Telehealth Promises to Transform U.S. Health Care

Abundant, inexpensive bandwidth could boost health care efficiency, efficacy and capacity – but only if a number of barriers are overcome.

By Dr. Robert Wack / *Frederick Memorial Hospital*

As is true for other other important public works projects, the significant investment a municipal fiber network requires involves difficult political and economic decisions. The challenge with fiber is that those decisions often are based on somewhat speculative assumptions using data that's relatively sparse – especially compared with projects such as roads or water treatment. Though there are ample examples of success, enough public fiber failures litter the landscape that some skepticism may be warranted.

Economic benefit arguments for municipal fiber often include the salutary effect they could have on developing and delivering better health care services. Some early results from pilot projects indicate that optimism is justified. The potential of telehealth remains to be fully realized, however, because of complex interactions among bandwidth scarcity, market forces, regulatory barriers and institutional inertia. Today, it's apparent that abundant, inexpensive bandwidth is a prerequisite for widespread adoption of transformational telehealth technology.

THE FUTURE OF HEALTH CARE

Why is telehealth important for the future of health care? At present, the health care system in the United States struggles with excessive costs, relatively poor outcomes for what people spend, and significant disparities in quality and access to care depending on geography, socioeconomics and ethnicity. In addition, a demographic crisis looms as the elderly population surges and the number of young people entering the workforce declines. According to U.S. Census projections, by 2030 there will be more Americans older than 65 than younger than 18, an unprecedented demographic inversion seen around the world.

Just when the health system will need extra capacity, both cost and labor constraints will hinder further growth in the current system. Telehealth promises to, and must, deliver increased efficiency and effectiveness to health care services, eventually adding needed capacity to the system.

A HISTORY OF SUCCESS

The first uses of telehealth connected rural clinics with hospitals using basic video to allow for communication and remote evaluation of patients who might not be able to make a long trip to a specialist. Saving someone an unnecessary trip or expediting a trip that is a high priority clearly creates value. But in reality, that type of service is mostly a triage exercise, figuring out which patients really needed to see the specialist at the hospital. The actual treatment still occurs at the referral hospital.

Teleradiology is the next step on the telehealth continuum. Imaging hardware (X-ray, CT, MRI, or ultrasound) is deployed

in the remote location, a patient has a study done, and the data is transmitted somewhere else to be interpreted by a radiologist. If the study is normal, that may end the process, with a happy patient who doesn't have to leave the community. If further evaluation or treatment is needed, the patient still needs to see the relevant specialist in person. (Read more about teleradiology in the sidebar on p. 102.)

A successful example of telehealth eliminating geographic barriers is the Teton Valley Health System, based in Driggs, Idaho, west of Grand Teton National Park in a very rural area of eastern Idaho. Thanks to an array of telehealth services, local residents have access to specialists from three different health systems in two states. They offer consultation services for oncology, infectious disease, stroke, burns, mental health and respiratory diseases. In some cases, specialists will travel to Driggs; in others, the patients travel to the specialist. Either way, a large amount of initial evaluation and follow-up is handled remotely using telehealth technology.

I have personally used teleradiology services with considerable positive effect. At Frederick Memorial Hospital (FMH) in Maryland, pediatric echocardiography services are provided remotely by Children's National Medical Center in Washington, D.C., 50 miles away. One weekend, an infant presented with a significant cardiac issue. After consulting a pediatric cardiologist, a local ultrasound technician performed an examination in real time while the parents and I watched with the cardiologist, who was in Washington, D.C. When the examination was complete, it was clear the infant needed to be transferred expeditiously. On another occasion, the same process revealed a problem that could be treated locally, avoiding an unnecessary transfer as well as providing considerable relief to the parents.

THE VHA SETS THE BAR

The Veterans Health Administration (VHA) was an early adopter of telehealth technology, demonstrating remarkable success providing advanced

Fiber networks enable telemedicine, which helps improve the health care available in smaller communities.

services to veterans in various settings. The VHA divides telehealth into synchronous and asynchronous services. A synchronous service happens in real time, connecting a patient to a provider to eliminate a geographic barrier. Asynchronous technologies gather data, store it, then forward it for analysis and response at a different location and time.

The VHA started with synchronous services aimed at connecting remote clinics to major VHA treatment facilities as a way of offering veterans in rural areas access to specialty care. This program is clinic-based and covers an extensive list of specialty services. More than 700 remote clinics are now connected to VHA hospitals using clinical video telehealth to diagnose, treat, follow up and manage services ranging from cardiology to genomics, nutrition to physical therapy.

The next group of services are asynchronous, focused on collecting, storing and forwarding imaging information. Two examples are the teledermatology and teleretinal imaging programs. Veterans visit a clinic where images are obtained using local technology, then forwarded to specialists in other locations for interpretation and recommendations for further treatment if needed.

The third group of VHA services is called home telehealth, which uses a combination of synchronous and asynchronous technology to achieve significant gains in patient care, all provided in the home. Vital signs data are collected by internet-enabled devices in the home, then transmitted and stored. Care managers monitor the data and interact with patients, either to reinforce healthful behaviors or to proactively address problems indicated by changes in vital signs. The care managers communicate with patients by text, email, voice or video communications.

Another example of a successful remote patient monitoring (RPM) program is the Chronic Care Management Program at FMH in Maryland. A recently concluded pilot project serving 138 patients showed significant cost savings from decreased 30-day readmissions (-84 percent) and decreased Emergency Department utilization (-52 percent) resulting in $2.7 million dollars in cost avoidance over a six-month period. The patients enrolled had one of several chronic conditions, such as congestive heart failure, chronic obstructive pulmonary disease, diabetes or hypertension. These diseases account for a major portion of hospital admissions and Emergency Department visits.

The FMH technology is similar to that of the VA programs: Bluetooth-

enabled scales, blood pressure cuffs and pulse oxymeters linked to tablets, which transmit data to nurses who keep in close touch with the enrolled patients.

In these programs, the technology deployed is relatively simple and the bandwidth utilized minimal. The positive impact comes from the technology that, given reliable data and a variety of ways to communicate, enables very close relationships between care managers and patients. It is still labor-intensive, but the efficiency and effectiveness of the care managers increases significantly, with tangible improvements in outcomes.

The technologies that move beyond these toward telepresence are still developing. (Read more about telepresence in the sidebar below.) With the ultra-high resolution of a 4K low-latency video stream, providers can see subtle changes in facial expression, posture and movements. With magnification, they can see subtle variations in skin texture and coloration, important for diagnosing numerous conditions. Add high-quality audio and the additional data from vital signs and other imaging data, and the encounter is very close to an in-person visit.

Continuous data collection in the home can become the basis for technologies that monitor health in the background, just as a thermostat monitors the environment and manages the furnace and air conditioner.

BARRIERS TO ADOPTION

Why haven't these technologies become more widespread, given their demonstrated utility in the aforementioned programs?

The first barrier to adoption, which until recently was dominant, is technical. Cumbersome user interfaces, unreliable network connections, bulky expensive hardware, and uncertain utility constrained deployment in the past. This barrier is eroding rapidly in the face of continuous improvement of hardware and software, through endless iterations of redesign, feedback and further optimization.

A more widespread barrier is bandwidth scarcity. Like the chicken and egg quandary, bandwidth scarcity constrains innovation of telehealth technology, but the dearth of compelling bandwidth-intensive telehealth applications undermines the demand for better bandwidth.

An example of that constraint is the experience of Docity, a telehealth services company in the Southeast. Initially, Docity configured its service to stream voice and video simultaneously, taking advantage of the abundant bandwith of its initial customers on the EPB gigabit network in Chattanooga, Tennessee. The company found, however, that in markets without gigabit services, customers had problems with a more robust offering, which was then scaled back.

Another impediment to wider adoption of telehealth is the health care industry itself. Physician practices, clinics and hospitals already are subject to intense financial and operational pressure from regulations, competition and changes in health care financing. The addition of fears about litigation

WHAT IS TELEHEALTH?

Telehealth is a complex field, so it's useful to review some terms.

Telehealth and ***telemedicine*** are broad terms encompassing a wide array of technologies and practices. Typically, they refer to any technology or process that mitigates or erases geographic or temporal barriers to health care. In other words, they allow health care services to project across both time and space in ways that are otherwise impossible without the technology.

Teleradiology is one field of telemedicine. In teleradiology, diagnostic imaging is gathered in one location, and the image data is transmitted to another location where it is viewed and interpreted by a radiologist, sometimes on the other side of the planet. It is important to note, though, that this does not create extra capacity in the health system – rather, it more efficiently utilizes existing capacity. However, communities benefit by eliminating the barriers to accessing health services that distance and lack of transportation often present.

Remote patient monitoring (RPM), or ***telemonitoring***, refers to specific technologies that gather, store, transmit and display patient data, usually vital signs, to allow more detailed and continuous care management. RPM technologies have proven to be highly effective but are labor intensive, and do not require particularly sophisticated technical solutions by modern standards. To date, however, the most successful demonstrations of telehealth technology involve RPM. The Veterans Health Administration (VHA) health system has used RPM technologies for many years, with a solid track record of success.

Telepresence refers to multimodal communications with very high resolution that create a high-fidelity, almost immersive experience of feeling together in a space, across any distance. This can include 4K video, high-quality audio, magnification capability, robotics and equipment for examining patients using ultrasound or semi-invasive equipment. Almost every sense used in an exam can be accurately replicated and transmitted in real time. These technologies are complicated and expensive and require dedicated high-capacity bandwidth to function effectively but come the closest to completely replicating an in-person visit. These technologies also can incorporate augmented reality (AR) and virtual reality (VR).

makes for generally risk-averse, cautious organizations that are slow to change and leery of untested innovations, regardless of how promising.

In addition, health care workflows are already very complex, so any new process or equipment that does anything to add to that complexity usually is met with skepticism and often outright resistance. The juice must be worth the squeeze if providers are going to embrace transformational technology.

Finally, reimbursement practices of private insurers and the federal government through Medicare and Medicaid significantly constrain the deployment of transformational telehealth technology. If providers can't obtain payment for delivering services via telehealth or if payments are not comparable to those for existing care delivery processes, providers will be more reluctant to deploy those technologies based only on cost avoidance – no matter how real and significant those savings might be.

INNOVATION WILL PREVAIL

In summary, telehealth is hard. Although technology solutions are continually improving, they can be overly complex, difficult to learn and use, and too expensive for widespread application. Broadband scarcity is a major impediment to the rapid development and deployment of advanced telehealth technology, which in turn slows down the acquisition of ROI data to drive investment decisions. Inertia and timidity in the health care industry also slow down adoption of new technology. Last, reimbursement challenges make the cost-effective utilization of telehealth much more difficult.

Even with all these challenges, innovation must continue, driven by the imperatives of an aging population and the dire need for additional capacity in the U.S. health care system, squeezed by increased demand and emerging labor shortages. One way or another, transformational telehealth will move forward. The communities that are ready with the necessary broadband infrastructure to provide abundant bandwidth will benefit first. ❖

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