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Telemedicine's Challenges to the Medical Profession

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FROM THE EDITOR
Telemedicine: A Dynamic and Expanding Practice

Telemedicine—broadly defined as using telecommunications technologies to transmit medical information to support clinical care—has increasingly captured the attention of patients, physicians, insurers, and politicians over the last several years as its breadth and impact have expanded. Telemedicine's movement from the fringe toward the mainstream of clinical practice has generated new models for efficient patient care and decreased disparities in access to care—and drawn attention to its limitations and shortcomings.

Each new technology and technique in medicine—from the invention of the stethoscope to the application of genetics—forces us to ask about the value of "the old way" and to question whether "the new way" comes at too high a cost. With the stethoscope, doctors began to listen to the patient's heart and lungs, sometimes at the cost of listening to the patient [1]. In *The Worth of a Child* [2], Thomas Murray asks: Should our understanding of genetics give us the go ahead to alter or "select out" genetic material to produce a child who suits our wishes. So it is with telemedicine. Does telemedicine provide a specialist for a patient who would otherwise not see one, or does it threaten the therapeutic power of the hands-on patient-physician relationship? Its transformative possibilities are readily apparent, but the gathering of rigorous evidence to support its use and quell concerns is still in progress.

In this issue of *Virtual Mentor*, we are pleased to highlight insights and perspectives from authors with intimate knowledge of the telemedicine landscape. Our three ethics cases, drawn from real-life scenarios, raise important questions regarding the impact of telemedicine in a range of clinical settings—the outpatient clinic, the emergency room, the intensive care unit—and medical specialties—psychiatry, radiology, and critical care.

The first ethics case commentary, written by Richard Gunderman, MD, PhD, provides insights into both the benefits and challenges of teleradiology and how communication between physicians is critical in an era of decentralized practice. In their case commentary, Nicholas Freudenberg, MD, and Peter M. Yellowlees, MBBS, MD, identify the need for comprehensive mental health care and examine how physicians can maintain the appropriate standard of care when practicing telemedicine. In the third ethics case commentary, Allison Harriot, MD, MPH and Michael A. DeVita, MD, respond to a case about a tele-intensivist managing a critically ill patient from afar. The breadth of these cases demonstrates the pervasiveness of telemedicine in today's medical care environment and invites

physician readers to consider the ethical implications of the integration of telemedicine technologies into their own practice.

As telemedicine becomes more and more common, we must begin to train the next generation of physicians in telehealth modalities. In this month's medical education article, Neal Sikka, MD, Tina Choudhri, MD, and Robert Jarrin, JD, discuss the current and needed integration of telemedicine into medical education curricula. They describe and discuss the telemedicine and digital health fellowship they have established at George Washington University, one of the nation's first, to train future leaders in telemedicine.

The rapid expansion of telemedicine has outpaced policy making in the areas of guidelines, standards, licensing, and payment for services. Karen Rheuban, MD, Christine Shanahan, and Katherine Wilson assess the current local and national policies regarding payment and clinical practice guidelines and standards for telemedicine and argue that greater coordination among stakeholders is needed. Mei Wa Kwong, JD, Mario Gutierrez, MPH, and James P. Marcin, MD, MPH, discuss the need for interstate licensing for physicians practicing telemedicine and highlight pending state and federal legislative action on the issue.

The ability of telemedicine to provide physicians with a means of transcending geographic limitations in a clinical encounter offers the possibility of greatly expanding access to medical services. One institution that has decades of experience with such delivery models is the Indian Health Service (IHS). Howard Hays, MD, MSPH, Mark Carroll, MD, Stewart Ferguson, PhD, Christopher Fore, PhD, and Mark Horton, OD, MD, give an overview of the IHS's uses of telemedicine—particularly in behavioral health and ophthalmology—and the clinical impact it has had. Eseosa Asemota, MD, MPH, and Carrie L. Kovarik, MD, describe the role of virtual patient care in humanitarian efforts around the globe, underscoring both the opportunities and challenges associated with this practice.

Telecare undoubtedly has the potential to change the patient-physician relationship. Shivan J. Mehta, MD, MBA, cautions that we must avoid ethical pitfalls such as inadequate personalization and blind embracing of novelty in working with telemedicine tools. Timothy M. Hale, PhD, and Joseph C. Kvedar, MD, discuss a recent paper that examined the privacy and security risks of telemedicine and recommend addressing these concerns through a comprehensive set of privacy and security standards and regulations.

The innovations and challenges examined in this issue have already begun to transform the conception of a "doctor visit." We still have much to learn about what these changes imply for the practice of medicine, the ethics of clinical care, and the prevention and elimination of disease. We invite you to read through this month's *Virtual Mentor* to explore some of these very questions.

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ETHICS CASE
Teleradiology: The Importance of Communication
Commentary by Richard Gunderman, MD, PhD

Mr. Brown, a retired pipefitter living in upstate New York, was bothered by persistent episodes of shortness of breath that had become increasingly frequent, waking him from sleep and leaving him gasping for air. After the third bout in a single evening, his wife took him to their local community hospital's ER at midnight.

The scene was busier than usual for a Friday evening, with nearly every room filled. Dr. Smith, the sole attending physician in the ER that evening, took a thorough history, eliciting Mr. Brown's chief complaint of shortness of breath, his prior occupational history as a pipefitter working with asbestos, a chronic cough for several months, and other medical comorbidities including mildly elevated cholesterol. Mr. Brown's vital signs were notable for decreased oxygen saturation and an elevated heart rate, but he had no sign of fever. An electrocardiogram confirmed the elevated heart rate but showed no worrisome signs for an acute heart attack. Concerned about a pulmonary embolism—a potentially serious blood clot in the lungs—Dr. Smith recommended that Mr. Brown undergo a CT scan and reassured him that it would be read within the hour.

At the physician workstation, Dr. Smith entered an order for the CT scan: "65-year-old man, shortness of breath. Differential diagnosis: pulmonary embolism, rule out pneumonia, rule out heart failure." She made no mention of his persistent cough or work history in the order, but did include these facts in her progress note.

Fewer than 30 minutes later, Dr. Jones, a radiologist board certified in New York but now based in Hawaii, reviewed the scan. He saw no evidence of pulmonary embolism or heart failure. A small focus of abnormal lung tissue raised the possibility of a localized pneumonia. Dr. Jones forwarded his report to Dr. Smith in New York.

Dr. Smith received and recorded the report. Pneumonia wasn't the most likely explanation she could see for Mr. Brown's symptoms—he had no fever and no productive cough—and she contemplated discussing the case with the radiologist. But it was late, many patients were waiting for evaluation, and remote readers tended to be hard to get in touch with. She decided to proceed with conveying the findings of pneumonia to Mr. Brown. She prescribed an antibiotic, and the Browns felt reassured and returned home.

After completing the antibiotic course, Mr. Brown felt somewhat better, but still had an intermittent cough and occasionally woke up with shortness of breath. Six months later, he was diagnosed with mesothelioma, an aggressive form of cancer.

Mr. Brown and his wife wondered how the cancer could have developed so quickly—there had been no evidence of it six months earlier. They were surprised and confused to hear from Mr. Brown's oncologist that, on the initial CT scan, there were in fact a few smaller nodules present. They were even more taken aback to learn that the radiologist who had reviewed Mr. Brown's initial scan was not technically an employee of the hospital and not available to speak to them.

Commentary

Mr. Brown's case is fraught with challenges, only some of which can be laid at the door of telemedicine. The teleradiologist's failure to detect several small nodules and to provide a complete differential diagnosis of the pulmonary abnormality on the chest CT scan, together with the ED physician's failure to consider the possibility that the CT pulmonary abnormality might represent a neoplasm, might have been avoided had (1) the ED physician adequately conveyed the clinical history, (2) the ED physician and teleradiologist conferred about the CT scan result, and (3) both physicians not been pressed for time.

First, the failure of the ED physician to provide relevant occupational history for a patient with cardiopulmonary symptoms may have contributed to the teleradiologist's failures both to detect the pulmonary nodules and to raise neoplasia as a diagnostic possibility. Like the classic relationship between figure and ground in perceptual psychology, every radiologic finding is always perceived (or not perceived) in a larger clinical context that includes the patient's present illness, past medical history, physical examination, and other diagnostic tests. When key information is not provided, the radiologist may over- or underrate certain possibilities—or overlook them entirely.

It is possible that the quality of communication and collaboration between the ED physician and the teleradiologist was affected by their wide separation. Perhaps had they been working closer to one another, they would have been likelier to discuss the case. However, they were in different states and time zones, and both may have reasoned that contacting the other was too great an inconvenience to warrant investing the time and effort it would require. Apparently the ED physician had experienced delays and frustrations in attempting to contact teleradiologists in the past. Moreover, we know that the ED physician faced a large case load, and this was probably also true for the teleradiologist.

A related but deeper problem underlies this failure to discuss the patient—namely, that Dr. Smith and Dr. Jones had probably never met each other face-to-face and never would. In these situations, physicians are unlikely to develop a good working relationship, simply because they do not know one another, and the resultant lapses in communication and collaboration can take a toll on patient care, as in this case.

Furthermore, we must consider the limitations of written communication. Radiologists' reports, physicians' notes, and electronic medical records are all very important, but they do not always tell the full story. For one thing, the point-and-click format they often employ can lead to omissions when aspects of a case do not fit typical profiles. Moreover, physicians are different—some tend to be very thorough and complete, leaving few stones unturned, while others tend to be more focused, conveying only what seems clinically relevant. If physicians do not know one another's styles, they may misinterpret information conveyed in writing.

I knew a medical student from a large urban school who did a rotation at a small rural hospital. After a few days, he expressed to his attending physician his surprise at the brevity of the notes different physicians were entering into their patients' charts. "Back at the medical school, each day's notes are usually more than a page or two long, while here it is not uncommon to see notes that run only a few sentences," he said. "Aren't you worried about missing things?" The attending physician smiled. "No," he replied, "we don't worry too much about what is in the notes, because around here we make it a point to talk with each other about our patients."

At least in part because no direct, real-time communication took place concerning Mr. Brown's case, the level of mutual understanding and collaboration between the ED physician and teleradiologist left much to be desired. Even when face-to-face communication is impossible, a variety of other media exist, including voice and video conferencing, instant messaging, e-mail, and so on. It is important for telemedicine systems designers to anticipate the need for, and to provide quick and relatively painless channels of, communication between the physicians caring for a patient.

The goal is not merely to avoid poor patient satisfaction scores or lawsuits. The goal is to provide a high level of care for patients. And just as care is likely to be better when patients and physicians know one another well, so patients benefit when the physicians involved in their care have developed good working relationships. In this sense, telemedicine is likely to be at a disadvantage compared to local care, partly because telemedicine services often employ dozens or hundreds of physicians, so employees of hospitals that contract with a telemedicine service may interact with a different remote physician each time they use it. The result is a pattern of faceless and nameless interactions between physicians, with patients falling through the gap.

In this case, the imperative of timeliness overwhelmed the imperative for quality. Physicians in a hurry to get an answer did not devote the time and attention necessary to ensure that the patient received good quality care. We can only hope that the hospital, the emergency department, and the radiology department had systems in place that would detect, examine, and learn from such errors. Possible strategies for improvement include providing the teleradiologist with real-time access to the patient's medical record, requiring a brief interaction between the two doctors, ensuring that local radiologists also review such cases, creating teleteams in

which the same local and remote physicians work together repeatedly, and developing a local or regional radiology staffing model that would eliminate the need for teleradiology.

It is easy to see why Mr. Brown would be baffled and frustrated by the care he received. Not only were the radiologic lesions not detected, but, even later, after his cancer had been diagnosed, he could not speak with the teleradiologist. Radiologists, referring physicians, and hospital and health system administrators may think that patients do not know or care who is participating in their care, but it is quite possible that many patients feel otherwise. To them, it may make a difference whether their doctors are strangers or know one another well.

In a profession that prizes the quality of relationships and the development of a certain degree of intimacy between patients and physicians, the very term telemedicine may seem a bit of an oxymoron, like telefriendship, telemarriage, or teleparenting. When a wide geographic gap separates physicians from patients and physicians from one another, relationship-based care becomes considerably more difficult to achieve. Taking good care of patients requires the development of good relationships, for which no gadget or software can finally substitute.

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ETHICS CASE
Telepsychiatry as Part of a Comprehensive Care Plan
Commentary by Nicholas Freudenberg, MD, and Peter M. Yellowlees, MBBS, MD

Dr. Lincoln, a young psychiatrist with a successful telepsychiatry practice, received a call from Dr. Adams, a hospital psychiatrist who had referred a patient to him a few months earlier.

Dr. Adams explained that he had Dr. Lincoln in mind for a patient named Justin whom he had been seeing recently. Justin had served in the military and completed a tour of combat Afghanistan, where he sustained a severe injury to his leg that ended his military career. He had been suffering from posttraumatic stress disorder and severe depression since his return home. After several months' unsuccessful struggle to find a job, Justin moved in with his parents and, frustrated with his physical condition, attempted suicide by drug overdose. Dr. Adams had been seeing Justin daily for four weeks and had started him on medication that appeared to be having some positive effect. Justin was ready to be discharged home to the care of his parents and thrice-weekly outpatient treatment, but, Dr. Adams explained, the hospital's psychiatrists couldn't take on additional outpatients at the moment, and Justin lived 200 miles from the nearest VA clinic.

Dr. Lincoln agreed to take Justin on. Their first telesession took place the following afternoon, and Justin kept all of his appointments for the first two weeks. But Dr. Lincoln noticed that, by the third week of their psychotherapy sessions, Justin seemed to be losing his enthusiasm. Justin also reported feeling that his medication was not helping him as much as it had initially done. Dr. Lincoln encouraged Justin to give the treatments a chance to fully exert their effects. In closing the session, he asked Justin—as he had in each of the prior sessions—if he had plans to hurt or kill himself. "No," Justin mumbled, and then, at a fainter volume not picked up by the webcam, he added, "not today."

Two days later, Dr. Lincoln logged on to his computer for his scheduled session with Justin. When the appointment time arrived, Justin's username failed to show up on the screen. Later that afternoon, Dr. Lincoln was contacted by Justin's parents, who informed him that Justin had committed suicide that morning.

Commentary
This case scenario concerns a patient with severe symptoms, an elevated risk for self-harm, and limited access to care. With its tragic ending, the case raises several questions. How does the effectiveness of telepsychiatry compare with in-person treatment? Did Justin's treatment meet the standard of care? Is telepsychiatry

inappropriate for some patients? Would a different approach have prevented Justin's suicide?

In a 2013 review article, Hilty et al. [1] concluded that the effectiveness of telepsychiatry was equivalent to that of in-person psychiatric treatment according to the data available at that time. The article also noted that telepsychiatry increased access to care, which improved outcomes. No specific diagnostic or demographic subgroups were identified for whom telepsychiatry would be inappropriate. For example, psychotic patients were not found to have incorporated the teleconferencing equipment into the content of delusions [1]. Certain subgroups, including children; adolescents; and patients diagnosed with ADHD, panic disorder, and agoraphobia responded positively to telepsychiatry [2].

Telepsychiatry also reduces the need for inpatient treatment among patients who have previously received it. A four-year study that measured outcomes for patients receiving mental health telecare within the VA system reported that hospital inpatient utilization decreased by 25 percent among study participants [3]. While more research is certainly needed to evaluate the long-term effectiveness of telepsychiatry and in-person mental health care, it should be noted that for a great number of patients the choice is not between telepsychiatry and in-person treatment but rather between telepsychiatry and no psychiatric care.

Justin appears to be in such a situation. Thus, Dr. Adams's choice to refer Justin for telepsychiatric care, a modality shown to be of equivalent efficacy to in-person care, was quite reasonable. The poor trajectory of Justin's condition after his transition to outpatient care is of concern, however. Was that trajectory related to his treatment, or was it an issue specifically related to telepsychiatry that contributed to the tragic outcome of this case?

Although Justin is a patient with severe pathology and a high risk for self-harm, thrice weekly visits with a psychiatrist would not be typical in an outpatient setting without the involvement of nonphysician practitioners. For example, in an intensive outpatient program, patients participate in group therapy and have the support of social workers. It is unclear from the vignette whether Dr. Lincoln had considered referring Justin for individual therapy, group therapy, or intensive outpatient or partial hospitalization programs, but these referrals would have been appropriate if such resources were available.

According to practice guidelines established by the American Telemedicine Association (ATA), "health professionals shall ensure that the standard of care delivered via telemedicine is equivalent to any other type of care that can be delivered to the patient/client" [4] and "the professional shall be familiar with local, in-person mental health resources should the professional exercise clinical judgment to make a referral for additional mental health or other appropriate services" [5]. This means that doctors seeing patients via teleconference have the same responsibility to refer their clients for needed services that they do when seeing them

in person. One potential difficulty for telepsychiatrists is that they are less likely to be familiar with the specific services in their clients' geographical areas. This is where the patient's local primary care doctor comes in.

Ideally all telepsychiatry treatment should involve close collaboration with clients' primary care physicians [6]. Approximately half of people treated for mental health and addictive disorders in in the US are seen by primary care doctors and hospital emergency department staff for their problems [7]. Primary care physicians are a significant point of contact for those at high risk of suicide; one review study found that 45 percent of those who died by suicide had seen their primary care physicians in the month preceding their deaths [8]. Considerable attention has therefore been given to the potential role for primary care doctors in identifying and mitigating suicide risk factors by, for instance, liaising with remote and local mental health professionals, addressing physical health needs, and decreasing barriers to care [9].

Primary care physicians can also play a valuable role in suicide prevention and intervention. Establishing a suicide safety plan is the standard of care in mental health. Safety plans typically involve suicide-prevention hotlines, mental health warmlines, on-call physicians, mobile crisis teams, first responders, and emergency medical services. In cases like Justin's, active participation on the part of the primary care physician is of vital importance.

One way to increase patient safety in such cases, and to improve collaboration with primary care physicians, is for patients to have videoconference appointments in the primary care medical clinic. When seeing patients in a clinic, telepsychiatrists and primary care doctors can communicate in real time and in the presence of the patient. Health care professionals are also available to assist patients who start to exhibit suicidal ideation. In clinical practice, this approach has been found to be useful, expedient, and therapeutic in urgent or emergency situations [4]. In the case of videoconferencing direct to the home, the ATA guidelines recommend the designation of a "patient support person" who can provide similar assistance in emergency situations [5].

In conclusion, current research shows that telepsychiatry offers a viable alternative to in-person mental health care, one that expands access to care and improves outcomes. Potential limitations of telepsychiatry can be mitigated by adherence to ATA guidelines and the employment of a collaborative approach, particularly one involving the patient's primary care physician. We offer the following specific recommendations:

- Telepsychiatry professionals must ensure that the standard of care delivered via telemedicine is equivalent to any other type of care that can be delivered to the client and should follow the ATA guidelines.
- Active collaboration with primary care physicians is strongly recommended.
- All practitioners should make themselves familiar with the services and resources nearest to the patient.

- Where there are safety issues, telepsychiatry visits should be arranged, if possible, at the patient's primary care clinic. If this is not possible or practical, a "patient support person" should be designated close to the patient for assistance in the case of emergencies.

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Disclosure: Peter M. Yellowlees is a co-founder and board member of the commercial telepsychiatry company HealthLinkNow Inc.

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ETHICS CASE
The Tele-ICU
Commentary by Allison Harriott, MD, MPH, and Michael A. DeVita, MD

Dr. Gray, a critical care specialist in a rural emergency room, was evaluating Mrs. Mason. The 80-year-old wife and grandmother, accompanied by her daughter Sarah, had been brought in by ambulance after body aches, fever, and persistent coughing of a day's duration turned into extreme shortness of breath and shaking chills. She was febrile and had tachycardia, low blood pressure, and dangerously low oxygen saturation. A chest x-ray demonstrated a significant, severe pneumonia. In keeping with a desire previously expressed to her husband and children to "do everything," she was intubated and transferred to the hospital's four-bed intensive care unit where she received IV fluids and antibiotics. Her vital signs returned to normal on the higher level of support.

Dr. Gray began preparing to sign out for the evening at 7 o'clock. Mrs. Mason remained intubated but appeared clinically stable. Dr. Gray anticipated that she might have the breathing tube removed in the morning.

Overnight, the intensive care unit was staffed remotely by Dr. Reed, a teleintensivist—an off-site critical care specialist with real-time access to patient monitors, test results, and audiovisual information from several hospital ICUs. The rural hospital, unable to find a specialist physician to staff the intensive care units, had established the teleintensivist care model the previous year. When Sarah asked Dr. Gray who would be taking his place, he explained that all of the patients were closely watched by a remote physician on a monitor and that nurses—and additional physicians, although they were not directly involved in Mrs. Mason's case—were available in the unit at all times in case a patient's condition became unstable.

Sarah asked, "Couldn't we arrange for her to go somewhere where there's a doctor actually on duty in-person at night?"

Dr. Gray paused before replying. The nearest hospital was several hours away, arranging a transfer would take several hours and might be dangerous due to the distance and the severity of Mrs. Mason's illness.

Commentary
The rapid progress of technology in medicine has created new possibilities that might improve the level of care available to patients around the world but also raise serious questions about the consequences of moving away from traditional patient-physician interactions. Telemedicine, an area of particularly rapid growth, involves

the use of communications technology to view patient results, conduct research, exchange information, and carry on a variety of health care-related activities (diagnosis, treatment, home monitoring) across long distances [1, 2]. The term encompasses any technology that allows the exchange of health care information without in-person, face-to-face contact with a patient.

Until recently, telemedicine has not been practical for the provision of day-to-day care because its capabilities were limited. Today, however, we can transmit huge amounts of data, including real-time images of the patient, recordings of heart and lung sounds, vital signs, laboratory results, radiographic images, ECGs, or just about any other information one might wish to access [3-6]. A continuum exists between "store-and-forward" telemedicine and "synchronous" telemedicine. Store-and-forward technology collects and transmits static patient information to a clinician who reviews it and returns a diagnosis and management plan, without interacting directly with the patient. Synchronous telemedicine, on the other hand, takes advantage of real-time videoconferencing for consultation. Most uses of the technology involve some of both.

Intensive care, a particular area in which telemedicine has shown promise, poses unique challenges because it requires a high ratio of clinicians to patients. The inadequate supply of critical care physicians, particularly in underserved areas of the United States and many areas of the developing world, remains a serious concern and appears likely to worsen over time. [7]. Commonly cited reasons for hospitals not staffing ICUs with critical care physicians include a shortage of trained practitioners, the rising cost of specialty care, and physicians' preference to live in metropolitan areas [6, 8]; perhaps intensivists also tend to prefer to practice in larger medical centers. Numerous studies have demonstrated that outcomes are better in intensive care units managed predominantly by a full-time intensivist [9-11], but having one present at all hours may not be possible.

Advantages of Tele-ICUs

Technology has made possible one method to address the shortage of critical care physicians. Telemedicine intensive care units (tele-ICUs) share data between the patient care location and a command center, which might be hundreds or even thousands of miles away. The command center monitors the incoming data, detects trends, and recognizes patients whose clinical conditions are worsening, enabling earlier expert intervention and patient stabilization than would be possible without an intensivist's involvement [6, 7, 12, 13]. Intensivists at the command center can talk directly with the patient or on-site care team, all of them seeing and hearing each other on in-room monitor screens. But the benefits of tele-ICUs go well beyond the benefits to individual patients.

Increasingly, US hospitals are integrating the tele-ICU model, enabling a single off-site physician to cover many care centers, thereby increasing efficiency and cutting staffing costs [5]. More importantly, several studies have shown that tele-ICU programs consistently improved clinical outcomes, including decreasing mortality,

shortening length of stays in the ICU and hospital, and increasing staff adherence to changes in best practices [14-16]. Other benefits of telemedicine could include a reduction in the number of hospital transfers for specialty care, fewer patients needing to travel long distances to see their physicians, and the ability to provide more comprehensive care to physician-poor areas—in short, greatly increased patient access to medical care [2].

Possible Disadvantages of Tele-ICUs

While the possibilities seem very exciting, troubling questions remain about the effects technology will have on the provision of care. One potentially serious concern involves determining what constitutes the "standard of care" in an interconnected world [4-6]. If medical decision making is at least partially outsourced, can the standard that exists in the patient's community be maintained or is it reasonable to expect treatment to conform to the standards and customs of the place on the other end of the line? How can standards be enforced if the command center is located in another state or even another country? Currently, there are no methods for making standards consistent across locations. That is, each hospital makes its own rules (albeit all drawn from a similar set of scientific data and practice guidelines). While international standards of care for some common treatments are being developed, consensus about care for many diseases is lacking. This raises the specter of conflict between telemedicine physicians and physically present physicians and, hence, the question of who the ultimate decision maker should be. While the obvious answer seems to be the on-site community physician, studies evaluating patient outcomes and the role of teleintensivists suggest another answer because telemedicine offers 24/7 critical care physician expertise, while the hospital lacks that skill set outside of the local intensivists' working hours [14-16].

And what happens if telemedical equipment malfunctions, resulting in patient harm? Whose responsibility is it? Who will the patient, the public, and the courts blame? Less drastically, reliance on telemedicine equipment may have unintended effects on the quality of care. If an ICU comes to rely on telemedicine support, other staffing, skills, and knowledge may be withdrawn or deteriorate. If there are interruptions, malfunctions, or losses of the service, the quality of care delivered on site would be below the "baseline" level of care that existed before telemedicine was introduced. While there are no data on this point, continued surveillance is likely to improve compliance with standards of care and, therefore, staff knowledge and skills, rather than worsen them.

Even more worrisome are concerns about the effect of telemedical care on the patient-physician relationship, a bond based on confidentiality, consent, caring, expertise, trust, and, historically, person-to-person contact [4, 16]. In the critical care environment, particularly, physicians see patients at their most vulnerable, and maintaining the patient's, family's, and health care team's trust and confidence in each other is a key facet of the intensivist role. Viewing patients—or in some cases only their images or numbers—on a screen threatens to reduce them to collections of

"data points," potentially dehumanizing them and making compassionate care more difficult to achieve.

Furthermore, when talking to a physician in a quiet exam room with the door closed, patients—rightly or wrongly—generally trust that the discussion is private, but there are substantial barriers to privacy in an interconnected environment. It is not difficult to imagine a celebrity's ICU stay, a politician's psychiatrist session, or any person of interest's discussions with his or her physician becoming a high profile target for hackers. Can transmitted data ever be made secure enough to prevent the loss of data to third parties? Such dangers inherently jeopardize the confidence of the patient—and perhaps of the community—in doctors, the medical profession, and their health care institutions. Trust is essential to the willingness of patients to give important but potentially socially sensitive information to their physicians and other hospital personnel. Loss of this trust can undermine a basic component of health care.

Attitudes about the novelty of the technology may also influence its effectiveness. Skepticism about the quality of care, whether arising from patients' own lack of trust in telemedicine technology or influenced by local physicians' attitudes towards it [4, 6], might compromise care from physicians they have never met in person. Fortunately, the few studies regarding patients' attitudes have shown a generally positive opinion [16-19].

Even if patients would readily accept telemedicine in the ICU, is the current informed consent process adequate? Some would argue that technology is just one additional tool for providing care—telemedicine already allows physicians to reference patient data, radiologists to interpret studies after hours, and health professionals to monitor vital signs and lab results remotely—and that the patient gives a sort of implied general consent to a facility's treatment methods when he or she agrees to be treated there [4]. But one could also argue that telemedicine differs so much from patients' expectations of typical medical treatment—particularly in terms of the risks to privacy entailed by electronic storage and transmission of information [4, 9]—that they should be informed of and consent to it specifically. This may be complicated by the difficulty of obtaining adequate, specific consent for telemedical care from ICU patients, who are often on sedating medications or have serious injuries that might impair their ability to make care decisions.

And suppose patients do not consent to remote treatment? It is technically feasible not to provide the remote monitoring and treatment; it is possible to turn off the tele-ICU link for an individual room or prevent the tele-ICU physician from "turning on" the video link. But in a tele-ICU environment, as we noted before, workers may become dependent upon this technology as a new standard of care. Although acquiescing to a patient's request to withdraw from tele-ICU care or transfer to a hospital that has in-hospital 24/7 intensivists may involve risks to the patient, in our opinion, such refusals should be treated like any other refusal of care: any person with decisional capacity (or that person's surrogate) has the right to refuse any

therapy at any time, as long as he or she is informed of the choices and potential risks and benefits of each option.

Conclusion

The rapid development of medical informatics and supporting technologies has expanded the boundaries of critical care medicine. The issues raised by this rapid progress, the increasing demand for physician services, and the growing need for cost containment will become more complex in the future. The tele-ICU model would seem to present a viable and safe means for providing high-quality care to underserved communities. We believe tele-ICUs are here to stay and will continue to expand in breadth and impact because of the cost savings they can bring. Fortunately, they are also associated with a quality-of-care benefit. Their expansion, however, forces us to consider standards of care, informed consent, and the fundamental relationship between critically ill patients and their clinicians and the health system at large. Telemedicine is neither ethical nor unethical. It is a tool that can enhance the ethical delivery of health care or harm it, albeit inadvertently. Our challenge is to ensure that these new capabilities do not undercut essential components of medicine and unintentionally cause harm.

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MEDICAL EDUCATION

The George Washington University Emergency Medicine Telemedicine and Digital Health Fellowship

Neal Sikka, MD, Tina Choudhri, MD, and Robert Jarrin, JD

The American Telemedicine Association defines telemedicine as the use of medical information exchanged between sites via electronic communications to improve a patient's health [1]. A growing variety of technologies are involved: two-way video, e-mail, smartphones and their apps, wireless tools, and others.

Some patients and physicians regard technology, especially in conjunction with appropriate in-person visits, as beneficial. It can reduce the challenges of appointment scheduling, travel, specialist access, follow-up care, and routine monitoring of chronic diseases. Patients express higher levels of satisfaction with telehealth delivery models than clinicians, who lack reimbursement and monetary incentives—and thus experience with these technologies—and are concerned about relying on health IT [2, 3].

Not surprisingly, medical education programs have failed to prepare students adequately to understand and apply advances in health IT. In a survey of psychiatry residents and fellows across the country, Glover et al. found that there is a "practice gap between resident interest and resident exposure to telepsychiatry": those with exposure to telepsychiatry reported a higher interest level and were more likely to report future plans to use it [4].

Medical residencies have recently incorporated the effective implementation and effective use of electronic health records (EHRs) into the milestones that residents must achieve [5]. But limiting technology-related milestones to effective use of EHRs is far too narrow. Health technology is much broader than EHRs, and implementing telehealth technologies is an important skill for physicians to master. Now is the perfect time for medical schools to broadly adopt formal curricula addressing health IT and biomedical informatics [6].

The Current State of Telehealth in Academic Medical Centers

About 50 percent of academic hospitals use telemedicine in at least one department—most commonly cardiology, neurology, emergency medicine, and radiology [7]. To increase trainees' exposure to health IT, academic medical centers must demonstrate leadership in adopting new technologies.

One barrier to realization of this goal is that health IT is often the domain of the clinical enterprise, which may be completely separate, both organizationally and

culturally, from the medical education mission [8]. Academic medical centers can foment change by developing teams—of hospital administrators, medical school and finance leaders, practicing clinicians, and IT specialists—to evaluate new technologies and explore how they can add value for patients and clinicians, be implemented within the existing infrastructure, and fit into payment models. These teams can also develop research protocols to help determine health IT usability, implementation, effectiveness, and outcomes.

Integrating Telehealth Education into Medical Education

Medical trainees should learn not only how to use health IT in a practice, but also about the barriers to its adoption, the risks of use, relevant policy, quality management protocols, and privacy and security concerns.

Telehealth education should be integrated into medical training early in the undergraduate medical curriculum. Given that current trainees are millennials and considered "digital natives," it can be beneficial to relate their use of technology outside of health care to their future role in caring for patients. Approaches for students just entering medical school can focus on their personal experiences with technology. For example, students can be asked about their favorite health apps. Who recommended them? How frequently do they use them? Do they find a benefit? How might these features relate to patient usability and patient engagement?

Senior medical students and junior residents should observe mentors and patients using telehealth technologies in clinical practice. Mentors must model the skills needed to effectively communicate with patients through video, text, chat, and e-mail. Trainees must understand how to communicate effectively at the patient's educational level, manage risk, use diverse technologies, monitor patients' progress remotely, and effectively process large streams of incoming patient-generated health data. At this stage the "see one, do one, teach one" model could be effective.

As trainees at the senior resident and fellow level get ready to enter independent practice, they must start to better understand the telemedicine landscape. Current topics of importance include interstate physician licensure, reimbursement, the regulation of medical devices, privacy and security, and workflow integration. At this stage, trainees must start to become familiar with practice guidelines, where available.

A New Fellowship Training Opportunity

The George Washington University Emergency Medicine Telemedicine and Digital Health Fellowship takes a novel approach to training in telemedicine [9]. It is designed to allow postresidency emergency physicians to get hands-on training in telemedicine, remote monitoring, and mobile health applications and to mold future telemedicine leaders. The fellowship consists of four main endeavors.

Study. Fellows have the opportunity to obtain a master's degree at The George Washington University during the fellowship. Options include an MBA or master's

degree in information systems technology from the School of Business, an MPH (master of public health) from the Milken Institute School of Public Health, or a master's degree in systems engineering and management in the School of Engineering and Applied Science.

Clinical work. Fellows care for patients in the department's Maritime Medical Access and Global Health Services programs, longstanding telemedicine services for the maritime and aviation industries and for corporate and adventure travelers. Fellows will participate in all the department's telemedicine services under the supervision of the fellowship director and the faculty of the Innovative Practice and Telehealth Section.

Research. Each fellow is expected to conduct two IRB-approved research projects during the fellowship. The first will develop and evaluate a new telemedicine program, study telemedicine's effectiveness compared to that of in-person care, or apply quality improvement methods to one of the department's extant telemedicine services. The second project will use a secondary data source, simulation model, innovative technology, or collaborative partnership from industry to assess a topic specific to telemedicine delivery, quality, or technology.

Departmental involvement. Fellows will be adjunct faculty members at The George Washington University School of Medicine and at an affiliated hospital, where they will work roughly a 50 percent clinical load in the emergency department and assist in the clinical training of medical students and emergency medicine residents.

Upon completion of the fellowship, fellows will be able to:

1. Effectively lead—conceptualize, plan, implement, sustain, champion, obtain funding for, and administer—telemedicine programs
2. Display an in-depth knowledge of the issues related to telemedicine delivery and technology
3. Conduct remote medical consultations using telephone, store-and-forward technologies, and real-time videoconferencing technologies
4. Conduct research related to telemedicine and apply for grant funding in this area
5. Use leadership techniques applicable to implementing collaborative telemedicine programs among physician groups, hospitals, and organizations

As the use of telemedicine and other innovative technologies continues to expand, there is a need for medical institutions likewise to expand their medical curricula and training programs to best prepare the doctors of the future. We hope to educate and train future telemedicine leaders who can bring together innovative technologies, effective business models, and novel applications to enhance the delivery of medical care.

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IN THE LITERATURE
Privacy and Security Concerns in Telehealth
Timothy M. Hale, PhD, and Joseph C. Kvedar, MD

Hall JL, McGraw D. For telehealth to succeed, privacy and security risks must be identified and addressed. *Health Aff (Millwood)*. 2014;33(2):216-221.

Innovative connected health technologies offer a promising solution to many of the challenges facing health care delivery in the United States. Connected health refers to a wide range of care delivery models that utilize communications technologies (sometimes referred to as telehealth and telemedicine) to help patients manage their conditions through improved self-care and to extend clinical care outside of traditional settings [1]. Health care systems that combine patient-reported information and objective data from telehealth devices and sensors can be used to create patient-centered, personalized health interventions. Although these new technologies promise to improve the quality of care, reduce costs, and increase patient satisfaction, they raise a number of ethical issues.

Hall and McGraw argue that there are significant privacy and security risks in telehealth systems that can adversely affect patients' and clinicians' level of trust and willingness to adopt and use the system [2]. Noting that current regulations do not provide sufficient guidance for developers or protection for users, the authors recommend that a single federal agency, the Federal Trade Commission (FTC), coordinate the creation and enforcement of comprehensive privacy and security standards. In what follows, we summarize Hall and McGraw's key points and then discuss their implications based on our experience in creating, evaluating, and implementing telehealth systems.

Hall and McGraw begin by describing the risks that telehealth systems pose to the privacy and security of patients' health information. Privacy risks involve a lack of control over the collection, use, and sharing of data. For example, home telehealth devices and sensors designed to detect falls may collect and transmit information on activities in the household that a patient wishes to keep private, such as substance abuse or that the house is unoccupied at particular time. Smartphone apps may share sensitive data—such as sensor data on location—with advertisers and other third parties in ways not anticipated by users. The primary security risk is that of unauthorized access to data during collection, transmission, or storage. Any transfer offers the potential for a security breach. The authors argue that, despite efforts to create secure devices and apps, many contain serious flaws, and hackers and malware pose an increasing threat to the security of telehealth systems.

Hall and McGraw explain that existing regulations are insufficient to provide strong privacy and risk protections for users. Currently, the Health Insurance Portability and Accounting Act (HIPAA) contains the primary set of regulations that guide the privacy and security of health information. HIPAA requires that identifiable health information be encrypted so that only those authorized to read it can do so. HIPAA, however, applies only to "covered entities"—health care providers and insurers—not to patients. The Food and Drug Administration (FDA) regulates medical devices but not consumer-facing devices and apps, focusing on technical issues related to the security and integrity of information. In this way, the FDA ensures patient safety but not patient privacy; hence, Hall and McGraw propose that Congress authorize a single federal agency, the Federal Trade Commission (FTC), to create and enforce telehealth privacy and security regulations.

The FTC has expertise in privacy and technical issues related to security, in creating and enforcing consumer protection laws, and in supporting innovation. The authors recommend that the FTC enlist stakeholders and manufacturers in creating voluntary codes of conduct for protecting privacy and security and provide a "safe harbor" or protection from legal action to entities that operate under these codes. If no agreement were reached on voluntary standards, the FTC would exercise its authority to create and enforce federal regulations. Hall and McGraw conclude that giving the FTC this two-part authority is the best option for creating comprehensive privacy and security standards that will ensure telehealth systems are trusted and adopted [2].

Discussion

Hall and McGraw provide a useful description of and suggested resolution for the privacy and security challenges facing the development of successful telehealth systems, but there are several caveats to accepting the authors' recommendation for an FTC solution.

First, there is the possibility that establishing voluntary standards or new federal regulations aimed at telehealth systems may not significantly improve users' level of trust, even if such steps improve privacy and security protections. Increased reporting of security breaches, which are almost a daily occurrence, may have contributed to a general sense of distrust in electronic transmission and storage of personal information that may not diminish with regulations directed solely at telehealth. For example, as this paper was being written, a cyber-attack was launched with the "Backoff" malware—first used in a widely publicized 2013 theft of information from Target—to steal consumers' payment card information from as many as 1,000 businesses [3]. What may be needed is a comprehensive set of privacy and security standards and regulations not exclusively for health data but for all consumer data that is collected, stored, and shared electronically [4].

Second, many people remain interested in using telehealth systems despite their concerns about the privacy and security of their health information [5]. A California Health Care Foundation survey in 2010 found that, although 66 percent of adults

thought that there was a need to address concerns about the privacy of their personal medical information [6], they agreed with the statement that "we should not let privacy concerns stop us from learning how technology can improve our health care" [7]. In addition, more than half of the adults surveyed were interested in using technology to monitor their health and almost half were interested in using telehealth devices to send health information to their doctors [6].

In fact, people may be more willing to accept privacy risks when they perceive that the health benefits of using telehealth systems outweigh the risks involved in sharing their information. For example, a study of focus groups on technology's future role in improving health care management found that healthy participants were more concerned about privacy than participants with chronic conditions [8]. In general, for most people, the convenience of rapid access to information and communication with clinicians outweighed privacy concerns. Another example of a privacy trade-off comes from a study we are conducting at the Center for Connected Health involving asthmatic teens' use of Facebook to share their experiences living with asthma and to improve self-management and medication adherence. To ensure some level of privacy in sharing identifiable health information, we are using a private Facebook group accessible only to study participants. Despite the potential privacy risks, legal guardians give permission for teens to participate, and teens are active in the group (unpublished data, study in progress).

A third caveat is that, despite the potential for telehealth systems to automate some tasks and deliver care outside of the clinic, patients' trust in their clinicians will play an important role in their adoption of telehealth technologies. Such trust is built on good patient-physician communication [9] and contributes to improved treatment adherence and continuity of care [10]. Physicians should discuss the benefits and risks of using telehealth and other technologies as part of a patient-centered care plan [11]. Due to the rapid pace of innovation it is unlikely that voluntary codes and regulatory agencies can provide guidance on all situations and new technologies [12]. Therefore, physicians will need to stay informed of their institutions' privacy and security policies and discuss these with patients as part of their ethical obligation to ensure patient-physician confidentiality.

Finally, to encourage patients to adopt and use telehealth systems, clinicians must do so first. At the Center for Connected Health, we have seen that clinicians' use of telehealth is a key factor in telehealth systems' success in improving clinical outcomes. For example, among diabetic patients who were using a text messaging program that delivered personalized coaching to promote physical activity and blood glucose control, those patients whose physicians did not log in to view their results were more likely to stop using the program than patients whose doctors did log in to view the results [13]. Therefore, the integration of telehealth systems into clinicians' workflows and standard of care will be essential to patient adoption and sustained use of telehealth systems and, ultimately, to their success.

Conclusion

Concerns about the privacy and security of telehealth systems may adversely affect people's trust in telehealth and threaten the ability of these systems to improve the accessibility, quality, and effectiveness of health care. More comprehensive standards and regulations may be needed to ensure strong privacy and security protections not only for telehealth but also for all electronic consumer information. But many people, especially the chronically ill, believe the benefits of using telehealth systems outweigh the risks. Physicians can contribute to the success of telehealth by creating patient-centered care plans that effectively use telehealth tools and make sure patients are aware of potential privacy and security risks.

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STATE OF THE ART AND SCIENCE

The Success of Telehealth Care in the Indian Health Service

Howard Hays, MD, MSPH, Mark Carroll, MD, Stewart Ferguson, PhD, Christopher Fore, PhD, and Mark Horton, OD, MD

The Indian Health Service (IHS) is a federal agency within the US Department of Health and Human Services (HHS) whose mission is to raise the health status of American Indian and Alaska Native (AI/AN) people to the highest level [1]. The IHS carries out this mission through a nationwide network of hospitals and clinics in 35 states, partially funded by an annual federal appropriation of approximately $4.4 billion [2]. A significant proportion of operating budgets for IHS facilities also comes from third-party revenue collections for services delivered to patients covered by insurance.

Historically, the IHS was an entirely federal system, but in recent decades it has evolved in a profound way. Tribal governments now directly manage more than half of IHS-appropriated funds and the great majority of physical facilities under self-governance contracts and compacts. In addition, 34 nonprofit Urban Indian Health centers provide care for AI/AN people and other underserved communities in urban locations. The IHS, Tribal, and Urban (I/T/U) health care facilities have come to be known collectively the Indian health system.

IHS and tribal health care facilities are overwhelmingly located in rural and isolated settings with little access to specialty services. Travel costs to bring patients to specialists, or vice versa, in locations such as the northern plains, desert southwest, and Alaska are prohibitive. Telemedicine is therefore an ideal if not essential component of care delivery if the IHS is to accomplish its mission in these locations. While the Indian health system does not have a single, nationally coordinated telemedicine program, telemedicine is widely used. The specific needs and solutions vary from location to location, depending on population characteristics and the availability of specialty services.

Many specialties serving American Indian and Alaska Native communities use the expanding telehealth “toolkit.” One of those specialties, cardiology, has begun to build new service models using telehealth. In recent years, cardiology consultations and services have been delivered across distance and time, with interpretation of echocardiograms, electrocardiograms, and other standard cardiac tests performed by specialists at distant referral sites. The specialists hundreds or thousands of miles away thus are able to connect virtually with team members skilled at image and information acquisition who live locally or travel across a tribal nation or region.

There are even examples of care management programs in which patients' vital signs, weight, and pulse oximetry are securely monitored via smartphones by a team trained in pattern recognition and readily available for real-time telephone consultation. Such programs in cardiac care management (e.g., the "Care Beyond Walls and Wires" program in northern Arizona) have demonstrated impressive results. Patients with timely access to expertise and care advice have improved outcomes, report greater satisfaction, and experience fewer hospitalizations and emergency department visits [3].

As telecommunication networks expand in both reach and capacity in rural communities across the United States, more patients and families are able to benefit from services when and how they need them. Many adult and pediatric specialty services are also available for Native communities through advanced telehealth tools and capability. Telehealth is increasingly important in helping I/T/U health facilities and programs close gaps in health condition recognition, diagnosis, and treatment that have existed for decades between many AI/AN communities and other communities in the United States. The sections that follow describe three broad and highly successful telehealth initiatives in Indian country and touch on some of the issues and opportunities for the future.

Telehealth in Alaska—The Alaska Federal Health Care Access Network

The Alaska Tribal Health System (ATHS) has relied on telehealth programs to deliver care to some of the most remote places in the United States for more than 20 years [4]. The largest of these programs is the Alaska Federal Health Care Access Network (AFHCAN), which has been in operation since 2001 and has been installed in 250 sites throughout Alaska. Most of these sites (180, or 72 percent) are clinics staffed by community health aides/practitioners (CHA/P) in small villages with an average population of less than 300 residents [5]. This system was originally implemented when broadband connectivity was unavailable or intermittent at most village clinics. Consequently, AFHCAN pioneered many concepts in multiorganizational "store-and-forward" telehealth (i.e., capturing images and other patient data for transmission and consultation later at a distant site) and developed technologies that are now used on all continents except Antarctica (AFHCAN Global Telehealth Solutions, LLC, unpublished data, 2014). In 2013, 1,686 clinicians in the ATHS used the AFHCAN system to deliver 36,229 episodes of care for 22,982 patients (Alaska Native Tribal Health Consortium [ANTHC], unpublished data); approximately 16 percent of all Alaska Natives were involved in telehealth in a single year (ANTHC, unpublished data).

Outcomes. The AFHCAN system has greatly improved access to care for Alaska Natives. A study conducted in Nome, for example, found that, prior to use of telemedicine for audiology and ear, nose, and throat (ENT) services, 47 percent of new patients would wait five months or longer for an in-person ENT appointment. After the introduction of telemedicine, this rate dropped to 8 percent of all patients in the first three years, and less than 3 percent of all patients in the next three years [6]. Using this service reduces patient wait times and opens up in-person appointment

slots. Patients who need additional testing or in-person evaluation and care are seen in an expedited manner. In fact, most specialty consultations are now completed within two to four hours (ANTHC, unpublished data). More than 70 percent of all consultations are conducted without requiring the patient to travel to the specialist, resulting in an estimated $8 to $10-million savings annually in the state's patient travel costs [7].

This telehealth system is now used to provide traveling mid-level practitioners access to specialist doctors [8] and enable presurgery planning [9] and postsurgery follow-up [10] for patients, leading to efficiencies and more timely access to care. AFHCAN also developed technologies to support these clinical services and now runs the only federally funded National Telehealth Technology Assessment Center (NTTAC) [11].

Contributors to adoption. The key driver for telehealth adoption in Alaska has been the commitment of more than 30 autonomous organizations in the ATHS to embrace telehealth as a strategy for improving access to care. Telehealth is a critical component of the corporate strategic plan for many organizations, and leading organizations have developed policies that mandate telehealth in certain circumstances. While the original AFHCAN program and equipment were federally funded, the ongoing costs for equipment, supplies, staffing, training, and connectivity have been borne by the participating organizations and offset by insurance reimbursement since 2001. Alaska, unlike some other states, also has a supportive environment for telemedicine adoption: the Medicaid program has reimbursed for video teleconference (VtC) and store-and-forward telehealth since 2001 [12], its "telemedicine coverage under the Medicaid plan is broad and the least restrictive compared to other states" [13], and the vast majority of third-party payers also reimburse (ANTHC, unpublished data).

The Universal Services Fund (USF) subsidy program has also contributed significantly to the growth of telehealth in Alaska. This program dramatically lowers connectivity costs for remote sites, resulting in greater bandwidth and more reliable connectivity that makes videoconferencing possible and provides greater store-and-forward capability. Currently, many tribal health organizations use VtC to deliver primary care services to rural villages (ANTHC, unpublished data). A few have expanded VtC services to provide behavioral health and physical therapy services (ANTHC, unpublished data). The ANTHC has built a high-availability, multi-organizational desktop VtC solution that is being deployed across the entire ATHS for specialties such as cardiology, oncology, endocrinology, speech-language pathology, pediatric endocrinology, pulmonology, infectious diseases, and adolescent medicine. ANTHC is also working toward the provision of live emergency teleconsultations for pediatrics, trauma, and other on-call specialty services. Preventing emergency travel or medevacs will lead to a substantially greater cost savings since "medevac ambulatory services are expensive [and] may, at times, exceed a cost of $100,000 and can cause significant financial hardship for Alaskans paying out-of-pocket for this service" [14].

The future. Telehealth in Alaska is expected to change dramatically in the coming years. The ATHS relies on 28 distinct electronic health record (EHR) systems that are now beginning to be connected to the statewide health information exchange (ANTHC, unpublished data). Providing unparalleled statewide access to clinical information will support both telemedicine and systems approaches to health care, including but not limited to population health, data analytics, and statewide lab order/entry. Almost all of these EHRs will support direct secure messaging (DSM) for the exchange of health care data and be capable of exchanging clinical documents in a consolidated clinical document architecture (CCDA) format, which makes use of templates. The integration of image capture with these EHRs will essentially turn every EHR into a store-and-forward telehealth system, vastly improve consultation and referral processes that are integrated with the EHR, and thereby upgrade the scheduling and billing systems. Finally, integration of video teleconferencing into the EHR will ease scheduling challenges and eventually permit patient-to-doctor video visits ("eVisits").

Mobile platforms will also play a significant role in health care in the very near future. AFHCAN telehealth apps are now available on iPads, iPhones, and Android-based systems, permitting rural clinicians to capture images and create cases on mobile devices. The IHS has also funded a program to convert the 16-pound *Community Health Aide Manual* (CHAM) for care in village clinics into an electronic version (eCHAM) that can also be downloaded to mobile devices. The statewide desktop video teleconferencing solution is also available on these devices, and some of the EHRs will migrate to mobile devices as well. This change will allow remote clinicians to use a single mobile device for all forms of telehealth, EHR, and access to knowledge and best practices.

Telebehavioral Health: Bringing Mental Health Services to the Patient

There are significant health and health care disparities between Native populations and other groups [15], including tremendous underfunding of services in tribal communities [16]. The suicide rate among AI/ANs is 50 percent higher than the rate for white Americans [17]. This disparity is most pronounced in rural and remote areas. Additionally, many AI/AN people continue to struggle with substance use disorders [18]. On the other hand, many Native Americans have an especially strong sense of community connectedness, cultural identity, and family and social support, which are all protective factors for wellness and sobriety [19].

Although the need is extreme, especially in remote areas, access to behavioral health services is often quite limited in Native communities [20]. This is particularly true of specialty care (e.g., child psychology, addictions psychiatry). Attracting and retaining behavioral health professionals in rural or remote areas is a significant challenge. They are typically in short supply in any community and have numerous employment opportunities in urban, higher-paying, and more desirable locations. The telehealth model allows behavioral health professionals to live where they like and still provide services equivalent to in-person care to high-need, remote communities [21].

The IHS Tele-Behavioral Health Center of Excellence (TBHCE) was established in 2008 to provide behavioral health services across the country through real-time (synchronous) televideo connections. This type of service requires dedicated bandwidth; otherwise the session can be disrupted. Due to the rural, remote nature of many Native communities, Internet connectivity is often lacking or of poor quality. To overcome this barrier, these services are provided within IHS or tribal health care facilities that have faster, more stable Internet connections than patients' homes.

Outcomes. Telebehavioral health improves continuation rates. Within the clinical telebehavioral health program we have noted that patients are 2.5 times more likely to keep their telepsychiatry appointments than in-person psychiatry sessions (TBHCE, unpublished data, 2012). This is particularly surprising, given that they have to travel to the clinic regardless of the type of session. When asked about this, the vast majority of patients said they felt that the telepsychiatry session was more confidential than an in-person session. They knew that they would not run into their therapists at the local school or grocery store and therefore felt that the risks to their confidentiality were reduced. Although the telecounseling component (i.e., providing real-time counseling services via televideo) of TBHCE is relatively new, there is also strong anecdotal evidence supporting its facilitation of the therapeutic relationship. For example, during the first two weeks of the program the psychologist was told by three different women, "if you were in the room I wouldn't tell you this" (personal communication with program psychologist). All three then went on to disclose information the psychologist considered to be extremely relevant to their treatment.

Given that the Native population is among the most impoverished in the United States [22], it is important to consider the benefits of TBHCE for Native patients. In fiscal year 2013 the telebehavioral health program allowed IHS patients to avoid more than 500,000 miles of travel, which translated into over $305,000 in savings for them (TBHCE unpublished data). We estimate that, because the telebehavioral health program was available to patients in 2013, these patients saved more than 16,450 hours of work or school that would otherwise have been missed to travel for appointments (TBHCE, unpublished data).

Teleophthalmology: Preventing Blindness in Diabetic Patients

Diabetic retinopathy (DR) is the leading cause of new blindness among working-age adults (20-74) [23], even though serious vision loss from DR can be very nearly eliminated by timely diagnosis and treatment. The standard of care that prevents needless vision loss due to DR has been widely accepted and promulgated for four decades, but these high rates of DR persist, largely because only half of those with diabetes obtain an annual retinal examination [24]. The annual DR exam rate is similar for AI/AN patients served by the IHS, a population with extraordinarily high prevalence rates of diabetes [25].

A lack of annual DR examinations is incompletely explained by simple access-to-care factors in Indian country and probably elsewhere. The persistent failure to

achieve screening targets through eye clinic-based DR examinations led the IHS to implement telemedicine in the primary care setting to improve compliance with DR standard-of-care guidelines and to decrease vision loss due to DR.

The Joslin Vision Network (JVN) is a teleophthalmology modality developed by the Joslin Diabetes Center that has been validated as equal to or better than a live, dilated retinal examination for diagnosing the level of DR and diabetic macular edema (DME) [26, 27] and is also able to identify other common non-DR eye diseases [28]. This technology does not use pupil dilation and is noninvasive, so it can be implemented in a primary care setting and easily integrated into the normal clinical workflow of care for patients with diabetes. Nearly 100 percent of the known population with diabetes could access this technology, whereas only about 50 percent of Americans with diabetes visit eye clinics [24].

Outcomes. The IHS began implementation of the JVN in Indian country in 2000 as a pilot program at two sites in Arizona. Since then the IHS-JVN Teleophthalmology Program (IHS-JVN) has grown to 92 I/T/U sites in 25 states, with more than 16,000 exams performed annually and more than 90,000 cumulative exams to date (figure 1).

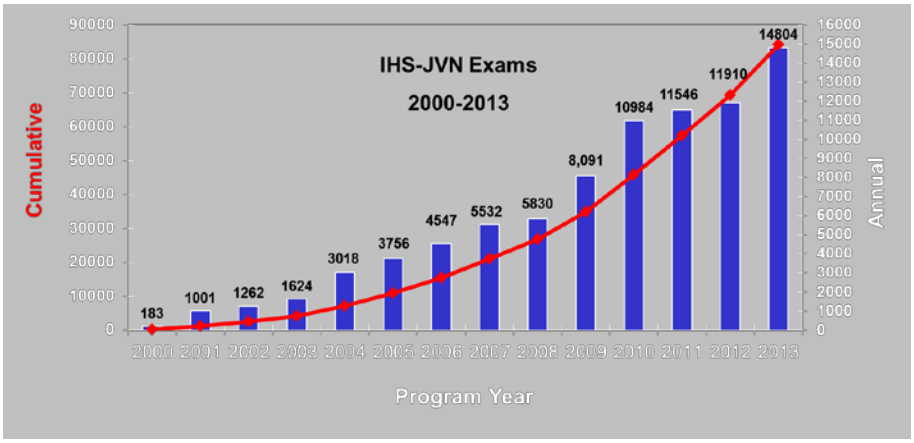

Figure 1. Annual and Cumulative IHS-JVN Exams, 2000-2013
(IHS-JVN Teleophthalmology Program, unpublished data, 2014)

These data aid understanding of how the program works and how it can be best utilized. DR screening programs have been associated with historic improvement in DR management and clinical outcomes in large public health implementations [29], and JVN in particular has been shown effective. A 2005 study showed the IHS-JVN to be more effective and less costly than a conventional eye examination for detecting DR and preventing severe vision loss [30]. A four-year study at a large IHS facility showed that the IHS-JVN was associated with a 50 percent increase in compliance with DR standards of care [31].

Improvements in these measures throughout the enterprise have been variable, however. This variability is not completely understood but is most likely associated

with staffing, program integration, and site-specific use. An additional limitation is that the current program distribution allows coverage of only 40 percent of the total AI/AN population with diabetes (IHS, unpublished data). Nonetheless, there has been an increase of almost 20 percent in the previously static IHS DR exam rate over the past seven years (49.1 percent to 58.6 percent), as IHS-JVN patient encounters have accelerated (see figure 1). This increase in the exam rate has a direct public health impact since each percentage point increase equates to approximately 100 AI/AN patients with sight-threatening DR who were identified and referred for care to prevent vision loss.

Coding and reimbursement challenges. Funding for the IHS Teleophthalmology Program has come largely through specific congressional appropriations but is supplemented by reimbursements from Medicare, Medicaid, and private insurance payers. The range of reimbursement from each varies widely but generally is insufficient for the program to break even in the short term. This is largely because Current Procedural Technology (CPT) diagnosis and treatment codes on which reimbursement is based do not accurately describe the IHS-JVN procedure, which is substantially undervalued. Appropriately valued codes that allow for a range of telemedicine services with defined clinical outcomes are needed [32]. The long-term economic value of the IHS-JVN procedure and program lies in the prevention of the costly morbidity of untreated DR, as well as in indirect savings from managing the chronic complications of diabetes in a sighted versus sight-impaired patient.

The future. Development of the IHS-JVN continues in operational, technical, and clinical areas. New software development focuses on improved interoperability to enhance clinical efficiency, patient safety, and regulatory compliance. New wide-field imaging technology will begin deployments in 2015 to further improve technical quality and diagnostic accuracy, and increased deployments of the portable IHS-JVN hardware will bring the service to more remote sites that have small populations of patients with diabetes.

For maximum benefit, this program must be integrated electronically as well as clinically. The IHS-JVN has been made interoperable with the IHS electronic medical record using Health Level-7 (HL-7), Digital Imaging and Communications in Medicine (DICOM), and Integrating the Health Care Enterprise (IHE) standards. This interoperability has facilitated operational efficiency and patient safety, and it also supports the Health Information Technology for Economic and Clinical Health (HITECH) Act's requirements for current and future meaningful use of electronic health records.

Based upon IHS-JVN successes to date, the program has been mandated for use at all IHS hospitals and all other IHS health care facilities serving more than 500 patients with DM. Current funding and reimbursement will allow the program to extend to approximately 125 sites with coverage of approximately 60-70 percent of the AI/AN population with DM.

Evolution, Barriers, and the Future of Telehealth in Indian Country

Despite its value in reducing health disparities, the promise of telehealth has yet to be fully realized for many AI/AN people. While there are many reasons for the delayed implementation of telehealth innovation, it is the business models—the economics of health care delivery—that represent the most significant obstacle. Except for special programs within states such as Alaska, reimbursement rules and policy have lagged behind technical capability. As a result, service models in Indian health facilities that depend on reimbursement from Medicare, Medicaid, and commercial insurance are unable to capitalize on telehealth innovation because reimbursement, a critical fuel for change, is low or absent.

Efforts are underway to change reimbursement policy, supported by growing outcome data showing the quantifiable contribution of telehealth to the "triple aim" [33] of improved population health, better experiences and outcomes for patients, and reductions in cost to the community. The focus on population health may help accelerate telehealth innovation use as reimbursement policy evolves from fee-for-service to accountable care and value-based payment models. Such a change will enable telehealth tools to be incorporated into new care processes that do not rely on fee-for-service reimbursement. While this trend toward accountable care takes shape, it is vital that reimbursement policy for fee-for-service care continues to improve. Efforts must continue in both fee-for-service and accountable care payment structures for the full value of telehealth to be realized for Indian health care.

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Telemedicine Use in International Relief Efforts

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Physician shortages and ever-increasing patient volume are longstanding problems in medicine. The problem is particularly acute in specialties such as dermatology and dermatopathology: dermatologists account for only 1 percent of US physicians and are underrepresented in resource-constrained areas [1, 2]. In developing countries, rural and displaced communities, and regions affected by war, natural disasters, epidemics, and influxes of immigrants and refugees, these shortages of doctors are even more severe [3].

Telemedicine provides a consultation platform for triage, diagnosis, and management decisions and plays a fundamental role in humanitarian efforts to increase access to care in remote areas, reduce health inequities, and strengthen health systems in the developing world [4]. The increasing use of information and communication technologies is transforming medicine and amplifying access to expertise to relieve suffering in areas of greatest need.

The Evolution of Telemedicine

The use of telemedicine to offer relief services should by no means be labeled an invention only of the late twentieth century; the vast array of health telematics applications available today has roots in the past. For instance, the 1920 founding of a seafarers' medical advice service that employed Morse code and radio [5] was cutting-edge for its time. Although very basic by modern standards, such technologies have a common denominator: seeking to resolve health needs, regardless of distance, by utilizing the most state-of-the-art technologies available. Telemedicine has evolved to incorporate the transmission of highly visual media such as pathology slides and images of affected areas of the body in real time or via a store-and-forward system.

The evolving communication and computing technologies are challenging the traditional conception of the patient-physician relationship [6]. Can an ideal therapeutic relationship exist in the absence of real-life contact? Will physical distance accelerate a trend towards a more cognitive, less caring model of the health system? Will telemedicine allow rural residents to rely more heavily on local clinicians with similar cultural backgrounds, who will then communicate with urban specialists on behalf of their patients? As these big questions are being debated, telemedicine serves the practical needs of those in places with inadequate local medical services.

In resource-limited settings, remote consultations and review of difficult cases increase the likelihood of definitive diagnosis and guide appropriate clinical management. Mobile telephone consultations have been shown to be feasible and acceptable to patients in developing countries [7-9]; they offer solutions for emergency medical assistance and guidance in the prioritization of care and more equitable allocation of scarce resources. Telemedicine network partnerships between fledgling health centers and remote clinicians are a valuable tool for capacity-building, supervision, quality assurance, and mobile training. Such partnerships are also useful for education of ancillary health care professionals to promote sustainability in areas that are developing self-reliance.

Potential Concerns about Telehealth

Despite the benefits of telemedicine for advancing humanitarian services, there are also areas of concern.

Troubling are potential confidentiality risks posed by "data intruders," whose motivations range from research and forensic needs to marketing, insurance, or employment decisions. Strong ethical concerns also exist about research based on electronic medical records or video recordings of teleconsultations and who will have access to them. If not monitored, such research can deviate from humanitarian goals and violate the moral imperatives to preserve confidentiality and secure informed consent from research participants.

With the growth of telemedicine, more clinical tasks, such as health monitoring and submission of cases for teleconsultation, are being entrusted to ancillary health workers [10]. It's debatable whether physicians' obligations extend beyond clear and timely communication of opinions. Does humanitarian work exempt doctors from normal legal responsibility for the patient and the acts of the referring medical personnel [11]? How should medical malpractice liability be apportioned if errors are made by intermediaries in the transmission and execution of specialists' recommendations?

Also, the quality of the information shared electronically may be compromised by patients' limited health literacy and communication skills, raising concern that treatment may be based on inaccurate or incomplete patient information. Given the limitations of the videoconferencing equipment, a thorough physical exam cannot be completed. Some studies have validated the use of videoconferencing by demonstrating high rates of concordance between diagnoses given after remote and face-to-face consultations [12-14]. However, these studies do not take into account the varying levels of health education and communication ability of patients who need humanitarian services.

On a policy level, humanitarian telemedicine may create conflict if issues of physician shortages are also not addressed in resource-limited areas. Will resource allocation decisions result in the poorest of the poor being "screened out" from in-

person doctor visits? Telemedicine cannot completely replace physician visits; rather, they need to be considered an adjunct to the current system.

Looking Ahead

The number of people around the world who, as a result of natural and manmade disasters, political violence, or epidemics, need specialty medical care is growing steadily, and telemedicine is quickly becoming a field that can relieve that burden. The increasing popularity of telemedicine aid calls for establishment of international standards and protocols so that patients receive the best quality care possible [15]. Clearly, more studies are needed to develop best practices and techniques specific to services in low-resource environments.

To protect all parties from exploitation, legislation should be enacted to delineate responsibilities and apportion liability when medical misadventure occurs as a result of mistakes made at various levels by referring medical personnel, health informatics professionals, expatriate specialists, and patients. Ideally, telehealth protocols should be structured to acknowledge these responsibilities and liabilities.

Detailed counseling should be provided and informed consent sought prior to the creation of an electronic health record. To manage the jurisdictional problems associated with the use of telemedicine data, institutional review boards should ensure that their committee members have expertise that enables thorough reviews of studies to protect research participants' confidentiality.

Because the ability to deliver humanitarian services via telemedicine is often hampered by unreliable Internet connectivity, improving interaction between networks will strengthen IT infrastructure and improve sustainability [16].

To prepare physicians to deliver excellent telecare, it is also vital that residency training programs develop a formal informatics curriculum that covers topics such as digital imaging, electronic medical records, information security and privacy, and clinical decision support systems. A well-rounded education should include mastering the art of safe, ethical, and socioculturally and politically sensitive telemedicine [17]. Physicians should also be aware of the local culture, diseases, and resources available at the site of the patient to provide the best care.

Conclusion—a Delicate Balance

Medicine and public health benefit by deploying the expert skills of professionals in remote patient-physician encounters to improve health care delivery and overcome barriers of geography, professional availability, limited transportation and infrastructure, and socioeconomic status. On the flip side, employing the revolutionary technology of telemedicine in underserved settings has profound technical, legal, and sociopolitical implications. These issues must be resolved for this evolving method to have the pragmatic and therapeutic success it promises. Today, the realization of this promise seems to be in our future.

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POLICY FORUM

Telemedicine: Innovation Has Outpaced Policy

Karen Rheuban, MD, Christine Shanahan, and Katherine Willson

Digital-age technology offers great promise for improving access to and quality of health care via transformational care delivery mechanisms. Demand for innovative solutions has been driven by an aging population, high rates of chronic illness, geographic and sociodemographic disparities in access to care, and increasing numbers of insured Americans seeking care in the face of health professional workforce shortages; the AAMC recently projected an estimated shortage of 46,000 primary care clinicians and 45,000 specialists by 2020 [1]. Telemedicine or "connected care," facilitated by a range of digital technologies and broadband communications services, can help address many of the above challenges.

Telemedicine is an exceptional tool for improving access, care quality, and population health. The field is advancing because of technological innovation, broadband expansion, professional engagement, strong evidence of its effectiveness, and consumer demand, but, for it to be properly integrated into everyday care in the twenty-first century, we must advance beyond twentieth-century public policy.

What is Telemedicine?

Defined as the practice of medicine using electronic communications services that connect a clinician in one location with a patient in another location, telemedicine services can be provided live, via high-definition interactive videoconferencing, or asynchronously, using store-and-forward technologies, mobile health tools, or remote patient monitoring. Its uses range from screening for diabetic retinopathy and management of chronic conditions such as diabetes to remote diagnosis and treatment of stroke, wound management aided by store-and-forward image programs, and collaborative management of malignancies by physicians in various locations.

Telemedicine has been adapted to fit diverse models of health care delivery. Opportunities for hospitals and medical practices to adopt telemedicine are extensive, varying with the needs of the institution, the credentials of the medical professional, and the model they wish to deploy. Primary care and specialty clinicians can connect to their patients or to one another through live interactive videoconferencing, offer clinical services using store-and-forward technologies, serve on panels for telemedicine services companies, or keep track of patients' progress with monitoring programs in their homes. Hospitals may choose to collaborate using telemedicine technologies to address gaps in services, to improve triage, or to reduce readmissions.

Telemedicine services companies offer direct-to-consumer care delivery and specialty care services to hospitals and clinics. Some provide contractual services to hospitals, correctional facilities, and other entities. Others contract with payers or patients and offer services in homes, workplaces, and travel destinations.

Advancements

Telehealth improves patient triage, reduces the burden of travel for care, fosters more timely access to care, and provides tools that support patient engagement and self-management. Extensive evidence published in the peer-reviewed literature demonstrates that telemedicine improves clinical outcomes and lowers the cost of care in a host of clinical specialties [2-15]. Patient satisfaction rates are high, and consumer demand for telehealth services is growing, in part because the convenience of receiving care locally—in retail clinic settings, the workplace, or the home—reduces the burden and cost of transportation for care [16-20].

Credentialing and privileging for telehealth care. Credentialing and privileging are important elements of telehealth practice, just as they are in face-to-face practice. Credentialing is the process by which hospitals verify the qualifications of practitioners. Privileging, which occurs at hiring and at regular intervals thereafter, is the granting to clinicians of authority to practice at a health care facility within the scope of their qualifications. The process of credentialing and privileging a practitioner is time-consuming and can be costly and impractical when large numbers of clinicians seek to provide telehealth-facilitated services in multiple hospitals.

Telehealth was incorporated into the Joint Commission Standards for Credentialing and Privileging beginning in 2000 and in its revised standards in 2004. In 2011, the Centers for Medicare and Medicaid Services (CMS) published new regulations in its hospital Conditions of Participation standards that include proxy credentialing and privileging arrangements as a viable option to further facilitate the delivery of telemedicine services across the nation [21]. Through an agreement between hospitals, these standards allow the originating site to accept the distant practitioner's credentials and privileges and to exchange quality data with distant site hospitals. These new regulations, which were developed in alignment with the Joint Commission Telehealth Standards, have streamlined the process of developing telehealth collaborations between hospitals.

Standards and practice guidelines. In conjunction with the relevant specialty societies, the American Telemedicine Association has developed standards and practice guidelines for telehealth in a number of specialties. Further adoption will occur when additional specialties develop appropriate guidelines and inform boards of medicine and the payer community [22]. Guidelines to address direct-to-consumer telemedicine for urgent care and primary care are currently in development by the American Telemedicine Association, since concern has been raised about the risks of

care fragmentation and overprescribing of antibiotics in these telehealth specialties [23].

The Federation of State Medical Boards (FSMB) and the American Medical Association have issued recent policy documents and guiding principles to ensure patient safety and choice, quality of care, licensure, and privacy of patient information [24, 25]. In particular, the FSMB model policy clearly states that prescribing as a result of a telemedicine encounter should follow all current standards of practice in terms of indications, appropriateness, and safety considerations. It also establishes that, in accordance with the guidelines, a virtual visit can establish a bona fide doctor-patient relationship [24].

Barriers to Adoption

Despite multibillion-dollar investments in telemedicine, broadband expansion, and innovations in health information technology, twentieth-century statutes and regulations have led to continued uncertainty that limits adoption.

Lack of coordination at the federal level. Even in the face of significant increases in the use of telemedicine nationwide, continued balkanization of the legal and regulatory framework that underpins the use of telehealth technologies adversely impacts integration into mainstream care. Currently, 26 different federal agencies report engagement in telehealth, be it in research or other grant funding opportunities, the establishment of broadband communications networks, clinical service delivery, device development, or regulation. The Fed-Tel working group effort to coordinate telehealth policy has made some progress, but a serious lack of coordination of practical policies across these agencies remains, in part because of statutory barriers [26]. As an example, Medicare's definition of "rural" for the purposes of reimbursement conflicts with the definition used by the US Department of Agriculture for its telemedicine grant program, and neither of these definitions aligns fully with that which the Federal Communications Commission uses for broadband communications discounts in the Rural Health Care Program. Inconsistent state policies and regulations create additional barriers for otherwise willing clinicians seeking to integrate telemedicine technologies into care delivery models. These policies pose significant challenges for large health care systems and are virtually insurmountable for small medical practices.

Reimbursement challenges and progress. Payment coverage restrictions remain a major impediment to clinicians' adoption of telehealth services.

The Balanced Budget Amendment of 1997 and the 2000 Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act (BIPA) authorized reimbursement for telemedicine services provided to rural Medicare beneficiaries for a broad range of diagnostic and treatment services. Section 223(d) of the act directed HHS to study and report on opportunities to expand coverage for telehealth services within two years [27]. Fourteen years later, no such report has been produced. Moreover, the current Medicare telehealth provisions in section 1834(m) of the Social Security Act

restrict eligibility for reimbursement to "originating sites" (sites at which a patient receives telehealth services) located in nonmetropolitan areas or areas that are part of federal telehealth demonstration projects [28].

The Affordable Care Act (ACA) of 2010 did not expand eligible originating sites within the traditional Medicare program in part because the Congressional Budget Office had overestimated the cost of telemedicine services to Medicare when BIPA was passed in 2000 [29]. Although pilot programs have been launched through the Center for Medicare and Medicaid Innovation, the regulations for accountable care organizations still require that the originating site conform to the regulations set forth in Section 1834(m) of the Social Security Act [28]. In its 2014 physician payment schedule, CMS expanded its operating definition of "rural," from nonmetropolitan counties only to regions defined as rural by the Office of Rural Health Policy.

These statutory barriers placed on telehealth programs are borne out by the meager CMS reimbursements for telemedicine services. In 2013, CMS reported fewer than $12 million in reimbursements for "allowable charges" nationwide for both originating sites (the location of the patient) and distant sites (the location of the clinician or telemedicine provider) [29]. That figure pales by comparison to the CMS's National Health Expenditure Data, which reported that Medicare spent $572.5 billion in 2012 [30]. Moreover, the current Medicare originating site payment is insufficient to cover the costs of establishing and maintaining a telemedicine service and facilitating the encounter [29].

Currently 47 state Medicaid programs provide some form of reimbursement for the delivery of telehealth-facilitated care to Medicaid beneficiaries, but there is no consistency in coverage across those programs. Most Medicaid programs pay for patients' transportation to care, and yet, in many states, there are still considerable limitations on coverage for telehealth services. A consistent federal-state approach to Medicaid payment for telehealth services would provide cost savings not only by reducing transportation but also by improving access to care and models of care delivery.

As of 2014, 21 states plus the District of Columbia have passed parity reimbursement legislation; in 29 states, however, there is no requirement that private insurance cover telehealth services [31]. Some commercial payers support coverage of telemedicine services even in the absence of a state mandate, and others have developed or adopted direct-to-consumer home or workplace telehealth programs, as either a benefit to members or an additional payment option, to reduce unnecessary emergency room and office visits [23].

Inconsistent state medical board regulations. Inconsistent state medical board regulations remain a significant barrier to the expansion of telemedicine services. For example, some states require an in-person visit prior to the provision of any telehealth service. In general, telehealth practitioners must be fully licensed in the state in which the patient is located. Obtaining these licenses is a cumbersome and

expensive process for physicians. The April 2014 report of the FSMB's Appropriate Regulation of Telemedicine (SMART) workgroup, "Model Policy for Appropriate Use of Telemedicine Technologies in the Practice of Medicine," which proposes a common framework and language for adoption by states, is promising [24]. By providing a model policy for use by state medical boards, the FSMB proposes to reduce regulatory barriers to more widespread adoption of telemedicine technology, all the while ensuring its appropriate use.

Lack of investment in broadband connectivity. Another continuing obstacle to the wider integration of telehealth care is a lack of broadband availability and affordable connectivity, particularly in rural areas. Following passage of the Telecommunications Act of 1996, the establishment of the Rural Health Care Program (RHCP) of the Federal Communications Commission's (FCC) Universal Service Fund has promoted expansion of broadband services for eligible health care facilities in rural areas by providing discounts for ongoing connectivity [32]. But challenges within this program remain. A number of types of entities, such as emergency medical services providers, skilled nursing facilities, and for-profit hospitals and clinics are deemed ineligible for RHCP support altogether [27]. Secondly, even for those who are eligible, the application process is very complex. The FCC has made efforts within their statutory authority to broaden the use of the Rural Health Care Program, but the onerous application process still creates disincentives even for eligible entities. As a result, the Rural Health Care Program has disbursed considerably less than the $400 million authorized by the Federal Communications Commission [33, 34].

In 2010, the health care chapter of the FCC's *Connecting America: The National Broadband Plan* identified a number of the federal agency challenges articulated earlier that inhibit adoption of telehealth and recommended substantive changes to the RHCP to integrate broadband communications services into sustainable models of health care delivery [35]. Many of those federal agency challenges remain in 2014.

Conclusion

Telehealth care is an essential tool to address our nation's significant challenges in access to high-quality care and clinician shortages. However, technological innovation has far outpaced advancements in policy, and the layering of innovative models over an outdated and inconsistent legal, administrative, and regulatory framework risks limiting the promise of telehealth. Thus, it is imperative to modernize federal and state telehealth policies to foster certainty, transparency, high quality, security, access, affordability, sustainability, and the adoption of twenty-first-century models of care.

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Christine Shanahan is a co-owner of DermUtopia, a mobile teledermatology company.

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POLICY FORUM

Interstate Licensure for Telemedicine: The Time Has Come

Mei Wa Kwong, JD, Mario Gutierrez, MPH, and James P. Marcin, MD, MPH

Telemedicine is the use of technology to provide health care services when the physician and patient are not in the same location. One of the advantages of telemedicine is its ability to provide virtual care in a location where there may be a shortage of qualified health professionals and specialists.

Most telemedicine-related policies are established at the state level. Each state sets its own policies for a variety of matters that impact telemedicine, such as Medicaid programs, private insurers' business practices, privacy and data security, and medical licensing. What might be recognized and reimbursed in one state could turn out to be nonreimbursable or even illegal in another. Furthermore, clinicians must be licensed by the state in which their telemedicine patient is receiving care [1]. Requiring that physicians be licensed in the state where a given patient lives greatly limits the main advantage of telemedicine. This article will examine the licensing issue in relation to telemedicine and how these policies may need to change in the future.

Licensing Today

Cross-state licensure is one of the top barriers to the expanded use of telemedicine across the country [2]. The cost in time, money, and resources of applying for licenses in each state in which a physician seeks to practice is a serious deterrent to expanding medical services across state lines. Ten state medical boards have created a "telemedicine license" to accommodate telemedicine professionals, and a few states have special arrangements for practice in contiguous states [1], but the physician will still need to apply and spend time and resources to obtain the license for each state.

There are, however, some promising examples of alterations to medical licensing regulations and policies to facilitate cross-state telemedicine practices. The Nurse Licensure Compact (NLC) was launched in 2000 and currently has twenty-four states as members [3]. The compact allows for a nurse to have one license that will enable the licensee to practice in other NLC states either physically, telephonically, or electronically. The Veterans Administration (VA) only requires eligible physicians to have one state license to practice in all VA facilities [4].

Satisfaction with these programs appears to be high. The interest of state governments in pursuing joining the Nurse Licensure Compact—the number of member states more than tripled in a decade [5]—indicates they believe it is useful and will have positive effects on patient health. And, although a scandal about long

wait times for appointments surfaced in 2014, customer satisfaction with the VA health services was high in 2013: 84 percent of patients who received inpatient care, and 82 percent of patients who received outpatient care, said they were satisfied with it [6]. Similarly, in 2014, VA patients' mean satisfaction level with at-home telemedicine services was 84 percent; with clinical video, 94 percent; and with store-and-forward (i.e., not in real time) telecare, 95 percent [7].

The Future of Licensing

As a result of public pressure, the Federation of State Medical Boards (FSMB) has taken up the issue and in May of 2014 released draft model language for an interstate compact to expedite medical licensing [8]. This proposal calls for the creation of a commission that would, among other duties, enforce the compact's provisions. Unlike the NLC, the FSMB's proposed compact will not issue a single license that can be used across state lines. Physicians will still need to apply for a license in each state and, as the draft language currently stands, could be charged a fee in each, as well as a payment to the commission to process the application [9].

While it appears the FSMB's proposed compact would help expedite the medical licensing process, since paperwork will be somewhat reduced by the expediting mechanism, clinicians will still be faced with some of the same financial and bureaucratic barriers, given that they will still need to obtain a license from each state. Also, this process could cost more in fees.

As the demand for telemedicine increases, however, changes in federal policy may eventually settle the question of cross-state licensure. Two recent congressional bills were introduced that address this issue.

The TELE-MED Act of 2013, introduced by Representatives Devin Nunes (R-CA) and Frank Pallone, Jr. (D-NJ), would allow Medicare-participating clinicians licensed in one state to provide services via telemedicine to Medicare beneficiaries in other states as long as they are licensed to provide the services in question. Any enforcement or disciplinary action would be carried out in the state where the clinician is licensed. Although the legislation only involves the Medicare program, it would, if it passes, be a step toward making licensure a federal, rather than state, issue.

Another recently introduced federal bill that may affect this issue is the Telehealth Enhancement Act sponsored by Representatives Gregg Harper (R-MS), Devin Nunes (R-CA), Mike Thompson (D-CA), and Peter Welch (D-VT). It proposes that, for the purposes of liability in the Medicare program, telemedicine services be viewed as being delivered at the location of the clinician, not that of the patient. Such a policy could change the licensing landscape.

The Federal Trade Commission (FTC), charged with protecting consumers from anticompetitive or deceptive business practices, has become increasingly interested in telemedicine and cross-state licensure. In March of 2014, the FTC held a

workshop to examine health care competition and professional regulation of health care professionals, including licensure. By looking at how health care professionals are regulated, the FTC is examining whether current practices might be creating an unfair environment for consumers [10]. While no definitive action has resulted so far, it would not be outside the realm of possibility for a federal agency such as the FTC to decide to become more involved in medical licensure issues.

Conclusion

As the world shrinks, borders and distance become less relevant, and technology-enabled health care is proven to be as good as—or in some cases better than—in-person care, state medical boards and the FSMB will find it less appealing to rely on regulations designed for a pre-telemedicine system. We live in a highly connected society, and the notion that a medical visit needs to occur within the traditional four walls of a clinic or hospital is already becoming obsolete. How clinicians are licensed and monitored for quality and safety will ultimately need to change according to the future possibilities of health care.

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MEDICINE AND SOCIETY

Telemedicine's Potential Ethical Pitfalls

Shivan J. Mehta, MD, MBA

Technology impacts almost all aspects of our everyday lives. We communicate with each other using mobile and electronic modalities and are increasingly comfortable using them to receive and share information about our personal and professional lives. Recent data show that Internet use is growing among all age groups: 87 percent of adults use the Internet, and 58 percent own a smartphone [1]. Moreover, 72 percent of Internet users seek information about health online [1].

Coinciding with the evolution of electronic communication are systemic changes in health care delivery. An increasing amount of medical knowledge is required to deliver even the most basic care for a population that is living longer with chronic diseases that require close management and coordination [2]. For many primary care doctors, there are not enough hours in the day to take care of a large group of patients [3]. Given these capacity constraints, the need to find more efficient strategies for providing medical care is an urgent one. Additionally, there has been a shift from reimbursement for service to a payment model that focuses on efficiency of care and outcomes, a change that may facilitate a more rapid adoption of new care delivery models. Our health care system and society are poised, then, to take advantage of new communication technology through telemedicine.

Telemedicine—the use of medical information and technology to advance clinical care at a distance [4]—has the potential to transform patient-centered care. New technology platforms allow us to communicate with patients through a variety of means, including text, e-mail, and mobile-device applications. Telemedicine can integrate remote monitoring and sensing mechanisms with automated interactions and reminders to better engage patients when they are not in a doctor's office [5]. The technology can also facilitate communications between members of the care team, improving coordination of care. Despite these advantages, there are serious concerns about how the adoption of telemedicine may impact care. Ensuring that telemedicine is ethically acceptable will require anticipating and addressing four possible pitfalls: erosion of the patient-doctor relationship, threats to patient privacy, forcing one-size-fits-all implementations, and the temptation to assume that new technology must be effective.

The Patient-Physician Relationship

One of the longstanding premises of the doctor-patient relationship is the therapeutic value of the face-to-face clinic encounter. This is reflected in physicians' emphasis on a detailed history and physical as well as in the prevailing reimbursement models.

We are taught as physicians about the importance of the patient-doctor relationship as a basis for fostering mutual trust and empathy. This norm is also reflected by guidelines. For example, the American Medical Association (AMA) position statement emphasizes that telemedicine should still be used as a supplement to live visits and only for those patients with whom the practitioner has a pre-existing relationship [6]. Despite this presumptive value of a live visit for an initial patient-physician encounter, a major opportunity for telemedicine is to improve access to care and physicians in geographic areas where both are limited, where telemedicine care must replace face-to-face encounters entirely. Moreover, as society becomes more comfortable with electronic communication, our medical practices can evolve as well. It is important to address and answer concerns about the loss of the patient-doctor relationship so that they do not stand in the way of modalities that can improve access to or the quality of care.

Threats to Patient Privacy

The concern over privacy is legitimate. Patients may not know exactly who will be responding to and sharing their personal medical information. That information is available on different devices and computers, increasing the potential for security breaches, which may undermine patients' acceptance of telemedicine. With asynchronous communication, a lack of clarity about who exactly will respond may raise further privacy concerns. These apprehensions are important, especially given the uncertainties about this new delivery model of care mentioned above. But security issues are more operational than ethical, inasmuch as new encryption and security tools to protect information continue to proliferate. To gain patient confidence, it is essential that a robust privacy and security plan accompany any new telemedicine program and be communicated to patients.

One Size May Not Fit All

Another important consideration for telemedicine is making sure we don't force the same "solutions" on patients with different clinical situations, needs, and preferences. Patients differ dramatically in their adoption of new devices and software. Text messaging may work well for one patient but not another. A patient-reported outcome questionnaire may be reasonable for taking a medication and family history, but less appropriate for end-of-life discussions. Some patients may prefer a patient portal to a live visit, while others may not even have a computer to log onto. These differences in access to technology may exacerbate existing health care access and equity issues related to demographics and socioeconomic status. Patient-oriented technology is not one-size-fits all. Effective telemedicine scenarios must be user- and case-sensitive.

New May Not Be Better

The fourth consideration is how telemedicine might impact the quality of care and whether its use will have unintended consequences. As with any new drug or device, telemedicine should be evaluated to see how effectively it works and whether it produces any adverse events, but the evaluation does not necessarily need to be a large randomized controlled trial. It is important for the medical profession to apply

its evidence-based ethos to telemedicine rather than blindly believing that new technology is better—to balance enthusiasm about telemedicine's potential with acknowledgement of the need for clear-eyed evaluation. For example, evidence about the use of telemedicine to improve patient outcomes and efficiency is mixed [7]. Having some demonstration of—even early—improved outcomes could dramatically accelerate adoption of effective technology or spur further development of technologies with limited effectiveness. The new generation of physicians who are more familiar with these technologies could take the lead in asking important questions to evaluate telemedicine's effectiveness.

Conclusion

Ultimately, we should think about the same ethical issues with telemedicine that we have always considered in caring for our patients. If we focus on maintaining a strong patient-doctor relationship, protecting patient privacy, promoting equity in access and treatment, and seeking the best possible outcomes, telemedicine can enhance medical practice and patient care in ways that we can all feel comfortable with.

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