For more than 40 years, the healthcare, medical device, and telecommunications industries have been pushing the boundaries on telemedicine—the remote transmission of clinical data—to support patient care. Over that time, telemedicine has reached people in exotic and harsh environments, from the summit of Mt. Everest to Antarctica; in isolated, rural regions or disaster areas with limited access to clinical specialists; and in “concierge” services for the super-rich around the globe.

Only now, however, is telemedicine really taking off across the healthcare enterprise:
- Over the past decade or so, healthcare systems, hospitals, physician practices, and long-term care facilities have expanded telemedicine services within their organizations.
- Over the past two years, the telemedicine frontier has shifted beyond institutional walls to communities, homes, and individuals.
- Over the next decade, experts expect a flurry of experimentation to develop new, systemic delivery models for telemedicine—everywhere and for everyone, not just in remote locations or for select patient populations.

Moreover, the scope of telemedicine is expanding from patient care to wellness care, with a focus on keeping people healthy—or what some now term telehealth.

“I see tremendous growth in the use of technological means to provide healthcare and wellness and behavior modification,” says Yadin David, principal with Biomedical Engineering Consultants in Houston. “That was not there just a couple of years ago. That’s the biggest change in my mind.”
The rise of telemedicine is creating both opportunities and challenges for healthcare delivery organizations (HDOs) and industry, as well as for clinicians and healthcare technology (HTM) professionals. The excitement about the possibilities for improved healthcare and wellness is palpable—and the barriers are steadily tumbling down.

**What’s Driving the Growth Of Telemedicine?**

A confluence of factors is spurring the rapid adoption of telemedicine:

- First, there’s the “triple aim” of the Affordable Care Act (ACA), which every HDO is working aggressively to meet:
  - Improving the patient experience of care (including quality and satisfaction)
  - Improving the health of populations
  - Reducing the cost of healthcare

  *Telemedicine can improve access to healthcare, provide cost efficiencies, and match or improve on the quality of traditional, in-person consultations.*

- Second, technological advances are making telemedicine more appealing, feasible, and affordable. The footprint of the telecommunications equipment and medical devices that power telemedicine is smaller, and they are more robust and reliable. Equally relevant, consumer devices such as smartphones, tablets, laptops, and desktops are proving valuable for telemedicine interactions. The voice, video, and camera capabilities of these devices—plus cellular, Wi-Fi and broadband connectivity and mobile apps—

  *Benefits of Acute-Care Telemedicine*

  - Reduction of inappropriate transfers
  - Freeing up expensive beds in the intensive care unit
  - Expanding service reach for high-end specialty services
  - Better care at lower costs
  - Best practices speed recovery time
  - Lower staff costs
  - More clinical services at a far lower cost

  Source: Wright, 2013

**UNDERSTANDING THE TERMS**

**Telemedicine** is the remote delivery of clinical information using telecommunications technology using the Internet, wireless, satellite, and telephone media.

**mHealth**, also known as mobile health, is a form of telemedicine using consumer-grade wireless devices and cellphone technologies.

**Health information technologies (HIT)** generate and transmit digital health data, often through an electronic health record. Generally, HIT is used for administrative functions, while telemedicine is the delivery of clinical services. HIT can facilitate, but is not a requirement, for telemedicine.

Source: American Telemedicine Association

**Telehealth** is the use of electronic information and telecommunications technologies to support long-distance clinical healthcare, patient and professional health-related education, public health, and health administration. Technologies include videoconferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications.

Telehealth is different from telemedicine because it refers to a broader scope of remote healthcare services than telemedicine. While telemedicine refers specifically to remote clinical services, telehealth can refer to remote nonclinical services, such as provider training, administrative meetings, and continuing medical education, in addition to clinical services.

Source: U.S. Department of Health and Human Services Health Resources and Services Administration
sync well with the requirements for telemedicine interactions.

- Third, clinicians, patients, and family members, many of whom use technology routinely in their daily lives, are now demanding more effective and convenient healthcare. Telemedicine reduces “windshield time,” in David’s words—the wasted time for medical specialists to travel to remote clinics, for example, when they could be more productive seeing more patients from their medical centers or offices. Likewise, patients might have to take three buses to get to an appointment, or drive or fly hundreds of miles from a rural area. That can be onerous for sick patients and their families, and expensive as well.

“Ten years ago, telemedicine was technologically and financially so expensive that it was limited to the select few who were concerned about quality and safety,” sums up David, who also was the founder and first president of the Center for Telemedicine and eHealth Law. “You had to invest in building a room, buying all kinds of special cameras and large monitors and computers and high-speed communications. Now everybody who has a mobile device can download some apps and become a semi-healer.” That tongue-in-cheek observation calls into question the quality of the design and provisioning of services, he says—issues that everyone is focused on now.

“The value proposition has become more clear,” adds David. “Physicians can become more effective, seeing more patients. Instead of saying, ‘Here’s how much I charge for an office visit,’ now it looks more like, ‘Here are all the benefits for everybody’s practice.’ That makes it easier to adopt.”

### A Continuum of Care

Industry and HDOs are now considering how telemedicine fits within the full continuum of care. Philips, for example, offers a portfolio of telemedicine products for critical and acute care settings and for tailored ambulatory and home care.

“We cover a very broad array of opportunities for the health system today,” says Manu Varma, head of marking strategy for Philips Hospital to Home. “We have solutions that improve outcomes in the ICU [intensive care unit], general medical–surgical units, emergency department situations, like telestroke on-call expertise, all the way to patients who are living at home and trying to stay at home longer and healthier,” including intensive, chronic, and transitory ambulatory care. “We cover hospitals and homes and a number of settings in between.”

For example, Philips eICU (formerly VISICU eICU before Philips acquired the platform) uses bidirectional audio/video technology, population management tools, proprietary clinical decision support, real-time and retrospective reporting tools, and targeted process design. A multicenter study of hospitals, which included 118,900 patients, found that this telemedicine application reduces length of stay and mortality in the ICU.¹ Philips has documented similar improved results with its other telemedicine offerings.

The provision of telemedicine varies in hospitals, and Philips works with them to tailor implementations to meet their needs. “We create the technology and we create a playbook of how to use it,” Varma says. The set-up features a remote command center, where clinicians monitor patient conditions, alert bedside clinicians of any worrisome trends in physiological parameters, and support the bedside team to address and correct issues. Depending on the telemedicine

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Steven Dean, administrative director, telemedicine operations, Inova, says:

“There is growing consumer demand and a level of expectation that health systems and providers and doctors have a means to communicate with their patients using on-demand technologies. Our work is cut out for us—and we have work to do.”

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In addition, an aging population with chronic conditions that must be managed is driving interest in telemedicine to improve care and reduce hospital admissions and readmissions.

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In this transition to remote provision of care, clinicians need a special skillset to practice telemedicine effectively.

Program and hospital, the remote command center might be staffed by an intensivist for the ICU, a hospitalist for medical–surgical care, or other specialty physician, supported by a physician assistant or critical care nurse. Some hospitals staff their command centers with dedicated clinicians; others use blended models in which they rotate staff between bedside and remote care.

Indeed, there is considerable variability in the delivery models for telemedicine services in hospitals. “As you’ll see across the country, if you’ve seen one telemedicine department, you’ve seen one,” says Steven Dean, administrative director for telemedicine operations, Inova health system. “I believe that is appropriate, because we’ll be successful when we no longer call it telemedicine, right? It should be just medicine. Every healthcare institution has its own best practices and algorithms. They see over time and through experience what’s the best way to deliver care. So all you’re doing is injecting technology into that practice.”

In this transition to remote provision of care, clinicians need a special skillset to practice telemedicine effectively—and that’s a “huge cultural shift,” Varma says. “Making a cool technology product is hard. But that’s actually easier, we think, than figuring out how you fit inside a health system and really change the way care is delivered.”

Mobile health is on the rise

<table>
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<tr>
<th>+32%</th>
<th>+18.88%</th>
<th>100,000+</th>
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Projected growth in the number of consumers using home health technologies globally

Source: Tractica, 2015
What Services Can Be Provided?

According to the American Telemedicine Association, “sometimes telemedicine is best understood in terms of the services provided and the mechanisms used to provide those services.” For example:

- **Primary care and specialist referral services** may involve a primary care or allied health professional providing a consultation with a patient or a specialist assisting the primary care physician in rendering a diagnosis. This may involve the use of live interactive video or the use of store-and-forward transmission of diagnostic images, vital signs, and/or video clips along with patient data for later review.

- **Remote patient monitoring**, including home telehealth, uses devices to remotely collect and send data to a home health agency or a remote diagnostic testing facility for interpretation. Such applications might include a specific vital sign, such as blood glucose or heart electrocardiogram or a variety of indicators for homebound patients. Such services can be used to supplement the work of primary care physicians, medical and clinical specialists, and visiting nurses.

- **Consumer medical and health information** includes the use of the Internet and wireless devices for consumers to obtain specialized health information and online discussion groups for peer-to-peer support.

- **Medical education** provides continuing medical education credits for health professionals and special medical education seminars for targeted groups in remote locations.

As telemedicine providers, clinicians need to understand both the technology and how to interact productively with their bedside colleagues. Remote-care providers are most effective when they support and coach frontline clinicians, without being pedantic or arrogant about the information they have. “We’ve seen customers who did not necessarily place the value on these soft aspects and honestly found themselves foundering,” Varma says. “They had to go back and make changes and intervene on those dimensions to get the program to be more successful.”

“There is an art to telemedicine care—and it’s not for everyone,” adds Steven Dean, administrative director, telemedicine operations, Inova health system. “That’s everything from how the bedside persona differs from the camera or screen persona—and sometimes delivering care where a patient cannot see the clinician—to building relationships with bedside staff. There is human factors component to this.”

That “telemedicine persona” is equally important as command center clinicians interact with caregivers outside the hospital, such as clinicians in acute- and long-term care facilities and family members and patients in homes, who tend not to be clinicians. “They are very appreciative of the service of alerting them to something that potentially requires some type of intervention,” Varma says. An effective remote bedside manner makes these interactions more productive.

Coordinating Care

Implementing many new technologies prompts hospitals to examine and sometimes change their workflow and healthcare delivery models. Still, “hospitals know how to run an ICU or a general ward and maybe skilled nursing delivery,” Varma says. “They know how to run a clinic. Actually, it doesn’t change a whole lot—it changes, but not a whole lot—from health system A to health system B.

### Top Telemedicine Specialties For Organizations

For its 2015 U.S. Telemedicine Industry Benchmark Survey, telemedicine provider REACH Health asked 230 healthcare professionals about the state of telemedicine in their organizations. The most mature telemedicine programs—those operating for more than three years—are as follows:

1. Stroke
2. Radiology
3. Neurology
4. Psychiatry/behavioral health
5. ICU

In addition, according to Saluke:

- 60% of the healthcare executives, physicians, and nurses in this inaugural survey said that telemedicine was a high priority for 2015
- “Improved reputation” and “greater physician productivity” topped the list of return-on-investment (ROI) drivers of telemedicine—ahead of “hard” drivers like reimbursement.

### Top Telemedicine Specialties For Physicians

American Well, another provider of telemedicine services, surveyed 2,000 primary care physicians about their perceptions of video consultations. The 2015 survey, conducted in collaboration with QuantiaMD, revealed that physicians ranked video consultations most useful for these 10 specialties:

1. Dermatology
2. Psychiatry
3. Infectious disease
4. Pain management
5. Neurology
6. Cardiology
7. Rheumatology
8. Gastroenterology
9. Sports medicine
10. Oncology
“What we’re talking about now,” Varma adds, “is the population health world in which systems have to worry about what happens outside their four walls. What happens to a patient at home, in other care settings, or, I should say, life settings? The care models, the operating models for that are not established.”

Clearly, stronger partnerships among organizations across the continuum of care will be part of that operating model. Technology is key to that effort as well, because sending a clinician to every remote clinic or patient’s home will not scale. Inova, for example, deploys iPads, iPods, and smartphones, some equipped with diagnostic or monitoring devices, and a “very user-friendly, streamlined workflow” to collaborate with local clinicians, Dean says.

LeadingAge—a membership organization of 6,000 not-for-profit organizations representing the entire field of aging services, 39 state partners, and hundreds of businesses, consumer groups, foundations, and research partners—is at the forefront of the movement to deploy telemedicine technology outside of hospitals.

Consumer and consumer-like devices are proving popular among LeadingAge members—especially tablets with touchscreens and user-friendly interfaces, according to Majd Alwan, senior vice president of technology and executive director of the LeadingAge Center for Aging Services Technology (CAST). “Some utilize only online health and wellness questionnaires,” he says. “Others use biometric devices to collect key vital signs relevant to the patient’s condition, such as a weight scale, blood pressure cuff, or glucometer, while a third group combines the two.”

Alwan is excited about two new and emerging applications of telemedicine for older adults:
- “The use of live audio–video telemedicine equipment to connect nursing home residents and the nurses who take care of them with physicians and specialists—

Inova: 12 Telemedicine Service Lines across a Metropolitan Healthcare System

For Inova health system in Northern Virginia, the movement toward telemedicine began 11 years ago, with the early adoption of eICU.

“It really was an executive leadership vision that we have an opportunity to serve our patients with different technology to provide better care, particularly in the night-time shifts,” says Steven Dean, administrative director, telemedicine operations at Inova. “Not all of our hospitals had access to an intensivist during the night-time hours. This ICU product gave us the ability to bring an intensivist, centrally located in a core command center, and provide clinical support to hospitals throughout the day and night, frankly. It’s a way of expanding our reach and care.”

Inova staffs its eICU with intensivists who work at bedside most of the time, but take shifts in the command center, along with dedicated nurses and “data assistants,” whose primary role is handling administrative tasks so clinicians can focus on monitoring and triaging patients before the start of every shift.

Today, Inova has 12 service lines supported by telemedicine—and it continues to look for new telemedicine opportunities. In doing so, the health system focuses on the needs of clinical staff and the region’s population, which spans mostly urban and suburban but also some rural communities. “The genesis of telemedicine is to support a population that had no access and very few providers,” Dean says. “A lot of times, there’s the perception that this is only applicable to rural areas, but it’s not. There are gaps in urban areas as well, where people either don’t have providers, don’t have a way to get to providers, or just lack information about providers. Telemedicine in an urban area is mostly about access and convenience.”

Inova’s telepsychiatry program “is far and away our heaviest user of our infrastructure,” Dean says. Before telemedicine, when patients presented at emergency departments with mental health symptoms, psychiatric liaisons would be dispatched by car from one hospital to another. On the region’s congested roads, that took time—which created a domino effect of delayed patient care and longer wait times for emergency department beds. “When they started using telemedicine, within three months they changed their paradigm and moved to a central location,” he says. “All consults are now performed from the Inova Psychiatric Assessment Center via telemedicine across the system.”
Colorado Children’s Hospital and University of Colorado Go ‘Full-Bore’ into Telemedicine

In a world where reimbursements for medical services are declining, Colorado Children’s Hospital has gone “full-bore” into telemedicine to become more efficient—clinically, administratively, and financially.

In conjunction with the University of Colorado School of Medicine, the system now has 92 telemedicine projects, according to John F. (Fred) Thomas, director of telemedicine at Children’s Hospital Colorado and assistant professor, Colorado School of Medicine, Departments of Psychiatry and Behavioral Health and Family Medicine. These projects are clustered under three broad perspectives of healthcare improvement:

1. Meeting the needs of the full spectrum of the lifespan of the pediatric population, from prenatal to young adulthood. For example, “fetal echo monitoring technology allows highly specialized maternal–fetal medicine cardiologists to interact in rural spaces to see an echo of a child in utero, diagnose whether there are issues that require immediate intervention, and whether or not that intervention is acute enough that it needs to be done at a highly specialized place or can be co-managed at a rural space in conjunction with our clinicians’ assistance,” Thomas says.

At the other end of the age spectrum, he says, “we’re making very innovative use of technology with dorm-based follow-ups for Type 1 diabetes patients transitioning from high school into college, so we can really manage people who are very likely not to be adherent to their diabetes management and reduce morbidity and mortality.”

2. Making “a day in the life” of patients and families better. The telemedicine staff collaborates with clinicians to identify opportunities to improve patient experiences with technology. “Patients start in the community,” Thomas says. “How do we return them to the community? What are all the different things we can do via technology to make that healthcare less disruptive to their lives and their families?” Some examples of how telemedicine is supporting those goals:

- **Baby chat.** Parents, grandparents, and siblings can do “virtual visitations” with babies in the neonatal unit via a phone, tablet, or computer connection to a tablet affixed to the baby bassinet.

  “We have very, very sick babies here for weeks and months at a time,” Thomas says. “The rest of the family has to go on with their lives. They can’t be here all the time. This is not a clinical application of telemedicine, but it is very meaningful to the family members.”

- **Discharge video conferences.** For children who have had very invasive procedures, such as organ transplants, the hospital care team, parents, child, and the care team at home—such as the primary care provider, pediatrician, and other specialists—hold a videconference to plan the transition to home. This ensures that everyone understands the procedure and their role in caring for the child going forward.

- **Psychiatric assessments.** Children presenting with behavioral health issues at any of Colorado Children’s network of care providers used to be sent immediately to the hospital’s emergency room—mostly by ambulance. But 50% of them were ultimately discharged. “If 50% are discharged, let’s discharge them from that space instead of having an ambulance ride. That’s $3,000 to $6,000 less in cost, it’s way less traumatic, and way less time-consuming,” Thomas says. Psychiatric assessments via telemedicine have changed the paradigm—and the results. In 2014, about 93% of children presenting with behavioral issues were transferred to the hospital by ambulance. So far in 2015, that figure is down to 25%.

“This is a ‘wow’—a major, major administrative win,” Thomas says. Clinical results support the change in practice, and families prefer it.

3. **Population health and continuing medical education.** With a grant from the Colorado Health Foundation, the children’s hospital and school of medicine are beginning a telemedicine model called ECHO, which stands for Extension for Community Health Outcomes. “This is true population health from highly specialized teams of people to primary doctors out in rural spaces,” Thomas says.

In 2015, expert teams in 19 different pediatric and adult disease states will be up and running; three were rolled out in July for chronic pain, autism spectrum disorders, and pediatric epilepsy. Primary care physicians submit case studies of their patients and receive comments and expertise from the specialists.

Already, up to 25 physicians and nurses have participated in the ECHO videoconferences, which Thomas likens to virtual grand rounds. “It’s very Brady Bunch-like or like Hollywood Squares,” he says, where all the practitioners can see one another on their screens from wherever they are.

“The idea is to get these primary care physicians practicing at the top of their license,” Thomas says. “The things that can be managed out there are managed out there. The things that do need to be managed here are managed better.”

In addition, ECHO serves double-duty as a powerful learning experience. The forum is directly applicable to clinical work—and a robust evaluation monitors changes in practice. Plus, participants can earn continuing medical education (CME) or continuing nursing education (CNE) credit, with cases submitted, attendance, and hours spent on the videoconferences all tracked in a learning management system.
particularly to help manage somewhat high-acuity skilled nursing care patients who are frail, without having to put them through the turmoil of transfer or, worse, readmission into a hospital.

• “The broader application of biometric telehealth to manage chronic conditions. These technologies can help patients better understand their conditions and improve self-management. They are very effective when a clinician is kept in the loop to review biometric readings, understand what is going on with the patient outside the clinic on a regular basis, and give them the opportunity to intervene early to prevent exacerbations—for example, to change or titrate medications, reinforce the importance of adherence to medications, diet, and exercise regimens, and other self-management aspects,” Alwan says.

“Of course,” Alwan adds, “both applications could be enhanced with and supported by electronic health records, appropriate medication management applications, and health information exchange capabilities.”

For Varma, the potential of wearable devices for people of all ages is exciting. “We have several revolutionary products out there—the Apple Watch, any number of patches,” he says. “I don’t think we’ve seen the best of it yet. It needs to be more unobtrusive and more reliable than it is today to really help us do more care, more telehealth.”

LeadingAge is seeing more interest, and encouraging providers to consider telehealth kiosks in retirement community campuses, assisted living communities, and senior housing communities, centers, and congregate living settings. “These kiosks are much more cost-effective than giving each resident, client, or patient their own devices,” Alwan says.

These technologies can help patients better understand their conditions and improve self-management.
Further afield, literally, David is seeing growth in telemedicine in sports, where healthcare providers are equipped with a “mobile suitcase” of diagnostic instruments to examine injured players on the field. Images from high-definition cameras that check pupil dilation for concussions or electrocardiograms that monitor heart function, for example, can be sent to specialists at medical centers to review and determine whether players can return to the field. Or, if they need to be transported to the hospital, diagnosis, treatment, and staff readiness are much further along. Select NFL teams are using this telemedicine equipment now; David expects all NFL teams, and other contact sports, will be using it soon.

“I also see tremendous growth in telemedicine for disaster response,” David says. “For first responders from Haiti to Japan for Fukushima to Nepal, telemedicine was part of the first responders’ tools and part of the field hospitals that were set up to respond to major damage.” Telemedicine equipment is proving valuable in helping first responders triage victims and determine which ones need to be evacuated for care and how many medical personnel, and which specialties, are needed.

**Telemedicine Challenges**

The shift to telemedicine comes with growing pains, including technical, legal, financial, and clinical practice challenges:

- **HIT interoperability.** Because telemedicine involves many healthcare providers in clinical and nonclinical settings, getting myriad telecommunications and medical systems to talk to one another could well be the biggest challenge, experts say.

  “Take a complex patient who goes to the hospital once this year, then they have to see two or three different types of specialists, all of whom might be on different software systems,” Varma says. “For telehealth, telemedicine, and our programs to be successful, we need to be able to connect all of those sources of information and actually make sense of all that—and all that’s going on in the patient’s home as well if it’s relevant.”

- **Medical records.** With multiple providers involved in providing telemedicine services, it’s not always clear who is responsible for updating patient’s medical records. The Center for Telemedicine and eHealth Law tackled this challenge in the 2000s, coming to the conclusion that the healthcare provider who delivers care holds this responsibility, David says.
Ownership of medical records is a knotty issue as well. “The Internet of things is global,” David says. “It is tempting to provide global consultation as well as domestic. Now, who is responsible, especially when you are globally located, is significantly important. Now you not only have locations outside the U.S. participating in care and that have different socio-cultural expectations, as well as a different legal basis for who owns the record than we do, you also have translation and linguistic issues about the medical record. “In the U.S., the providers and the patients have shared responsibility for the records,” David adds. “Usually, the practice is the that the provider of the care is archiving the record and the patient has the right to obtain a copy and review it. Globally, there is a wider spectrum of responsibility, where the patient has more opportunity to be the archivers.”

“Ownership of medical records is a knotty issue as well. “The Internet of things is global,” David says. “It is tempting to provide global consultation as well as domestic.” — Yadin David, principal with Biomedical Engineering Consultants in Houston

A GROWING ROLE AND NEW OPPORTUNITIES FOR HEALTHCARE TECHNOLOGY MANAGERS

Telemedicine brings career opportunities to biomedical and clinical engineers and biomedical equipment technicians (BMETs).

“HTM professionals are key members of the planning, technology selection, and implementation of any telehealth or telemedicine program,” says Majd Alwan, senior vice president of technology and executive director of the LeadingAge Center for Aging Services Technology (CAST). “They can develop the technical requirements for the system and help other team members understand those and prepare the IT infrastructure needed to support the application, including the network, storage, redundancies, Health Insurance Portability and Accountability Act compliance, and data security.”

Indeed, telemedicine is adding more to the HTM plate, such as configuring remote command centers and servicing mobile “telecarts” and imaging equipment. Given the prevalence of images and video in telemedicine, “there is a distinct knowledge base, a body of knowledge that needs to be acquired that is not typical for BMETs,” Yadin David, principal with Biomedical Engineering Consultants in Houston, says. “That is optics—like how cameras work, telecommunications as far as understanding quality of service of transmitting images and data, how to troubleshoot and service integration of such tools, and, finally, how to insure the quality of the technology performance on an ongoing basis, just like BMETs are doing for infusion pumps and bedside monitors.” Poor image quality can result in wrong diagnoses. BMETs use calibration tools routinely; adding image calibration expertise to their competencies would be a smart move.

Telemedicine equipment also is becoming less segregated and more integrated into hospital environments and HTM services, David says. Robotic surgical systems, which essentially enable telemedicine over a short distance, are an example.

In addition, experts interviewed for this article envision new career paths for HTM professionals:

• **Telemedicine engineers** with expertise in clinical or biomedical engineering, telemedicine and telecommunications engineering, and desktop engineering. While there are as yet no degrees in this specialty, Inova is one healthcare system that already employs a telemedicine engineer with these competencies in its remote command center.

• **Telemedicine technicians** who specialize in servicing telemedicine equipment in hospitals, eldercare facilities, and the home health market

• **Hybrid positions** that require clinical engineering, IT, HTM, and telemedicine competencies, particularly in hospitals that do not yet have a full array of telemedicine offerings.
In this environment, interoperability challenges pertain to updating, archiving, and sharing medical records as well.

- **Security and privacy of patient data.** With telemedicine layered onto many systems, devices, and users, “there’s not a health system in the country that doesn’t have security and privacy at the forefront of their thoughts,” Dean says. Inova’s real-time tele conferencing services, for example, use a web-based, secure platform that is compliant with the Health Insurance Portability and Accountability Act (HIPAA) for privacy and security.

  Like many healthcare systems, Inova also deploys a mobile device management system to secure mobile devices it owns. But with devices from other providers and from patients in the mix, security and privacy are growing concerns.

- **Bandwidth and cellular coverage.** Inadequate Internet bandwidth can be a problem for video consultations and transmissions. And many rural areas, in particular, can have spotty cellular coverage, or no coverage at all.

  For global telemedicine practitioners, inadequate bandwidth or cellular coverage could call for ingenuity and flexibility. Colorado Children’s Hospital, for example, runs a telemedicine clinic in Guatemala, where “the Internet can be down for the entire country four out of seven days of the week,” Thomas says. “We have done clinical interactions and grand rounds through a cell tower. That’s not the ideal interaction, you want a more robust 3G or 4G encounter, but we can do it.”

- **Reimbursement.** Billing for telemedicine consultations can be an issue; in some states, only face-to-face consultations are reimbursable. As of July 2015, 29 states have telemedicine parity laws for private insurance; as of May 2015, 48 state Medicaid programs have some type of coverage for telemedicine, and 24 states have some type of telehealth coverage under one or more state employee health plans.

  Regarding Medicaid regulations, states are slowly moving away from the traditional hub-and-spoke model and allowing a variety of technology applications. Twenty-four states and D.C. do not specify a patient setting as a condition for payment of telemedicine.

  Many home health agencies use the telehealth and remote patient monitoring under the Medicare prospective payment, which reimburses for actual visits and does not cover telemonitoring costs, Alwan says. This provides home health nurses with information that makes their visits more efficient and effective, improves patient outcomes and care quality, reduces readmissions for hospitals, and helps these agencies gain more referrals. In some states, home telemonitoring of Medicaid and nursing home-eligible patients is covered under Medicaid waiver programs that aim to keep these individuals in their own homes.

  Plus, Alwan says, “there are a few emerging partnership opportunities under health reform, including the Hospital Readmission Reduction Program, accountable care organizations, bundled payments and managed care, to name a few, that have better and more aligned incentives that are encouraging the use of these technologies.”

- **Medical credentialing.** Telemedicine opens up opportunities for physicians to practice across state lines. But medical licenses are issued by states, for practice within states. HDOs and physicians need to ensure that physicians and other practitioners can demonstrate to other states, insurance carriers, government agencies, and partner organizations that their competencies and credentials are valid and up to date in the states where they practice. This is doable, and increasingly accepted—but it takes time and is an ongoing administrative effort, as credentials must be updated regularly.

- **Clinician training.** Telemedicine doesn’t necessarily come naturally to clinicians. Doctors, in particular, are accustomed to walking into a consultation or procedure with all the administrative and pre-clinical tasks done for them.
United Healthcare Leverages Award-Winning Telehealth Program for Navajo Nation to Expand Services for Underserved Native American Populations

It took three years for UnitedHealthcare, one of the nation’s largest health insurance companies, to launch a pediatric telehealth program for rural Navajo children, in Arizona, Colorado, New Mexico, and Utah with complex congenital conditions.

“We’ve been able to leverage the success of that initial program to reach out to other tribal nations, and provide telehealth services in other specialties. That has been the real unwritten win,” says Don Graf, national director of telehealth, UnitedHealthcare.

The story began in 2009, when UnitedHealthcare recognized the inefficiencies and burdens on patients, families, and physicians who had to travel vast distances for highly specialized services, either at rural clinics or major urban medical centers. It wasn’t the audio–visual technology for teleconferences or the T1 lines for connectivity over secure Internet pathways that took time. It was the meetings with medical, religious, and community leaders in Tuba City, a predominantly Navajo community, to build trust in a traditional culture where elders don’t even like to have their photographs taken.

That nurturing of relationships paid off. The pediatric program, launched in 2012, bundled:

• A blended model of telemedicine technology, which is now shifting to more mobile devices, and some in-person consultations.

(The latter respond to an unexpected issue: moms actually like traveling to Phoenix or Albuquerque for their children’s in-person appointments, because they can also use those trips to shop for goods they can’t get in their rural communities.)

• Electronic case records and treatment plans, accessible to community healthcare providers and to their specialists for coordination of care

• Creative financing through a grant from the U.S. Department of Health & Human Services Health Resources and Services Administration’s Medicaid and Children’s Health Program, which services low-income women and children, especially children with special health care needs. The Title V grant provides federal block grants to states to support comprehensive services for these populations.

The program won the 2014 National Best Practice Award for Telehealth in a competition sponsored by Medicaid Health Plans of America.

Today, UnitedHealthcare offers telemedicine programs for even more rural Native American populations, including Apache, Tonono O’odham, and Zuni nations. For the Tonono O’odham community, for example, the company provides speech therapy services to children who have had cleft-lip and palate procedures, cochlear implants for hearing loss, and other cranial–facial procedures. “The physical intervention of these procedures without appropriate, timely, and consistent follow-up becomes moot,” Graf says. With telemedicine, twice-weekly speech therapy for several months makes these procedures more effective.

Based on these experiences, Graf advises other healthcare providers interested in telemedicine to start small, understand the clinical and cultural needs of the populations, and integrate the technology seamlessly into busy clinicians’ established routines.
Healthcare providers will need to make sure patients and caregivers can use any equipment they’ll need for telemedicine services at home, which can be a chaotic environment.

In 2009, a real-time electrocardiogram with GPS coordinates was transmitted via satellite phone from Mount Everest to determine a climber’s physiological capability for continued ascent.\(^{10}\)

Colorado Children’s develops workflows, algorithms, and protocols for what happens before, during, and after a telemedicine interaction, so everyone understands their role—and then it trains clinicians so they know what to expect and what to do. If there’s a glitch, the telemedicine staff works with clinicians and makes improvements to the process.

### Considering Risk and Standards

Coordination of care is an area of interest with telemedicine for The Joint Commission (TJC) “As the only accreditor that’s really capable of looking across the full continuum of care—everything from adult day care and foster care homes all the way to the most exquisitely sophisticated academic medical centers—we have a pretty broad view of the world,” says Margherita Labson, executive director for TJC’s Home Care Program.

TJC sees that “technology and innovation are being used to drive a higher level of quality care and to cope with the demands of healthcare in an area where there is shrinking reimbursement,” Labson says. At the same time, the accreditation organization has an eye on potential risks, including the ability of multiple providers to coordinate and collaborate without any delays or other missteps in patient care.

“For hospital-to-hospital telehealth, there’s a certain level of confidence that there’s an IT system and support and resources around that,” Labson says. “When you’re talking about bringing telehealth and telemedicine into the home, that adds another layer on. When you start moving farther and farther out into the community, ultimately into the healthcare consumer’s place of residence, that gets a little more difficult.” Bandwidth and cellular coverage might not be robust, user interfaces on devices used by patients might not be user-friendly, for example. “If you are relying on that healthcare consumer to push buttons and transmit information, there are more variables.”

Healthcare providers will need to make sure patients and caregivers can use any equipment they’ll need for telemedicine services at home, which can be a chaotic environment. “It’s great that hospitals do discharge planning and you’re one-on-one, going step by step through the process of using a device,” Labson says. “And then they’re going home, the phone is ringing, the dog is barking, people are coming to visit, they’re really tired, and maybe they’re 78 and the only person at home with them is their 81-year-old spouse until the kids come to visit over the weekend. Homes are very different. The lighting is different, the plugs on the wall are different, and maybe the only time they use the Internet is to Skype with the kids.”

For these reasons, TJC’s Divisions of Healthcare Quality Evaluation and Standards and Survey Methods, among others, are keeping a close watch on telemedicine as a “specific, special area of interest” in how it is being used within the scope of the existing accreditation process. Labson says. TJC understands that telemedicine is “exploding exponentially” and changing rapidly. If standards emerge as a compelling need for patient safety and quality care from experts in the field, TJC will consider developing them.

Several standards already play a role in telemedicine, Varma says, including Continua standards that define how various in-home devices can send data to a gateway that ultimately feeds this information into a cloud-based platform. Existing HIT interoperability standards, such as Consolidated-Clinical Document Architecture (C-CDA), Fast Healthcare Interoperability Resources (FHIR), and HL7 also apply.
A nurse provides instructions to a patient in a telehealth program to monitor her health in order to reduce the risk of readmission.

References


Resources


