Promising Telehealth Initiatives Highlight the Need to Close Digital Divide
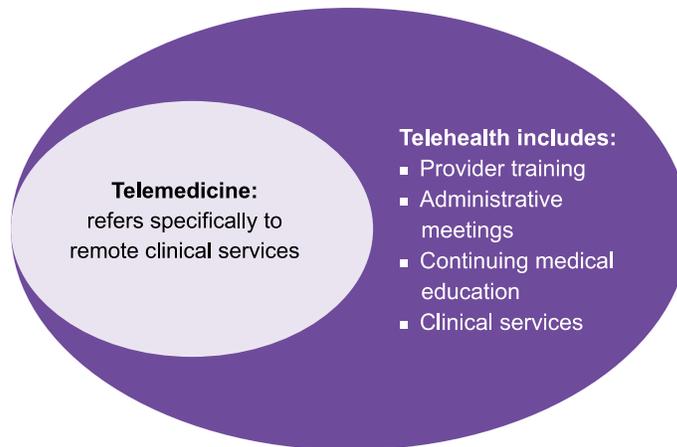December 2018

Jordana Barton

Increasingly, health care systems are pressured to deliver cost-effective quality care to more people. To meet this demand, health care systems often rely on digital health information and tools to enhance continuity of care and increase efficiency, timeliness and reach.[1] One promising tool, telehealth, is a platform that can be deployed to address access-to-care issues for both underserved urban and rural populations. However, broadband infrastructure and access gaps, particularly in low- and moderate-income (LMI) and rural communities, are barriers to unleashing telehealth's full potential. This report will highlight five case studies that demonstrate how telehealth is being used effectively and creatively to decrease costs and increase efficiencies in the delivery of health care.

The significant positive economic return on investment of telehealth for rural areas has been well documented by NTCA—the Rural Broadband Association in a 2017 report. For example, the report notes savings for patients in travel expense, lost wages, hospital cost and increased local revenue for lab work, and pharmacy revenue.[2] Additionally, the U.S. Department of Commerce reports, "Telehealth [in the U.S.] reduces hospital admissions by 25 percent and overall length of stay by 59 percent." The agency further documents that "hospitals without electronic health records will spend $371 billion more over 15 years than their counterparts."[3]

Telehealth is the use of electronic information and telecommunication technologies to support and provide long-distance clinical health care and monitoring, patient and professional health-related education, and public health and health administration. Technologies include videoconferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications.[4] Figure 1 shows the difference between the terms "telehealth" and "telemedicine." Telehealth is the broader term, and telemedicine relates specifically to the provision of remote clinical services.

Figure 1. Telehealth-Telemedicine Definition

Telemedicine: refers specifically to remote clinical services

Telehealth includes:
- Provider training
- Administrative meetings
- Continuing medical education
- Clinical services

SOURCE: Health Resources and Services Administration, courtesy of Texas Health Improvement Network.

Digital Divide Limits Use of Telehealth

Broadband, high-speed internet service that is always on and has sufficient speeds for uninterrupted transmission of data, is now a basic infrastructure essential to the well-being of all communities.[5] The Federal Communications Commission (FCC) defines broadband as a download speed of 25 Mbps (megabits per second) and 3 Mbps for uploads.[6] Today, the provision of quality health care relies on the use of digital health information and tools. Increasingly, health providers expect their patients to use digital tools and applications to ensure better health outcomes. Without broadband access, digital literacy training and technical support, LMI patients are at a disadvantage when it comes to managing their health outcomes in a digital society.

Despite advancements in fiber optics and broadband technology, these innovations are not available to all Americans. The digital divide is the gap between people who have access to broadband services and know how to use the internet and those who do not have such access or knowledge.[7] Those who find themselves on the wrong side of the digital divide—including low-income people, those with less formal education, rural populations, the elderly and minorities—suffer further economic, social and health disparities resulting from disconnection.[8] According to Camille Ryan in, "Computer and Internet Use in the United States, 2016," households making $25,000 or less have a broadband adoption rate of 58 percent, while those making more than $150,000 have an adoption rate of 96 percent. Those statistics include people who have only smart phone service. Smart phones are important; however, one of the best practices for closing the digital divide is to consider households with a broadband subscription across multiple devices (desktop or laptop *and* smartphone or tablet), since there is a limit to what a person can do with a smart phone (and data plans vary depending on what a person can afford). According to Ryan, households with subscriptions across multiple devices, with incomes above $150,000 per year, have an adoption rate of 80 percent, and households with incomes under $25,000 per year have an adoption rate of 20 percent.[9]

According to the Federal Communication Commission's (FCC) "2016 Broadband Progress Report," 34 million Americans lack access to fixed broadband at speeds of at least 25 megabits per second (Mbps) for downloads and 3 Mbps for uploads. Rural America has the least connectivity with 39 percent—23 million people—lacking sufficient access to high-speed broadband.[10] Given this gap, the use of telehealth can be stymied since broadband networks are the basic infrastructure necessary for reaching people through this tool. Thus, a sizeable portion of the U.S. population is missing out on a transformative and necessary platform for accessing health care.

According to Pete Otholt, senior IT&S manager for Methodist Healthcare Ministries of South Texas Inc. and member of the Digital Inclusion Alliance San Antonio, "While telehealth offers a proven solution to the gap in access to care, it is necessary to recognize that limited broadband infrastructure and access in underserved urban and rural areas limits the application of telehealth for regions most in need."[11] Harnessing the potential of telehealth requires communities to first determine broadband availability since sufficient and reliable broadband speeds are required to accommodate the use of secure videoconferencing and transmission of high-definition images commonly used in telehealth. It is also important for health care institutions to partner with local governments as they develop their broadband infrastructure to ensure broadband capacity and speed will support telehealth.

See Figure 2 for the state of deployment of the various technologies and the associated speeds. The speeds necessary for different types of telehealth activities will vary. 100 Mbps may suffice for a videoconference between a primary care physician or specialist and a patient; 200 Mbps may suffice for the transmission of some patient records such as CT scans or heart images; and 25 mbps may allow remote monitoring through a mobile phone for a diabetes patient. However, for medical schools and health systems to conduct advanced research, for surgeons to perform remote operations or for a specialist to remotely assist in a surgery, 1 gigabit+ speed may be required. Additionally, telehealth applications often require download and upload speeds to be equally fast (symmetrical) since two-way data sharing is common.

Figure 2. Data Speed and Capacity
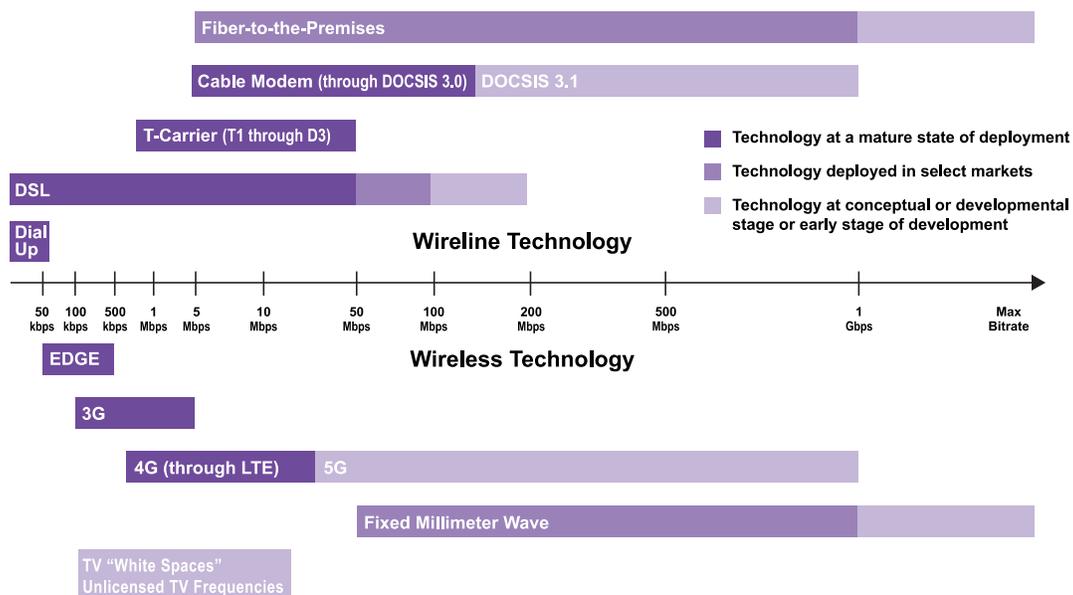
SOURCE: Columbia Technology Corp., 2017.

It is important to point out that fiber optic infrastructure is considered "future proof" because of the gigabit+ speed it can offer and the capacity to build in extra unused or "dark" fiber strands to "light" or activate as communities evolve and technological advancements in user devices allow faster speeds. Furthermore, it must be noted that wireless is not fiberless. Wireless technologies depend on proximity to fiber optic infrastructure to offer high-speed internet, including 5G wireless, which is currently under development and will potentially offer gigabit speed.

Satellite technology (not included in Figure 2) is specialized for different commercial areas, such as 1) connectivity at the earth's poles; 2) marine connectivity at sea; 3) wholesale connectivity to other satellite providers; and 4) connectivity to consumers in rural areas. Satellite technology is unique and not precisely comparable to the other technologies in Figure 2. As Gabriel Garcia, director and senior counsel for CPS Energy, noted, "Satellite connectivity is a complicated market in which speed varies based on world geography and network capacity. Within the U.S., there are several satellite providers that specialize in providing connectivity to certain business sectors, such as park rangers, long-haul truckers, drilling operators and remote regions, such as Alaska, Hawaii, the Texas–Mexico border and mountain ranges."[12]

The first three telehealth case studies described in the next section use satellite technology for internet access on mobile service vehicles because they operate in locations with limited or no broadband infrastructure. Satellite technology remains the most expensive form of broadband access and has limitations related to the speeds that are available, data caps and latency issues (i.e., delayed connections) due to the distance/time it takes data to travel to and from the outer atmosphere where satellites orbit the earth. As noted in Reviews.org, "If you've done even a casual search for satellite internet, you've probably discovered there aren't many providers out there. And if you've seen the prices and data limits that often come with satellite service, you probably also know it's not the best internet option. But if you live in a rural area, you still need internet, and a satellite provider might be your *only* option."[13] Satellite plans usually have slow "dial-up" speed (minimum) and 100 Mbps (maximum). The industry is expecting advances in satellite technology in the future by SpaceX and others; however, limited speeds, cost, data caps and latency are issues at present.

Telehealth Initiatives

Initiatives from various locations in the Eleventh Federal Reserve District, as well as recent hurricane relief efforts on the Gulf Coast and Puerto Rico, demonstrate the opportunity for telehealth to improve health care access. The initiatives described below are from both urban and rural geographies and represent efforts to use telehealth to reach the underserved. As noted in the previous section, the first three case studies are in rural or remote areas and use satellite technology. The last two are based in San Antonio and Houston respectively, urban areas where there was sufficient broadband fiber optic infrastructure to enable wireless solutions for the programs to operate. It should be noted, however, that San Antonio and Houston ranked among the "worst connected" of the 75 cities in the U.S. with 100,000+ households, each with 38.2 percent of households without fixed wireless service. If not addressed, this digital divide could limit the use of telehealth.[14]

Bringing Telehealth to the South Texas Border and the Colonias

The Texas border region is a mix of urban and rural geographies and is one of four persistent poverty areas of the country.[15] Approximately 48 percent of people on the Texas–Mexico border live at or near the poverty line. An even larger percentage of residents in the periurban and rural colonias, 62 percent, live at or near poverty.[16] The colonias have been a public health focus of government agencies, community advocates, elected officials and residents for over three decades due to the lack of basic infrastructure and substandard housing and the impact of those conditions on health outcomes. An organization serving the colonias, La Union del Pueblo Entero (LUPE), is partnering with a regional hospital system to use telehealth to improve access to care. "We are the connectors," explained Tania Chavez, systems strategist and development manager for LUPE. "We're the middlemen between the community and the health system," she said.[17]

LUPE is a community-based organization located in San Juan, Texas, in Hidalgo County. Its focus is to build stronger, healthier communities where residents use the power of civic engagement for social change. LUPE's grassroots connection with the communities it serves has helped create access to valuable programs and services that have improved the quality of life in the border region. Health on Wheels (HoW) is a telehealth program administered by LUPE in partnership with Methodist Healthcare Ministries of South Texas Inc., the Valley Baptist Legacy Foundation and Doctors Hospital at Renaissance to broaden access to health care in low-resource communities.

The HoW program offers a holistic approach to health through its outreach efforts. These include:

- Mobile health clinics
- Community health workshops focused on preventive care led by University of Texas Rio Grande Valley medical school residents and other health advocates
- Leadership training for certified *promotoras* (community health educators) through the Texas A&M Colonias Program.[18]

The mobile clinics operate out of a motor home retrofitted with high-definition videoconferencing equipment and state-of-the-art medical devices to offer general medical services, and vision and specialty care. Services include low-cost vision exams and eyeglasses, diabetes prevention and care, women's health and mental health care.

HoW Program Mobile Clinic, Hidalgo County, Texas, 2017.
SOURCE: La Union del Pueblo Entero.

Certified *promotoras* are a vital asset to the program as they successfully engage with the community to schedule appointments for the mobile unit, encourage attendance at health workshops and recruit future *promotoras*. Prior to partnering with LUPE, Doctors Hospital at Renaissance was unable to attract patients to its mobile clinic. However, once the hospital partnered with LUPE, its mobile unit became an effective way for border residents to receive health care.

The HoW program plays a critical role in the community by identifying unmet health needs and serving the uninsured. Indeed, 91 percent of patients served through the program lack any form of health insurance, and the mobile clinic is the only place that 13 percent of its patients receive medical care. The mobile clinics also serve as an important entry point into the health system—34 percent of mobile clinic patients have been referred to other community clinics for follow-up care.[19]

The HoW program illustrates an important lesson: Technological innovations can be coupled with innovative community development approaches to reach LMI populations. Telehealth is the tool, and the *promotoras* have gained the trust of the population.

Improving Health Care Access for Rural Veterans–Northern Louisiana

The Rural Veterans Coordination Pilot Program (RVCP), operated by Volunteers of America North Louisiana in partnership with the Overton Brooks VA Medical Center in Shreveport, Louisiana, was originally a two-year program extended to three years; the program provided psychiatric services to veterans in underserved areas by using telemedicine to complement services offered at the VA medical center. The $2 million project, sponsored by the Department of Veterans Affairs (VA), outfitted a cargo van that served as a state-of-the-art mobile clinic using satellite technology. At the mobile clinic, telemedicine appointments were facilitated by an on-site nurse or social worker and were videoconferenced from Overton Brooks VA Medical Center.

"The program improved the quality of life for veterans and their families," said Bryan Byrd, executive vice president of innovation and new business development for Volunteers of America North Louisiana. "The RVCP has demonstrated savings of thousands of miles not traveled. The average mileage traveled by rural veterans to the Overton Brooks VA Medical Center is 145 miles per visit, with the program's average annual travel savings exceeding $1,800 per veteran," he said.[20] While the individual cost savings to veterans is significant, the program also improved outcomes for the VA medical center with a 59 percent reduction in in-bed days of care and a 35 percent reduction in hospital readmissions. Furthermore, the program reduced the number of missed appointments, improved veteran access to preventive care and reduced higher-cost emergency room use. The nonprofit applied for continued support from the VA, and it is looking to diversify funding by applying for grants from other sources. This will enable the organization to expand telemedicine services from a focus on psychiatry to include additional services such as dermatology, diabetes management, long-term care and post-acute care.[21]

In an article detailing the work of the RVCP, Jen Fifield of the Pew Charitable Trusts notes, "While long drives and limited access to health care are familiar burdens for many rural residents, the problem is particularly acute for veterans in those areas. They are far older than other rural residents and far more likely to be disabled, meaning more of them are in need of medical care. And, there are a lot of them— one in four veterans lives in rural areas, as compared to one in five adults in the general population, according to 2015 census data."[22]

Telehealth for Emergency Response in the Gulf Coast and Puerto Rico

During natural disasters and other emergency events, telehealth can make a big difference to both those in need of medical care and those providing the services. In these extreme situations where health facilities are destroyed or conditions restrict mobility, telehealth is a vital tool. Hurricane response activities in 2017 incorporated telemedicine, to some degree, and highlighted the need to integrate telemedicine into emergency response and disaster recovery plans across the country. Two examples follow.

In August 2017, Hurricane Harvey hit the Texas Gulf Coast, from Corpus Christi to Houston, causing widespread damage and flooding across the region. As part of the emergency response, Children's Health in Dallas set up a telemedicine station at a major evacuee site in Houston. Children at the shelter were seen by emergency room physicians through a computer monitor, and doctors used specially designed equipment on site for measuring vital signs.

The telemedicine station was prepared to treat skin rashes and infections, asthma (exacerbated by mold in flooded homes), viruses and bacterial infections carried by floodwater, and behavioral health issues resulting from anxiety and depression caused by the traumatic event.[23]

In the months following Hurricane Maria in Puerto Rico, telemedicine tools were used to help meet the huge demand for medical services. NewYork–Presbyterian Weill Cornell Medical Center set up telemedicine equipment and dispatched emergency personnel to assist patients on the ground in Puerto Rico. This enabled consultations with specialists in New York to occur.

SOURCE: Children's Health System of Texas, August 2017.

Although the ability to use telehealth was limited in Puerto Rico due to limited cell phone, internet and electricity services after the storm, as Bill Siwicki of *Healthcare IT News* notes, "...the use of telemedicine in Puerto Rico is in essence a proof of concept that digital health services can be of tremendous value in an emergency and disaster response situations."[24]

Transforming Diabetes Care in San Antonio

Methodist Healthcare Ministries of South Texas Inc. serves low-income patients who typically do not have health insurance, often struggle to find reliable transportation and sometimes live in rural areas with limited access to basic health care and specialists. Pete Otholt, with Methodist Healthcare Ministries of South Texas Inc., emphasizes "the importance of telemedicine as a means of providing integrated, responsive and cost-effective health care services to underserved populations. For diabetes patients, real-time support is especially important as many factors contribute to managing the disease."[25]

As part of an initiative to provide integrated health care in real time, Methodist Healthcare Ministries of South Texas Inc. and Medtronic developed the Turning Point pilot program for diabetic patients with uncontrolled HbA1c (A1C) levels—a measure of a person's average level of blood glucose, or blood sugar, over three months. The six-month pilot program used a smartphone digital app to monitor diabetes progress and offer real-time support, without which many patients fail to manage the disease effectively. For example, Philip Fisher, a San Antonio chef who plans and prepares meals for Outcry in the Barrio Ministry, was diagnosed with diabetes in 2014. Like many diabetes patients, Fisher was overwhelmed with managing the disease on his own, so he ignored it. When his doctor suggested he participate in the Turning Point program, Fisher had an A1C level of 10.9 percent. His A1C level was well above the 7 percent target A1C for people with diabetes set by the American Diabetes Association.[26]

The Medtronic app helped Fisher keep track of his blood glucose levels, blood pressure, sleep patterns and weight. As with each patient in the program, he was assigned to a Medtronic care coordinator who: 1) completed his enrollment; 2) helped with equipment troubleshooting; 3) maintained open communication through in-person or phone check-ins; 4) tracked Fisher's progress through the app; 5) communicated health information to his physician in a timely manner to avoid further health complications; and 6) offered diet counseling. Fisher experienced significant improvement. He brought his A1C level down 5 points to 5.9 percent, which is below the diabetic range. These results inspired Fisher to begin preparing healthier meals for the men he serves in his ministry.[27]

Overall, the program was successful at improving patients' A1C numbers by an average of 2.0 points. Fisher and other patients lost weight, benefited from increased energy and became role models for others in their families and community. Positive health outcomes and patient satisfaction led to continuation of the program.[28]

Diverting Unnecessary High-Cost Emergency Room Visits in Houston

In 2014, the Houston Fire Department began a partnership with the Houston Department of Health and Human Services along with 13 other community organizations to introduce the Emergency Telehealth and Navigation Project (ETHAN) to ease emergency department overcrowding and overuse. The goal of ETHAN is to reduce the stress on emergency response resources by diverting nonemergency patients to other less cost-intensive resources.[29]

Paramedics connect patients with minor injuries or illnesses by video to an emergency physician using a tablet device powered by wireless technology. The physician determines whether the patient needs to go to the emergency room, what mode of transportation is best suited to the patient's level of acuity or whether the patient should see a primary care doctor instead. In cases where an emergency room visit is not necessary, appointment arrangements and transportation are coordinated for the patient. In cases where ETHAN was used, 80 percent of unnecessary ambulance and emergency room visits were averted.[30]

Conclusion

An important step to unleash the potential of telehealth will be for rural and underserved communities to close the digital divide. Hospital systems can partner with local governments, nonprofits, financial institutions, broadband providers and others to achieve this goal. The significant role of broadband access in the provision of health services has led Mignon Clyburn, a former commissioner of the Federal Communications Commission, to call broadband access one of the social determinants of health. Clyburn recognizes that broadband is critically important to health outcomes and must be addressed along with the other social determinants of health: physical environment, socioeconomic factors, health care access and health behaviors.[31]

The telehealth initiatives described in this publication are promising examples of how health care systems can use technology to create more efficient and effective ways to meet the needs of rural and underserved communities.

Notes

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Author

- **Jordana Barton**
  Senior Advisor, Community Development, Federal Reserve Bank of Dallas

Editor

- **Dianne Tunnell**
  Editor, Federal Reserve Bank of Dallas