How Telehealth Is Transforming Healthcare

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Telehealth—the use of communications technologies to provide healthcare services and access to medical information—is having a dramatic and positive effect on the practice of medicine in the United States. Summarizing the opportunity, a 2015 policy statement by the American Academy of Pediatrics explained that telehealth solutions “have the potential to improve current models of care by increasing communication among clinicians, resulting in more efficient, higher quality, and less expensive care.”¹ In a 2015 industry analysis, Goldman Sachs projected that the widespread use of telehealth and digital therapies may deliver more than $300 billion in U.S. healthcare system savings.²

For healthcare providers, the instant availability of digital patient records can reduce diagnostic errors, speed the processing of insurance claims and promote collaboration between remote practitioners within rapidly consolidating healthcare practices. For patients, the secure and accurate transmission of electronic records helps streamline care among different medical providers. It also expands treatment options to include “virtual” doctor visits at home and remote in-home health monitoring.³

TELEHEALTH MODALITIES

Telehealth encompasses telemedicine (remote clinical services) plus a broader range of remote healthcare applications, including training, education, administration and collaboration. A 2015 analysis by the American Hospital Association highlighted three modalities for telehealth delivery: real-time, store and forward, and remote monitoring.³

Real-time telehealth modalities enable provider and patient communication via live video, voice and data conferencing. The modality is used for remote consults with specialists and primary care providers, as well as telepsychiatry, telecardiology, telestroke and telesurgery applications.

Store and forward modalities involve capturing data in digital files, storing them on a computer or mobile device and then securely transmitting the files for later study or analysis. These files include medical imaging as well as the recording of digital photos, video, audio or text by clinicians for applications such as teleradiology, telepathology and teledermatology.

Remote monitoring modalities collect patient data from wearable sensors and other devices. The data is transmitted to monitoring systems and made available to health care professionals to track patient wellness. This modality is used to manage chronic conditions such as heart disease, diabetes and asthma, as well as for tele-ICU (intensive care unit monitoring) applications.

OhioHealth, a nationally recognized, not-for-profit healthcare system with 11 hospitals and more than 50 other clinical locations across central Ohio, is utilizing all three telehealth modalities to enhance care delivery. With OhioHealth’s eICU solution, highly skilled intensive care unit professionals remotely monitor critical patients in its smaller hospitals that lack 24-hour access to on-site specialists. OhioHealth’s Stroke Network connects stroke victims at local clinics with neurologists at larger hospitals within the critical first hour of care. With real-time video and voice connectivity as well as access to digital imaging files, the OhioHealth Stroke Network accelerates treatment and intervention.
IMPROVING CHRONIC CARE

Research finds that only 5 percent of the U.S. population accounts for a staggering 50 percent of healthcare costs. Telehealth is proving to be a particularly powerful approach to tackling spiraling costs and improving outcomes for the treatment of chronic conditions such as diabetes, asthma and heart disease.

Consider these innovative solutions. A mobile electrocardiogram (ECG) device seamlessly connects with smartphones and tablets, enabling high-risk patients to check their heart function. Through the mobile ECG application, patients can immediately review results while data is transmitted through the cloud to their cardiologist. Similarly, a smartphone-connected blood glucose monitor automatically tracks and organizes diabetes-patient data.

One of the largest U.S. nonprofit healthcare systems completed a telehealth trial in 2015 focused on its most complex and costly patients. The remote monitoring and consulting solution reduced total costs of care by 27 percent, primarily due to a 45 percent reduction in hospitalization rates.

VIRTUAL OFFICE VISITS

By combining the power of high-speed Internet connectivity, mobile devices and applications, consumer telehealth solutions are enabling anytime, anywhere office visits with primary care physicians for everyday health issues.

Employers are increasingly eyeing virtual doctor visits as a way to manage healthcare costs. One employer survey found that virtual office visits increased by 35 percent in 2015. The trend is expected to continue, with more than 80 percent of employers reporting they could be offering such services as part of their healthcare plans within three years. The numbers explain why: a recent actuarial study found that telehealth solutions can save more than $100 per office visit.

CONNECTING WITH VIDEO

Besides cost savings, patients appreciate the convenience and effectiveness of telehealth consultations. A 2015 study found the average in-person medical visit takes 2 hours. This includes 37 minutes for travel time, 64 minutes for office paperwork and waiting time, and only 20 minutes of one-on-one time with a doctor.

Rather than spending time driving to a doctor’s office, emergency room (ER) or urgent care center and hunkering down in a waiting room, many consumers would rather connect with care through their computer or mobile device—particularly if the consult is conducted via online video. A 2015 survey of U.S. consumers found that 64 percent are willing to utilize virtual doctor visits. They see video as the preferred form of telehealth, with more than six in ten consumers saying they believe it is more likely to yield an accurate diagnosis than phone or email alone.

It is not surprising consumers are opting for telehealth. Research finds that 83 percent of conditions are resolved by a virtual physician visit. The most common diagnoses made during a telehealth session are cold and flu-related symptoms. Only 17 percent of telehealth patients needed an office visit for further consultation, while 10 percent required an ER referral. As more consumers and providers move to capitalize on the benefits, telehealth video consultations are forecast to grow by 700 percent over the next five years.
Telehealth can save nursing homes $151,000 per year in hospitalization

Highlighting the trend, the largest U.S. drugstore chain recently partnered with a telehealth service provider to support video consultations with a physician through its mobile app. With a click, customers can connect 24/7 with a doctor to treat common illnesses like sinus and ear infections, sore throats, and skin problems. At the start of 2016 the service was available in half of U.S. institutions are also leveraging remote video consultations. In a telehealth trial that enabled nursing home residents to consult with physicians via videoconferencing, hospitalization rates declined by almost 10 percent. Researchers concluded that telehealth could save $151,000 in hospitalization costs per nursing home per year.12

TELESURGERY OPERATIONS

Robotic surgical systems have been approved for use in the U.S. for more than 15 years, and it is estimated that more than 600,000 procedures are performed robotically each year.13 Telesurgery goes a step further by enabling a doctor to remotely perform robotic surgery. Innovators in the field believe telesurgery can eliminate the barriers of distance in the delivery of high-quality surgical care.

In 2015 researchers at the Florida Hospital Nicholson Center completed telesurgery tests that compared remote robotic-procedure performance using network connections within the Orlando metropolitan area. Expanding upon the positive local results, the tests were extended 65 miles to neighboring Tampa, and then 1,200 miles to Fort Worth, Texas. “Based on these tests, we have determined that telesurgery is possible and generally safe for large areas within the United States,” noted Dr. Roger Smith, the center’s chief technology officer.14

TELEHEALTH NETWORK PERFORMANCE

Network performance is central to any successful telehealth initiative, especially those utilizing real-time video and voice. Internet and wide area network (WAN) connections that offer high bandwidth and availability, as well as minimal latency, are critical. (See Table 1: “Telehealth Modality Network Performance Requirements.”)

Bandwidth is a measure of both the capacity of a data connection and the amount of data delivered through it, expressed as Mbps or Gbps.* Latency is a measure of the lag time required for a data packet to travel to a destination, either one way or round trip, measured in milliseconds. (Excessive latency contributes to packet loss and jitter that can degrade real-time application performance.) Availability is a measure of reliability, typically reported as a percentage describing network uptime.

| TELEHEALTH MODALITY NETWORK PERFORMANCE REQUIREMENTS |
|---------------------------------|------------------|--------|--------|
| **Modality** | **Application Examples** | **Bandwidth** | **Latency** | **Availability** |
| Real-Time | Remote consults, telestroke, telesurgery | High | Low | High |
| Store and Forward | Teleradiology, telepathology, teledermatology | High | Moderate | High |
| Remote Monitoring | Management of chronic conditions, tele-ICU | Moderate | Low | High |

Source: American Hospital Association and Kinetic Strategies
A report by the U.S. Federal Communications Commission advises small physician-practice offices to deploy broadband connections of at least 10 Mbps, with larger medical practices requiring 25 Mbps or more. Bigger medical facilities need even more bandwidth, from 100 Mbps to 1 Gbps per location.\textsuperscript{15} It is easy to understand why. A single standard-definition videoconferencing and collaboration application may require 1.5 Mbps per user, while high-definition video requires up to 6 Mbps.

Latency matters too. For high-quality videoconferencing, technology solution providers such as Cisco Systems and Microsoft recommend round-trip network latency of 150 milliseconds or less. When it comes to telesurgery, latency is critical because delays in video and control signals impact how safely a surgeon can operate remotely. In addition to high bandwidth, latency of 150 milliseconds or less is required for telesurgery.\textsuperscript{16}

“Having a high-speed, high-performance, highly reliable, low-latency network is absolutely critical to our operations,” said Jim Lowder, System Vice President, Technology at OhioHealth. OhioHealth tapped Spectrum Enterprise to create a high-performance network to support its innovative telehealth applications, including 100-Mbps Ethernet Private Line (EPL) circuits to its care sites, plus a 300-Mbps Fiber Internet Access (FIA) connection.

**SELECTING A NETWORK PROVIDER**

Because Internet and WAN performance offer an essential foundation for telehealth success, selecting the right network service provider is essential. Network reliability, resiliency and diversity are especially important for healthcare providers to ensure the delivery of quality care in an increasingly connected clinical environment. Additionally, high availability and robust security are critical for telehealth applications to support compliance with HIPAA and HITECH regulations.

According to HIPAA security rules, healthcare organizations must “ensure the confidentiality, integrity, and availability of all electronic protected health information the covered entity creates, receives, maintains, or transmits.”

By HIPAA’s definition, availability means that “data or information is accessible and useable upon demand by an authorized person.”\textsuperscript{17} Under HIPAA and HITECH, willful neglect of security and privacy rules can result in fines of up to $50,000 per incident and $1.5 million per year for repeat violations.\textsuperscript{18} Because of the unique requirements of telehealth applications, consider the following four factors when evaluating communications and network service providers.

1. **Facilities-Based Foundation:** Select a provider that owns its last-mile network and can offer scalable, future-proof fiber and Ethernet solutions. Facilities-based providers with broad network reach are better able to guarantee service quality. Using a variety of access technologies, they may also be able to serve a wide range of business locations, from large medical centers and office parks to small office, branch office and retail locations.
2. **Service Level Agreements**: Because network availability is so important for telehealth applications and regulatory compliance, select a provider that offers service level agreements (SLAs). Such agreements set performance benchmarks for service reliability and, should an unplanned outage occur, responsiveness for repair and restoration.

3. **Managed Security and Routing**: Healthcare providers can benefit from managed IT service solutions that offload network support requirements from internal staff and gain best-in-class expertise. Unified Threat Management (UTM) integrates a range of security capabilities, including an advanced firewall, antivirus/antispam tools, intrusion detection and prevention, virtual private networking (VPN), vulnerability management and advanced security reporting capabilities. Likewise, managed router services include turnkey provisioning, configuration, change management, monitoring and security support for key network infrastructure elements.

4. **SIP Trunking Support**: Telehealth applications that integrate voice, video and text messaging may rely on Session Initiation Protocol (SIP), a signaling communications protocol for IP networks. Not surprisingly, organizations are increasingly choosing SIP Trunking to connect to carrier networks. In addition to delivering cost savings over legacy telecom alternatives, SIP Trunking offers advantages for scalability, converged IP networking, business continuity and disaster recovery.

**THE TELEHEALTH OPPORTUNITY**

Telehealth is transforming healthcare delivery by enabling models that offer more efficient, higher quality and less expensive care. Partnering with a network provider that can deliver solutions with sufficient bandwidth, latency performance, security and availability is essential for telehealth success.
ABOUT THE AUTHOR

Michael Harris is principal consultant at Kinetic Strategies. Applying more than 15 years of experience as a strategist, research analyst and journalist, Michael consults with select clients in the networking, Internet and telecommunications industries.

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