring group experienced greater mortality which they hypothesize was related to either unexpectedly low mortality among the usual care group or to increased access to health care (e.g., unnecessary tests) that may have resulted in the increase in mortality. Another randomized controlled trial tested supplementing nurse case management with telemonitoring among 316 elderly heart failure patients [22]. In this study, 316 Medicare Advantage members of New Jersey, New York, and Pennsylvania were randomized to either telehealth care management or usual care management. The investigators found no significant differences in hospitalization, emergency department visit, or death between the telehealth and usual care group. The groups also did not significantly differ in hospital days or cardiovascular admissions. Another study of a care coordination home telehealth program for 387 veterans diagnosed with diabetes found that those in the home telemonitoring
program were less likely to be admitted to the hospital for preventable conditions during the initial 18 month follow-up period [23]. However, the difference in hospitalization between the treatment and non-treatment group was no longer significant after 18 months.

Moreno and his colleagues designed a study to test the efficacy of providing depression treatment via Webcam to low-income Hispanic patients [4]. The study compared depression treatment provided by a psychiatrist via Webcam to treatment as usual by a primary care provider. All participants experienced an improvement in depression symptoms. Forty-one percent of the patients achieved remission (34% in the treatment as usual group and 49% in the Webcam intervention group, p<.06). The authors assert that telepsychiatry was found to be an acceptable means of treatment to patients in this diverse patient group, although they did not report the proportion of completed visits among the usual care and telehealth visits.

In Shea’s RCT of 1665 Medicare beneficiaries with diabetes (described above), treatment through a teleconsultation between a person with diabetes and an endocrinologist resulted in improved glycemic control, blood pressure levels and total and LDL cholesterol levels, compared to the usual care group, after one year of follow-up [12]. For example, mean HbA1c improved from 7.35% to 6.97% in the intervention group, which was a statistically significant improvement compared to the usual care group. A study of 25 patients with diabetes in a rural community receiving glycemic management advice from endocrinologists through a telemedicine program also found an improvement in glycemic control [18]. Given that measurements of HbA1c were available for only sixteen of the 25 participants and there was no control group for this study, these results should be interpreted cautiously.

A study of a Veterans Administration telerehabilitation program for people with low Activities of Daily Living measured the impact on healthcare costs. The program provided adaptive equipment and environmental modifications to patients, and care coordinators remotely monitored vital signs and provided education on self-management strategies. Investigators found that the intervention group increased their clinic visits, but had fewer hospitalizations and nursing home stays [24].

McConnochie and his colleagues tested whether telemedicine and in-person evaluations were comparable with respect to diagnosis and treatment outcomes for common, acute illness in children [25]. They found telemedicine diagnoses were as reproducible as in-person diagnoses overall and for prescriptions, but that telemedicine evaluation for children with upper respiratory tract-ear symptoms reproducibility varied significantly between the telemedicine and in-person evaluation.
IMPACT ON COST

Costs of technology and for connecting via the internet or videoconferencing have gone down, dramatically in some cases, making it more feasible to implement telehealth interventions [26] [27]. This should make it more likely to achieve cost savings when telehealth is implemented, but the few studies that have examined this find mixed results. Cost savings have been demonstrated in telestroke settings [28] but not in other speciality care settings [29]. In primary care settings, studies that measure cost-effectiveness or cost savings are less common.

Crow and colleagues tested the cost effectiveness of cognitive behavioral therapy (CBT) delivered via telemedicine versus face-to-face treatment for women with a DSM-IV diagnosis for bulimia [30]. A total of 128 subjects were randomized, 66 to face-to-face therapy and 62 to telemedicine therapy. The study was conducted at nine regional sites in eastern North Dakota and northwestern Minnesota. Psychologists conducted 20 sessions of treatment over a 16-week period, either face-to-face or via telemedicine. In person CBT and telemedicine CBT were found to have similar efficacy, and telemedicine CBT incurred substantially lower per person costs.

Another study compared the cost of providing in-person mental health treatment with care via videoconference [31]. The investigators enrolled 74 male veterans with PTSD and moderate to severe anger problems from three Veterans Centers in Maui and the Big Island in Hawaii. Both in-person and remote videoconferencing treatment were found to be effective at reducing anger, and the telemedicine treatment showed statistically significant reductions on two of the three anger outcomes compared to the in-person group. Average total costs for telemedicine treatment were significantly lower (by $716) than the average cost of in-person treatment.

Researchers conducted a cost analysis to test the financial impact of telemedicine ophthalmic screening in a rural health clinic in West Virginia over a seven-year period from 2003-2009 [32]. Over the seven-year period 659 patients were screened. Patients who used telemedicine rather than in-person screening saved $14,611.36 in travel costs, $13,456.00 in missed work, and $34,978.57 in billing. Over seven years, telemedicine use for ophthalmic screening saved a total of $71,189.28, with an average savings of $153.43 per patient.

TIME AND TRAVEL DISTANCES

Costs to patients and caregivers in terms of time and distance traveled to doctor’s appointments can be substantial. Accordingly, a number of studies have taken a patient-centered approach to their measures of cost. A survey of 800 parents in the Health-e-Access program (described above) of both inner-city and suburban children in elementary school or childcare found that 84.6% of parents felt positively towards their telehealth experiences in the program [15]. Saved time was the most commonly cited reason (33.6%) for parents’ positive perceptions, followed by allowing the parent to stay at work (13.5%) and delivering medication to child on site (7.1%). For their children due to perceived convenience and saved time (33.6%). Of those that worked, 68.2% were paid hourly and 34.9% stated that missed days of work due to child illness would equate to loss pay. Fifty-
six percent of the parents indicated that they had missed work in the past due to sick children and would often attempt to use antipyretics to reduce fever and allow sick children to attend school.

In a study of 149 rural patients who underwent parathyroidectomy at a clinic in Marshfield, Wisconsin, researchers measured savings to patients in terms of distance traveled, lost work time, and transportation costs of a telemedicine visit versus on-site surgeon visit. The average total travel saved was 119 miles per patient, with an average cost savings of $357.00 per patient [33].

A small randomized controlled clinical trial evaluated the effectiveness, feasibility, and economic benefits of home web-based telemonitoring for 20 patients with Parkinson's disease [3]. Twenty adults were randomly assigned to telemedicine or in-person care. Each telemedicine visit saved participants on average 100 miles of travel and 3 hours of time. The average time that a participant devoted to a single telemedicine visit was 53 minutes and the average time that a person devoted to a single in-person visit was 255 minutes. The same amount of time was spent with the physician in each group. No change in quality of life was noted between the two groups.

**BARRIERS TO TELEHEALTH ADOPTION**

There are several barriers to more widespread implementation and adoption of telehealth in the United States. Technical challenges are a barrier in some cases, in addition to the need for more education and training for patients and staff, preferences for in-person care, need for program improvement and the need for additional staff time to provide telemedicine [19]. In addition, improvement in reimbursement mechanisms, efficient technology platforms, communication with referring providers, and proper training to support sustainable practices is needed [7]. State licensure requirements also have a critical role on the ability of providers to use telehealth.

**REIMBURSEMENT POLICIES**

Medicare will pay for telehealth services for remote patient face-to-face services via live video conferencing in real time [34]. Remote face-to-face services will be reimbursed by Medicare when the service is provided to a Medicare beneficiary in an eligible facility (originating site) that is located in a rural Health Professional Shortage Area or in a county outside of a Metropolitan Statistical Area [35]. The originating site must be a providers office, hospital, rural health clinic, Federally Qualified Health Centers, Skilled Nursing Facilities and Community Mental Health Centers [34], [35]. There is no restriction on the location of the health professional delivering the service.

Services that are eligible include consultation, office visits, individual psychotherapy and pharmacologic management, screening, group visits to provide education on a variety of diseases, and ESRD services. A full list of covered services is located here: [35], [36]. Asynchronous store-and-forward technology is reimbursed only as part of telemedicine demonstration projects in Alaska and Hawaii [35]. The provider who is conducting the visit from a distance is reimbursed for the visit and the originating site is paid a facility fee.
The limitation by Medicare to reimburse for telemedicine only to patients in rural areas is considered by many to be a significant limitation to expanding telemedicine use by more providers and patients [37].

Reimbursement policies for state Medicaid programs vary considerably by state. At this time between 39 and 42 (depending on the source) states provide some type of reimbursement for telehealth services, with behavioral health being one of the most common covered services [38], [39], [40]. Most states do not have a geographic limitation to covering services (except Nevada, which has restriction similar to Medicare’s) [39] [40].

STATE LICENSURE

States have varying policies on licensing requirements for physicians who want to practice telehealth across state lines. Some have specific “telemedicine licenses,” others require a full medical license [41]. Although this is not a topic that we found in the peer-reviewed literature, it was a frequently cited barrier to telehealth by key informants.

CONCLUSION

There are few well-designed studies with adequate sample sizes of the impact of telehealth in primary care settings. This reflects the reality that telehealth in primary care has not experienced the uptake that specialty care has, so there are few examples of telehealth in primary care to study. The IDEATel and Health-e-Access studies are exceptions to this.

In addition, most of the studies in this review did not ask the question of most interest. They are instead framed to test new interventions, for example, whether telemonitoring for elderly people at high risk for hospitalization prevents hospitalization. What providers and patients want to know is whether telehealth visits in primary care can be substituted for in-person visits without any negative impact on clinical outcomes and subsequent health care utilization.

The literature also appears to have a bias towards a providers' viewpoint. Measures and outcomes that matter to consumers and patients should be included in all studies of cost. Future studies should also use more complete measures of total health care use.

To understand the impact of telehealth in primary care settings, programs in primary care settings must be established or located. Then studies designed to evaluate the impact of the intervention on clinical outcomes, costs to the health care system, and costs to the patient can be established.

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