The Role of Telehealth in an Evolving Health Care Environment: Workshop Summary

DETAILS

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THE ROLE OF TELEHEALTH IN AN EVOLVING HEALTH CARE ENVIRONMENT

Workshop Summary

Tracy A. Lustig, *Rapporteur*

Board on Health Care Services

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

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Willing is not enough; we must do."
—Goethe

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[1]Institute of Medicine planning committees are solely responsible for organizing the workshop, identifying topics, and choosing speakers. The responsibility for the published workshop summary rests with the workshop rapporteur and the institution.

Reviewers

This workshop summary has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published workshop summary as sound as possible and to ensure that the workshop summary meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We wish to thank the following individuals for their review of this workshop summary:

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Although the reviewers listed above have provided many constructive comments and suggestions, they did not see the final draft of the workshop summary before its release The review of this workshop summary was overseen by **HUGH H. TILSON,** University of North Carolina Gillings School of Global Public Health. Appointed by the Institute of Medicine,

he was responsible for making certain that an independent examination of this workshop summary was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this workshop summary rests entirely with the rapporteur and the institution.

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1

Introduction

In 1996, the Institute of Medicine (IOM) released its report *Telemedicine: A Guide to Assessing Telecommunications for Health Care* (IOM, 1996). In that report, the IOM Committee on Evaluating Clinical Applications of Telemedicine found

> Telemedicine is similar in most respects to other technologies for which better evidence of effectiveness is also being demanded. Telemedicine, however, has some special characteristics—shared with information technologies generally—that warrant particular notice from evaluators and decision makers. Most notably, telemedicine is not a single technology or a discrete set of related technologies; it is, rather, a large and very heterogeneous collection of clinical practices, technologies, and organizational arrangements. In addition, widespread adoption of effective telemedicine applications depends on a complex, broadly distributed technical and human infrastructure that is only partly in place and is being profoundly affected by rapid changes in health care, information, and communications system. (IOM, 1996, p. 208)

Since that time, attention to telehealth[1] has continued to grow in both the public and private sectors. Peer-reviewed journals and professional societies are devoted to telehealth, the federal government provides grant funding to promote the use of telehealth, and the private technology industry continues to develop new applications for telehealth. However, barriers

[1]See later in this chapter as well as Appendix A for more on definitions of telehealth, telemedicine, and other relevant terms.

remain to the use of telehealth modalities, including issues related to reimbursement, licensure, workforce, and costs. Also, some areas of telehealth have developed a stronger evidence base than others.

WORKSHOP STATEMENT OF TASK

The Health Resources and Services Administration (HRSA) sponsored the IOM in holding a workshop in Washington, DC, on August 8-9, 2012, to examine how the use of telehealth technology can fit into the U.S. health care system. HRSA asked the IOM to focus on the potential for telehealth to serve geographically isolated individuals and extend the reach of scarce resources while also emphasizing the quality and value in the delivery of health care services. Specifically, the charge to the planning committee was to

- discuss the evolution of telehealth since 1996, including the increasing role of the private sector, policies that have promoted or delayed the use of telehealth, and consumer acceptance of telehealth;
- discuss the current evidence base for telehealth, including available data and gaps in data;
- discuss how technological developments, including mobile telehealth (mHealth), electronic intensive care units, remote monitoring, social networking, and wearable devices, in conjunction with the push for electronic health records, is changing the delivery of health care in rural and urban environments; and
- discuss actions that the U.S. Department of Health and Human Services (HHS) can undertake to further the use of telehealth to improve health care outcomes while controlling costs in the current health care environment.

Overall, the workshop speakers were asked to meet the following workshop objectives:

- delineate the evidence base for telehealth;
- highlight special implications for rural populations;
- discuss the actions HHS can undertake; and
- identify what in particular warrants further study.

The planning committee's role was limited to planning the workshop, and the workshop summary has been prepared by the workshop rapporteur as a factual summary of what occurred at the workshop. Statements, recommendations, and opinions expressed are those of individual presenters

and participants, and are not necessarily endorsed or verified by the IOM, and they should not be construed as reflecting any group consensus.

DEFINITIONS

In 1996, the IOM defined telemedicine as "the use of electronic information and communications technologies to provide and support health care when distance separates participants" (IOM, 1996, p. 1). (See Appendix A for more definitions related to telehealth and telemedicine.) In his keynote address at this workshop (see Chapter 3), Dr. Thomas S. Nesbitt of the University of California, Davis, Health System noted that while the terms *telehealth* and *telemedicine* both describe the use of technology to exchange information to improve a patient's health status, they are often interchanged. He stated that *telemedicine* has typically been used more to describe direct clinical services, whereas *telehealth* has been used to define a broader scope of health-related services (e.g., patient education, remote monitoring). Similarly, the American Telemedicine Association (ATA) states,

> Telemedicine and telehealth both describe the use of medical information exchanged from one site to another via electronic communications to improve the patients' health status. Although evolving, telemedicine is sometimes associated with direct patient clinical services and telehealth is sometimes associated with a broader definition of remote health care services. (ATA, 2012a)

Many of the presenters at the workshop itself interchanged the use of the terms, and this summary does not attempt to regularize the usage of either term. Appendix A defines some telehealth-relevant terminology, as defined by the ATA.

ORGANIZATION OF THE WORKSHOP SUMMARY

In this summary, the presentations at the workshop have been organized into 13 chapters. Following this introduction, Chapter 2 presents the opening remarks of the planning committee chair and the workshop sponsor. Chapter 3 provides an overview of the past, present, and future of telehealth. Chapter 4 considers some of the overarching challenges in telehealth, especially for rural communities. Chapter 5 delves into the issues surrounding the challenges of payment for telehealth. Chapter 6 examines the use of telehealth by a variety of providers in different settings across the health care continuum. Chapter 7 reviews the observations and discussions of the planning committee members as well as other workshop participants at the end of the first day of the workshop.

Chapter 8 discusses the evidence base of telehealth, including challenges

with research design and how evidence can help change policy. Chapter 9 explores the development of newer telehealth technologies. Chapter 10 examines how telehealth is being embraced at the state level. Chapter 11 considers the experiences of the federal government in providing telehealth care. Chapter 12 presents perspectives from the representatives of several stakeholder organizations. Finally, Chapter 13 provides final observations made by planning committee members and workshop participants at the conclusion of the workshop.

Appendix A offers some key definitions for telehealth. Appendix B includes a list of acronyms. Appendix C provides the workshop agenda.

2

Opening Remarks

The workshop opened with welcoming remarks from Karen S. Rheuban of the University of Virginia Health System, the chair of the IOM Planning Committee for a Workshop on the Role of Telehealth in an Evolving Health Care Environment. Dr. Rheuban then introduced the project sponsor, HRSA's Office of Rural Health Policy (ORHP). Dr. Mary Wakefield, HRSA Administrator, gave additional welcoming remarks to set the context for the workshop.

WELCOME FROM IOM PLANNING COMMITTEE

Karen S. Rheuban, M.D.
University of Virginia Health System

For nearly 50 years, telehealth programs have served as innovative tools for the delivery of care, linking patients and providers separated by geographic and socioeconomic barriers, all the while mitigating specialty workforce shortages. Through an explosion of advanced technologies and with significant federal investments in telehealth programs and broadband infrastructure, millions of Americans, and likewise patients around the world, now benefit from care provided through telehealth. Telehealth programs are entirely aligned with the triple aims of the Centers for Medicare & Medicaid Services (CMS): better care, better health, and lower costs. With the passage and recent affirmation of the Patient Protection and Af-

fordable Care Act (ACA),[1] the United States is at a strategic inflection point to further integrate telehealth into mainstream health care.

WELCOME FROM PROJECT SPONSOR

Mary Wakefield, Ph.D., R.N.
Health Resources and Services Administration

Telehealth is a key component in ensuring access to health care services in isolated geographic areas across the United States. More effective deployment of telehealth technologies will enhance our ability to better meet the health care needs of those in rural and frontier parts of the country. However, telehealth is important not just for rural communities, but for any underserved community. This workshop will focus on how we can drive telehealth in an even more robust fashion to improve patient outcomes, and how we can harness telehealth technologies to expand the reach of scarce health resources. That is, how can we capitalize on the promise and the opportunity of telehealth, with an obvious recognition of some of the challenges we have yet to overcome? There is no better time than right now to think about the role that telehealth can play in what is clearly a rapidly evolving health care environment.

When it comes to isolated populations, rural parts of the nation have real challenges. The rural population, nearly 20 percent of the U.S. population, is spread across about 80 percent of the nation's countryside. Rural communities tend to be older, have people with lower incomes, and have higher rates of certain chronic diseases. Rural areas have particular challenges with attracting and retaining health care providers, and some of the smallest hospitals today operate on the thinnest of margins. All of this creates additional barriers for rural populations to obtain health care services in real time. Telehealth applications can be part of the solution.

The Patient Protection and Affordable Care Act

The importance of telehealth and its potential will continue to grow, especially as more and more people in rural and isolated areas across the United States are able to seek a full complement of health care services as a result of some of ACA provisions. As the ACA is more fully implemented, especially as the state-based insurance exchanges come online in 2014, there will be a dramatic increase in the numbers of Americans with health care coverage. The ACA expands insurance coverage in places where it is

[1]Patient Protection and Affordable Care Act, P.L. 148, 111th Cong., 2nd sess. (March 23, 2010).

not frequently found, and some financial barriers to preventive care will be removed (e.g., elimination of copays), putting even more demand on the system. The ACA also focuses on improving health care quality through team-based, patient-centered care; telehealth has a role in linking team members. In addition, the ACA focuses on addressing health disparities and improving public health, both of which are very important to rural areas.

As a result of the ACA, about 16 million Americans living in rural areas no longer face lifetime limits in terms of dollar amounts on their health benefits. Additionally, about half of all of the workers who live in remote communities are employed by small firms that now qualify for tax credits, which can help them provide coverage for their employees. The nation will also be at a critical juncture in terms of the implementation of electronic health records as part of the push toward meaningful use. By 2014, the expansion of community health center infrastructure and investments in the growth of primary care providers will be finishing up.

Advancing Technologies

Telehealth has already started to play an even more important role, especially as we move away from the traditional fee for service system and toward new models of care, including accountable care organizations (ACOs), patient-centered medical homes (PCMHs), and other strategies that focus on outcomes. At the same time, the costs of telehealth technologies are dropping and becoming even easier to use. These technologies are becoming more widely prevalent in the marketplace, more accessible, and consequently, can be adopted more easily than perhaps 5 or 10 years ago. The pace of technological innovation is accelerating, but the cost of innovation is falling.

Advances in technology have important implications for the workforce: both for the cost of health care services and for the availability of health care providers in remote areas. They also have implications for the types of training that health care providers will need in order to acquire proficiency in deploying and using technology. In addition, health information technology–derived information is critical to quality improvement strategies. The data generated by all these technologies may enable the development of quality measures that can contribute to timely and understandable feedback for safety net providers and other members of clinical teams. In this rapidly changing environment, strategies for leveraging these technologies to improve health outcomes will be extremely important, especially to reduce health disparities.

The Role of the Federal Government

The Federal Government and Rural America

The current administration has made rural America a high priority. HHS Secretary Sebelius is a knowledgeable advocate for the unique challenges and opportunities for rural communities and rural health care infrastructure. President Obama created the White House Rural Council, the first council of its type, with an eye toward the economic health of rural communities. This council has been active in advancing many issues, including health care. Additionally, HRSA has worked with CMS and others to engage small rural hospitals for its Partnership for Patients, and rural communities are mentioned in many of the newly funded initiatives in the Center for Medicare & Medicaid Innovation (CMMI).

The Federal Government and Telehealth

HHS has become increasingly engaged with, and invested in, telehealth. Recently, HRSA signed a Memorandum of Understanding with the Indian Health Service (IHS) to develop a joint quality strategy. The IHS has been an innovator in telehealth, given the geographic challenges they face in delivering health care services to the most rural and remote populations. HRSA has also been working closely with CMS to include measures in the proposed rule for stage two of meaningful use that reflect the underserved and vulnerable populations served by HRSA's grantees. These include measures on oral health, behavioral health, rural populations, and maternal and prenatal care. The ORHP has an initiative titled the "Flex Rural Veterans Health Access Program," which is using telehealth to increase access to mental health care services for veterans who are returning from Iraq and Afghanistan to their rural homes. Currently three grantees are being funded through that initiative—Alaska, Montana, and Virginia—all of whom provide mental health services, including crisis intervention, detection of posttraumatic stress disorder, care for traumatic brain injury, and care for other injuries that veterans have suffered. Through the Office for the Advancement of Telehealth, HRSA has also established a series of grant programs to support the development and expansion of telehealth, including a focus on the licensure portability. This includes supporting state professional licensing boards to develop and implement policies designed to reduce the statutory and regulatory barriers to telehealth. In addition, the National Library of Medicine funds a number of projects that are examining how to leverage telehealth to improve health care outcomes.

Others in the federal government are also looking at the opportunities that telehealth offers. The U.S. Department of Defense (DoD) invests

heavily in telehealth. The U.S. Department of Agriculture (USDA) and the Department of Commerce have focused heavily on expanding broadband capacity, which is integral to telehealth utilization. Telehealth is also an area of focus for the White House Rural Health Council (not just through HHS work, but also through the engagement of the U.S. Department of Veterans Affairs [VA] and the Federal Communications Commission [FCC]) to identify ways they can work together on telehealth issues designed to improve access to care for veterans who reside in rural and remote parts of the country.

Looking to the Future

Where do we need to go next? We are well past the point where we need to prove how telehealth applications work. The focus now needs to be on how we can do a better job of harnessing the technology to improve care and to do that as effectively and efficiently as possible, to ensure that telehealth is embedded in the fabric of health care for rural populations. However, this focus raises many questions, such as

- What is or what can be the role of telehealth in a health care system that is predicated on value and improving patient outcomes?
- How should we use this technology in efforts that are designed to improve care coordination?
- What is the role of telehealth in team-based, interprofessional care?
- How can telehealth decrease care fragmentation?
- What can telehealth do to help clinicians work more effectively together and use data in real time for the care of patients and communities?

While there are many challenges going forward, there are also many opportunities. We need renewed thinking on what we need to do to overcome barriers and capitalize on opportunities. We need to think not just about the clinical applications of telehealth, but also telehealth's utility for continuing education, new training opportunities, and distance-based health professions training oversight. Clearly, telehealth can play a role in supporting the health care workforce just as it can help us to be more efficient, particularly in underserved areas. We need to think about what could happen in the long term if we start to put the right pieces in place. A lot of that building is not just from the federal government, but it is what the federal government can be doing in tandem with state governments, private-sector partners, and others. All of the opportunities in telehealth can make a real difference in the health care system in terms of access, quality, and efficiency.

3

The Evolution of Telehealth: Where Have We Been and Where Are We Going?

Thomas S. Nesbitt, M.D., M.P.H.
University of California, Davis, Health System

What is the rationale for telehealth? One of the landmark publications of the past couple of decades, *Crossing the Quality Chasm*, stated, "information technology must play a central role in the redesign of the health care system if a substantial improvement in quality is to be achieved" (IOM, 2001, p. 16). Nowhere is this more true than in rural communities. New knowledge and new science are being developed all the time. When some people have access to that new knowledge and expertise and other people do not, disparities grow. Advances in telecommunication and information technology can help overcome some of these disparities by redistributing that knowledge and expertise to when and where it is needed.

HOME- AND COMMUNITY-BASED CARE

Health care in the home-based setting has a long history. For example, an 1879 article in the *Lancet* talked about using the telephone to reduce unnecessary office visits. In 1925, a cover of *Science and Invention* magazine showed a doctor diagnosing a patient by radio, and within envisioned a device that would allow for the video examination of a patient over distance. Home monitoring developed more fully in the Mercury space program when the National Aeronautics and Space Administration (NASA) began performing physiologic monitoring over a distance. NASA further developed this technology with a pilot with the Papago Indians, the Space

Technology Applied to Rural Papago Advanced Health Care (STARPAHC) project.

The biggest need in home- and community-based care relates to chronic disease. The 100 million Americans with chronic disease account for about 75 percent of health care expenditures. Traditionally, chronic disease has been managed through an episodic office-based model rather than a care management model, which uses frequent patient contact and regular physiologic measurement. More than a decade ago, the VA developed a care management program that offered personalized education, monitoring, and feedback at home from a remote disease management support team. Use of technologies for chronic disease care management has been associated with reductions in hospitalizations, readmissions, lengths of stay, and costs; improvement in some physiologic measures; high rates of satisfaction; and better adherence to medication. Studies of home monitoring programs have shown specific improvements in the management of hypertension, congestive heart failure, and diabetes. However, more and higher-quality studies are needed. In the future there will likely be more laptop-based and tablet-based devices used in the home. In addition, there will likely be even smaller devices used for physiological monitoring. For example, companies are developing wearable wireless devices that can combine an accelerometer, stethoscope, electrocardiogram, and other functions to collect data from continuous monitoring. There may also be watches or rings that can measure blood pressure and heart rate.

Patient preference and acceptability is one challenge in home-based telehealth. Many studies show attrition with the use of these technologies after the pilot ends. More information is needed regarding what kinds of devices people want to use and how much intrusion they are willing to accept in their lives. We also need to determine how to best involve patients and their families in care. Another challenge is to determine how to use off-the-shelf devices (e.g., mobile phones, gaming systems) in care. Furthermore, how can we manage the data flowing in from all these devices and transform it into information that is actionable by a clinician? Many physicians do not have disease management teams, so how does the small rural doctor's office use the data in a meaningful way? Finally, policy changes are needed to enable the use of these technologies.

OFFICE-BASED TELEMEDICINE

Telemedicine has also been used for decades in clinical settings. In 1906, the inventor of the electrocardiogram published a paper on the telecardiogram. Since the 1920s, the radio has been used to give medical advice to clinics on ships. Alaska has been a model for the development and use of telemedicine for decades. For example, community health aides in small

villages can perform otoscopy and audiometry, and the information can be sent to specialists in Anchorage or Fairbanks to make the determination of whether a patient needs to travel to the specialist for more definitive treatment. Today, we think of office-based telemedicine as flat-screen, high-definition units with peripheral devices that can aid in physical examination of the patient. There are a lot of these units out there, all of which do not talk to each other, and some of which use proprietary communications methods. If telemedicine is to become as ubiquitous as the telephone, communications standards will be needed.

Store and forward (S&F), or asynchronous, technologies have been a great advance. For example, in ophthalmology and optometry, non-mydriatic cameras can be used to perform retinal screenings in diabetics without needing to dilate the eyes; this has increased screening rates. Teledentistry has been used to by dental hygienists and dentists to improve access to oral health care. Dermatology and psychology are two of the biggest areas for telemedicine. Since the 1990s, studies have shown high rates of agreement between diagnoses made in person and diagnoses made via teledermatology. Other studies of teledermatology show high satisfaction rates and no delay to definitive care. However, barriers to its adoption by dermatologists have a lot to do with reimbursement. Similarly, studies show good agreement between diagnosis and treatment plans with in-person mental health care and those developed using telehealth technologies; these studies also show high satisfaction rates, even among parents of children with psychiatric illness. Telemedicine equipment will continue to evolve. For example, there is already an otoscope that connects to an iPhone. Also, there will be more integration of telemedicine and decision support systems into electronic health records.

Office-based care has many challenges and opportunities in the future. For example, what is the best use of nontraditional providers? How do we use new telehealth models that build community clinical expertise? Can we improve interfaces, such as through high-definition or three-dimensional images? How can we use less-costly equipment such as handheld devices (e.g., smartphones)? We need to continue to develop evidence-based standards for care, and determine reimbursement models that can support telemedicine to rural and remote communities.

ANCILLARY TELEMEDICINE SERVICES

Teleradiology

Teleradiology has been used for at least 60 years. In the past, film was passed through a digitizer; now most systems use direct digital capture, which allows images to be read overnight in other countries. Radiolo-

gists have promoted the Digital Imaging and Communications in Medicine (DICOM) standard for transmitting and storing data. By the late 1990s, studies showed that teleradiology reduced transports for head injuries out of rural areas and that the availability of teleconsultation with a radiologist significantly affected diagnosis and treatment plans.

Telepathology

Telepathology is less common than teleradiology, but digitization of pathology slides is becoming much more common. These are very large files, which require the ability to view color images under different magnifications. A lot of people were concerned about moving these large files across firewalls, but now a number of models being developed have the image sitting on a server and the image can be viewed over distance without needing to be moved. Studies have shown the value of telepathology. One study demonstrated that a specialist pathologist via telemedicine was better than a staff pathologist onsite. In 74 percent of cases, the diagnosis was more precisely done (Liang et al., 2008).

Telepharmacology

Pharmacy has been practiced over distance for a long time. Telepharmacy is facilitated by computerized physician order entry, remote review, and even remote dispensing. Combining that with video, being able to review medications, and conducting a video consultation with a patient allows the whole pharmacy visit to occur over distance. In one recent study on 47 cancer patients, 27,000 miles of travel were saved because of telepharmacy (Gordon et al., 2012). Another study of six rural hospitals showed that with telepharmacy, about 19 percent of patients had one or more medication errors that were picked up by the remote pharmacists (Cole et al., 2012).

HOSPITAL-BASED TELEMEDICINE

Probably one of the earliest and most famous uses of hospital-based telemedicine was in the late 1950s and early 1960s when a closed-circuit television link was established between the Nebraska Psychiatric Institute and Norfolk State Hospital for psychiatric consultations. Hospital-based telemedicine is growing quickly in two areas: stroke care and care in the intensive care unit (ICU). Evidence shows that with good imaging, high-quality stroke exams can be done over distance. Although the literature on tele-ICU has been mixed, recent studies indicate associated reductions in

length of stay, mortality, and costs. However, the specific elements of tele-ICU that make a difference are not clear.

A number of devices are being used in inpatient setting as well as in skilled nursing facilities. Telemedicine reduces avoidable visits to emergency departments for skilled nursing patients. Some rural skilled nursing facilities exist in communities that do not have physicians, and getting physicians there urgently can be a challenge. Recent studies show strong evidence of clinical benefit and savings with increased use of telehealth in nursing homes, and that families and nursing home personnel were very positive about the use of telepsychiatry for geropsychiatric care.

Looking toward the future, telesurgery has been used on a small scale. Future challenges and opportunities include determination of the key beneficial elements of tele-ICU and how it can be tailored to smaller hospitals. In terms of development, a lot of the expansion of hospital-based telemedicine has been with for-profit companies offering stroke and ICU care to hospitals that can afford those models. How can we build incentives to expand those models, so either private companies or public institutions can afford to offer these services in rural communities? Also, as payers stop paying for readmissions, there may be more incentives for the use of telemedicine in skilled nursing facilities. Finally, telementoring and telerobotic surgery may increase as a method to capitalize on experts' technical skills and knowledge.

CONCLUDING REMARKS

Nesbitt concluded that advanced telecommunication and information technologies have a role to play in transforming the health care system. Evidence-based models facilitated by these technologies can improve access to and quality of health care across the geographic and economic spectrum. To date, we have been attempting to layer these technologies onto a health care system that does not have the necessary incentives. However, the passage of ACA and other policy changes can help facilitate this transformation. Overall, more research is required to develop appropriate quality standards in all these areas of care.

4

Challenges in Telehealth

A panel of experts discussed the scope, applications, process, structure, and capacity issues faced in telehealth. This included an overview of the common challenges of telehealth, issues in licensure, the FCC Rural Health Care Support Programs, and issues with the misalignment of definitions of *rural* and how it is operationalized programmatically and financially within today's health care system. The following sections reflect the individual speaker's comments and reflections.

OVERVIEW OF COMMON CHALLENGES

Jonathan Linkous, M.P.A.
American Telemedicine Association

When the ATA started in 1993, telemedicine largely consisted of hub and spoke networks based out of tertiary care or academic medical centers. Today it is a quite different picture. Every year in the United States, about 10 million patients receive telemedicine services. In most of those cases, the patients do not know that telemedicine is being used. This is a sign of success, but it is also a sign of how telemedicine has been absorbed into many health care networks. There are "seven deadly barriers" for telemedicine: money, regulations, hype, adoption, technology, evidence, and success. Some of these are shared with health care in general and some are new kinds of barriers that accompany the transformation of health care by telemedicine.

Money

Reimbursement is commonly cited as a major barrier for telemedicine. About 90 million people are in managed care systems, yet there is not much evidence about managed care organizations using telemedicine to control costs. Additionally, Medicare does not reimburse very much in the fee-for-service system, and that reimbursement is largely limited to nonmetropolitan areas, to certain institutions, and to certain current procedural terminology (CPT) codes. Many of these restrictions result from fears that telemedicine either will allow providers to abuse the health care system or will lead to overutilization and drive up costs. A lot of technology companies that are not fully informed about the health care market are getting involved in telemedicine because they see large financial opportunities. As a result, many technologies are being produced by people who are attracted to the potential market of health care without really understanding the applicability of telemedicine.

Regulations

Licensing was a minor issue when the ATA was formed, because most telemedicine systems operated within a single state. Today there are multistate systems with multistate practices. As most of the major health care providers move into a national system, licensure is becoming a bigger barrier. Practice regulations may be an even larger barrier than licensure, as many state medical boards require an in-person consultation before initiation of any telemedicine services. In fact, the American Medical Association recently proposed a resolution to the same effect, and federal legislation has also been proposed. Telemedicine also often encounters barriers with traditional regulatory agencies (e.g., the Food and Drug Administration [FDA], the FCC). Finally, another major barrier to the use of telemedicine is Section 1834(m) of the Social Security Act,[1] which limits the use of telemedicine to certain providers.

Hype

We are victims of our own hype. We tend to talk about studies and all the wonderful things that telemedicine can do, but a lot of studies show that some applications of telemedicine do not work or cost too much. To move telemedicine forward, we have to be realistic about what works and what does not.

[1]Social Security Act, § 1834(m).

Adoption

Health care providers sometimes resist innovation in telemedicine because it creates competition. Individual providers may resist solutions to licensing barriers because they do not want competition from another state's telemedicine network. This resistance is even greater with the development of nationwide networks.

Technology

Technology has been the focus of telemedicine for a long time. However, telemedicine is really about the services—where they can be provided and how they change people's lives—and not about the uniqueness of the newest piece of technology. Additionally, the implementation of multiple technologies may create huge data flows that are not useful or easily maintained (e.g., continuous monitoring of temperature and blood pressure).

Evidence

Some applications of telemedicine show great progress, but other areas lack large studies, or require synthesis of existing studies to evaluate their value. For example, some large payers are ready to implement telemedicine, but more evidence is needed regarding cost savings.

Success

Telemedicine is becoming part of the business plan of many hospitals. Telemedicine is also moving into urban areas because that is where the people are. As a result, we need to think about what happens to the rural networks and rural populations. Telemedicine networks are expanding ICUs and capabilities for stroke care, but many of these are independent networks, and isolated from the traditional telemedicine networks. Are they competing or are they a part of it? Are independent teleradiology firms working with the hospital or are they competing? Finally, applications of mobile telehealth (mHealth) have a lot of potential, but may not be embraced by traditional health care providers.

LICENSURE

Gary Capistrant, M.A.
American Telemedicine Association

Capistrant began with the premise that licensure should be more patient centered in order to address not just the mere license, but also some of the discrepancies and practice issues that vary from state to state. There are many issues related to professional licensure. First is that the population is incredibly mobile. Individuals travel across state lines on a daily basis, and telehealth facilitates the dissolution of the barriers of distance and geography.

Second is patient choice. Multistate health care systems let patients choose which providers they want to go to, no matter where they live. This is especially important for access to specialists. Twelve states have less than 2,000 specialists, and 11 states have less than 11 specialists per 10,000 population. Would it be right to limit individuals in those states just to the provider pools within their own states? Three states are on both of these lists: Idaho, Montana, and Wyoming. This is especially a problem for people with special needs, such as in the care of rare diseases (diseases that affect less than 200,000 Americans). What kind of access does somebody with one of those diseases have in rural or underserved areas? Where would you go if you needed a pediatric cardiologist who spoke Spanish or knew sign language?

A third issue is that the current system does not encourage provider productivity. In the short term, we cannot dramatically affect the number of health care providers, but we can do something about the productivity of their time and resources. Increasingly, multistate plans deliver health care, whether it is a managed care plan or an ACO, in order to provide more care options.

Licensure raises many other questions for telehealth. For state practice acts, is telemedicine sufficient to meet doctor-patient relationship requirements? When is a medical exam involved? What can you do with prescribing? Also, many Americans live along the 22,000 miles of state borders in this country, and the closest health care provider is in a different state. While many health care providers have multiple state licenses, this comes with a high cost. Reciprocity is one solution, but some states will not even allow for a physician to talk to another physician without being licensed in that other state. Some states have developed a telehealth license, but this is not a good long-term solution. Telehealth should not be separate; it is not a specialty of medicine.

Federal health care programs should not be hindered by state law in the same way the federal government has authority to deal with interstate com-

merce. The first article of the Constitution indicates that the states agreed to give Congress the power to regulate interstate commerce. Later, an amendment gave the states the authority to deal with intrastate commerce. This has been used to address exceptions for health care providers in federal agencies (e.g., DoD, VA) needing multiple state licenses. In December, Congress unanimously approved an expansion for the DoD that extends a license in one state to all other states (just as you need only one license to drive). That model is being used in another proposal for the VA, and could be used for other federal agencies, federal health programs (e.g., Medicare, Medicaid), and federally funded sites like community health centers.

BROADBAND CONNECTIVITY

Dale C. Alverson, M.D.
University of New Mexico

This country needs ubiquitous, adequate, affordable broadband to support telehealth and health information exchange in order to increase access to quality care for all individuals at the right place and the right time when it is needed. This can improve access to care, lead to better health outcomes, and reduce costs. Yet, significant gaps in access to broadband remain, particularly among rural and underserved populations. Access to broadband is also necessary for other community and individual needs in education and training, economic development, and government. Major public health issues impact rural communities and their economic development, in part due to a lack of access to health care services. Telehealth technologies play a major role in helping individuals and their health care providers to better manage health.

In 2010, the U.S. Government Accountability Office reported on the lack of good data on the impact of FCC programs (GAO, 2010). Millions of dollars have been invested in broadband, but its value needs to be demonstrated. The FCC has three rural health care programs that are managed by the Universal Services Administrative Company (USAC). First, the rural urban rate discount permits rural communities to only pay as much as the largest city in their area. Second is the Internet subsidy, which provides 25 percent of the cost of Internet. Third is the Rural Health Care Pilot Program (RHCPP) in which USAC provided coaches for the individually funded projects involved in the establishment of broadband health care networks.

In 2010, the FCC issued its National Broadband Plan (www.broadband.gov) that reviews the potential value of broadband-enabled health information technology (IT); provides an overview of the current health IT use in the United States; and issues recommendations such as better reimbursement, modern regulation, increased data capture and usage, and sufficient

connectivity. In July 2010, the FCC issued a notice of proposed rulemaking related to their rural health care programs. In July 2012, the FCC requested more input about how these programs might be improved.

Rural Health Care Pilot Program

The RHCPP was established by the FCC to help public and nonprofit health care providers deploy a state or regional dedicated broadband network, with the ultimate goal of creating a nationwide broadband network dedicated to health care. In 2007, the FCC initially announced 69 projects, for a total of $417 million, to be distributed over 3 years. To date, only 50 projects remain.

One such project, the Southwest Telehealth Access Grid, analyzed the strengths, weaknesses, opportunities, and threats of the RHCPP. Strengths include that it is a great idea to design, construct, and operate broadband to support telemedicine and health information exchange as a means to increase access to health care. Weaknesses mean the process did not work well—it was cumbersome, required two 1-year extensions, and several projects dropped out. Also, there is inadequate evaluation of the benefits, and there was poor coordination with other federal programs. Opportunities include the ability to improve and streamline the process to make it more user-friendly and timely. Finally, threats include incomplete implementation, persistent gaps in broadband coverage, inability to demonstrate the value of broadband, wasting of funds, and lack of sustainability.

Potential Next Steps

In order to advance broadband networks for health care, Alverson said that efforts in coordination, cooperation, and collaboration will be needed across multiple programs and initiatives. This includes federal programs, private initiatives, and international efforts. He suggested that one step in that direction could be the formation of a transdisciplinary advisory board that includes public- and private-sector representatives. In addition, he said, processes need to be streamlined and common network design is needed for state, regional, and national initiatives. Assessment is needed to determine and fill gaps in broadband connectivity. Finally, he asserted that the development and implementation of evaluation metrics is needed to promote the adoption and use of broadband, and to definitively demonstrate its value.

THE DEFINITION OF RURAL

Steve Hirsch, M.S.L.S.
Health Resources and Services Administration

Many federal entities are involved in defining *rural*, including the U.S. Census Bureau, the Office of Management and Budget (OMB), the USDA's Economic Research Service (ERS), and the Office of Rural Health within HRSA.

The Census Bureau

The U.S. Census Bureau has never defined *rural*; instead, it defines *urban*, and everything that is not urban is therefore rural. About a century ago, the U.S. Census Bureau defined *urban* as any incorporated place that had at least 2,500 people. Around 1950, recognizing that suburbs were growing up around cities, it expanded the definition to include suburbs, ignoring the borders of the incorporated places. The U.S. Census Bureau defines two kinds of urban areas: urbanized areas and urban clusters. *Urbanized areas* have a core population of at least 50,000 people, and *urban clusters* have a core population of 2,500 to 50,000 people. Generally, urbanized areas need a population density of at least 500 people per square mile, or fewer than one person per acre. However, this cutoff may therefore consider some suburban areas as non-urban, even though they are in close proximity to urban areas.

In 1900, the majority of the U.S. population lived in rural areas, but this has been steadily declining (see Figure 4-1). Census data show that between 2000 and 2010, most of the population growth in the United States was in urban areas. According to the 2010 Census, for the first time, less than 20 percent of the U.S. population resided in rural areas. The density of the entire U.S. population is about 87 people per square mile, but the density of the urban population is more than 2,500 people per square mile. More than 80 percent of the U.S. population lives on less than 5 percent of the total land area. However, about 60 million people still live in rural areas.

The Office of Management and Budget

The OMB defines *core-based statistical areas* based on the population of individual counties. *Metropolitan statistical areas* have a core urban area of at least 50,000 people, while *micropolitan statistical areas* have an urbanized core of at least 10,000 but fewer than 50,000 people. Like the U.S. Census Bureau, the OMB does not formally define *rural*. About 35 percent of U.S. counties are considered metropolitan, accounting for nearly 84 percent of the U.S. population. Ten percent of the U.S. population

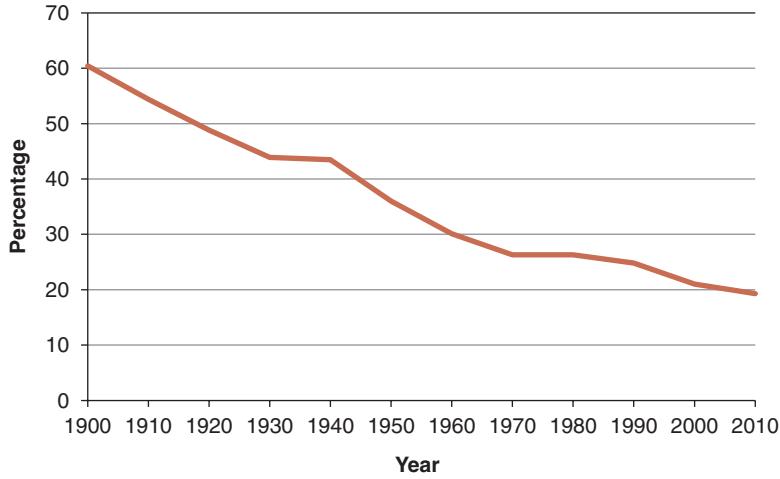

FIGURE 4-1 Rural percentage of U.S. population.
SOURCE: U.S. Census Bureau (2012).

resided in micropolitan counties, while just over 6 percent were in neither micropolitan nor metropolitan counties.

This consideration of whole counties facilitates distinction of metropolitan counties, micropolitan counties, and counties without an urbanized core. However, these definitions still create problems. For example, Coconino County in Arizona, which includes the Grand Canyon, is considered a metropolitan area because of the density of the population in the southern part of the county. Just as the U.S. Census Bureau's definitions might lead to suburban areas being considered rural, OMB's definitions include a lot of rural areas within the boundaries of a metropolitan county.

The Economic Research Service

To classify populations, ERS uses 9 Rural-Urban Continuum Codes (see Table 4-1) and 12 Urban Influence Codes (see Table 4-2) to divide both metropolitan and nonmetropolitan counties based on size or proximity to a metropolitan (metro) area.

Additionally, ORHP and ERS have worked together to develop rural-urban commuting area (RUCA) codes, which are based on subcounty units (see Table 4-3). This coding system takes functional relationships (e.g., commuting flows), population, and population density into account. A zip code approximation of these tracts was developed so that health care researchers can compare zip code data with its RUCA code to determine if that area is considered rural, micropolitan, or metropolitan.

TABLE 4-1 Rural-Urban Continuum Codes

Code	Description
Metropolitan Counties	
1	Counties in metro areas of 1 million population or more
2	Counties in metro areas of 250,000 to 1 million population
3	Counties in metro areas of fewer than 250,000 population
Non-Metropolitan Counties	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
7	Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area

SOURCE: USDA (2012b).

TABLE 4-2 Urban Influence Codes

Code	Description
Metropolitan Counties	
1	In large metro area of more than 1 million residents
2	In small metro area of less than 1 million residents
Non-Metropolitan Counties	
3	Micropolitan area adjacent to large metro area
4	Non-core adjacent to large metro area
5	Micropolitan area adjacent to small metro area
6	Non-core adjacent to small metro area and contains a town of at least 2,500 residents
7	Non-core adjacent to small metro area and does not contain a town of at least 2,500 residents
8	Micropolitan area not adjacent to a metro area
9	Non-core adjacent to micro area and contains a town of at least 2,500 residents
10	Non-core adjacent to micro area and does not contain a town of at least 2,500 residents
11	Non-core not adjacent to metro or micro area and contains a town of at least 2,500 residents
12	Non-core not adjacent to metro or micro area and does not contain a town of at least 2,500 residents

SOURCE: USDA (2012c).

TABLE 4-3 Rural-Urban Commuting Areas

Code	Description
1	Metropolitan area core: primary flow within an urbanized area
2	Metropolitan area high commuting: primary flow 30% or more to an urbanized area
3	Metropolitan area low commuting: primary flow 5% to 30% to an urbanized area
4	Micropolitan area core: primary flow within a large urban cluster (10,000 to 49,999)
5	Micropolitan high commuting: primary flow 30% or more to a large urban cluster
6	Micropolitan low commuting: primary flow 10% to 30% to a large urban cluster
7	Small town core: primary flow within a small urban cluster (2,500 to 9,999)
8	Small town high commuting: primary flow 30% or more to a small urban cluster
9	Small town low commuting: primary flow 10% to 29% to a small urban cluster
10	Rural areas: primary flow to a tract outside an urbanized area or urban cluster

SOURCE: USDA (2012a).

Office of Rural Health Policy

ORHP defines all nonmetropolitan counties in the United States as rural. In addition, ORHP looks for RUCA tracts inside metropolitan counties. This adds up to about 60 million people being considered rural, which is near the U.S. Census Bureau's estimation. ORHP also estimates that about 91 percent of the U.S. land area is rural; this is less than the estimation by the U.S. Census Bureau, and more than the estimation of the OMB. Finally, the ORHP has a new definition for *frontier*. Just like the RUCA codes, *frontier* has several categories, based on population and travel times to different sizes of urban areas.

REACTION AND DISCUSSION

Moderator: Spero M. Manson, Ph.D.
University of Colorado Denver

An open discussion followed the panelists' presentations. Manson began the session by noting that we have invested in defining *rural* from a policy point of view, but that we might need to consider whether *rural*

may actually be a symbol for isolation. Thinking of food deserts[2] within urban areas, he suggested thinking about isolated communities rather than rural versus urban. Next, he commented on the discontinuities among the different kinds of networks that have emerged nationally, regionally, and internationally, as well as the challenges of bringing them together. Finally, Manson noted that the idea of a driver's license that works in every state is an interesting precedent for rethinking the notion of licensure at both the state and federal levels, adding that practice standards, scopes of practice, and other regulatory issues are increasingly polarizing stakeholders. Audience members were then able to give comments and ask questions of the panelists. The following sections summarize the discussion.

Defining *Rural*

One participant commented on the need to more accurately define *rural*, giving the example of San Bernardino County, which is 20,000 square miles and includes the Mojave Desert, yet is defined as metropolitan. Hirsch stated that rather than focusing on definitions of *rural*, more concentration should be placed on the broadband coverage necessary to serve all individuals. Hirsch added that no definition is perfect, and asserted that the ORHP's current definition works well. He added that the new definition of *frontier* will be especially helpful for identifying areas that are truly isolated and need greater help in connecting to health care. The participant further remarked on the need to address limitations on reimbursement solely to rural areas, as it impedes the ability of telehealth to reach all underserved populations. Capistrant agreed that geographic location should be irrelevant in health care, and these provisions need to be removed in both Medicare and Medicaid. He further noted that limitations of coverage may prevent an area from having an adequate population base on which to create a sustainable telehealth network.

Alternative Providers

One participant mentioned that the ACA promotes the use of new and different types of health care providers that may be lower cost, more efficacious, and particularly amenable to telehealth. She further noted Section 2706, a nondiscrimination section of the law. Capistrant agreed this is one of many solutions to licensure and productivity issues.

[2]Food deserts are "low-income census tracts with a substantial number or share of residents with low levels of access to retail outlets selling healthy and affordable foods" (Ver Ploeg et al., 2011, p. 46).

The Potential of Telehealth

Alverson stated that telemedicine will have an important role navigating a combination of major issues: the ACA remains very controversial, there is an economic downturn, the current health care system is not sustainable, care demand is on the rise, the population is aging, and there is a significant shortage of health care providers of all kinds. Alverson also stated that telehealth will enable the integration of all types of health care, including behavioral health.

One participant commented that telemedicine will likely be driven by vendors or big businesses. Alverson commented that telehealth has to be driven by needs. He noted that his home state works collaboratively with communities (including health care providers) to address what the community itself sees as the most important health needs. He further described New Mexico's Health Extension Rural Offices, patterned after the agricultural rural offices that help farmers understand best practices, to look at best local practices in health care.

Another participant asked about the use of Geospatial Informational Systems mapping to look at smaller communities. Alverson stated this will be important for a variety of public health issues (e.g., pandemic flu, seeing where patients with diabetes reside) in order to redirect resources. Linkous commented that as systems are consolidated and networks are broadened, the number of independent rural health providers will be likely to decline, and that technology will be critical to link in health care providers in rural areas to the other parts of the network.

Payment

Linkous suggested that some providers embrace telehealth because they can see more patients in the same amount of time, yet want to be paid at the same rate as in-person care. He said that because of these efficiencies, perhaps the payment rate should not be the same as in-person care, but noted the issue is extremely sensitive. Physician payment might be the most important challenge in telehealth, even more than licensure, Linkous asserted. Another participant mentioned that a recent IOM study on geographic payment adjustment for Medicare payment called for changes in payment policy on telehealth. She added that the committee saw the availability of telehealth as a matter of equity of access to care, and also that the committee made recommendations on scope of practice, seeing that as a matter of efficiency and access for Medicare beneficiaries.

Federal Communications Commission

One participant commented that the FCC Rural Health Pilot was "an absolute mess." Another participant working for the FCC urged participants to file comments in line with the recent public notice. She added that when the notice of proposed rulemaking was issued in 2010, many of the pilot projects were not fully off the ground, and now have more questions. She further added that there is a strong commitment to reform of the programs. Alverson said that everyone needs to work collaboratively toward realistic solutions and shared goals, and that the FCC plays a huge role in achieving adequate broadband connectivity in this country.

Levels of Evidence

One participant related the story of a study that aimed to look at both clinical and the financial benefits of home telemonitoring for elderly congestive heart failure patients. She noted that the randomized controlled trial (RCT) was difficult because of delays in institutional review board approval. Furthermore, many patients would not enroll because they knew about home telemonitoring, and did not want to risk being in the control arm and not receive the technology. When she asked what level of evidence is necessary to speed up the adoption of telehealth technologies, Linkous recommended focusing on cost savings instead of patient satisfaction surveys.

5

Telehealth and Payment

A panel of experts discussed issues related to telehealth and payment. This included a look at Medicare policy for coverage of telehealth services, especially for rural Medicare beneficiaries; the challenges of traditional payment models for telehealth; the perspective of private payers; and innovations in payment. The following sections reflect the individual speaker's comments and reflections.

MEDICARE

Jeff Stensland, Ph.D.
MedPAC

A recent study of rural health care from the Medicare Payment Advisory Commission (MedPAC) looked at Medicare and telehealth to get an understanding of how far it is expanding, why it is expanding, what is promising, and what has been disappointing. In health care, all stakeholders strive to increase patient access and to improve the quality of care. However, while some (e.g., government, payers) want to constrain costs, others (e.g., providers) want to make a profit. All of these desires need to be met in order for telehealth to expand.

Medicare seeks to improve access to care for isolated beneficiaries. About 7 percent of rural Medicare beneficiaries travel an hour or more to receive care. Telehealth could improve access for these beneficiaries. However, Medicare only covers certain services for rural beneficiaries via

interactive videoconferencing between the beneficiary at a certified rural site and a distant practitioner.

Medicare Policy

Between 1999 and 2001, there was a big shift in Medicare policy. The initial payment policy required two providers (one with the patient at the originating site and one at the distant site for consultation), and the payment was split (75-25). There was little telemedicine at that time in part because of the lack of profitability. In 2001, the requirement for a provider at the originating site was removed. In addition, payment was changed so that the distant provider received the entire payment (according to the fee schedule rate), and a separate payment was added for the originating site—currently, $24. For the distant provider, this payment is equal to what it would make in a face-to-face visit, even though the costs may not be the same. It is important to note, however, that now the total payments are higher. Any discussion of expanding telemedicine widely must consider how much more those visits will cost the taxpayer, not only on an individual basis, but on a number of visits.

Telehealth in Medicare Today

Today, telehealth services are not used much in Medicare. Medicare only pays about $6 million annually for telehealth services. In 2009, about 14,000 beneficiaries had one or more telehealth visits. In 2009, there were about 40,000 telehealth visits, but less than 30,000 bills from the originating site. In part this may be because the originating site was in a patient's home, which is not a recognized provider site under Medicare.

In 2009, only 369 practitioners provided 10 or more telehealth services to Medicare beneficiaries, and most of these were mental health services. There are many possible reasons for these low usage rates. For example, extra time may be required for the telehealth visit. Some specialists (e.g., dermatologists, cardiologists) may think their income will be higher by performing procedures during that time. They may already be so busy with face-to-face patient loads that they do not perceive the need to add more patient populations. Also, any additional administrative cost might be another hindrance.

Psychologists, psychiatrists, and clinical social workers accounted for 49 percent of the health care professionals who provided 10 or more telehealth services in Medicare. Physician assistants, nurse practitioners, and clinical nurse specialists accounted for 19 percent of the practitioners, and family medicine and internal medicine physicians accounted for 7 percent. This is somewhat surprising since telehealth is largely promoted as a mo-

dality to receive specialty care. Nephrologists accounted for 4 percent of practitioners and 22 percent were "other" practitioners, such as cardiologists, neurologists, and dermatologists.

Promising New Telehealth Uses

One promising new use of telehealth is telepharmacy. Telepharmacy might be especially important to improve access to and quality of care for critical access hospitals that do not have a pharmacist on staff, or for towns with less than 1,000 people that cannot support a freestanding pharmacy. Additionally, this would not cost the insurer any extra money. MedPAC interviews with individuals running telepharmacy programs found that none of the pharmacies were receiving grant funds other than start-up funds. These programs made enough profit off the additional prescriptions they sold to cover the cost of the pharmacy technician located in the small town, and the additional cost of the consulting pharmacist.

Tele-emergency care and tele-ICU care represent other opportunities for a specialist to consult with another practitioner who is attending to a patient. For example, in some critical access hospitals, there is not a physician or registered nurse on-site. Tele-emergency care may provide that less-trained practitioner access to an emergency department (ED) physician who can help guide the practitioner to stabilize the patient.

Remaining Questions

Early on, the reduction in patient travel times was considered a motivator for telehealth adoption. An interesting research question would be to look at the trade-offs between the physician's time and the patient's time. For example, if telehealth technologies add time to the physician's work time, either through technical difficulties or administrative requirements, physicians may resist adoption of the technology. This could be compared to how patients (and their employers) value time as it relates to travel time. However, today, the greater motivator for telehealth adoption is probably more about improving quality of care than saving time. Another area for research is to assess reasons why providers have abandoned the use of certain telehealth technologies. Medicare has 12 years of claims data for every physician who has provided telehealth services. Some questions might include, Did you think it did not work? Were the administrative barriers too big? Was it cutting into profitability? Knowing more about why things failed could ultimately lead to more adoption of these technologies.

TRADITIONAL PAYMENT MODELS AND REGULATION

Karen E. Edison, M.D.
University of Missouri Health System

As part of the Medicare, Medicaid, and SCHIP[1] Benefits Improvement and Protection Act of 2000,[2] constraints were put on the expansion of reimbursement for telehealth in the Medicare program in order to get the legislation passed. Today those constraints are prohibiting the further expansion of telehealth. Both Medicare and Medicaid place constraints on the types of providers that can deliver telehealth services (e.g., licensure and credentialing requirements), the allowable originating sites, and the eligible services. For example, Medicare reimburses for live, interactive telehealth if the patient is in a nonmetropolitan statistical area. It also covers S&F telehealth in Alaska and Hawaii. Medicaid covers live, interactive telehealth in 45 states and S&F services in 16 states. Fifteen states have laws that mandate private payers cover telehealth, but many private payers are covering these services even without mandates. Additionally, meaningful use requirements place some additional pressures on telehealth.

Barriers

Fears

One barrier to the coverage of telehealth is the fear of liability for medical malpractice. Many community health centers and critical access hospitals are afraid to let remote providers see patients who are not already patients within those facilities. This is largely because as far as Medicare is concerned, care is provided where the patient is, not where the provider is. The centers and hospitals worry they will be liable for these new patients. There are other unfounded fears in telehealth. For example, early on, many were fearful of fraud and abuse, which did not come to pass. Furthermore, some independent providers fear being replaced by larger network practices. Health care for most Americans is a local or regional effort of providers who refer based on relationships. Telehealth will not replace these needed providers.

[1]State Children's Health Insurance Program.
[2]Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000, P.L. 554, 106th Cong., 2nd sess. (December 21, 2000).

Definitions

The definition of *rural* (see Chapter 4) as it relates to payment is another barrier. Variations in the definition can lead to patients falling in and out of coverage due to changes in whether, by definition, the patient is considered to live in a rural area. Additionally, many definitions include consideration of the proximity of urban areas. Restriction of telehealth coverage to rural populations alone may prevent some Medicare beneficiaries who are unable to travel from receiving necessary care merely because they live within a certain distance of an urban area.

Credentialing and Privileging

Originating site hospitals can accept the credentialing and privileging decisions of the distant site hospital. However, hospitals have to change their bylaws to allow for such credentialing by proxy. Alternatively, applying for privileges at each originating site can be very costly and time consuming for telehealth providers.

Potential Solutions

Instead of restricting telehealth coverage to specific patient populations, providers, sites of care, and services, Edison suggested that telehealth should simply be treated the same as in-person care. If you drive to see a doctor, the care is delivered where that doctor is; just because technology takes you there should not be any different. Agreement that the service is provided at the location of the provider would solve many problems, including some privileging and credentialing issues, licensure issues, and fears of liability.

Edison said the major barrier to the widespread use of telehealth technologies is the traditional reimbursement model, which lacks incentives for providers. Many physicians already have full schedules and receive higher reimbursement for procedures than for consultations. Others see telehealth as a mission-based activity to serve the underserved. Also, health care professionals lack training and mentoring in telehealth. Overall, Edison said, many things can support the adoption of telehealth, such as provider payment reform, integrated care, meaningful use, and a mature electronic health information exchange environment.

PRIVATE PAYMENT

Manish N. Oza, M.D.
Wellpoint Comprehensive Health Solution

Health care is complicated. Finding a provider is challenging, wait times are long, and distance can be a barrier to accessing care. Telehealth models such as online care can be simple and fast. For example, video chat is enticing—it is user-friendly and accessible, as a patient is able to log on anytime from anywhere, which is something that consumers want. Patients should be able to quickly pick a trusted provider. Providers should be able to e-prescribe and order radiologic and laboratory tests that can be done before determining if a face-to-face visit is necessary. However, for a variety of reasons, not all providers are ready to embrace telehealth.

There are many incentives for covering telehealth. Telehealth has the potential for cost savings, but attention is also needed to ensure there is no abuse. It also has potential for increasing productivity because patients will not need to leave work for long periods of time to consult health care providers. These types of savings and increases in access are especially appealing to employers. The PCMH model creates incentives for providers to ensure their patients are not readmitted to hospitals or having unnecessary visits to the ED. Engagement of patients in disease management strategies is challenging, but providers might be able to work with their patients over the Internet to discuss health promotion and to reconcile medications. Additionally, there is consumer demand. According to Anthem's market research, 74 percent of their consumers said they were likely to use online services. Payers need to prepare by finding the right providers who are ready to embrace these approaches, as well as having enough providers to meet this demand.

Healthcare in Your Hand was a pilot at Anthem, which leveraged case management via the web. The initial feedback was positive and engagement rates were higher than normal. The program highlighted some interesting challenges, such as the fact that members liked seeing the nurse's image via video, but did not like the nurse being able to see them. Additionally, because many of these nurses worked from home, questions arose as to whether she needed to wear a uniform, or if a backdrop was needed to prevent patients from seeing into the nurses' homes. These types of details are not considered until programs enter implementation phases.

Ultimately, payers want their members to be healthier and have the ability to access health care when and where they want, the way they want. One challenge is the integration of data (e.g., multiple devices monitoring vital statistics). Can all of this data be integrated into an electronic health record? Could researchers eventually mine that data for information on

metrics and quality? Other challenges include costs, determination of the types of services that are best served by the different telehealth modalities, and the potential for patients to "shop" for different providers until they get the exact care they want (e.g., prescriptions). Finally, many laws restrict the use of telehealth, such as states that require face-to-face encounters for writing prescriptions. Overall, we need to find the modalities that will save money and increase quality, and find the providers who are willing to embrace this kind of health care.

CENTER FOR MEDICARE & MEDICAID INNOVATION

Linda M. Magno, M.P.A.
Centers for Medicare & Medicaid Services

The existing health care delivery system is fragmented, uncoordinated, unsupportive of both physicians and patients, and ultimately unsustainable. In spite of this, we like to think we have the best care in the world because people come from around the world to be treated here. In particular instances you can find the best care in the world, but this is not true of the system as a whole. CMMI is charged to move toward a future delivery system that is more affordable and accessible, provides seamless and coordinated care of high quality, is person- and family-centered, and supports clinicians in serving their patients' needs. CMMI looks for innovations that produce better care at the point of delivery through the identification and dissemination of best practices, better outcomes of care through incentives like measurement and public reporting, and lower total per capita costs of care through restructuring incentives to reward value over volume.

Typically telehealth includes encounter-based telemedicine (i.e., real-time encounters between patient and physician with each in a different location) and remote patient monitoring (i.e., the transmission of information about and from patients on an ongoing basis to his or her physician to permit ongoing monitoring and adjustment of care around one or more conditions). Myriad devices offer remote monitoring for things like vital signs, medication adherence, and detection movements (e.g., falls). In addition, there is an explosion of applications for smart phones and mobile devices. As these devices become more common and as the users of these devices age, there will likely be more demand for mobile health applications related to self-care management.

For reimbursement, we need to consider who the consumers are for all the information these technologies provide. Consumers include physicians, care delivery organizations (e.g., hospitals, home health agencies), patients, caregivers, and payers. Historically, Medicare does not reimburse providers for the specific tools they use to deliver care; rather, providers are

paid for the care they deliver. Payment models can create incentives that may discourage the use of better, cheaper, friendlier, and more accessible technologies.

CMMI looks at where innovations fit into the health care delivery system, whether the system is demanding these innovations, how prepared the system is to use the new information the innovations generate, and whether the innovations provide value. Some of the innovations CMMI has examined (e.g., remote monitoring) have not been well received by physicians because they get more information than they wanted or needed about their patients. The data were not useful in the way they were presented, or too many individuals were trying to provide information to the physician for different patients with different insurers. Therefore, the challenge is to find delivery and payment models that work together to create an environment in which telehealth services are both valued and reimbursed.

Early in 2012, CMMI awarded nearly $1 billion in cooperative agreements to 107 different projects to innovate health care delivery and payment models. Seven of these projects are focused on telehealth, such as to expand the use of daily monitoring or to increase the reach of intensivists. CMMI has the authority to take models that produce better care, better outcomes, higher quality, and lower costs; expand them in scale; and eventually shape CMS policy without getting specific legislation.

REACTION AND DISCUSSION

Moderator: Thomas S. Nesbitt, M.D., M.P.H.
University of California, Davis, Health System

An open discussion followed the panelists' presentations. Nesbitt began the session by noting that broadening the use of telehealth is not just about creating better reimbursement models, but it is also about removing barriers for providers to take advantage of those models. Nesbitt added that payers may be moving ahead because of consumer demand, but that even when providers are paid to use telehealth, there are still barriers to finding providers willing to do so. Finally, Nesbitt stated that all the new and emerging payment models give hope for the great opportunities of telehealth. Audience members were then able to comment and to ask questions of the panelists. The following sections summarize the discussion session.

Care Coordination

One participant asked if telehealth might be a tool for care coordination, either in a fee-for-service payment system or a managed care plan. Stensland stated that MedPAC has been neutral with respect to whether

fee-for-service or managed care in Medicare is "better," and that patients should be able to choose which plan they think works best for them.

Transforming Payment

One participant asked about the likelihood that the collection of data on cost savings would actually transform into new payment strategies. As an example of transformation, Magno noted that the Physician Group Practice demonstration essentially served as the platform on which the ACO program was built.

The participant added that telehealth should be regarded as a modality for delivering health care instead of arguing over whether payment should be for telehealth versus face-to-face consultation. Magno added that discussions often focus on the lack of payment for individual telehealth services or types of providers, or whether payment amounts are adequate. Instead, she said, the real challenge is to develop a health care delivery system that can create the necessary infrastructure and tools to deliver care that results in higher quality, better outcomes, and lower costs. Magno added that even with challenges of measurement, health care should be heading toward payment for outcomes rather than payment for the specific method (e.g., telemedicine vs. in-person visit). Nesbitt noted that this may be validated by the fact that both the Kaiser system and the VA are rapidly increasing the amount of telehealth they are doing within their capitated systems.

Another participant called for fundamental change in how we pay for health care, noting that the current system pays more for procedures and hospital-based care, and does not pay well for preventive care. Magno responded that existing Medicare policy is governed by constraints within statute, and that CMMI hopes that innovations can help shape changes in policy.

One participant asked about innovative payment models within fee for service that might create incentives for a specialist to use telehealth, especially given that there are not enough specialists to begin with and many are already too busy with their in-person patient load. He suggested that one solution might be to give extra points for telehealth in the value-based purchasing system. As a second possible solution, he asked about existing financial incentives for specialists to provide rural health care in person (e.g., loan repayment), and whether those same incentives could be translated for telehealth. Nesbitt agreed this could be a strategy. Edison commented that currently, these incentives are mostly for primary care providers.

Store and Forward Telehealth

Several participants pointed to the need for reimbursement of S&F telehealth. One participant noted that more than a quarter of states provide Medicaid reimbursement for S&F telehealth, as do most of the private payers, but that CMS has not progressed on coverage. He asked about strategies for moving forward, with or without CMS. Edison clarified that S&F was limited in statute because of budgetary concerns, but noted that worries of fraud and abuse have not been realized. She stated that S&F technology for teledermatology and diabetic retinal screenings is a "no brainer," and that it is especially useful in PCMH models as a way of providing a quick and high-quality consult to the primary care physician. Magno asserted that CMS is open to testing new models of payment and delivery, adding that many issues need to be considered, including patient preferences and costs. Stensland indicated that partnerships are needed with multiple stakeholders, including CMS, private insurers, and those outside the fee-for-service system in order to learn what works best.

Site of Care

One participant argued that many challenges with licensure, credentialing, and reimbursement could be resolved if care was determined to occur at the site of the distant health care provider. He gave the analogy that telehealth is like driving to another state to see a provider who is licensed and privileged there.

Site Fees

Another participant asked what would be equitable for a site fee at the originating site. Stensland said it is difficult to determine an exact fee due to the need to balance many factors, such as increasing access and the value of an individual's time (e.g., for travel). Edison added that meaningful use requirements will also have an impact, especially for the care of patients with complex health care needs. She stated that as the electronic health information exchange environment evolves, more consideration will be needed for how that should impact payment.

State-Based Payment Reform

One participant asked what could be done at the state level (e.g., policy, legislation) to encourage greater adoption of telehealth in a sustainable manner and whether there were any examples of workable payment models. Edison advised the participant to seek guidance from experts who have

already done similar projects in other states. Nesbitt shared that one challenge is that the different state-based stakeholders may have different missions, and that it may be difficult to get them together to enable legislation.

The Increased Costs of Telehealth

Stensland questioned whether telehealth could lead to increased costs, such as the replacement of a request by phone for a prescription refill with a billable consultation. Both Stensland and Oza suggested that telehealth might be better paid for as part of a per member per month payment, but Oza noted that physicians are skeptical about whether telehealth will increase or decrease their incomes. Oza added that is why they are starting with the PCMH, and using telehealth to increase capacity. Oza argued that if the incentives are aligned properly, telehealth can help physicians keep patients out of the ED.

6

The Health Care Continuum

A panel of experts discussed the use of telehealth technologies by a variety of health care providers and in a variety of settings of care across the health care continuum. This included consideration for the use of telehealth for health promotion and disease prevention, for acute care, and for chronic disease management. The following sections reflect the individual speaker's comments and reflections.

PROMOTING HEALTH, PREVENTING DISEASE, AND PROMPTING POPULATION PROGRESS

William K. Appelgate, Ph.D.
Iowa Chronic Care Consortium

Population health management has three parts. First is disease and care management for individuals in the population at risk who are actively receiving health care services. This is usually the group that gets most of the attention. Second is lifestyle and health behavior management for individuals in the population who are at risk, but not currently sick. Finally, there is health maintenance and promotion for the population with no known risk factors.

Salutogenesis (the optimization of health) is the opposite of pathogenesis in that it focuses on the building and establishment of health, rather than the costly approach of addressing disease. What prevents the transformation from pathogenesis to salutogenesis? First, the current health care system is primarily oriented to acute disease and diagnosing chronic condi-

tions, and does very little to mitigate the progression of disease. Second is the misappropriation of education—that is, patients need to be activated to change their behaviors rather than to merely be given information. Lastly, there is an overreliance on coming to the health care provider for chronic disease management. Instead of waiting for patients to present with exacerbated symptoms, health care providers need to approach chronic disease proactively.

The Cost of Chronic Disease

Chronic disease accounts for the vast majority of health care spending. However, chronically ill patients only receive a little more than half of all clinically recommended health care, and there is a lag between the establishment of evidence and the adoption of a new care pattern. Half of the people on Medicare right now only cost $550 per year or less, which means that the other half is very expensive. For example, in 2007 the annual average expenditure for Medicare beneficiaries with heart failure was about $25,000; it was about $20,000 for beneficiaries with chronic obstructive pulmonary disease, and about $13,000 for beneficiaries with diabetes. ED visits and hospitalizations account for 83 percent of the cost of chronic care in the Medicare population. Chronic care management interventions can dramatically reduce costs and improve health by keeping individuals out of EDs and hospitals.

Experiences of the Iowa Chronic Care Consortium

Telehome Care Models

A large health system asked the Iowa Chronic Care Consortium (ICCC) to design a heart failure program for their Medicaid population. At the start of the project, the 266 Medicaid heart failure patients had an annual cost of $24,000 each. The ICCC used daily contact and care management, all by phone. The program led to a net savings in excess of $3 million in the study cohort, primarily due to avoided hospitalizations (see Figure 6-1). This was demonstrated through a matched cohort study design, wherein the matched cohort had an increase in costs of $2 million during the same time period.

Similarly, the ICCC's Medicaid Diabetes Telehomecare Project led to a 54 percent reduction in inpatient visits, a 13 percent reduction in outpatient visits, and a 6 percent reduction in office visits among the study cohort as compared to the match cohort (see Figure 6-2). This resulted in an overall reduction in costs of about 20 percent. Sometimes these interventions led to an increase in the number of office visits, but they are so much less costly than a hospitalization that costs are still greatly reduced.

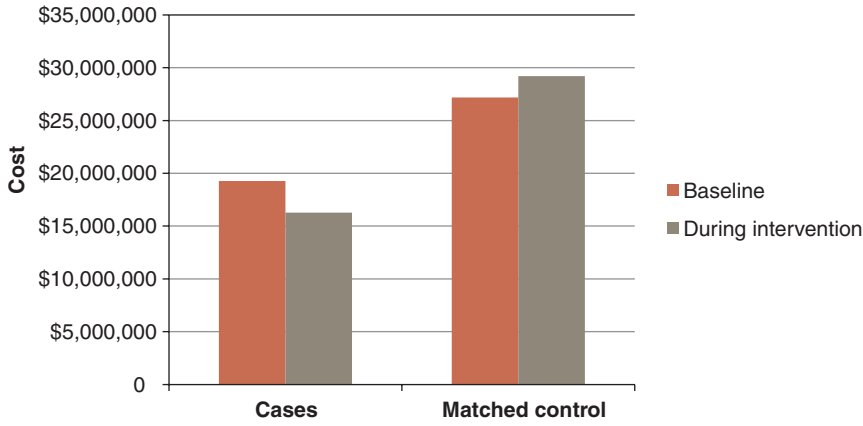

FIGURE 6-1 Total cost of health care service use (Medicaid Heart Failure Program).
SOURCE: Reprinted with permission from William K. Appelgate (2012).

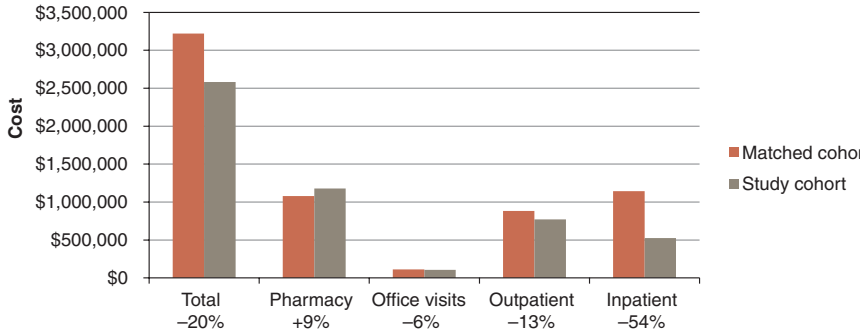

FIGURE 6-2 Medicaid diabetes telehomecare project, preliminary cost data 2010-2012.
SOURCE: Reprinted with permission from William K. Appelgate (2012).

ICCC is in the process of evaluating a current project on health and wellness behavior change in the pre-Medicare population (farmers between the ages of 58 and 63). This intervention included health risk assessments; patient education; diet and exercise incentives; and coaching. The intervention resulted in reduced risk, improved health status, and zero trending.

Many lessons can be learned from experiences with these telehome care models. First, most health care takes place within the home; therefore, to dramatically change health care, the home is the ideal point of delivery. Second, engaging individuals in the self-management of their health is a pri-

ority. Finally, simple approaches can show the value of care management. For example, most of the ICCC's intervention models are designed just for the use of a telephone.

Evidence-Based Health Coaching

Behavioral patterns and lifestyle choices have some of the largest impacts on health and premature death. In addition, most health care is self-care, and the individual patient is the biggest untapped resource in health care. However, the current system does not activate individuals to change their behaviors. ICCC developed evidence-based health coaching, which involves two elements: transforming the conversation (e.g., between provider and individual) and transforming the care process.

Potential Next Steps

Appelgate stated that telehealth projects and demonstrations with high-quality evaluations should be supported. Matched control groups and other powerful designs can show clinical improvement, reduced costs, patient satisfaction, and improvement in patient functionality. To do this, he said, technical assistance should be provided for the design and evaluation of new projects. Collaboration is needed with CMS to test the best demonstrations in Medicare and Medicaid. More projects that leverage work on costly chronic conditions are especially needed. Finally, remembering that most care is a function of self-management, the value of health coaching should be evaluated.

TELEHEALTH IN AN ACUTE CARE SETTING

Joseph A. Tracy, M.S.
Lehigh Valley Health Network

Challenges in health care today include an aging population, an increased demand for providers, and increased costs. In turn, there is an increased demand for ICU care, which costs about $107 billion annually. Approximately 540,000 people die in ICUs each year, with mortality rates of 10 to 20 percent in most hospitals. Although the number of ICU beds has increased, the number of hospitals with ICU beds has decreased. Only 10 to 20 percent of hospitals have dedicated ICU staffing, and only 1 percent

have it at night. By 2020, there will be a 35 percent shortage of intensivists.[1] Therefore, we need to spread this expertise beyond the large centers.

Tele-ICU

The Lehigh Valley Health Network (LVHN) includes the largest academic community hospital in Pennsylvania and the largest Level One trauma center in the region, with more than 11,000 employees and three hospital campuses. Ten years ago the LVHN developed a model for a tele-ICU unit, the *Advanced ICU* (AICU). The basis for its development included patient safety issues, the need to maintain a high level of ICU care at smaller hospitals, the desire to go beyond Leapfrog requirements for the intensivist staffing model, and finally, its development became simply the right thing to do. The development of the AICU took a lot of time and resources, as well as the involvement of all key stakeholders.

In the AICU model, between 7 a.m. and 7 p.m., the health care team visits patients at six critical care units at two different campuses. Starting at 7 p.m., this team hands off patients to the tele-ICU team, which works remotely (separate from the other facilities), and consists of one board-certified intensivist, three critical care nurses, and one clerical team member. The intensivist works at one of four identical pods with a health information technology bundle that includes every information tool that would be at the bedside (see Figure 6-3). Among the tools, the bundle includes a picture archiving and communication system (PACS), real-time audio and video into each room, which can be used to zoom in and look at pupillary reaction; the ICU electronic medical record, which is connected to the master medical record; an electronic algorithmic event system, which sends an immediate notification for any negative changes in a patient's vital signs; and direct access to all laboratory results.

The tele-ICU team does not replace the health care professionals already present in the ICU. Instead, the tele-ICU team is an added layer of care for patients during the night. In addition, none of the members of tele-ICU team works full time; they all have part-time floor duties to ensure they maintain their skills. The team also has access to anesthesiologists and trauma surgeons at night, in case invasive procedures (e.g., central line placement, intubation) are needed. It should be noted that the LVHN is a closed system, so the intensivist can intervene and consult on every case in every ICU. Additionally, separate ICUs for trauma and burn patients have

[1]Intensivists are physicians who are board certified in a medical specialty, and then receive special education, training, and subspecialty board certification specifically in critical care (SCCM, 2012).

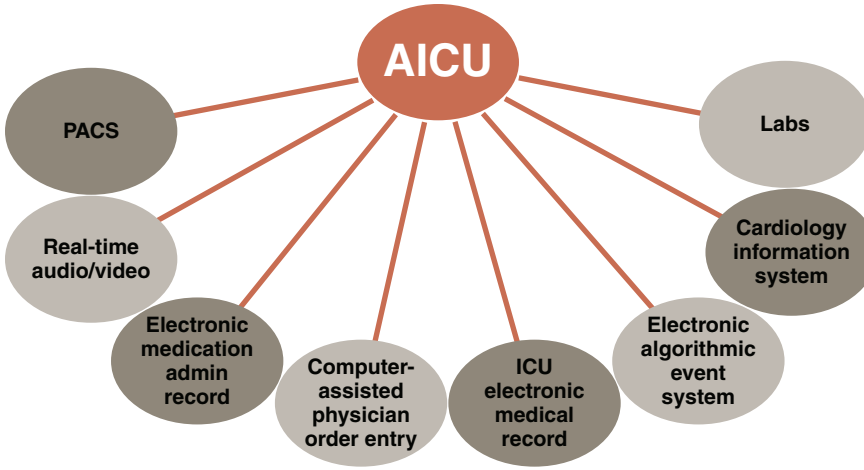

FIGURE 6-3 AICU health information technology bundle.
SOURCE: Reprinted with permission from Joseph Tracy (2012).

physicians in-house all night, so those cases are not covered by the tele-ICU team.

Evidence for Tele-ICU

Some studies show that the implementation of tele-ICU is associated with decreases in mortality, length of stay, and costs, which may in turn lead to an increase in the overall number of ICU admissions. For example, in a 2010 study of tele-ICU at LVHN, the authors showed a 31 percent relative mortality risk reduction in the study group, as well as significant reduction in the use of mechanical ventilation (McCambridge et al., 2010). LVHN estimates that the AICU has resulted in 500 more patients leaving alive each year. LVHN also estimates that each ICU nurse gains about 95 minutes more of direct patient time (during a 12-hour shift), in part due to reduced charting responsibilities. However, other studies have not shown benefit. This may be because of the design of the tele-ICU model rather than the quality of the study methodology. For example, some of the other studies did not use the technology to its fullest capacity (e.g., only for selected cases or specific conditions), thereby creating two levels of care.

Tele-Infectious Disease

LVHN also has a program for inpatient infectious disease consultations with remote physicians. Again, the model uses a standard set of technologies (e.g., interactive video, stethoscope exam cameras, access to labs). This is a true consultation wherein the remote physician provides documentation back to the hospital group, which retains responsibility for patient care. As a result, 85 percent of patients are staying in the smaller hospital instead of being transferred. This has big implications for payers because many of these consultations are to small rural hospitals without infectious disease specialists. Laboratory testing and X-rays are performed at the smaller hospital, which is a much lower cost environment, and all the transport costs associated with an interfacility transfer are saved. Additionally, beds in the bigger tertiary care center are left open for people who really need them.

Concluding Remarks

Tracy concluded that the use of telehealth technologies for acute care can keep patients close to home in a safe and lower cost environment, which may in turn increase a rural hospital's case mix index. However, reimbursement and licensure remain a persistent barrier in all of telehealth. Some of these barriers can be overcome by defining the site of care to be where the provider is located.

As new models emerge, such as for tele-ICU, questions will arise as to what the minimum standards are for such care. Other questions arise related to anti-kickback statutes. For example, in 2011, the Office of Inspector General (OIG) issued an opinion[2] regarding a telestroke program designed to keep patients in their local hospitals and communities (OIG, 2011). The distant telestroke provider wanted to provide the equipment, protocols, and education, all without any charge for the service. In return, the hospital would only use the telestroke services of this provider for 2 years. The OIG said that under normal circumstances this would be a clear violation of the anti-kickback statutes, but that based on the premise that telestroke patients would be kept in their local communities, they would not prosecute. Perhaps, Tracy said, more of these waivers are needed to measure the true capacity and value of telehealth programs.

[2]The OIG said that this opinion only applies to the requestor, and the OIG relies strictly on the materials supplied by the requestor of the opinion.

CHRONIC DISEASE MANAGEMENT

Sanjeev Arora, M.D., FACP, FACG
University of New Mexico

The mission of Extension for Community Healthcare Outcomes (ECHO) project is to expand the capacity to provide care based on best practices for common and complex diseases in underserved areas, and to monitor outcomes.

The ECHO Model

Project ECHO is based on four principles. First is the use of technology (e.g., videoconferencing, the Internet) to leverage scarce resources (e.g., specialists). Second is the use of a disease management model focused on improving outcomes by reducing variation and sharing best practices. Third is the use of case-based learning whereby primary care clinicians comanage patients with experts in order to "learn by doing." Lastly is the use of the Internet to track outcomes.

Within these parameters, health care providers are first trained in the disease and in the use of Web-based software to track patients. These providers then participate in telemedicine clinics, called *knowledge networks*, wherein experts come together simultaneously on an interactive video network to give advice to the primary care provider for the comanagement of the patient. During the 2 hours of a clinic, the team comanages 15 patients, and then gives a didactic presentation on some aspect of the disease. No patient ever comes onto this network. Providers learn and become experts through a *learning loop*—they learn from experts through advice, from didactic presentations, from each other, and mostly by doing.

Through the telemedicine clinics, Project ECHO provides continuing education credits to physicians and nurses at no cost. It seeks to reduce professional isolation by improving interaction for rural providers, and to bring a mix of work and learning, which is often not available for rural providers. It also uses simple technologies.

Project ECHO and Hepatitis C

Project ECHO initially developed through the collaboration of many partners to address the lack of providers to care for patients with hepatitis C in New Mexico. Hepatitis C is a global health problem. While it is curable, if untreated, hepatitis C can lead to death due to end-stage liver disease or liver cancer. In New Mexico, about 28,000 people have hepatitis C, yet less than 5 percent have been evaluated, just 3 or 4 percent have been

treated, and none of the 2,300 prisoners who have been diagnosed have been treated. New Mexico has the highest rate of chronic liver disease, cirrhosis, and deaths in the nation (twice the national average). In 2003, not a single primary care doctor in New Mexico was treating hepatitis C, and people would have to have to get on long waiting lists and drive hundreds of miles to receive care. The care is complex, with regimens that have a high level of side effects.

A large trial of the ECHO model in New Mexico demonstrated that rural primary care clinicians provided hepatitis C care that was as safe and effective as care provided at a specialty clinic at the University of New Mexico. Additionally, cure rates were better than in other large trials. Other studies have shown that clinicians' self-efficacy in the assessment and care of patients with hepatitis C improved after participation in the clinics. Rural clinicians also report diminished professional isolation, enhanced professional satisfaction, and expansion of patient access. To date, Project ECHO has held 500 telehealth clinics for hepatitis C, with more than 5,000 case presentations. Project ECHO has expanded to include multiple diseases, and overall provided 27,000 hours of continuing medical education credit to rural clinicians in New Mexico for 19 different conditions.

Expansion of Project ECHO

Project ECHO identified six criteria for extending the model to other diseases:

1. The disease is common.
2. Management is complex.
3. New treatments are evolving.
4 The disease has high societal impacts (e.g., health, economics).
5. Untreated disease leads to serious outcomes.
6. Treatments are effective.

The key to Project ECHO is the *force multiplier*, a logarithmic improvement in the capacity to provide care for very complex problems. Force multiplication occurs through the use of existing community clinicians to provide the same level of care as a specialist. ECHO projects now exist for cardiac risk reduction, asthma, substance abuse, chronic pain, rheumatology, HIV, and many other diseases. The ultimate vision is to transform primary care so that every primary care provider has an area of special interest, creating supporting networks of trained primary care providers (for different diseases) in every region. This is needed because medical knowledge is increasing exponentially, and there is an increasing gap between what a doctor needs to know and what he or she can possibly

learn in order to provide the best care for every disease. Project ECHO also trains community health workers, medical assistants, and others because of the need for team-based care in chronic disease management.

Concluding Remarks

Arora asserted that ECHO models benefit the current health care system through improvements in quality and safety, rapid learning, reduction in the variation of care, improvements in access for rural and underserved patients, reduction in disparities, and workforce training. Additionally, Arora said, there are force multiplier effects by de-monopolizing knowledge, improving professional satisfaction, supporting the medical home model, avoiding excessive testing and travel, and integrating public health into the treatment paradigm. Project ECHO is being replicated across the country and around the world. In conclusion, Arora said, using multipoint video conferencing, following best practice protocols, and comanaging patients with case-based learning together form a robust way to safely and effectively treat chronic common complex diseases in underserved areas and to monitor outcomes.

REACTION AND DISCUSSION

Moderator: Sherilyn Z. Pruitt, M.P.H.
Health Resources and Services Administration

An open discussion followed the panelists' presentations. Pruitt began the session by noting that all three presentations demonstrated how telehealth leverages partnerships—in each case, the technology itself was not emphasized, but rather, what people could do together with a technology. Audience members were then able to give comments and ask questions of the panelists. The following sections summarize the discussion session.

Payment

One participant asked why we have not been able to transform payment policy in relation to population health management data, and whether the answer is shared savings. Appelgate said the current reimbursement system is not very amenable to innovations in paying for the care of populations. Appelgate and Arora agreed that there has not necessarily been enough compelling evidence of the value of telehealth to completely transform payment systems.

The participant also asked about moving ECHO to a model where the consultants who help the primary care providers are paid under a consul-

tation model. Arora responded that when a health plan is responsible for the total costs of the patient, they see the value of ECHO because they immediately accrue the benefits of cost savings, and pay for the model as a whole. He added that Project ECHO is more focused on developing partnerships with the health plans and having the plans covering the costs of the infrastructure rather than focusing on individual payments.

Translation of Knowledge into Practice

One participant asked the speakers to comment on challenges with the translation of knowledge into practice and sustainability. Appelgate responded that the ICCC often does not continue the operation of a project after a certain period of time, so they build a sustainability clause into their contracts that requires the people they train to continue running the project for a set period of time after the external funding is used up if performance measures are achieved. Tracy added that LVHN has little grant funding, so telehealth is actually part of the strategic plan of the network. Arora agreed, saying this is exactly the problem Project ECHO is trying to solve. Because health care providers cannot possibly know everything about all of health care (and put it into their practices), Arora noted that Project ECHO seeks to give the providers the mentorship they need to provide the best practice in a particular area of their choice.

The Design of Telehealth Programs

One participant noted that the speakers gave examples of telehealth programs that did not achieve positive results, but suggested this may have been due to the protocols and designs. The participant then asked about the role of best practices and practice guidelines in growing the field of telehealth. Arora said that best practices and practice guidelines are key to the future of telehealth. He noted that part of the reason that payers do not see clear value is because of all the contradicting studies, and so more attention is needed to methodologies of designing telehealth models. Tracy noted that various programs around the country have had mixed results, and agreed that guidelines are needed. He suggested that the Office for the Advancement of Telehealth within HRSA might use their telehealth resource centers to assemble information on what works (or does not work) in the programs in each of their regions. Appelgate reiterated the need for technical assistance to individuals starting telehealth programs.

Transformation of the Health Care System

One participant recalled writings by Atul Gawande on health care reform and the compelling arguments he has given about the changes that have to occur in the system, such as focusing on the highest consumers of health care, the unnecessary variations in care patterns, and the need to follow evidence-based best practices. Arora responded that he (and his colleagues) have a CMMI grant to develop a new specialty in medicine—the outpatient intensive care team—to target the 5 percent of Medicaid patients who consume 57 percent of the resources with the support of ECHO-like knowledge networks. Arora added that reducing variation was not an explicit goal of Project ECHO, but noted that when best practices are used and decisions are discussed in a forum of peers, variation automatically reduces. Tracy pointed out that variation can also be due to institutional politics, noting that unless ICUs are closed (with an intensivist in the lead), the multiple providers may not be willing to consult with each other in decision making. Appelgate responded that population health care managers need strategies to adapt projects to any location.

7

Remarks and Discussion: Day 1

In this session, the members of the planning committee summarized their individual perceptions of the themes discussed during the first day of the workshop. Subsequently, the planning committee members had an open discussion with workshop participants, including audience members.

PLANNING COMMITTEE REMARKS

Karen S. Rheuban, M.D.
University of Virginia Health System

When integrated into acute and chronic disease management, telehealth can improve access, improve quality, and in most cases lower costs. Telehealth reduces the burden and cost of travel for both patients and payers. For example, the University of Virginia telehealth program has documented the avoidance of 7.2 million miles in travel. Telehealth is a force multiplier. It can mitigate workforce shortages and even create a new workforce. With the necessary regulations, telehealth is perfect for integration into new payment delivery mechanisms, such as PCMHs, ACOs, and bundled payments. However, constraints remain due to outdated payment delivery mechanisms, federal and state statutes, and regulations that limit the expansion of services and interstate commerce in health care.

To move forward, we need greater provider engagement, sharing of best practices, collaboration with the specialty societies, the advancement of innovative care coordination models, and the evaluation of telehealth

programs and innovative payment models. Finally, a fresh look at point-of-care and site-of-service definitions is needed to mitigate current barriers.

Nina M. Antoniotti, Ph.D., M.B.A., R.N.
Marshfield Clinic

Problems in telehealth are problems in health care. We should stop thinking about them as separate. Telehealth is a strategy to deliver health care services, but it is also subject to everything else that is going on in health care. Telehealth is not different than in-person care; rather, it is just that the two people are not physically in the same place. Adopting this philosophy eliminates many of the barriers in telehealth.

In terms of payment, shared savings models are probably the way to go. Then again, instead of paying for consults under a fee-for-service model or shared savings model, maybe it would be better to have payment for the infrastructure. The development of compelling evidence for value is necessary for acceptance by business leaders. In addition, we should not move ahead with assumptions about what patients want or value. Telehealth leaders also need to look more closely at existing models to learn more about who the providers of telehealth care actually are. Although telehealth presents many barriers, many innovative projects are going forward and making people healthier. Payers are adopting telehealth and the government is a participating partner.

Kamal Jethwani, M.D., M.P.H.
Partners Healthcare Center for Connected Health;
Harvard Medical School

Technology provides the opportunity to create a new model of delivery that keeps care simple, patient centered, and with a focus on overall health instead of illness. Technology will also help make care more collaborative. For example, health care providers will not just instruct patients to lose weight, but they will be able to give patients the tools and feedback needed to help them lose weight. Focus needs to move away from just demonstrating cost savings and move toward creative demonstrations of the value of investment. Similarly, newer research models are needed to collect and analyze data in order to prove the positive outcomes that result from the use of telehealth.

Spero M. Manson, Ph.D.
University of Colorado Denver

It is particularly important to not isolate the discourse among those in this particular section of the industry from the broader narrative about health care. The issues regarding telehealth usage are matters of degree and emphasis not substantively different than what all others in the health care industry are facing. Telehealth leaders need to ensure that discussions take place within the broader landscape.

In spite of challenges, RCTs are possible in telehealth. The challenges associated with the methods and procedures of telehealth are the same ones faced in other studies, but may require more creativity to design studies that elevate the level of the science of telehealth. Telehealth leaders should not shy away from seeking to meet the highest expectations around scientific merit. Telehealth intervention research provides an opportunity to pursue the science of dissemination to enhance the diffusion, adoption, and operationalization of effective models. In that regard, further study is needed to analyze and describe the critical components of successful telehealth models and how they can be assembled in various settings or geographic areas in a way that remain true to the original models that gave rise to them.

Thomas S. Nesbitt, M.D., M.P.H.
University of California, Davis, Health System

Ongoing discourse about telehealth is needed, especially with those who are not telemedicine enthusiasts. In some ways telehealth is held to a higher standard of evidence, but we need to move past that. Also, due to the current environment, evidence on value is essential. Technology is not an end in and of itself. Instead of talking just about telehealth, we need to be talking about evidence-based models of care that are better facilitated with the use of technology. Lastly, consideration is needed for the implications of student and resident training. Rural practitioners need to be prepared for the next century rather than trained for the past century.

Sherilyn Z. Pruitt, M.P.H.
Health Resources and Services Administration

These are exciting times that include both change and chaos. Whenever there is a lot of change, there is a lot of opportunity. Innovative models have shown tremendous successes, and along with that will be some failures. For example, it would be interesting to find out why some providers have abandoned the use of telehealth—what did they do and why did it not work?

The discussions of the day have raised many questions:

- Are the days of the rural independent provider over? Will all providers become part of a larger system? Will the rush to increase market share leave out small rural providers or underserved urban populations?
- How will the move toward clinicians reaching their patients directly in their homes impact comprehensive care? Will this information get into their electronic medical records? Who will be their primary care provider? What about the continuity of care?
- How will rapidly evolving technologies continue to change how health care is delivered and how can we keep up with these changes?
- What is the best way for HRSA to share best practices?

REACTION AND DISCUSSION

Moderator: Karen S. Rheuban, M.D.
University of Virginia Health System

An open discussion followed the planning committee members' remarks. Audience members were able to give comments and ask questions of the planning committee members and other workshop participants. The following sections summarize the discussion session.

Rapidity of Change

One participant commented that the opportunity costs of telehealth have been discussed in the multiple specialty journals in this country and around the world for nearly 20 years. He added that the government is not keeping up with the technology, and so policies are needed that can easily adapt to the rapid changes in technology. He also suggested that because other countries around the world are using these technologies, we should look to them for lessons.

Consumerism

One participant raised the issue of consumerism—stating that consumers are going to demand the availability and usage of telehealth technologies. He suggested that lack of a telemedicine consult might be considered a breach in the standard of care if the technology is available, but not used. Rheuban agreed, stating that in some instances, case law has reflected the use of telemedicine as a standard of care in rural communities. Another participant agreed, stating that the younger generation already values technology and will expect technology to be available for their health care.

Education and Training

Arora commented that when medical students are exposed to the ECHO model, they question why everybody is not approaching care in this manner (e.g., where colleagues share information), but as they move through the education system, they become more "indoctrinated" to the fee-for-service system. Antoniotti noted the slow change from resistance by physicians, to schools and residency programs beginning to teach telehealth, to new graduates expecting availability of telehealth in their practices. She noted that policy has not moved as quickly as practice to embrace telehealth. Nesbitt added that technology is being used for telementoring. That is, as has been done in the past with a phone call, colleagues are asking each other advice without a formal consultation.

8

Current Evidence Base

A panel of experts discussed the evidence base of telehealth, including what is really known, the barriers to creating evidence, the challenges of study designs, and how to translate the evidence base into policy changes and changes in standards of care. The following sections reflect the individual speaker's comments and reflections.

CURRENT RESEARCH BASE

Elizabeth Krupinski, Ph.D.
University of Arizona

A huge body of literature and evidence for telemedicine already exists, and not just in the telemedicine-specific journals. Figure 8-1 shows a classic pyramid of the hierarchy of evidence (based in part on their importance and relevance) and the types of studies that one can conduct. At the top are systematic reviews and meta-analyses. Under that are best evidence, evidence guidelines, and evidence summaries, which can only appear as the body of evidence evolves because scientifically sound studies are needed to create these kinds of standards. Below this, there are essentially two categories for study designs: *experimental* and *observational* (see Box 8-1). In experimental studies, the primary investigator assigns and chooses the test intervention (e.g., telemedicine versus no telemedicine), there is always a control or a comparison group, and the subjects are allocated randomly. With observational studies, the primary investigator studies the people and the exposures in situ. A control or comparison group may or may not be a

FIGURE 8-1 Hierarchy of evidence.
NOTE: The following acronyms are used for spacing purposes: SR is systematic review, MA is meta-analysis, BE is best evidence, EG is evidence guidelines, and ES is evidence summaries.
SOURCE: Reprinted with permission, Elizabeth Krupinski (2012).

part of the study design, which is why some people consider observational studies to be a little less reliable than experimental studies, but that is not necessarily the case. RCTs and observational studies (with a control or comparison group) both have advantages and disadvantages, and in the long run, both are valid and have been used in many telemedicine studies. Observational studies without a control or comparison group are generally considered less rigorous.

Each of these types of studies serves a different purpose. Although the RCT is the gold standard and there should be more of these, other viable alternatives are being used in traditional medicine as well, so there is no reason why these other study designs should not be used and have the same impact in telemedicine as occurs in the rest of medical care.

BOX 8-1
Experimental and Observational Studies

Experimental Studies

- Randomized controlled trials
- Community trials
- Lab trials

Observational Studies

With a control or comparison group:

- Analytic study
- Case control study
- Cohort study

Without a control or comparison group:

- Descriptive study
- Correlational study
- Case series
- Case report
- Cross-sectional study

Randomized Controlled Trials

There is much disagreement about whether RCTs are needed for telemedicine. The strengths of RCTs include the randomization and the fact that they are typically prospective studies. One of the main goals of RCTs is to eliminate, or at least minimize, the different types of biases. Generally, RCTs seek to falsify a hypothesis (rather than confirm). Also, RCTs allow for meta-analysis because of the quantitative data that are collected. Weaknesses include that RCTs are expensive and time consuming, and randomization can be impractical. There may be ethical issues related to withholding a potentially beneficial treatment. For telemedicine, a double-blind study is nearly impossible, which may or may not be important.

Cohort Studies

Cohort study strengths include that the same characteristic is measured in two different groups. Typically, the groups differ in only one parameter—for telemedicine this would be the use of the technology versus traditional care. Eligibility and outcome assessments are usually standardized. The weaknesses are that these studies are observational, and they are often not randomized. For example, patients may be placed into a group based on a characteristic such as the presence of Internet connectivity in their homes, which may introduce some bias.

Cross-Sectional Studies

Cross-sectional studies are rife in the medical literature, yet they are often criticized in telemedicine as being not rigorous enough. Cross-sectional studies are based on interviews, surveys, or study. The data are collected at a single point in time from a representative sample. This can be difficult for telemedicine because the impact of telemedicine will mostly occur in the long run, but a lot of valuable information can be collected here as well. Sometimes the data collection relies on history or recall, which may introduce bias. Typically, these studies establish associations rather than causality, but are very useful for developing future research in the field.

Case Studies and Case Series

Case studies and case series are a little less rigorous, but still informational. A case study is a description of a single case, such as how something impacted an individual in a unique manner. These studies typically describe rare events, early trends, or unusual manifestations or responses. Case studies are especially useful because they are the stories that are used when trying to educate and influence policy makers. These studies elucidate mechanisms and look at impact, but usually do not have hypotheses or statistical analyses. Typically they are retrospective, but are more scientific than mere anecdotes.

A case series is a little more powerful than a case study. A case series typically represents about 10 to 30 subjects, which is not statistically powerful, yet does provide a body of evidence. Case series include more detailed descriptions, offer a well-described treatment or intervention, have specific exclusion and inclusion criteria, and can be prospective or retrospective. The main weakness is that there is no comparison group.

RCTs and Chronic Disease Management

In 2012, Wootton published a literature review of RCTs for chronic disease management of five conditions: asthma, chronic obstructive pulmonary disease, diabetes, heart failure, and hypertension (Wootton, 2012). This included all RCTs conducted between 1990 and 2011 that had a control group and used one or more telemedicine interventions (of any type). This review yielded more than 1,300 publications. Wootton then looked at the number of subjects, the patient types (e.g., disease and severity), the intervention type (i.e., what type of telemedicine it was), how long the studies went on, and what the outcomes were. He also rated the overall value of the intervention based on whether primary or secondary outcomes in the intervention group were significantly better, worse, or equivalent when

compared with the control group. Wootton found a total of 141 RCTs in which 148 telemedicine interventions had been tested with nearly 37,000 patients. He determined that 108 of the trials were favorable toward the telemedicine intervention and 38 trials showed no statistical difference between the telemedicine intervention and traditional care. So this meta-analysis showed that in 99 percent of the studies, telemedicine interventions were as good as or better than traditional approaches to care.

What were limitations of the study? Some argue there is a publication bias in telehealth because usually only studies with positive outcomes are published. However, this "bias" exists in traditional medicine as well. No significant differences were noted among the diseases for the telemedicine effectiveness, which might arouse suspicion. Finally, the median duration of the studies was only 6 months, which may not be long enough to observe significant impact.

Review of Reviews to Determine Assessment Methodologies

Also in 2012, Ekeland and colleagues published a review of systematic reviews of telemedicine to determine assessment methodologies (Ekeland et al., 2012). They narrowed nearly 1,600 studies to the 50 that described their methodologies. As a result, they made four recommendations for the development of a stronger evidence base for telemedicine:

1. larger, more rigorous design-control studies that assess the impact of telemedicine;
2. better standardization of populations, interventions, and outcome measures to reduce heterogeneity and to facilitate meta-analyses;
3. combination of quantitative and qualitative methods; and
4. more naturalistic methods and settings.

Concluding Remarks

Krupinski asserted that the existing body of evidence for telemedicine is robust enough to permit the creation of evidence guidelines and standards, which is a clear indication of the maturity of the field. The ATA has established and is developing a number of guidelines. Other bodies have developed guidelines for telemedicine, including the American College of Radiology, American Dermatology Association, American Medical Association, and many others. There are also many international guidelines, such as the European Code of Practice for Telehealth.

In conclusion, Krupinski stated that the telemedicine community needs to work with funding agencies (e.g., the National Institutes of Health [NIH]) to develop Requests for Proposals for telemedicine research in

line with Ekeland's recommendations. In addition, meta-analysis projects should be supported; these are difficult to conduct and time consuming, but they provide a more comprehensive perspective. They can be specific to disease or intervention. Finally, standards and guideline development should continue to be supported. This brings together all the evidence that exists, leading to even better research (because people do research based on the standards and guidelines) and, eventually, payment.

USING DATA TO CHANGE POLICIES AND CREATE NEW STANDARDS OF CARE: TELESTROKE

Lee H. Schwamm, M.D.
Massachusetts General Hospital;
Harvard Medical School

Acute stroke is a high-impact, but low-frequency, event. It is the fourth leading cause of death and the leading cause of disability. There are 800,000 strokes each year across the United States, and about one practicing neurologist for every 20,000 Americans, or 50 to 60 strokes per neurologist per year. However, not all of these neurologists are experts in stroke care. Telestroke is a way to reallocate the expertise and make it available broadly.

Intravenous tissue plasminogen activator (tPA), a clot-dissolving medication, is known to be beneficial in stroke, but it requires immediate expertise to be available and there is disparity in its use. When it works, it dramatically increases the likelihood that patients will improve and return to a near-normal life. Treatment within the first 90 minutes of an acute stroke leads to a roughly 18-fold better chance of being helped than harmed, and benefit continues for 4.5 hours after stroke onset. Stroke patients need to get to the right location to receive care as quickly as possible. In fact, American Heart Association guidelines support bypassing hospitals that do not have the resources to treat acute stroke when transporting a patient in whom acute ischemic stroke is suspected.

Telestroke is an early and sustainable application of telehealth for stroke care, particularly acute stroke care. The evolution of telestroke first required proof that acute stroke evaluation could be done safely and effectively via telehealth. It also required collaboration of all the key stakeholders to achieve consensus on the need to regionalize care (i.e., specification of criteria and designation of centers to provide acute stroke care), to have ongoing education to make use of those centers, to certify the sites, and to have public reporting of outcomes. Finally, sustainability of telestroke depends on increasing rates of adoption, promoting diffusion and innovation of the technology, and improving reimbursement of services.

Telestroke is a disruptive technology that is changing the delivery of

health care. Clayton M. Christensen, a professor at the Harvard Business School, has been recognized for his conceptualization of the force of disruptive innovation in the world of business and health care. He said:

> The challenge that we face—making health care affordable and conveniently accessible to most people—is not unique to health care. […] The transformational force that has brought affordability and accessibility to other industries is disruptive innovation. […] Most disruptions have three enablers: a simplifying technology, a business model innovation, and a disruptive value network. (Christensen, 2011)

Within that context, the goal of telestroke is to expand access to acute stroke care to rural hospitals and smaller hospitals, many of which are neurologically underserved even if they do not reside in areas that meet the definitions of *rural* or *health professional shortage area*.[1]

Disruptive Innovation: Simplifying Technologies

The simplifying technologies for telestroke were

- the use of brain computed tomography (CT) imaging, which allowed for examination of the brain and detection of stroke in vivo;
- an injectable clot dissolver (i.e., tPA) which could be given anywhere, not just at a high-technology center;
- DICOM standards that allowed for the reliable transfer of brain images;
- video standards that enabled lower cost and high reliability videoconferencing; and
- innovations in chip design and video compression that made videoconferencing an everyday event.

Disruptive Innovation: Business Model Innovation

The first enabler for telestroke was the distillation of acute stroke care into a standard process. Also, hospitals without stroke expertise needed to figure out how to provide that service. However, stroke experts are in short supply, and are needed 24 hours per day, 7 days per week, which is expensive. Easy access via telehealth to regional stroke centers means lower

[1]A health professional shortage area includes any of the following that the Secretary determines has a shortage of health professional(s): (1) An urban or rural area (which need not conform to the geographic boundaries of a political subdivision and which is a rational area for the delivery of health services); (2) a population group; or (3) a public or nonprofit private medical facility (*Code of Federal Regulations*, Public Health Service, Department of Health and Human Services, title 42, chapter 1, part 5 [2010]).

costs and access to higher quality care than was previously available locally. Thus this redefined access to acute stroke expertise became an outsourced commodity that hospitals could now purchase.

Evidence

In the telestroke model, the patient is with a health care provider at the bedside. Images are encoded digitally, sent to a distant location (e.g., stroke center at a hub hospital) on a dedicated server, and then another physician can be connected remotely. The remote provider can zoom in and interact with and visually inspect the patient for key signs. Research has shown that the quality and interrater reliability of the use of the NIH Stroke Scale, the standard measure of stroke disability, by two different observers at the bedside is equivalent to the interrater reliability of its use by one remote observer and one observer at the bedside. Subsequent studies have shown and confirmed that the rates of agreement can increase even more with more clearly defined protocols and guidelines for how to score these tests.

Acute stroke expertise is needed, in part, because reading a CT scan is difficult. An analysis of the first 2 years of the Massachusetts General Hospital telestroke pilot demonstrated not only that the technology increased the likelihood of treatment in a statistically significant manner, but did not significantly add to the time of treatment. It also demonstrated that neurologists could read a CT scan for acute stroke without the need of an additional radiologist. The American Heart Association recommends the use of high-quality videoconferencing for assessment and recommendations and teleradiology for review of brain CT scans when onsite experts are not available.

Telestroke is a cost-effective, sustainable way to allow smaller hospitals with limited neurology coverage to provide equitable access to high-quality stroke care. The use of telestroke also standardizes care across a network or a state, supports the development of stroke centers in the community, and leads to the quicker evaluation and treatment of more patients with tPA. Additionally, remote supervision of tPA before transfer to a regional center has been shown to be feasible and safe. The outcomes of patients treated through the telestroke network have been shown to be equal to those of patients treated within the parent facility.

Disruptive Innovation: Disruptive Value Network

Increases in public reporting and requirements for meaningful use create incentives for hospitals to gain expertise in stroke care. Participation in a telestroke network enables hospitals to access highly experienced stroke experts from a comprehensive center at a reasonable cost. These

spoke hospitals can thereby retain or grow their stroke care portfolio. Additional value comes through education exchange, enhanced patient and provider satisfaction in the local emergency department, and improvements in overall stroke care. Hub hospitals can extend their expertise into the community, which aligns with their academic mission and goals. They grow their stroke business and attract patients for innovative treatments and clinical trials. At the hub level, it can increase provider compensation and satisfaction by broadening their audience of patients and providing opportunities for both academic growth and driving innovation in care. Overall, participation in the network deepens relationships within the community, keeps patients within their own communities, and drives demand for other telehealth delivery models.

Survey of Telestroke Network Participants

A survey of programs providing telestroke network services showed that hub hospitals support spoke hospitals that are both in and out of their corporate networks (Silva et al., 2012). Formal written agreements or contracts exist in nearly all networks. Ninety-five percent of all sites were using high-quality, two-way, real-time interactive video, but only 68 percent were reviewing brain imaging as part of their consultation process. Many incorporated telephone-only (49 percent) or S&F consultations (11 percent) when appropriate. All the networks included ED consultation as a main purpose of the program, and 84 percent said they use the network for the triage of patients for admission versus transfer. Benefiting the community, improving clinical outcomes, and enhancing clinical process effectiveness or provider knowledge were the three most common internal factors for initiating the program. Reducing cost was among the least important factors. That is, hospitals are not viewing this as a cost-saving approach, but instead as a way to improve quality. Less than half of hub hospitals had a dedicated telemedicine software package; many were using their own electronic medical record, dictating into the spoke hospital's record, or using paper only.

Respondents noted that barriers to growing the telestroke program include the lack of infrastructure funds, inability to obtain physician licensure, and lack of physician reimbursement. Lack of physician buy-in is also an issue. At this point it is not about the technology, or more and better technology, but about eradicating the conventional barriers.

Potential Next Steps

Schwamm said several things can be done to promote the growth and diffusion of telestroke programs, all of which could also be applied to other diseases, including

- providing federal grants to help ensure access to care anywhere that patients are neurologically underserved;
- simplifying the main administrative processes related to licensure, credentialing, and billing, which are frequently different in each state;
- requiring that federal and third-party reimbursements for telestroke services are at rates equivalent to in-person acute stroke care;
- removing requirements for physical proximity to the patient from current critical care billing code regulations;
- encouraging the use of telestroke within a state-based, system of care model or integrated delivery networks rather than a geographically disconnected, one-off transactional model; and
- requiring participation of telestroke sites in national quality improvement programs, including measurement and reporting their outcomes.

In terms of further research or inquiry:

- determine the most effective models of telestroke care delivery;
- explore whether the models can be applied effectively to other disease conditions;
- determine if disparities in access to digital broadband services mirror disparities in health care access; and
- provide funding to measure the actual costs of telestroke versus conventional stroke care (i.e., clinical effectiveness research).

Finally, Schwamm said, the IOM should convene a committee to gather evidence on the current barriers, make recommendations for solutions, and create a clearinghouse of information for states, patients, and providers.

REACTION AND DISCUSSION

Moderator: Kamal Jethwani, M.D., M.P.H.
Partners Healthcare Center for Connected Health;
Harvard Medical School

An open discussion followed the panelists' presentations. Audience members were able to give comments and ask questions of the panelists. The following sections summarize the discussion session.

Evidence and Policy

One participant agreed that much evidence already exists, but challenged the field to produce the evidence needed to educate and influence policy makers. Krupinski responded that part of the problem is the rapidity with which technology changes. She said that some sophisticated systems (e.g., smart homes) are impractical and not cost-efficient, but because the technology changes so rapidly, people may eventually find these devices for a very low cost and install them themselves. She also noted that because of the rapidity of technological change, it is nearly impossible to do an effective study and then get the results published, even within a year.

One participant commented that policy makers have a keen interest in evidence of cost effectiveness. Schwamm agreed, stating that within his ACO, they spend a lot of time thinking about ways to make stroke care more cost-effective.

Technology in the Patient-Centered Medical Home

One participant asked how telehealth might help fulfill the promises of the PCMH, contending that rural communities do not have the necessary resources or facilities. He further suggested looking at how the entire spectrum of telehealth, including telephones and fax machines, can contribute to improvements without having to bring patients to the larger medical centers and without having to increase the workforce in the rural community. Krupinski opined that technology in the PCMH will be "off the shelf"—meaning that patients will buy it on their own. She noted that the iPad is an FDA-approved device for reading CTs, ultrasounds, and magnetic resonance imaging (MRI). She also predicted developments in software algorithms to automatically analyze data. Krupinski disagreed with the participant in part, stating that telehealth will be used for PCMHs in rural areas because the cost is dropping dramatically. Schwamm added that hospitals were willing to purchase telestroke services because policy was actually moving ahead of the business model, viewing the availability of stroke care as a health care rights issue. He added that the movement toward global payments liberates resources to allow hospitals to invest in the infrastructure to improve access and create some downstream return on that investment to defray the costs. Schwamm added that technologies like videoconferencing are becoming higher quality and more ubiquitous, and people are more open to its use because of experiences with technologies like Skype.

Provider Readiness

One participant argued that there is still a role for studies of provider readiness, citing data on provider buy-in as a barrier to adoption, especially in the acute care setting where telemedicine can substantially disrupt workflow. Krupinski disagreed somewhat, stating that those studies can be useful on a local level to understand an individual organization or help to implement a new program, but that they do not need to be published widely.

Study Methodologies

One participant asked whether existing literature adequately reflects the right control groups. He noted that several speakers had called for telemedicine to be considered a tool for quality improvement in clinical care. He argued that because it is expensive, it should be compared to other less expensive quality-improvement tools (e.g., traditional education and outreach), rather than to nothing. He argued that comparing telemedicine to no intervention may introduce bias to make it appear that telemedicine is better than it might be if compared to a less expensive alternative. Krupinski stated that sometimes the intervention or treatment itself can define the control group. For example, she said, a clear comparison is someone coming into the door of a stroke center versus someone coming to the door of a non-stroke center. She added that the participant's question directly related to the recommendation for more naturalistic settings, noting that many studies are now mixing interventions—that is, it is not "nothing" versus the intervention but instead, different degrees of telemedicine (e.g., telephone alone versus telephone with video versus telemedicine with supplemental nurse visitation).

Schwamm added that telehealth is an intersection between a technology and human behavior, and so there is an important role for involving social scientists in the study designs. He agreed that methodology questions are to a certain extent shaped by the actual intervention. He noted that the use of telehealth is a systematic change to the way care is provided, and so in his opinion, the more effective studies are those that use a cluster randomized design at the hospital level wherein a cohort of hospitals is identified to participate, and they are randomly allocated to treatment or control groups so that all subjects at the site are allocated to the same intervention, and the comparison is at the hospital level. This prevents cross contamination of the intervention into the control.

Defining Terms

One participant noted that *telehealth* is a broad and encompassing term, so precision is needed in language. Schwamm agreed, adding that precision of language is also needed when talking about affordability and costs. He noted that costs are incurred by patients, by third-party payers, and by the provider institutions, and so clarity is needed about who saves money. He said some interventions may save the patient money that is not accounted for in health care dollars (e.g., patient transportation, time lost from work), which is not the dollars that most legislators or payors are focused on saving. He added that telehealth can reduce usage, such as by using each health care provider to his or her highest capacity (e.g., a nurse practitioner providing care with telehealth support from a physician, a physician providing care with support from a more senior physician). He summarized that precision is needed about the true costs and where real savings occur. Krupinski agreed, stating that definition of terms in a cost analysis is a form of standardization. She stated that differing interpretations of *cost* makes comparison of cost analysis studies difficult. Krupinski further added that cost of care cannot be separated from quality of care.

Incentives of Health Care Reform

One participant asked if the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009[2] and the ACA might motivate the adoption of telehealth. Schwamm stated that the contingencies, costs, and efficiencies associated with the HITECH Act created incentives for his own organization to adopt a single, unified medical record on the platform of an integrated delivery system. He noted, however, that discussions of the medical record have lacked consideration for the integration of telehealth as one of the key priorities in selecting a vendor. He argued that as organizations start to embrace and adopt electronic medical records, vendors will need to ensure the links will be there to incorporate telehealth in all modalities as another domain of the medical record.

Consumer Advocacy

One participant asked whether there might be a public push for telehealth technologies and how that might be leveraged. Schwamm agreed that the public is very engaged in access to health care information, and frustrated by the lack of access to providers, especially through modalities

[2]The HITECH Act was enacted as part of the American Recovery and Reinvestment Act, P.L. 5, 111th Cong., 1st sess. (February 17, 2009).

such as smartphones and the Internet. He suggested working with disease-based organizations that advocate for patients (e.g., PatientsLikeMe) to determine how to provide patients with trusted sources of information. Krupinski agreed, noting that the ATA works closely with many patient advocacy groups, especially when they speak to policy makers about the advantages of telehealth.

9

Technological Developments

A panel of experts discussed advanced technological developments in telehealth, including patient-generated data, remote monitoring of the use of social networking, and wireless health. The following sections reflect the individual speaker's comments and reflections.

PATIENTS' PROVISION OF DATA

David S. Muntz, M.B.A., CHCIO, FCHIME, FHIMSS
Office of the National Coordinator for Health Information Technology

Technology creates changing roles for and demands from patients. For example, technology can create unbounded expectations. There used to be short-term, mid-term, and long-term planning horizons, but today, the presence of mobile devices has developed the immediate-term expectation. Technology and its evidence base need to be developed more rapidly to get the technology into the hands of the people. In addition, people already have technologies that will have to be deployed in a number of areas.

In terms of the roles, who will be the primary coordinator of care? Is it the physician with PCMHs, the patient, or the patient support groups? How can different groups be connected? Meaningful use requirements will create meaningful conversations about the roles for the respective parties. Who will be the custodian of data? In virtually all states, the medical records person or the health information management person is the custodian of data, but that is likely going to change to be the purview of the patient. This would help solve some significant problems (e.g., privacy, confiden-

tiality, security, access). However, the country still has a significant digital divide. For those who are unable to be custodians of their own data, solutions such as health information exchanges will be needed, and somebody else will have to act as that primary coordinator of care. The Office of the National Coordinator for Health IT (ONC) has developed a consumer e-health group that focuses entirely on that issue. ONC talks about three "As":

1. Access: How do you get a patient to the data?
2. Action: How you get a patient to take action on the data?
3. Attitudes: How do you change the attitudes about care?

Challenges

Products on the market today enable the monitoring of daily activities inside the home. How can they best be packaged and used? What reimbursement system will support their use? How will people be trained? How can information be gathered to promote particular actions to be taken? There are many challenges with patient-generated data. The first relates to the engagement of the patient and includes issues of culture, literacy, privacy, confidentiality, and security. For example, who is the custodian of an adolescent's health information? How does it affect the doctor-patient relationship? How will individuals who do not know how to use computers be assisted with the use of these technologies? How will providers keep pace with the amount of information available to patients on the Internet? Will competition develop once patients have access to the same information their providers do?

Second, many have questioned the reliability of patient-generated data. In a face-to-face meeting, providers may use body language to determine truthfulness. However, the reliability of physician data may also be questioned. Some patients have discovered that some of the information in their medical record is not accurate. Having everybody look at the data ensures that the value of the data goes up and the integrity stays as high as possible.

Lastly, there is a need for the intuitive collection of data. If the use of a device requires special training, it probably will not be used. To this point, software will need to be designed better for intuitive usability. If a device is easy to use and is able to ensure that safety measures are put in place, it will deliver a better outcome. Finally, the technology needs to be incorporated meaningfully into the lives of the consumers.

Consumers

Consumers are looking for a trusted source of data, but online searches produce a significant amount of inaccurate information. If we want people to use technology to gather data, and to be stewards of their own information, then we need to figure out how to improve the integrity of that data. There is a gap between the potential and the reality of telehealth. For example, only 15 percent of consumers have renewed a prescription online, only about one fourth want to adopt digital health records, and less than half think digital records will boost health care delivery. In response, the ONC developed several initiatives. In the Consumer e-Health Pledge Program (www.healthit.gov/pledge), more than 350 organizations (representing more than 100 million Americans) pledged to provide access to personal health information. Both data holders and non-data holders are encouraged to participate. ONC also looks to share real stories of people who have successfully used health information technology (e.g., the Million Hearts campaign, Beat Down Blood Pressure) with the intention of engaging more individuals. A current initiative rewards individuals for sharing stories of how having access to health records improved the quality of their care.

In the end, said Muntz, consumers need all the stakeholders to connect, communicate, and collaborate so they can better understand what an electronic health record can do.

REMOTE PATIENT MONITORING

Bonnie Britton, R.N., M.S.N., ATAF
Vidant Health

Eastern North Carolina is very rural with a great deal of poverty, illiteracy, and chronic disease. Vidant Health is the largest health care system in North Carolina, serving 1.4 million people. Seven of the system's 29 counties are among the top counties for chronic disease in all of North Carolina. As a result of previous experiences with telehealth in the state, Vidant Health developed a remote monitoring program for patients with cardiovascular disease and pulmonary disease for all 10 of its hospitals. Vidant Health's goal for the program was to identify inpatients to be referred to a telehealth program that would monitor their blood pressure, pulse, weight, and oxygen saturation in their homes on a daily basis. Additionally, the program incorporated a patient activation measurement tool, which assesses the patient's engagement in their own health care. The program is directed at patients who score low on this tool—the patients who are distrustful or fearful of health care, who believe care is the responsibility of the health

care provider and not the patient, and who tend to be noncompliant. The program also includes elderly, homebound patients with chronic disease.

Lessons Learned

Many people are initiating remote monitoring in the patient's home. One of the big lessons is to develop a program based on the payment structure. To determine their target population, Vidant Health looked at their core measures, what will be reported publicly, and where they stood on the linear graph of value-based purchasing. Another lesson is that care needs to shift from the hospital to the home setting. With the patient at the center of care, there has been a lot of research about care coordination and transitions in care. However, the models for those programs have very high nurse-to-patient ratios, which make them very hard to scale up, and is unaffordable. With remote monitoring, the nurse-to-patient ratio is one nurse to between 85 and 100 patients. In addition, changes are needed in hospital care management. Another strategy is the PCMH; four Vidant Medical Groups are seeking certification as PCMHs, and they all have incorporated telehealth into their programs.

To be successful, remote monitoring programs should be based on best practices. For example, programs should focus on the top 5 percent of users—the high-risk patients with chronic illness. Assessments of engagement are needed so that providers can teach and coach based on the activation level. Goals should be patient-centered goals, not the goals of the provider. For most patients, these goals will be very small steps to encourage engagement.

Additionally, specific protocols are associated with success. Patient-selection criteria should be inclusive versus exclusive. For example, Vidant Health's only exclusion criterion is that the patient does not have electricity. Programs need standardization for patient identification, screening, and enrollment. There also needs to be a provider plan of care in the ambulatory record, and a physician referral in the inpatient record. In the Vidant Health program, licensed practical nurses train patients on the use of the equipment and test patients' competency. They also do medication reconciliations at discharge and the day after discharge, when they install the equipment in the patient's home.

Programs need to be data driven. The Vidant Health program accumulates data on demographics and objective clinical data (e.g., height, weight, blood pressure, pulse, oxygen saturation, low-density lipoprotein, hemoglobin HbA1C). Financial data are also important. Finally, integration of the electronic health record is critical. Telehealth vendors are willing and able to do this integration, but the electronic health record vendors need to be pushed.

Finally, capital is the biggest roadblock for remote monitoring, especially lack of reimbursement. Providers need to see this as a cost avoidance and cost savings strategy.

Results

For the 65 patients who completed Vidant Health's remote monitoring program, data have been analyzed by pooling all of the data from 3 months prior to telehealth, during telehealth, and 3 months after intervention. About half of the patients were female (54 percent), African American (50 percent), and over age 70 (53 percent). Primary diagnoses were heart failure, diabetes, and hypertension and the primary insurance was Medicare. As seen in Figures 9-1 and 9-2, hospitalizations and bed days were both dramatically reduced after implementation of the program, both during the monitoring, and in the 3 months after monitoring had stopped. Among other benefits, this frees up hospital beds for surgical patients and other more critical cases. It also allows patients to return to their homes and communities.

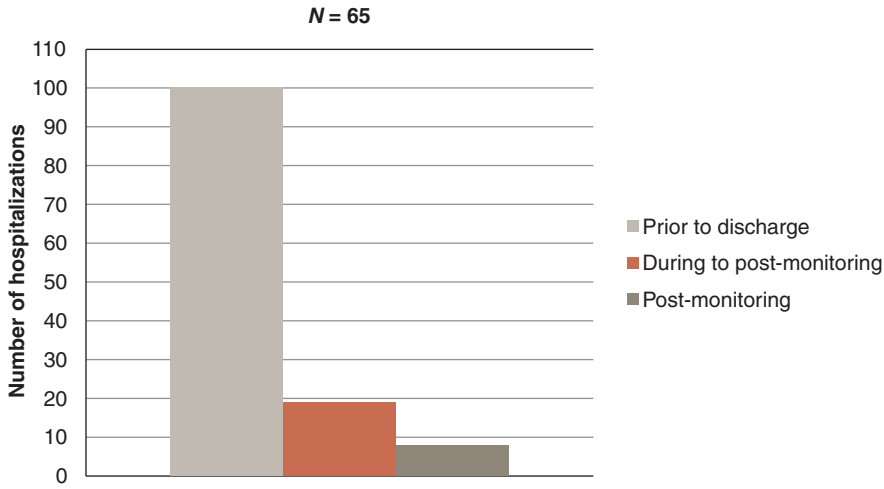

FIGURE 9-1 Impact of remote monitoring on hospitalizations.
SOURCE: Reprinted with permission from Bonnie Britton (2012).

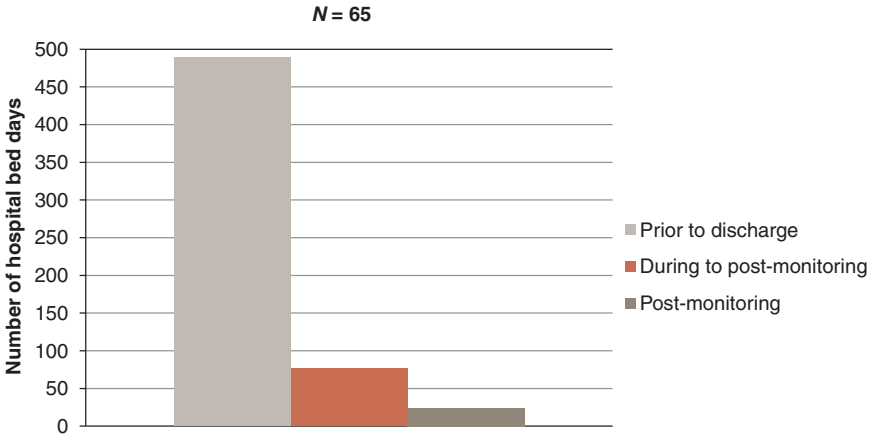

FIGURE 9-2 Impact of remote monitoring on hospital bed days.
SOURCE: Reprinted with permission from Bonnie Britton (2012).

SOCIAL NETWORKING

Dave Clifford
PatientsLikeMe

PatientsLikeMe is an online platform for social networking for people with chronic illness. PatientsLikeMe is uniquely positioned as a generator of data. As we talk about what kind of data we can gather from outpatient life, platforms like this are a cheaper way to get at some patient outcomes. PatientsLikeMe was founded because Stephen Heywood, diagnosed with Amyotrophic Lateral Sclerosis (ALS),[1] and his family (a family of engineers) became frustrated by the quality of the data available regarding individuals with ALS. Literature on ALS is limited to very small cohort trials, and there are not many information manuscripts about what day-to-day life is like. There was no place for someone to come and talk about what it is like to have that disease (or many other chronic diseases) with a data-driven perspective. Many places have narrative content (e.g., blogs), but the Heywood family wanted to supplement some of that narrative content with data content.

Today, PatientsLikeMe is an online network of more than 150,000

[1]ALS is also known as Lou Gehrig's disease.

patients who have signed up to use the website. These members can connect with others like themselves for personalized learning and support. They enter their own information over time, and the website graphs the information, which gives an immediate visual perspective on what their disease course has been like. They can use that information to dive into the richer community experience. For example, individuals can look for other people who are on the same medications, who have had the same disease for the same amount of time, or just share common symptoms. Most of the members have private profiles, which means that their information can only be accessed by other members of the PatientsLikeMe community. PatientsLikeMe knows the members' e-mail addresses for adverse-event reporting, but do not know their real names. The majority of patients using the site have severe neurological diseases (e.g., ALS, fibromyalgia, Parkinson's disease, epilepsy). These are not the diseases that are the big drivers of care in the remainder of the population.

In this community, people are surprisingly open about severe pathology. They score their quality of life and take disease-specific questionnaires to track things like medication dosages and side effects. Members talk about their primary diseases and their comorbidities, and share symptoms on a none/mild/moderate/severe scale. This enables others to get a sense of what it is like to actually have a specific disease based on a visual presentation of data. The site also has an area where people talk about what it is like to have a specific disease in more of a narrative view.

So, PatientsLikeMe is a place for people to come together and talk, but what is the benefit? One-third of the people with epilepsy in the online community say they had no one in the real world with whom to discuss their disease. Rural populations especially may have difficulty finding support groups. This site provides ongoing access to a support group anywhere at any time. For the majority of people with epilepsy, the site gives them a better understanding of their seizures. In addition, epilepsy patients frequently discontinue medications because they do not know if something is a side effect, because it makes them feel weird or strange. Most cases of uncontrolled epilepsy are due to non-adherence to medication. Information on the site helps them understand their side effects, which drives them to be more adherent to their medication in many cases. The site also leads to patient activation: Twenty-one percent of members with epilepsy said that as a result of using the site, they insisted on seeing a specialist.

Few care systems have adopted good places for patients to be meaningful custodians of their health care data. When people are trying to manage their health online, they are doing it in the context of other information. PatientsLikeMe allows patients to share their personal health information with others (e.g., peer groups, clinicians) in an isolated system. For providers and for care teams, PatientsLikeMe provides a clinically robust

understanding of the patients and real-world outcomes by aggregating the data and then supplying that data to interested parties. For example, PatientsLikeMe discovered that due to the side effects, patients with multiple sclerosis frequently take their biologic medications at night rather than during the day, but this is not something that clinicians frequently tell them to do.

Additionally, PatientsLikeMe provides the breadth and adaptability of social networking and crowdsourcing, but the presence of data is an underlying pin to these narrative threads. For example, if someone is considering a drastic therapy that is not well received in the peer-reviewed literature, a group of individuals on PatientsLikeMe may have personal experiences with the procedure and be able to share the data they tracked. So as opposed to health information that is placed onto the Internet without any fact checking, this allows for a data-based double check for some of this health information.

The goal of PatientsLikeMe is to build a world where every patient's treatment is shaped by every other patients' experiences. This is a complementary role that patients can bring to telehealth, especially in the context of things like remote patient monitoring. In order to zero the sensors in the PCMHs, we need to have some of this complementary data about what was going on in the patient's life that day to make these sensors more robust and useful. Overall, PatientsLikeMe is trying to integrate with as many data streams as possible to make the entire system work well for patients.

WIRELESS HEALTH

Mohit Kaushal, M.D., M.B.A.
West Wireless Health Institute

The three main macroeconomic drivers of health care today are rising costs, the epidemiological transition, and shortages of health care professionals. First, approximately 18 percent of the gross domestic product is spent on health care, and this percentage is growing. Secondly, the population is aging. This is important because older adults have more chronic disease, which drives even more cost. Finally, to compound all of this, there are not going to be enough providers to care for everyone. Technology, especially mobile technologies, can solve some of these issues.

Health Care in Transition

Today there is a real shift from paying for transactions and volume of care to paying for outcomes. Essentially, the site of care needs to be shifted from expensive, centralized, bricks-and-mortar hospitals that are managed

by physicians and nurses, to sites outside the hospital, along with the "de-skilling" of health care. Labor productivity in many other industries has improved over the past decade, while it has lagged behind in health care.

The current model of health care is reactive: It is characterized by low-frequency visits based on when the physician can see the patient; it is location-centric and high-cost. West Wireless Health Institute coined the term "infrastructure independence" for a new model of health care—a proactive system that provides the right treatment at the right time wherever the patient is and for a lower cost. For example, the earlier detection of patients' illnesses and management in home-based settings rather than hospitals (or in independent living facilities rather than nursing homes) would result in huge savings.

Health care reform has had several inflection points. First, payment reform will likely reward best clinical practices. Second is the focus on technology, such as the digitization of health care. In other industries, digital data and analytics have transformed productivity and outcomes. More data are needed to help improve the health care system. The third practical effect of health care reform is that many physicians are becoming salaried employees.

Wireless Health

The taxonomy of wireless health is extensive and includes terms like mHealth, wireless health, and telehealth. The system of wireless health includes various components. First there is data input with mechanisms (e.g., sensors) to capture physiological parameters. Then there is data transmission wherein data are moved via wired and wireless networks. Next, data need to be stored and analyzed so that they can be changed from raw data to meaningful information for health care practitioners. Finally, an appropriate user interface is needed to empower the final user with all this information.

Mobility allows the capture of data and transmission of information anytime, anywhere, and anyplace. However, that alone is not enough. The wireless health industry has moved away from just mobility toward creating end-to-end solutions that include analytics and user interface. In essence, technology must be implemented within the right clinical process. Furthermore, technology may help develop new clinical processes to care for patients for a fraction of the cost and with better outcomes.

On the data input side, sensors are becoming cheaper and more ubiquitous. Beyond capturing basic vital statistics (e.g., blood pressure, pulse, weight), technology is beginning to capture more valuable data. For example, when treating congestive heart failure, sensors in a patient's bed might be able to pick up signs of decompensation 2 weeks before that patient

becomes symptomatic. This represents a convergence of health information technology, service delivery, and user interface and design. The amalgamation of all these very different disciplines will contribute to positive final outcomes. It is not just about making a device wirelessly enabled; rather, it is about how this device better manages patients for a fraction of the cost.

Optimism and Barriers

There are many reasons to be optimistic about wireless health. First, networks are ubiquitous, whether they are wired or wireless, and can transmit more and more information. Unfortunately, huge parts of the country still lag behind in the connectivity piece, which needs to be solved. Second, the consumer-scale production of smartphones and other devices has led to a proliferation of applications for consumers, providers, and other caregivers. The ones that are creating a lot of value are appearing slowly, but will continue to grow. Next, decision support may be the most important piece. There is a real generation gap now in analytics in health care versus other industries. The challenge in health care is how to capture multisource raw data (e.g., multiple sensors, medication compliance, the electronic medical record, social factors) and turn it into something meaningful, especially to determine unknown levers. Finally, the current rate of inflation in health care cannot continue, and will force the redesign of the health care system.

The VA has demonstrated compelling data with a home telehealth program. They showed a 19 percent reduction in hospital readmissions for people within that program and, for the patients who are admitted, a 25 percent reduction in bed days (Darkins et al., 2008). However, this is not just about a technology. Rather, it is about the right payment model, the right culture, the standardization of process, the use of care coordinators, and then the right technology to help augment and accelerate all of that.

Unfortunately, there are still significant barriers to the use of wireless health. First, baseline connectivity is the prerequisite to empower everything. Next are issues of interoperability and liquidity of data. Data are currently isolated in non-interoperable systems. Within the wireless health space, the concern is that front-end devices cannot talk to the back-end data warehouses or the electronic medical records. The next area of concern is how the different technologies integrate. Finally, clinical evidence needs to be perpetuated around the final value proposition of all of this. Again, the key point is that the technology has to be implemented in the right care processes to get the best outcomes, rather than developing technology just for technology's sake.

REACTION AND DISCUSSION

Moderator: Kamal Jethwani, M.D., M.P.H.
Partners Healthcare Center for Connected Health;
Harvard Medical School

An open discussion followed the panelists' presentations. Jethwani began the session by noting that several speakers referred to technology as a tool—that telehealth is not about the technology itself, but about the people and the processes. He also referred to discussions about who should be the custodian of data, and the role of patients in generating, validating, and sharing their own data. Audience members were able to give comments and ask questions of the panelists. The following sections summarize the discussion session.

Incorporating Technology

Jethwani spoke about the need for intuitive data collection, perhaps integrating data collection into the flow of daily life. He suggested this might be the role for wireless and mobile health, since phones are ubiquitous and part of the daily flow of work and life. Clifford added that people frequently look to mobile technology as the solution, but that while the number of health and fitness applications has risen dramatically, most people rarely use these applications beyond the first download. He stated that the mobile application development community is not going to solve the problem alone. Instead, he argued, the panelists had highlighted that technology can only solve the problems of health care insofar as it is integrated intelligently into work flows, life flows, and clinical flows. Jethwani agreed, adding that this is why mHealth developers need to come together with the larger team in care plan design.

Patient Preferences

One participant asked if there are any data on how patients would like to connect with providers using technology. Clifford responded that the individuals who use PatientsLikeMe are not representative of the entire population (e.g., have high health literacy, are extremely engaged in their health care, have already embraced technology) and so may not reflect the needs and demands of all patients. He stated that their members want health care providers to have a dialogue with them, to speak to them intelligently, and to allow them to be participants in their care, and that they largely do not care whether it is virtually or face-to-face.

Evidence and Research

One participant asked if patients will start to decide the research questions, noting that patients are starting to aggregate themselves and identify researchers who are interested in studying their conditions. Clifford responded that there are several emerging models that run counter to traditional research models, and that this might be useful for some research questions. He noted one project that is trying to build a new health commons that includes portable legal consent—the ability for any person to give global consent to allow the data that they gather about themselves (from electronic health records and other data sources) to get aggregated into an open database that can then be used by researchers internationally. He referred to another part of this project in which a group of individuals can agree to a research question, make their data available on a website, and offer a monetary award to whichever researcher can come up with a more apt model to answer that question than the one that exists.

Muntz added that more should be done to promote clinical research. He asserted that health care providers need to be more connected to the clinical trial enterprise because treatments can significantly impact the course of a clinical trial. He noted that in his previous organization, physicians were often not aware of the clinical trials happening within that same site, so they instituted a system that queried a database of all the people enrolled in a clinical trial and would alert clinicians when that patient came in for care. Muntz added that this needs to happen across boundaries, such as in health information exchanges, to promote clinical research.

One participant asked whether smaller, local programs can serve as pilots that lead to more research. Britton noted that North Carolina is holding a summit to discuss starting chronic disease consortiums that allow for centralized remote monitoring (to keep costs down), to keep standardization in place, and to serve as a repository of data. This would require just one institutional review board and have the ability to bring all that data together to have greater numbers to take to the federal government.

Clifford disagreed that the RCT should be continued as a gold standard, stating that such research is less valuable than the tremendous amount of data collected by sensors, and yields real-world information. A participant responded that the randomized controlled trial is "here to stay," but should only be one part of the research armamentarium, and that newer research techniques should be used as well.

Adoption of Technology

One participant talked about linking small programs that yield positive findings with clinical translational science programs that might also

be able to address how to improve adoption of newer processes based on these findings.

Another participant noted that adoption of previous health care tools (e.g., stethoscopes, X-rays) was not necessarily based on a tremendous amount of evidence, yet telehealth is held to a higher standard. He asked how this related to the development of federal policy because the government has a history of being unable to change quickly in response to rapid innovation. Kaushal stated that in most cases, technological innovations will outpace regulatory or policy innovation. He agreed that many of the connected technologies discussed on the panel have less of a value proposition in a fee-for-service world, and so payment models are key. Kaushal further added that he is less worried about culture change for clinical process innovation, because, he argued, once the right incentives are in place (e.g., providers can get paid for the use of a technology), patterns will change. He noted that another key lever is to get regulatory clarity around how innovators can get some of these technologies through the FDA's clearance process. Clifford stated that FDA regulation does not make sense for the use of data and technology in clinical decision making.

Muntz questioned what compels people to act and collaborate. He stated that in the past, the markets were not efficient and many people developed software that would not talk to other software. He argued that in many ways, the government is the last resort when a market does not do things efficiently. Muntz maintained that stimulus money helped to computerize health care records in a way that could not have happened without government intervention. He suggested that current regulations are forcing interactions in a way that creates more of a commodity-like use of the data.

Payment Systems

One participant noted that while some patients are highly educated and look to their physicians for advice, others merely want to be told what to do. She asked how payment systems will enable providers to go into the patient's home, reconcile medications, and get the patients to their appointments, given that the less engaged patients are always more expensive. Britton argued that from a policy perspective, one needs to act locally (e.g., state Medicaid programs) and that federal policy changes will be difficult without randomized controlled trials. Britton added that from a practice perspective, hospitals are often willing to act because they want to change the way they do things so they can take care of patients and wrap services around patients who are the most vulnerable.

Connectivity

One participant asked what we need to do to make affordable broadband connectivity available to everyone. Kaushal referred to Muntz's earlier remarks regarding the role of government, and suggested that this is where the FCC has a role to play. However, Kaushal stated that there are other areas where there is no market failure; he asserted that connectivity will become ubiquitous as the cost of implementing technology and building and managing networks decreases.

10

State-Based Perspectives

In this session, a panel of experts discussed many of the telehealth issues that can fall under the purview of states, such as statutes, regulations, health reform issues, licensure, reimbursement, Medicaid issues, and credentialing.

THE VIRGINIA PERSPECTIVE

Cindi B. Jones, M.S.
Virginia Department of Medical Assistance Services

Telehealth should not be an afterthought, but an integrated aspect of health care delivery. The governor of Virginia realized there were many opportunities for health care reform within and beyond the ACA. Therefore, he created an advisory group of health care leaders and business leaders to talk about what we could do better in Virginia in several strategic areas, including payment and delivery reform, capacity, Medicaid, technology, and how to get employers involved for value-based purchasing. Telehealth is intertwined in all of these areas. For example, we do not have enough health care professionals now, and so we spent a lot of time discussing how telehealth combined with team-based care can increase capacity.

Virginia Medicaid serves nearly a million people with a budget of almost $8 billion. Virginia Medicaid telemedicine coverage started in 1995 as a small pilot with a small number of services. In 2003, coverage was expanded and a variety of providers were recognized for the provision of telemedicine services. Generally, any new services in the Medicaid program

must be priced out for the governor and the general assembly. However, Virginia has embraced telemedicine not as new service, but instead as a method in the delivery of services. Therefore, telemedicine is seen as a new mechanism to provide access for Medicaid clients. In October 2009, the program expanded the list of originating sites. Recently, even more services have been added to the Medicaid telemedicine program based on services available in the commercial market.

Over time, as Virginia has moved farther away from fee-for-service payment systems toward managed care (Virginia Medicaid is about 70 percent managed care), the use of telemedicine has evolved from needing a specific modifier on claims to being included as part of the global payment for what is done to serve the individual. Providers of telemedicine are expected to fully comply with service documentation and other coverage and billing requirements, and they may be audited for their compliance. Telemedicine coverage is similar to Medicare coverage, but it is not tied to rural area definitions. Even though telemedicine tends to be used in rural areas, telemedicine is also very useful method in urban areas.

Use of telemedicine in fee-for-service Medicaid looks low if you just look at claims. However, this may be because some providers are not using the billing modifiers on claims forms, some providers are using telemedicine as part of a larger bundle of services, and hospitals and clinics often do not break out telemedicine on their claims. Medicaid managed care plans have gone even further in their use of telemedicine. Surveys of these plans show that one plan has focused on adolescents and psychiatric services while another focused on aged, blind, and disabled individuals. One plan covers telemedicine without preauthorization.

Virginia Medicaid is discussing the use of telemedicine for home health services, postoperative care, high-risk pregnancies, and infections. They are also considering S&F coverage (e.g., for ophthalmology). In addition, Virginia Medicaid is working on a memo to help inform out-of-state physicians about how to receive reimbursement in caring for Virginia residents.

THE MARYLAND PERSPECTIVE

Laura Herrera, M.D., M.P.H.
Maryland Department of Health and Mental Hygiene

Maryland is like Virginia in terms of the numbers of individuals it serves in the Medicaid program, but unlike Virginia, it is not as far along in using telehealth. In 2010, the Maryland Health Quality and Cost Council (chaired by the lieutenant governor and the secretary of health) was tasked with identifying challenges and solutions to advancing telehealth. After the council issued a report, a task force (led by the Maryland Health Care

Commission and the Maryland Institute for Emergency Medical Services) was established to further pursue these issues.

Telemedicine Task Force

Three advisory groups were established to develop recommendations: the Finance and Business Model Advisory Group, the Technology Solutions and Standards Advisory Group, and the Clinical Advisory Group. The Finance and Business Model Advisory Group recommended that state-regulated payers should be required to reimburse for telemedicine services to the same extent as face-to-face health care services. The Technology Solutions and Standards Advisory Group wanted a network built on existing standards and integrated into the statewide health information exchange. All 46 Maryland hospitals are reporting regularly into the health information exchange (e.g., discharge data, lab data, radiology data), and so the group wanted telehealth integrated into this network. Additionally, the group recommended certain minimum requirements related to connectivity. The Clinical Advisory Group focused on changes in licensure, credentialing, and privileging of providers to facilitate the adoption of telehealth.

Legislation

As a result of the recommendations of the Finance and Business Model Advisory Group, legislation was introduced in 2012 in both the Maryland House and Senate. The bill required state-regulated private payers and Medicaid to cover services delivered through telehealth as they would if delivered in person. Furthermore, private payers would not be permitted to require preauthorization for telehealth services, nor could they limit these services to just rural areas. The Maryland Department of Health and Mental Hygiene (DHMH) supported the bill with amendments. One amendment allowed Medicaid to conduct a review. Unlike other states, the Maryland Medicaid program sits within the DHMH, as opposed to the Department of Social Services. So while the DHMH supported the bill, they wanted to fully understand the implications to the entire system. DHMH stated that if services were deemed to be cost neutral, it would cover services in FY2013, but if they were not neutral, they would seek coverage in FY2014 through budget initiatives in the 2013 legislative session. Another amendment allowed private payers to require preauthorization for telehealth services. The bill was passed and signed into law with both of these amendments.

Current DHMH Activities

Pursuant to the amendment on cost neutrality, the DHMH started a review of the current literature and evidence on telehealth. They did a comprehensive analysis of publicly available information as well as the network available to Medicaid directors to understand what was being covered by other states. They found that 37 states covered hub-and-spoke teleconferencing, 16 covered S&F technologies, 15 covered home health monitoring, and only 2 covered telephone and e-mail. Furthermore, they looked at what private payers (both commercial and managed care organizations) covered in the state of Maryland. DHMH also started researching different modalities and services, as well as looking for any cost studies, to see if any specific modalities stood out. Assumptions included everything from real-time interface to S&F technologies to home health monitoring, especially in light of long-term care rebalancing efforts currently happening in the state.

Prior to all of this, Maryland did cover telemental health services in 12 rural counties, but the originating site could only come from an outpatient mental health service hospital or a federally qualified health center and the distant provider could only be a psychiatrist. So, in addition to what is being done now to expand coverage, Maryland is also reassessing telemental health usage and seeing what can be done to expand it.

DHMH undertook all of these efforts while thinking about how to implement the ACA. Maryland has a lot happening at the state level related to PCMHs as well as ACOs. Maryland was just funded for four ACOs, three of which are practicing in rural areas. DHMH has been synthesizing these findings and developing assumptions based on what other states are doing, ACA implementation efforts, and what private payers within Maryland are doing. The DHMH will report back to the general assembly in December 2012.

THE DELAWARE PERSPECTIVE

Rita M. Landgraf
Delaware Department of Health and Social Services

The state of Delaware has less than a million residents in just three counties. Sussex County is the largest from a geography standpoint, but is very rural. Also, many retirees are coming to this county. Telehealth presents a marvelous opportunity to advance the medical infrastructure to care for those populations.

Successes

The Delaware Telehealth Coalition, formed in 2011, has more than 50 members, including all the hospitals. The coalition evaluated the use of telehealth, and coverage was established as a policy of the Medicaid program, and not through the general assembly. Delaware Medicaid, housed within the Delaware Department of Health and Social Services (DHSS), started reimbursing for telehealth services on July 1, 2012 (the start of the fiscal year). Delaware Medicaid is largely supported by managed care organizations that have contracts with numerous providers, all of whom are now able to offer telehealth. In conjunction with that, one hospital in Sussex County and DHSS are specifically using telepsychiatry for crisis evaluation. New Castle county has a more robust medical infrastructure, and so the use of telemedicine has helped to avoid transferring patients from Sussex over to New Castle (e.g., for consulting on trauma cases). La Red Health Center, a federally qualified health center in Sussex County, has received a Rural Health Services Outreach grant to provide telepsychiatry services. They are also interested in moving beyond psychiatry services as well.

Part of the success of adopting telehealth in Delaware comes from the personal commitment and advocacy of many individuals. Dr. Karen Rheuban came to Delaware in 2011 to advocate for the adoption of telehealth in Delaware Medicaid, which in many ways was a turning point. Additionally, in 2008, Dennis and Betty Leebel retired to Lewes, Delaware, from College Park, Maryland. Betty Leebel had been diagnosed with Parkinson's disease about 10 years earlier. In 2009, Dennis Leebel founded the Sussex County Parkinson's Education & Support Group. They found that many of their members were traveling great distances to visit specialists, sometimes taking up to 2 days round-trip. As a result, they began working with the La Red Health Center and Dr. Ray Dorsey, a Johns Hopkins neurologist, to use telehealth to bring care to Parkinson's patients in Sussex County.

Barriers

As mentioned previously, the aging of the population is also a major consideration for Delaware. Telehealth offers an opportunity to provide all individuals in the state with the best care (whether it be from providers within or outside the state) with the most effective and cost-efficient care. However, the Delaware Telehealth Coalition continues to address several barriers. First is that distant-site providers must be licensed in Delaware to practice telehealth. Since that licensure issue falls within the office of the Secretary of State, the Secretary of the DHSS has dedicated one individual to work with them to streamline that licensing process. The second bar-

rier is that telehealth technologies have not been widely adopted. Some providers are skeptical, so hopefully with the Medicaid coverage, evidence will be generated that demonstrates that the cost is not prohibitive and the care is high quality. Some individuals may not be comfortable seeing a provider in this manner, but when faced with lengthy travel, this concern may disappear, especially when they see the opportunities it provides. Finally, some hospitals and practitioners see telehealth as a threat to their revenue streams. However, with the availability of reimbursement, this threat should become an opportunity for them to serve even more patients.

Looking to the future, in addition to the state and the advocates, more hospitals and primary care providers are coming into the coalition. Next, they hope to engage the private sector so that this can be a true collaboration to facilitate cooperation. The state is also looking at different applications of telehealth, including at-home uses for the aging population and the state's underserved rural areas. Furthermore, they are looking at telehealth as a way to manage chronic conditions as supported by the ACA.

STATE-BASED ADVOCACY: NOBEL WOMEN

Maurita K. Coley, J.D.
Minority Media and Telecommunications Council

The Minority Media and Telecommunications Council (MMTC) is a leader in media and telecommunications policy and advocacy for minority and underserved communities. MMTC started out advocating for minority ownership and diversity of voices in the media, and has expanded into broadband adoption and advocacy and telecommunications policies that are designed to address the individuals who do not have the most advanced technologies available to them. The National Organization of Black Elected Legislative (NOBEL) Women are 235 current and former members of state legislatures in 39 states. They work to communicate the legal, social, political, economic, education, and health care needs of children, women, and families.

MMTC works with NOBEL Women to advocate on telecommunications issues at the local, state, and federal levels: the White House, the FCC, the Federal Trade Commission, the U.S. House of Representatives, and the U.S. Senate. MMTC has worked with the NOBEL Women on a number of proceedings before the FCC, such as the Open Internet, Universal Service Reform, Lifeline Telephone Service for Low-Income Families, and Minority Media Ownership. MMTC and NOBEL Women have partnered on a number of legislative and regulatory policies. For example, they have worked on the National Broadband Plan with the goal of 98 percent broadband adoption by 2015 and also to create jobs and opportunities

for small minority-owned businesses. MMTC has worked with NOBEL Women and on their own on spectrum exhaustion issues and wireless and smartphone adoption.

Model Telemedicine Legislation

Telehealth technology is a "game changer" for both rural and urban communities. For underserved communities, there is not that big a difference between rural and urban. Disparities often result from a lack of access or a lack of representation. NOBEL Women are especially concerned about the racial and ethnic minority or rural populations who do not have primary care physicians, often because of financial and transportation barriers.

In 2011, the NOBEL Women first created model telemedicine legislation. The legislation represents the opportunity for widespread adoption of telemedicine, much as has already been done in broadband adoption. The legislation, similar to that of the American Telemedicine Association, focuses on requiring private pay mandates to be the same for in-person care as it is for telemedicine. However, the NOBEL Women also focus on extending state Medicaid coverage. The NOBEL Women's model telemedicine legislation

- requires the coverage of telemedicine;
- expands the definition of telemedicine (or in some cases, establishes the definition) as including audio, video, or other telecommunications technology at a site other than where the patient is located;
- allows home telehealth (via videoconferencing) and remote patient monitoring;
- makes denial of coverage subject to review procedures;
- prohibits state Medicaid plans from denying coverage if the service would be covered through in-person consultation;
- requires statewide medical assistance benefit of health home for individuals with chronic conditions; and
- applies to all insurance policies, plans, etc., but not short-term travel, accident-only, or other limited coverage plans.

Most states provide some coverage for telemedicine, but this varies widely. The NOBEL Women have chosen to work on establishing a "level playing field." In July 2012, the NOBEL Women formally launched their goal to expand their telemedicine legislative initiative to every state where a NOBEL Woman serves. The NOBEL Women's 2013 Telemedicine Group Action Plan includes addressing legislation on state-by-state basis. This may include clarifying existing law with state officials, hosting roundtables to increase awareness, and identifying key stakeholder organizations and groups for partnering and collaboration.

At the state level, the overall strategy is to look at the health home for chronic care, high-risk pregnancies, stroke diagnosis and rehabilitation, mental health counseling, school-based health services (e.g., speech and hearing), Medicare-level telehealth coverage for rural and underserved populations, safety net critical access facilities, and telehealth coverage for state employees. At the federal level, the strategy is to advocate for federal legislation to improve Medicare coverage for urban beneficiaries, home-based services, S&F telehealth (for both rural and urban populations), and telehealth payment and service models for dually eligible patients; to work with the FCC on rural health programs to enable wider broadband access; and to support nationwide portability for health care professional licensure. NOBEL Women are especially interested in the licensure of practitioners. NOBEL's telehealth licensure resolution was passed at their legislative summit on June 22, 2012, which would prevent health care professionals from needing to seek a new license in every state in which the patient is located if they are using telemedicine. Overall, this strategy will need federal advocacy, state advocacy, and media advocacy in order to create a successful national campaign

REACTION AND DISCUSSION

Moderator: Karen S. Rheuban, M.D.
University of Virginia Health System

An open discussion followed the panelists' presentations. Audience members were able to give comments and ask questions of the panelists. The following sections summarize the discussion session.

Cost Neutrality

One participant asked if Maryland's cost neutrality study will be publicly available. Herrera answered that it would be made available to the public at a very detailed level, including the activity level in all 50 states and within the VA and the IHS, as well as what they find in their literature review. Rheuban noted that Virginia Medicaid found that telehealth would save millions of dollars in transportation costs and wondered if Maryland's analysis would consider that. Herrera said they would be looking at cost savings and noted that the ACA included a lot of initiatives concerning emergency department use, hospital admissions, and 30-day readmissions, which could also be considered among cost savings. She emphasized that in addition to looking at the costs of real-time interface, they are also considering S&F technologies and home health monitoring.

Functionality of Technology

One participant asked Herrera to clarify the intent or desired functionality behind the requirement for telehealth to be integrated with their health information exchange. Herrera responded that this had to do with record-keeping of the telehealth encounter to be incorporated into the patient's full record. She added that right now the exchange is getting information from hospitals, but they want to expand that at least to involve their ACOs and PCMHs.

One participant was concerned about choosing the right technology, and asked the panelists if they are considering the stepwise integration of telehealth, giving the example that some patients may not even have a telephone. Jones agreed that sometimes we get carried away in jumping to the most sophisticated technologies, and that there are significant areas of Virginia where people still have problems with Internet access. She said the secretary of technology surveyed Virginia health care providers about their capabilities on a variety of issues, including electronic health records, and found many holes. Jones noted that there is a push to try to provide funding to ensure everyone can communicate electronically. Herrera responded that she had previously served in the IHS and used telehealth in areas north of the Arctic Circle more than 14 years ago, and compares that to a state now where it is not used pervasively and is hard to get providers engaged. She asserted that providers want to do all they can to improve access and deliver quality care, but with all the factors competing for their time, it just will not happen without proper reimbursement. Landgraf agreed that reimbursement is necessary for the sustainability of telehealth, and that we should also work with the retail markets. Coley added that MMTC and the NOBEL Women have focused on broadband adoption because they found that many women and minority groups did not have high-speed Internet at home, in part due to the fact that they could not afford computers, because they did not know how to use computers, or because they did not find computers to be relevant to them. Coley asserted that some of this basic infrastructure is necessary to get telehealth at the level we might want.

Overcoming Barriers

One participant asked Landgraf about the source of the listed barriers in her presentation. Landgraf replied that the barriers were identified through grassroots efforts. She noted that licensure surfaced as the predominant issue and is the one they would be focusing on in Delaware. Landgraf also noted that some in the medical community may be threatened by telehealth. In part because of workforce shortages, they have been turning more to nurse practitioners and others to become involved in telehealth

services. She further noted that there are many myths to dispel regarding the use of telehealth, including those held by the public. Landgraf added that while Delaware Medicaid was able to achieve coverage of telehealth services through policy, she believes coverage needs to be codified as a state law, so that it does not depend on the support of the sitting administration.

Another participant asked Herrera if they planned to engage with providers to increase their interest in and use of telehealth. Herrera responded that two large academic centers (Johns Hopkins University and the University of Maryland) are already doing a significant amount of telehealth, and have their own telehealth departments. Herrera noted the centers are very involved in the advisory committee in providing subject matter expertise (e.g., equipment, standards of care). Herrera added that once Maryland Medicaid makes a decision, they will go forward with educational efforts for providers.

Specific Populations

One participant asked if any of the panelists had experience with using telehealth for the Department of Corrections. Rheuban responded that in Virginia, telehealth is a large element of service delivery, but that this population is managed by a different department than the Department of Medical Assistance Services. She added that there are correctional telehealth programs around the country that have been very successful.

Another participant asked about expectations for managing chronic disease through telehealth. Landgraf noted that in meeting with Medicaid managed care organizations, they have observed that traditional chronic care disease management is not producing the desired outcomes. She said they are working together to determine the high-cost drivers, choose methodologies, and conduct real-time evaluation to determine benefits. Jones added that like many states, the 30 percent who are in fee-for-service Medicaid are often the most costly. She said that when they talk about care coordination for this population, they might suggest the use of telehealth, but they cannot require its use.

11

Experiences of the VA and IHS

For the most part, the VA and the IHS work independently of one another. However, they have a formal Memorandum of Agreement that addresses how they should work cooperatively to serve veterans of mutual interest. In this session, a panel of experts discussed the approach to telehealth within each of these agencies, and the challenges and opportunities that emerge with collaboration. The following sections reflect the individual speaker's comments and reflections.

U.S. DEPARTMENT OF VETERANS AFFAIRS[1]

Adam Darkins, M.D., M.P.H.M., FRCS
U.S. Department of Veterans Affairs

The issue of telehealth is not about whether it will happen, but how it will happen. The VA is recognized as a national leader in telehealth, and defines several modalities within telehealth, including home telehealth, clinical video teleconferencing, S&F telehealth, teleradiology, secure messaging, and mobile health. The VA uses off-the-shelf technologies, and has a dedicated national telehealth training center for their staff. Additionally, they use standardized business processes because of the need for interoperability. Developing telehealth services should be based on a demonstrable patient need, and the VA introduced telehealth primarily in the interest of

[1]Data presented in this section belong to the VA. Personal communication, A. Darkins, U.S. Department of Veterans Affairs, August 17, 2012.

providing care to veterans. The reasons for doing telehealth include reducing costs, increasing quality, and improving access. Therefore, the VA's vision of telehealth is that it should be veteran focused, forward looking, and results oriented.

Telehealth Modalities in the VA

Home Telehealth

The value of home telehealth is based in the care of people with chronic conditions. There is no evidence the traditional outpatient clinic is the most effective way to care for individuals with long-term chronic conditions. The VA uses home telehealth (e.g., video, mobile devices) to provide noninstitutional care across the health care continuum: for chronic care management, acute care management, and health promotion and disease prevention. As shown in Figure 11-1, the census for VA patients receiving home telehealth has grown steadily. In FY 2003, about 800 patients were cared for with home telehealth. By the end of FY2012, the VA estimates 92,000 patients will receive home telehealth services annually.

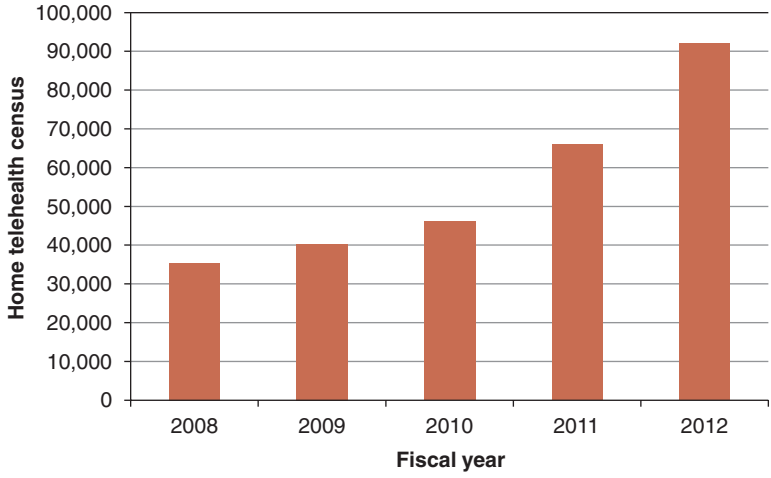

FIGURE 11-1 VA home telehealth patient census, FY2008-2011 and projected FY2012.
SOURCE: Reprinted with permission from Adam Darkins (2012).

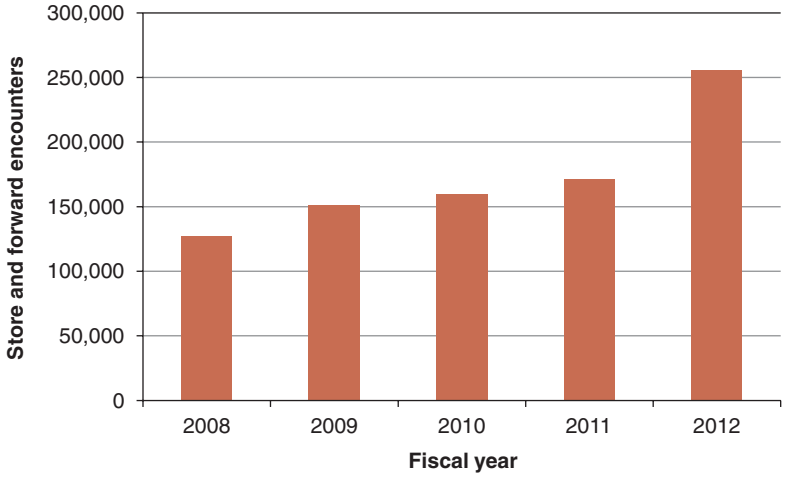

FIGURE 11-2 VA store and forward encounters, FY2008-2011 and projected FY2012.
SOURCE: Reprinted with permission from Adam Darkins (2012).

Store and Forward Telehealth

In the VA, S&F telehealth is mainly used for teleimaging for diabetic retinopathy and for teledermatology. Both of these serve a demonstrable patient need. About 20 percent of the 5.6 million veterans in the United States have diabetes, and screening for diabetic retinopathy is a way to prevent avoidable blindness. Additionally, many VA organizations, particularly those in rural areas, have difficulty finding dermatology services. The VA is also exploring how to use this technology into wound care. Figure 11-2 shows the growth in S&F encounters. In 2005, about 1,500 patients were managed by S&F telehealth; by the end of FY2012, this number is estimated to be around 256,000.

Clinical Video Telehealth

Clinical video telehealth replicates the face-to-face consultation (e.g., between provider and patient, provider to provider) and eliminates the need to travel for certain services. The VA primarily uses this for real-time videoconferencing between VA medical centers and community-based outpatient clinics. It is mostly used for the delivery of mental health services and specialty consultations (e.g., telecardiology, teleneurology, tele-amputation care, teleaudiology, telepathology). In the past year, the VA has been moving

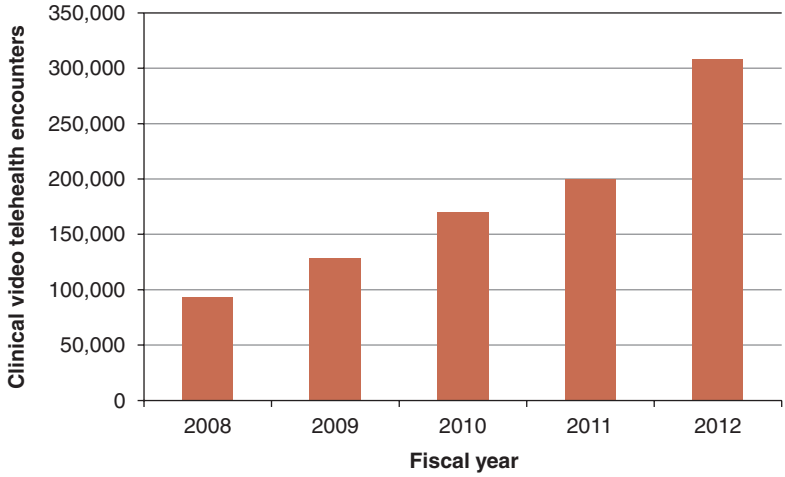

FIGURE 11-3 VA clinical video telehealth encounters, FY2008-2011 and projected FY2012.
SOURCE: Reprinted with permission from Adam Darkins (2012).

into tele-ICU. Over the past 7 years, the VA has built a dedicated national network for clinical video telehealth. This network includes 4,000 video endpoints within the VA system (e.g., hospitals, clinics), with everyone using Internet protocol (IP) video. The VA is also extending IP video into home care. As seen in Figure 11-3, the VA has had tremendous growth in the use of clinical video telehealth.

Impact

In 2011, clinical video telehealth, home telehealth, and S&F telehealth together accounted for care at more than 150 VA medical centers and 750 community-based outpatient clinics to 380,865 patients. Thirty-seven percent of the patients were in rural areas and 3 percent were in highly rural areas. For FY12, the VA estimates that 480,000 veterans (approximately 9 percent of the veteran population) will have been served by one of these telehealth modalities, and that in FY13, the number will rise to 820,000, or about 15 percent of the veteran population.

Outcomes assessments show reductions in bed days for home telehealth programs (53 percent) and clinical video telehealth for mental health care (25 percent). In terms of patient satisfaction, home telehealth programs have a mean score of 86 percent and S&F telehealth has a mean score of 92

percent. The VA pays for a certain amount of travel costs, and assessments show an average savings of $34.45 per video consultation and $38.81 per consultation for S&F. In previous years, savings associated with the home telehealth program (above all other costs, including the cost of the program) ranged from $1,238 to $1,999 per annum per patient.

Telemental Health

Mental health care is a major reason for implementing telehealth. In FY2011, 146 hospitals provided 55,000 patients in 531 community-based outpatient clinics with 140,000 telemental health visits. Home telemental health programs provided care to more than 6,700 patients for conditions such as depression and posttraumatic stress disorder. A review of more than 98,600 patients who received clinic-based telemental health care between 2006 and 2010 showed a 25 percent reduction in hospitalization. A review of 1,041 mental health patients before and after enrollment in home telemental health services by the VA in 2011 showed a 30 percent reduction in admissions in their first 6 months of care as compared to a similar period of time before enrollment.

Meeting Challenges and Ensuring Quality

Two challenges facing the VA are not unique to the VA: training often is not part of the health professions' curricula, and there are no outside resources to train VA providers on the use of telehealth. Currently, more than 60 requirements exist to establish a telehealth program, and they are often beyond the competency of most individual VA staff (e.g., privileging, information technology compatibility). Furthermore, the Joint Commission does not survey telehealth specifically, but will encounter telehealth during their reviews.

To meet these and other challenges, and to ensure the quality of their programs, the VA has three telehealth training centers that develop and provide standardized training and resource materials. Additionally, a quality management team provides biannual reviews of each Veterans Integrated Service Network (VISN) for integration of telehealth standards with Joint Commission requirements for hospital- and home-based care. The VA also has national databases, reports, and analyses for metrics of performance and quality of telehealth programs at the levels of the local VA medical center, the VISN, and nationwide. The VA also has national contracts and contract support for telehealth technologies, including service and warranties to ensure equipment quality and safety, and collaborates with national clinical experts to develop standards of care for telehealth care. Lastly, the

VA collaborates and coordinates with stakeholders to ensure comprehensive infrastructure for telehealth.

National Telehealth Training Centers

The mission of the telehealth training centers is the right training, in the right place, and at the right time. Because of the size of the VA network, it is important that people are trained in a standardized way. The emphasis is on virtual training (98 percent of the training is provided virtually) and strategic partnerships with the Employee Education System. These centers provide the training, tools, and resources to

- successfully plan, deploy, and manage telehealth programs;
- standardize organizational, clinical, technical, and business infrastructures;
- assess programs to identify clinical needs that telehealth can address;
- improve and expand the delivery of care via telehealth to ensure the efficiency, quality, and sustainability of services; and
- integrate with existing programs.

Through the third quarter of FY12, the VA has had 150 training courses or forums available from the three centers. The clinical video telehealth training center has trained more than 4,000 staff through more than 600 events. The S&F training center has trained more than 3,200 unique staff through more than 250 training events, and the home telehealth national training center has trained more than 2,500 staff through 800 events.

Training innovations include clinical practice forums, integrated telehealth master preceptor programs, interactive meeting rooms, new and improved methods of training, out options for super users, the use of video to capture the human element, scenario-based instruction evaluation, the use of animation, and rapid response training.

INDIAN HEALTH SERVICE[2]

Mark Carroll, M.D.
Flagstaff Medical Center

Where are we trying to go in telehealth? The widespread adoption of telehealth seems to be an important and major goal. Why is this so difficult,

[2]Dr. Carroll indicated that while he worked for the IHS for 20 years, his comments did not necessarily reflect those of the agency.

and are we approaching it in the right way? The easy answer is that the problem is all about reimbursement, and that telehealth payment should be equivalent to in-person care. However, perhaps the widespread adoption of telehealth is not really the goal. Instead, the real goal is quality, as conceptualized by the triple aim of the Institute for Healthcare Improvement: experience of care, cost, and population health (IHI, 2012). So, the real question is how can telehealth innovation help achieve the triple aim?

The IHS includes more than 600 facilities, some full-time and some part-time, across the country. These facilities include hospitals, health centers, Alaskan village clinics, and health stations. Most of these facilities are under tribal self-governance. Partnerships and collaborations are critical, and tribal governance is an important part of that. Indian health care is mainly rural, but it also occurs in urban environments. A differentiating point for IHS as compared to other federal systems of care (e.g., the VA) is that more than half of annual operating budgets of many IHS facilities is from third party billing, so business models matter.

Telehealth is not new to the IHS. In the 1970s, the STARPAHC project was jointly sponsored by the IHS; NASA; the Department of Health, Education, and Welfare (predecessor to HHS); and the Papago Tribe. In the project, health care providers traveled in a van to deliver health care via "two-way television," radio, and remote telemetry, applying some of the same basic precepts of care that we talk about today.

New Service Models

Since that time, many new tools have been embraced with the development of new service models. However, one model does not fit all. Some of the models are driven by necessity, such as the complete lack of access to specific specialty care. Many of the models for these new services rely on new partnerships, including ones that seem unfamiliar. For example, Coconino County in northern Arizona is the second largest county in the United States, and it sits adjacent to the Navajo nation and the Hopi nation. Currently, shared models are being developed for psychiatry and other services. Some models add very robust efficiencies. For example, the use of S&F consultation across the state of Alaska has resulted in dramatic improvements in speed of reply. However, efficiencies cannot be reached in some places because the models are not integrated into the care systems. This depicts the care approach and the culturally appropriate plan-do-study-act cycle in the Chinle Service Unit on the Navajo reservation. New types of innovation that do not work in this type of model and depiction are not easily integrated. Many models require new commitments. For example, the IHS ran telenutrition services from northern Arizona in Indian health sites in multiple states for years, resulting in thousands of interactions. When the

commitment went away, so did the ability to continue that model of care. Most models are not successful without a lot of effort. In another example, the IHS uses the Joslin Vision Network for a teleophthalmology program for retinopathy screening. The program improves access to screening and it improves access to laser treatment for diabetic patients already cared for in the clinic. The costs are lower, and the screening and care is better than in-person exams. This took a long time to get up to speed, and while eye screening rates across the IHS have improved by 20 percent in the facilities that have embraced this program, there is still much room for improvement.

Diffusion of Innovations

In *Diffusion of Innovations* (Rogers, 1962), Rogers highlighted issues relevant to telehealth. Many care models using telehealth do not diffuse the same way, yet these models are still isolated in specific categories (e.g., real time, S&F, remote monitoring). A different stratification system may be needed to distinguish telehealth innovations by their ability to diffuse easily rather than by the modality. For example, first there are innovations that can integrate more easily into conventional models of care because fundamental process and payment changes are not required. Teleradiology may be an example of that. Next are innovations that require important, but non-fundamental, changes within a closed health care system. Examples may include the use of telehealth within the Kaiser health system and the VA. Finally, there are the telehealth innovations that require fundamental changes, especially for open systems, systems that are collaborative in nature, and not within particular organizations. An example is chronic care coordination after hospital discharge.

Telehealth-enabled care is not necessarily the same as in-person care. They are different models of care and should not necessarily be reimbursed in the same way. Instead, new models of reimbursement are needed care. For some care models, there is no in-person option, and so reimbursing the same way across video makes sense. For some care models, a new tool (i.e., telehealth) does not necessarily bring added value. However, there is a growing evidence base for certain models that shows that telehealth care is just as good as conventional care; and sometimes it is better. We need to remember that not all of telehealth is exactly the same.

Relationships and Connectedness

In research, we need to consider the value of relationships and connectedness in some of these new care models. Part of the purpose of innovation in health care is to activate certain intermediate behaviors and activities, such as self-efficacy, self-management, and medication compli-

ance to achieve the triple aim. Relationship supports (e.g., social supports, behavioral health screenings, health coaching) are critical to this activation.

A 2010 study of patients hospitalized for heart failure concluded that telemonitoring did not improve outcomes (Chaudhry et al., 2010). However, important details might affect that interpretation. For example, this multisite trial was based on an earlier single-site trial that resulted in a 44 percent reduction in the rate of readmission, and was associated with significant cost savings. In the attempt to scale the model, a single skilled nurse case manager (who had one-on-one conversations with the responsible physician) was replaced with an automated monitoring system. Therefore, an alternate conclusion is that the non-relationship based model did not work.

Learning from that, Care Beyond Walls and Wires, a collaborative project in northern Arizona among private industry, the IHS, community health centers, and the Flagstaff Medical Center, is built on the need for relationships. This model uses tools like smartphones and a 3G signal so patients who live in remote areas can stay in communication with health care coordinators, especially after a hospital discharge. At the heart of this and other telehealth models is the relationship and regular communication between the patient and the care provider.

Concluding Remarks

Carroll reflected that changing care models is a daunting task, and challenges health care teams and policy makers alike. To facilitate these changes, telehealth innovations need to be stratified differently so that we can identify and learn from the different obstacles to diffusion. Also, more collaboration is needed in open health systems to work toward achieving better experience of care, lower costs, and improved population health. Different health organizations have different business drivers and motivators. Because of that, more study is needed on the role of connectedness in regional partnerships to improve transitional care for patients. Finally, care model change on a larger scale can be supported by focusing on key locations such as IHS facilities and community health centers, where national projects to study the effects of systematic uses of telehealth innovation can lead to policy and legislative changes.

CRITICAL RELATIONSHIPS IN TELEHEALTH WITH AMERICAN INDIANS AND ALASKAN NATIVES

Jay H. Shore, M.D., M.P.H.
U.S. Department of Veterans Affairs;
University of Colorado Denver

Telehealth is not about the technology itself, but is a bridge to the relationship with the patient needed to provide care. In a lot of ways, the most important treatment we give is the healing relationship between the patient and a provider. As seen in Figure 11-4, that relationship is the core of telehealth care, but that does not happen without a series of relationships that need to occur to allow a provider to see a patient in a rural community. In fact, although that relationship is critical, it is not the most important relationship for successful telehealth clinics. In rural populations, the most important relationship is often the relationship between the provider and the community, because without it the service will not exist. Embedded in that are organization-to-organization relationships, and particularly for native patients; this relates to eligibility across multiple systems. For example,

FIGURE 11-4 Multiple relationships of telehealth care.
SOURCE: Reprinted with permission from Jay H. Shore (2012).

evidence shows that native patients in particular use various systems of care; so, native veterans might get primary care from the IHS, and then choose to get specialty mental health care from the VA. Finally, in specific programs, there are internal and external relationships that need to occur for successful clinical interaction.

Mental health has a unique fit for telehealth in that most of mental health care can be accomplished in some form over videoconferencing. This has been shown in the growing literature over the past decades, across age groups, populations, and treatments, although even more research is still needed. Particularly in the past 5 years, the emerging technologies of direct in-home video conferencing, mobile health, and Web-based care have been changing how providers interact with patients. Telehealth and telemental health are especially relevant for native communities with geographic barriers to access, as well as cultural and institutional barriers that may prevent them from accessing care. RCTs are certainly needed to demonstrate that these treatments are as rigorous as any other treatment, but more nuanced approaches are also needed to understand this tool of technology and how it interacts in relationships. Each type of technology has strengths and weaknesses. There are appropriate pairings of technology with diseases and populations, but we do not necessarily understand in a systematic way how to make those pairings.

Patient-Provider Relationships

Good data show that there are some situations where telehealth may be more effective than face-to-face visits. For example, Shore related that in working with female natives with a history of domestic violence or post-traumatic stress disorder, the women often say it is easier to begin working with an unknown provider over video because in the initial visits, the distance helps facilitate a feeling of safety. As the relationship builds over subsequent sessions, the need for this feeling of safety through distance lessens as the patient develops trust with the provider. Counterpoints to that distance include the loss of cues and the perception of emotional distance. RCTs in telemental health show equal outcomes, but there are some hints of an impact on the patient-provider relationship and the clinical process. We do not know how that translates and how that ultimately impacts clinical outcomes. Telemental health clinicians will say it is different than seeing someone face-to-face. The good clinicians and systems understand that and make adaptations.

There are many different adaptations to bridge patient-provider gaps, such as provider contextual training. Providers are often from urban areas, and may not have spent much time in rural communities, so they may feel disconnected when caring for remote patients by video. Unless these provid-

ers make real efforts to understand the patient's environment and the issues impacting the patient in terms of community events, they may lose touch with what is going on contextually. Cultural and clinical facilitators are also useful. For example, the tribal outreach worker is a native veteran who lives in the community, does scheduling, builds rapport, and helps bring in patients who traditionally may have been reluctant to get care from federal health care systems. Veterans without a history of care for mental health issues may come for care for the first time not because of a stranger coming over video from an urban location, but because of the community member involved in the clinic. That is one adaptation at the patient-provider level. Additional adaptations include collaboration with traditional healers and family members.

Program-Program Relationships

Telehealth requires multiple internal and external collaborations among programs that may not come together in the traditional course of health care (e.g., primary care providers and information technology specialists). These programmatic areas may also have different languages, cultures, structures, models, and philosophies. The need to work together compels an increased level of coordination, continuity, and consistency in care, and leads to more holistic approaches. It also requires new models of care integration and health care team configuration. The conceptualization of health care teams has not kept pace with the technologies and the models that are delivering these technologies.

Organizational Relationships

Providing care may also involve multiple organizational collaborations. For example, one of Shore's clinics has six different partners: two VAs, a university site, the IHS, and two tribal partners. The cooperation and coordination of multiple systems of care is possible and, at times, highly desirable. Whereas one institution might not have all of the necessary resources, this cooperation provides more options for patients and increases care coordination. Also, with multiple systems, there may be better collective sources of funding. However, challenges include the identification of the correct configuration of partners. In addition, the technologies in the different organizations need to be able to interact, and managing multiple compliance and regulatory issues across systems can also be very challenging. Other sensitive issues include the designation of the primary funder and determination of who will pay for which programs or services. Organizational collaborations often start off based on individual relationships, and are critical in native communities. Overall, success depends on systematiz-

ing the right communication and collaboration processes that work within the local context, so that when the champions and other individuals move on, the infrastructure remains.

Concluding Remarks

Shore concluded that we need to do a better job of investigating, exploring, and codifying models that are successful at each relationship level in order to understand the importance of the impact of the relationships—how they are successful or how they do not work. We also need to understand how technology affects the process of health care, either positively or negatively. Finally, we need to learn more about appropriate adaptations to make sure that the development of telehealth services and networks focuses on enhancing the quality of and access to care in order to fulfill the promise of telehealth, especially for American Indians and Alaskan Natives.

REACTION AND DISCUSSION

Moderator: Spero M. Manson, Ph.D.
University of Colorado Denver

An open discussion followed the panelists' presentations. Manson began the session by noting the speakers' emphasis on relationship building not just at the provider-patient level, but throughout the hierarchy of relationships that underpin health care. He added that these relationships relate directly to the success of health care services in both the short and long terms. Audience members were then able to give comments and ask questions of the panelists. The following sections summarize the discussion session.

Reducing Federal Silos

One participant asked how to facilitate more successful collaboration among federal agencies and reduce silos. Carroll stated that recognition of the differences in the organizations and systems (including their missions) is critical. He noted that the IHS and the VA have a Memorandum of Understanding that allows for the exchange of information, tools, and experiences, but the respective missions of the organizations have guided the focus of their collaborations on service for native veterans. Carroll stated that better understanding of why certain models diffuse well in some systems and not others can serve as guideposts to steer expectations of diffusion because not all systems will work the same way. For example, there have been some great programs that work well within closed systems, but

are challenged when translated into systems that require interactive partnerships. Shore added that growth is needed both from the "top down" and the "bottom up." He cited the Memorandum of Understanding as an example of growth from the top. He added that the best IHS-VA collaborative successes occur when individuals at the local level look for how to use national processes to serve veterans. He noted that this, in turn, often leads to changes at the structural level.

Darkins responded that reducing silos is not merely about agreeing to work together, but that developing networks and standardized processes has real challenges, including issues of privacy and confidentiality. He suggested that telehealth could be defined as a multimedia patient record. Without the ability to exchange information, he said, the utility of video alone is relatively limited because telehealth is really about decision making for patients, and so successful collaboration is about building communities that link different systems. Darkins further noted that building a standardized process even within one system of care is challenging, adding that the VA is no different from other organizations when it comes to funding. He stated that the VA does not mandate the use of telehealth, nor is there centralized funding, so the values to growing these programs are largely access and local savings. For example, he said, it took nearly 5 years to build the data to support home telehealth.

One participant stated that NASA would be a good collaborative partner for the IHS and VA for the sharing of electronic medical record modules.

Linking Data Sources

One participant asked if federal data might be made available for use by the private sector, especially to do point-in-time evaluations. Darkins agreed, stating that linking data is the challenge of health care systems worldwide. He noted that the VA is working toward how information can be shared like this. Carroll also agreed, adding that the VA has been involved in information system development for many decades, and is interested in the bidirectional and contiguous exchange of data.

Involvement of Decision Makers

Manson asked how each system of care has educated and involved key decision makers, especially within the local community. Shore stated that the involvement of both the VA system leadership and the tribal leadership have been critical to his work. He said that in each community where they set up telemental health services, they have discussions with the tribal council and engage that leadership, as well as the local VA leadership. He agreed that support of the local and regional leadership is critical to success.

He added that engaging leaders at the national level is key to expanding models to other locations. Manson agreed, stating that generating an early series of small but effective models can inform other advocacy levels. For example, Manson and Shore discussed the role of the VA in supporting the development and further adoption of local models of care that were based on existing tribal relationships. Darkins stated that population health is really the driver for the development of telehealth. Perhaps there will be collaborations at the state level to allow for telecommunications resources to be pooled and used in different ways to serve multiple organizations. However, he said, there are many complexities, including privacy and confidentiality, to making this happen.

One participant asked how to get CMS to accept the work and data of the VA and IHS as evidence for coverage decisions. Carroll answered that the IHS has been working with CMS on these issues. He noted that the IHS also has tremendous data to share on outcomes, process, and costs related to the use of telehealth for national coverage determinations for telehealth. Carroll noted that a U.S. Senate bill had previously been proposed to authorize Medicare telehealth reimbursement for community health centers and Indian health sites. Darkins stated that CMS has been actively supporting telehealth development with many pilot programs. He added that telehealth is not being carried out in a standardized way across the United States, and that creating standardized systems for telehealth within the VA is a key to success. Darkins stated that CMS bases investment decisions on effectiveness, and they will determine if and when there is sufficient evidence to support the development of larger telehealth networks, and which, if any, of the models they believe can be transferred.

Cultural Competency

One participant raised the issue of the importance of cultural competency to the patient-provider relationship. Shore responded that in each community he and his team have served, they have tried to establish either a formal or an informal network with traditional healers. He said they have had ceremonies and blessings for the use of videoconferencing. They also will refer patients interested in traditional healers for sweat lodges to help with posttraumatic stress disorder, and that occasionally, those healers (with the patient's permission) will come in to discuss the patient's treatment. Shore stressed that this demonstrates to the individual patient that his or her perspective on health care and treatment is being considered, and it is an indication to the community that the individual provider and the larger health care organization are considering the community needs. Shore further asserted that demonstration of collaboration and partnership at the community level is critical to relationships.

12

Stakeholder Perspectives

A panel of stakeholders who represent individuals who are involved in or receive health care services through telehealth technologies discussed their individual and organizational perspectives on telehealth. They also considered actions HHS could take to further the use of telehealth to improve health care outcomes while controlling costs.

NATIONAL RURAL HEALTH ASSOCIATION

Alan Morgan, M.P.A.
National Rural Health Association

We are at the perfect storm of health care: If we are to move forward in implementation of the ACA, if we are to address current workforce shortages in rural America, if we are to address quality and disparities, we have no other option than the use of telehealth as a clinical tool. The barrier to the implementation of telehealth is no longer the technology, as it was 20 years ago. Instead, the barriers remain in the rules, regulations, and guidelines that we have imposed. The National Rural Health Association (NRHA) focuses on four key policy areas to advance telehealth: reimbursement, credentialing, broadband and infrastructure, and research.

Reimbursement

First, the NRHA recommends lifting the geographic patient requirements of receiving health care via telemedicine. As we proceed, we should

not lose sight of the rural designations in ensuring that rural areas are served. However, rural providers are reimbursed less than their urban counterparts. If the financial equation for the urban base originating site does not work, telemedicine will remain as a fringe service. Second, the NRHA recommends the elimination of separate billing procedures for telehealth services. Telemedicine is a tool for the clinician; the use of separate, specific codes does not make any sense. The third recommendation is to reimburse care provided by physical therapists, respiratory therapists, speech therapists, and social workers. These services are in high demand in rural areas, but are often not available to rural communities. Finally, the NRHA recommends reimbursement for S&F applications.

Credentialing

We need to look at the cost of credentialing and privileging, as it is very burdensome to rural providers. A telehealth provider can administer health care services to patients anywhere in the country. The NRHA recommends that CMS adopt a policy to allow telehealth providers to receive deemed status (meaning that the providers meet Medicare and Medicaid certification requirements) and to allow for health care facilities receiving telehealth services to perform credentialing by proxy.

Broadband and Infrastructure

Investment in broadband will require the combined will of and collaboration between government regulators and private industry.

Research

Much research on telehealth is already available. However, the NRHA calls for additional quality measures in telehealth treatments to improve the services in rural America. To be clear, the health care delivered in rural America is not of lower quality. This is reflected neither in the 2005 IOM report *Quality Through Collaboration* (IOM, 2005) nor in CMS Hospital Compare data that compare small critical access hospitals to their urban counterparts. Those sources indicate that rural health care is comparable (and sometimes even better) than the health care that is delivered in urban communities. However, it makes sense to look at some specialties to see if the quality of care has improved with the use of telehealth.

The NRHA also calls for research to aid the telehealth resource centers and regional extension centers to improve the services they provide. The NRHA does not mean to imply these centers are not doing their jobs, but without the outcomes research of how their assistance is helping, they can-

not move forward in providing technical expertise to rural providers and communities.

Finally, the NRHA calls for a study on the effect of telehealth on recruiting and training clinicians. Telehealth not only addresses the direct clinical application, but also can help address workforce challenges.

AMERICAN TELEMEDICINE ASSOCIATION

Stewart Ferguson, Ph.D.
Alaska Native Tribal Health Consortium;
American Telemedicine Association

Providers who use telehealth usually start locally and then build to regional, national, and international efforts. Telehealth has largely been successful in Alaska—it is depended upon to decrease costs (especially travel costs) in the delivery of health care services, and Alaskan leaders are looking for incentives to increase the use of telehealth. Alaskan hospitals embrace telehealth as part of their strategies and business plans. Tribal partners mandate the use of telehealth, and have demanded increased use for access to specialty care. Just like others, Alaska has a vision that telehealth will be fully integrated into the health care system to improve the quality, access, equity, and affordability of health care throughout the world. After this type of success, the challenge will be trying to scale the system to meet the demand.

The ATA provides resources to local telehealth providers such as its journal, webinars and webcasts, social media outlets, and opportunities for member participation. The annual meeting of the ATA is the largest of its kind anywhere in the world devoted specifically to telehealth. It convenes providers, device manufacturers, educators, and academics to discuss the best evidence and the best financial models. Aside from meetings, the influence of the ATA has a lot to do with the participation of its members. Within the ATA, there are several special interest groups that are made up of subject matter experts who hold their own webinars and meetings. There are also various chapters, discussion groups, an Industry Council, and an Institutional Council (representing those who provide health care). These member groups are important in the development of practice guidelines, advocacy, training, and peer review.

A major challenge in the adoption of new telehealth programs is not knowing the best practices for doing so; the ATA is a major resource for this information. With the involvement of academia, industry, providers, and clinicians, the ATA has developed several evidence-based practice guidelines, with many more in progress (see Box 12-1). Guidelines and standards are especially important because telehealth is a solution of scale.

BOX 12-1
American Telemedicine Association Practice Guidelines

Completed

- Teledermatology Quick Guides for Live-Interactive and Store and Forward
- Telepresenting
- Diagnosis of Diabetic Retinopathy
- Telerehabilitation
- Telemental Health: Video-Based Evidence-Based Telemental Health
- Core Standards for Telemedicine Networks
- Teledermatology
- Home Telehealth
- Telepathology

In Progress

- Remote Prescribing
- Desktop and Internet Telemental Health
- Remote Health Monitoring Data Management
- TeleUrgent/Primary Care
- Tele-ICU
- Telepathology
- Telestroke
- Teleradiology

SOURCE: Presentation by Stewart Ferguson, American Telemedicine Association.

The investment and the change in the health care delivery system are just too difficult to do for too few patients. However, when you get to scale, the problems and challenges change. When you look ahead to an exponential adoption curve, the challenges are challenges of scale (e.g., going from 40 to 400 to 4,000 annual consultations). Much of this will require standardized training and methodologies and centralized support. In this vein, the ATA accredits telemedicine training programs.

ATA Strategic Plan for Fiscal Year 2013

In the coming year, the ATA will continue to work on changes in public policy. They will develop and distribute an evidence base and care studies for telehealth and drive the adoption of best practices through standards and guidelines. They will work with the training programs on developing a comprehensive educational system. Finally, they will continue to work with consumers to ensure they are aware that telehealth technologies exist to meet their needs.

The ATA is more than "American" and it is more than "Telemedicine." More than 10 percent of ATA members are international, which is good

because telehealth and health care go beyond the bounds of this country alone. The overall goal of the ATA is to bring people together and move the telehealth agenda forward.

AMERICAN PUBLIC HEALTH ASSOCIATION

Georges Benjamin, M.D., FACP, FACEP(E), FNAPA, Hon FRSPH
American Public Health Association

Public health looks at the world primarily from a population-based perspective, and not individual patients. Just like in our evolving health care system, there are also many new drivers of change for the population health system. These include the enhanced capacity to link and analyze large datasets, the speed at which technology is changing, and the requirement to better integrate primary care and public health (e.g., prevention and early intervention). The younger generation will be a major driver of much of this new change because they are much more comfortable with the use of emerging technology.

Healthy People 2020

Healthy People 2020[1] includes, as one of its goals, the use of health communication strategies and health information technology to improve population health outcomes, to improve health care quality, and to achieve health equity. It also includes several related objectives that support shared decision making between patients and providers. The telehealth movement helps this shared decision-making and fundamentally changing the relationship between patients and providers toward an interaction that supports an informed, bilateral conversation to improve health. Other *Healthy People 2020* objectives that support telehealth include goals to deliver reliable and actionable health information, goals to connect with culturally diverse and hard-to-reach populations, and a goal to provide sound principles in the design of programs and interventions that result in healthier behaviors.

Telehealth and Population Health

Telehealth brings enormous value to managing population health interventions. Public health has 3 core functions and provides 10 essential

[1] *Healthy People* is a set of national health objectives consisting of overarching goals for improving the overall health of all Americans and more specific objectives in a variety of focus areas. Every 10 years, HHS evaluates the progress that has been made on *Healthy People* goals and objectives, sets new goals and objectives, and sets new benchmarks for progress.

services. The core functions are assessment of community health needs, policy development to address those needs, and assurance that all necessary health services are available. The 10 essential services focus on a range of public health services that are believed to be necessary to improve population health. They include the following:

- Monitor health status.
- Diagnose and investigate health hazards.
- Inform, educate, and empower people about their health.
- Mobilize community partnerships to solve problems.
- Develop policies and plans to support health.
- Enforce laws and regulations that protect health and safety.
- Link people to providers of care.
- Ensure a competent health workforce.
- Evaluate the effectiveness and quality of health services.

Telehealth is going to be very helpful for tracking diseases and disease trends (e.g., immunization, cancer registries). With new disease outbreaks, telehealth provides new mechanisms to perform disease surveillance so that data can be collected not just from the health care system, but also pharmacies and grocery stores. These data can be combined with other data (e.g., school absences) to pick up on new disease processes based on clinical syndromes and community trends. Telehealth also provides a variety of ways to communicate effectively with stakeholders, including social media. Mobilizing community partnerships can include partnerships with the private sector, civic groups, nongovernmental organizations, faith communities, and others to move entire communities toward health.

When talking about linking people to systems and coordinating care, we can continue to talk about the 25 percent of the people who incur 75 percent of the costs of care, but the more interesting discussion may occur when we overlay the most costly patients with those who have problems impacted by the social determinants of health. For example, the communities that are challenged in being connected to health care may also be the same communities that have food deserts, high levels of lead in the environment, high crime rates, or lack of repair to roads and other infrastructure. These patients used to be called "noncompliant," but when we consider why they are noncompliant, we find that many things are fundamentally outside their functional control due to their socioeconomic status. From a community perspective, if we can fix those factors, we can begin to improve health. This partnership between the public health community and the health care community could work together using all these data to develop strong community programs or interventions that would make health improvements easier.

A lot is happening with workforce development, including webinars, video conferencing, and interactive journals and blogs, all of which are trying to help improve skills. Additionally, much research is being done on health systems and public health systems.

Social Media Tools

The American Public Health Association (APHA) has invested a lot in social media tools due to their effectiveness in engaging communities. For example, the APHA's Flu Near You campaign challenges individuals to report how they feel on a weekly basis. This is an attempt to see if they are able to detect whether the flu has entered a community based on self-reported symptoms. If successful, this would allow authorities to send out targeted information on flu prevention (e.g., distancing, hand washing, vaccination) to populations at risk. Many other social media tools will be effective as we go forward to further engage people on a population basis.

The Challenge of Paying for Population Health Information Technology

Paying for population health information technology is always a challenge. Obsolescence remains a problem, however. For example, before 9/11, the public health system was still operating off rotary phones. Now, public health systems are operating off the technologies that were put into place after 9/11, but in many cases resources have not been available to upgrade those technologies and so they have not been replaced. Additionally, questions persist about adequately measuring the return on investment for many IT preventive activities, which makes the argument for continued investments challenging. This will continue to be a problem until the hard work is done to show the fiscal as well as the health value for those technologies

Ideas to Advance the FieldBenjamin stated that first, we clearly need to make strategic investments in population-based health information technology and data systems. Second, we need to require appropriate linkages of the public health and health care data systems. Finally, we need to demand accountability for population-based outcomes from everybody. Many states have remained at the bottom of the public health rankings for a long time, yet this does not seem to have as much impact or related activism as rankings for crime or education. Telehealth can not only help to document health outcomes, but help to target solutions so that we can make a real difference.

REACTION AND DISCUSSION

Moderator: Nina M. Antoniotti, Ph.D., M.B.A., R.N.
Marshfield Clinic

An open discussion followed the panelists' presentations. Antoniotti noted that based on these presentations, we still need to document return on investment in health care in general, we need to link and look at large datasets, and we need to enhance the use of public policy. Audience members were then able to give comments and ask questions of the panelists. The following sections summarize the discussion session.

Interoperability and Support

One participant noted that while he agreed that the focus should not be on the technology itself, he wondered why there is not more focus on interoperability standards. The participant noted that his university has been marketed to by companies that have interesting systems that are proprietary and so will not work with other systems. Ferguson agreed that interoperability has been a struggle from the beginning. He said that while the ATA does not address interoperability directly, it is often addressed through standards and guidelines or on the Industry Council. He added that other groups are focused on this directly, such as standards for device interactions. He also noted that some solutions are emerging, such as the development of middle-ware that can communicate with any electronic health record, and the use of direct messaging.

Collaboration

One participant questioned whether there was an opportunity to build a shared support network for providers. Ferguson noted there are some national support centers, but they have not developed to the level they could, and Ferguson thinks they will continue to develop.

Antoniotti asked each panelist to speak to how they are working together to advance telehealth, and how others might work with them. Morgan noted that the NRHA and the APHA have worked together on numerous issues, but not telehealth, so this is a prime opportunity. He stated that by the nature of the health care delivery process in rural America, the NRHA and the ATA speak on a regular basis. Morgan further added that they need to bring other organizations into the discussions as they move forward. Benjamin concurred, adding that health educators are key partners, especially with the amount of misinformation on the Internet. He added that as an example, the APHA spent a lot of time responding quickly

to misinformation about vaccines. Ferguson added that ATA also works with many organizations, including other professional organizations as well as disease-specific organizations.

Oral Health

One participant urged the audience to be inclusive of all types of health care services. He stated that the disparities in oral health are far beyond those in general health, and that telehealth has tremendous opportunity for those who are unable to access the traditional oral health care system. He further noted that California law was changed to replace the word *telemedicine* with *telehealth* to be more inclusive, and the July 2012 issue of the California Dental Association journal (a free download) was devoted to describing the technologies and methodologies for teledentistry. Antoniotti added that the Marshfield Clinic has used teledentistry since 2005. Ferguson responded that teledentistry has been occurring in Alaska for many years. He described the dental health aide therapist program in which people come in from villages, receive some training, and then return to their homes to provide some dental care. Dental health aide therapists are trained in telehealth, such as for taking images that are reviewed by distant supervisors.

Licensure

One participant noted that licensure has been mentioned multiple times as a challenge in telehealth. She added that as the cochair of a subcommittee of the ATA, they invited physical therapy, occupational therapy, and speech and hearing licensure boards to join their discussions about license portability, and noted that the boards wondered why they had not previously been asked to participate. The participant urged everyone to invite all parties that are involved in licensure in these discussions. She also noted that it is not always the licensure boards that are the obstacles in licensure challenges, but that the professional societies may be creating some of these roadblocks. Ferguson referenced some changes, including that federal entities now do not require consultants to hold a license in the state in which the patient is being served, and that the ATA board has voted to take this on as a major policy issue. Benjamin stated that licensure issues will be driven and resolved by bigger business interests like ACOs and integrated health care systems that cross state lines.

Chronic Disease

One participant acknowledged that organizations need to be responsive to their membership, but asked why they have not demonstrated more leadership in managing chronic disease. Morgan responded that meeting agendas are based on topic submissions, and opined that this begs a much larger question—namely, why are providers not placing importance on chronic disease? Benjamin stated that the APHA does address chronic disease both locally and internationally, but is focusing on primary prevention, the built environment (e.g., food systems, transportation), and social determinants of health as approaches to addressing chronic diseases. He noted that the APHA is certainly involved in all the clinical preventive health services, and they advocated for the $15 billion prevention fund of the ACA that targets physical inactivity, nutrition, and tobacco. Benjamin added that these areas are tied to the leading causes of death and disability (e.g., cardiovascular disease, cancer, some injuries, chronic obstructive pulmonary disease). Benjamin stated that we need to get people into healthier lifestyles from earlier on in their lives to change communities and prevent much of the chronic disease we are seeing. He further added that there has been an enormous assault on the public health prevention fund as well as money for the Centers for Disease Control and Prevention, and the APHA has been focused on preserving the core funding for infrastructure and public health. Ferguson noted that home telehealth and remote patient monitoring has been the largest growing sector of the telehealth industry, and the ATA does have a significant industry representation in its membership and is doing everything it can within its scope to be involved in these issues.

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Concluding Remarks and Discussion

In this session, the members of the planning committee reflected on the overall themes they perceived during the workshop. The sections below reflect the individual member's thoughts and remarks.

PLANNING COMMITTEE REMARKS

Spero M. Manson, Ph.D.
University of Colorado Denver

In the short term, HRSA, particularly through the Office for the Advancement of Telehealth, can begin to task a number of its technical assistance and resource centers with activities such as further synthesis of the available evidence in the literature and assistance with respect to articulating the essential components of best practices. In the longer term, HRSA should convene a full study on telehealth—there is enough evidence available, and the timing is appropriate. The work of the Office for the Advancement of Telehealth could inform that study process, giving researchers a great foundation. While the workshop covered a breadth of topics, HRSA needs to carefully consider what specific priorities it would want such a study to address. Specificity in the statement of task will be critical to reaching desired goals.

Sherilyn Z. Pruitt, M.P.H.
Health Resources and Services Administration

One theme that emerged over the workshop included an emphasis on the relationship between the patient and the provider; technology should not be seen as a barrier, but something that facilitates access for more patients to interact with their providers. Similarly, the focus should be on the patient and not the technology. Also, there was a lot of discussion about the consideration of the site of service being where the provider is, instead of where the patient is. Another theme was to think about a more systematic way to implement telehealth across the country, so that every person can get appropriate care no matter where they are, and what that system might look like. While many people are working on their own roles, we need to take a step back and look at the system as a whole.

Is there a way to accelerate getting knowledge into practice across the country, especially because technology changes at such a rapid pace? For example, Models That Work was a program that looked at effective community-based models. With grant funding, they were able to create replication guides (e.g., what they did, how they did it) that other communities could download off the Internet. The communities then used government funding to contract directly with the models' designers to come help them adopt the program.

As we look forward, other questions come to mind. Why do we not appreciate the evidence on telehealth that is already available? How can we increase the number of payers who reimburse for telehealth? How can we learn from what is happening in other countries?

Thomas S. Nesbitt, M.D., M.P.H.
University of California, Davis, Health System

Questions arise when we try to think about what telehealth would look like if we did it right. What would a technology-enabled rural community look like? What would the services be? How would chronic disease and home health management work? How would it work when you go to your physician and find that you need specialty care? What would it look like when you go to the emergency department with a stroke, or you are in the intensive care unit?

We are beginning to assemble all the pieces. We heard that the evidence is very strong in some areas, but we also heard there is an opportunity to do studies using a variety of methodologies, and we do not have to be ashamed that we do not use just one methodology for looking at telehealth and its benefits. However, we need to have a better way to pull together consensus of the evidence that is more accessible to people. It is not just policy makers

who remain unaware of the evidence base, but perhaps also researchers who repeat studies because they do not know other studies exist. We also heard that there is an explosion in technology that is rapidly changing, and it is difficult to keep pace with this change. In many ways, consumers are going to push us in different directions than we might expect, and may come up with their own solutions. If we are not proactive, these solutions may not be the best. For example, we heard about websites with misinformation. Also, stakeholders can be great advocates for telehealth, including for the applications that we do not always think about, such as for public health.

One of the most impressive things is the amount of enthusiasm and activity at the state level. In the current political climate, top-down "stick" approaches to health care from the federal government are not popular. However, federal support for removing barriers in state-initiated approaches, including Medicaid waivers, will be critical. If states come up with solutions (e.g., Medicaid reimbursement), it will be easier to make federal policy changes. The VA and IHS showed us that there are good models out there to serve rural communities. We need to figure out how to get their "lessons learned" out to the rest of the population.

Kamal Jethwani, M.D., M.P.H.
Partners Healthcare Center for Connected Health;
Harvard Medical School

The evidence base for telehealth is strong, but maybe this evidence is enough to prove that it works, but not enough to motivate adoption. As we go forward, an immediate next step is to come up with standards for what kind of evidence is needed (e.g., cost-effectiveness data, return-on-investment data) in order to accelerate adoption. Additionally, health care can be made more efficient with all the data that are being generated, such as for the application of big datasets to public health at the population level. Health care has been lagging behind other industries for a long time. A recent article by Atul Gawande in *The New Yorker* talked about how health care can be made as efficient as The Cheesecake Factory, which reduced waste by benchmarking the activity of their customers (Gawande, 2012). In health care we collect so much data (e.g., electronic medical records, patient-generated data, remote monitoring), there must be opportunities to put these data together and make health care more efficient.

Nina M. Antoniotti, Ph.D., M.B.A., R.N.
Marshfield Clinic

Vision for the future can sometimes be held captive to bureaucracy. Even within HHS, there can be a dichotomy of pushing for the latest tech-

nologies while holding to old standards. How can we transform public policy? The vision of the ONC should help transform the policy thinking of other HHS agencies and help people receive care and interact with the health care system in the virtual space, from direct patient-to-provider consult to mobile applications.

In terms of the evidence base, one question is, Are we making this too hard? In Wisconsin, telepharmacy was initiated under the physician practice model and against the will of the pharmacy boards. After pharmacists were brought in, they became convinced of the use of the technology just based on their experience, not academic research. As a result, public policy was changed. Telehealth-facilitated dialysis care started not because of a robust evidence base, but because a member of the U.S. Congress wanted it. However, we need to develop a valid clinical trial design and validate the match controlled study design to be the gold standard for evaluating telehealth.

Telehealth is about the people, not the process. Public policy should not place barriers based on assumptions. For example, we are mired in discussions of presuming to know what patients want. Furthermore, we need to establish the methodology that HHS would use to translate consumer momentum around mobile devices. Consumers push us to do things differently in health care, and we do it because it makes sense, has good outcomes, and engages patients.

Finally, there should be an ongoing committee to help facilitate integrating technology-supported health care into evidence-based health care, public policy, and the mainstream.

Karen S. Rheuban, M.D.
University of Virginia Health System

Many policy decisions need to be made at the state and federal levels. We need to broaden reimbursement at the federal and state levels in order to get providers on board, both in the current fee-for-service model as well as in payment reform models. Also, the rural requirement should be eliminated; many specialty providers are located in urban areas and we want them to support rural communities as well as their own communities. We have repeatedly heard about barriers due to licensure, credentialing and privileging, and scope of practice, which need to be addressed. For example, a new paradigm for "place of service" may help to eliminate regulatory barriers. We need to expand the availability of broadband service. More studies are needed on the value, proposition, and return on investment for telehealth. Finally, telehealth is about all of health care, and we need to collaborate with the specialty societies.

REACTION AND DISCUSSION

Moderator: Karen S. Rheuban, M.D.
University of Virginia Health System

An open discussion followed the planning committee members' remarks. Audience members were able to give comments and ask questions of the planning committee members and workshop participants. The following sections summarize the discussion session.

Data and Evidence

One participant talked about how to fast-track important studies in peer-reviewed journals. Another participant supported matched cohort group designs for research to prove the efficacy of telehealth. Another participant noted that telehealth needs to be integrated into the push for the adoption of electronic health records, creating meaningful use, and establishing health information exchanges. He stated that face-to-face patient encounters already involve the examination of several data sources, and the use of health information technology could allow for the inclusion of support mechanisms to help reduce medical errors and variation in care. He added that the sharing of data, in a secure and meaningful way, is improving the continuity of care, decreasing overuse (e.g., unnecessary tests), and increasing efficiency. He further added that telehealth and health information exchange need to become global efforts.

Consumers

One participant remarked that the cost of gasoline may push consumers toward telehealth, especially if they have to travel long distances to receive health care services. Another participant added that telehealth technology is necessary to leverage solutions for reaching broader populations. He further added that in order to make any difference in health and health care, we need to change behaviors, so telehealth might be used for that as well.

Workforce

One participant remarked that there was not enough discussion of the kind of workforce that is needed to support telehealth in rural areas—either new types of providers or retraining of current providers. The participant added that more discussion is needed about scope of practice, and how providers work together. Nesbitt noted the funding that HRSA provides for health professions training and suggested incentives could be created for

the inclusion of telehealth training in proposals. He added that exposure to telehealth is key to provider acceptance. Antoniotti stated that several educational models are already using distance education to a large degree, which could be used to train many professionals in telehealth technologies. Rheuban commented that HHS funded the Virginia Health Workforce Development Authority, and one of the grant projects they will support is the development of a certified telehealth technician program. She stated that health care providers need to understand what the technology can do, but do not need to operate the technologies, so a trained workforce can be developed to do this. Antoniotti disagreed, stating that in their model, providers were trained in how to use, fix, and maintain their own equipment, as this was much more efficient than calling in others to do it, and prevented abandonment of the technology. Rheuban responded that because most clinic providers are already overwhelmingly busy (and likely to be even busier after full implementation of the ACA), their vision is to train an on-site licensed practical nurse or certified nursing assistant to support the telehealth technologies, thereby maximizing the efficiency of the primary care or specialty care providers.

Medicaid

One participant noted that Medicaid is a key player in telehealth because of the numbers of individuals they cover, because of the high amount of expenditures, and because success with these populations will be the most difficult challenge. Nesbitt agreed that with Medicaid expansion, there will be tremendous pressure on the Medicaid managed care program. He noted that telehealth might be seen as a solution in states that are required to show the ability to provide timely access to services for newly added populations. Telehealth might also help solve problems with lack of local providers, particularly specialty providers, who are willing to serve Medicaid populations, and provide more choice to patients.

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Appendix A

Definitions[1]

Asynchronous is a term sometimes used to describe store and forward transmissions of medical images or information because the transmission typically occurs in one direction at a time.

Digital Imaging and Communication in Medicine (DICOM) is a standard for communications among medical imaging devices; a set of protocols describing how images are identified and formatted that is vendor dependent and developed by the American College of Radiology and the National Electronic Manufacturers Association.

Distant site is defined by CMS as the telehealth site where the provider/specialist is seeing the patient at a distance or consulting with the patient's provider. Other common names for this term include hub site, specialty site, provider/physician site, and referral site. This site may also be referred to as the consulting site.

Hub site, see *distant site*.

Internet protocol (IP) is the protocol by which data are sent from one computer to another on the Internet. Each computer on the Internet has at least one address that uniquely identifies it from all other computers on the Internet. IP is a connectionless protocol, which means that there is no

[1]These terms are as defined by the American Telemedicine Association, and do not represent any consensus of the participants of this meeting on their definitions (ATA, 2012a,b).

established connection between the end points that are communicating. The IP address of a videoconferencing system is its phone number.

Mobile telehealth (**mHealth**) is the provision of health care services with the assistance of a van, trailer, or other mobile unit in which the health care provider might provide patient services at a distance from a normal medical facility. Services may also be provided through mobile technologies that allow a mobile vehicle equipped with medical technologies to attach to an existing health care facility.

Originating site is defined by CMS as where the patient and/or the patient's physician is located during the telehealth encounter or consult. Other common names for this term include spoke site, patient site, remote site, and rural site.

Remote patient monitoring is the use of devices to remotely collect and send data to a monitoring station for interpretation.

Spoke site, see *originating site*.

Store and forward (**S&F**) is a type of telehealth encounter or consult that uses still digital images of a patient for the purpose of rendering a medical opinion or diagnosis. S&F also includes the asynchronous transmission of clinical data from one site (e.g., patient's home) to another site (e.g., home health agency, hospital, clinic).

Telemedicine and **telehealth** both describe the use of medical information exchanged from one site to another via electronic communications to improve the patient's health status. Although evolving, telemedicine is sometimes associated with direct patient clinical services and telehealth is sometimes associated with a broader definition of remote health care services.

Videoconferencing is the real-time, generally two-way transmission of digitized video images between multiple locations; this uses telecommunications to bring people at physically remote locations together for meetings.

Appendix B

Acronyms

ACA	Patient Protection and Affordable Care Act
ACO	accountable care organization
AICU	advanced intensive care unit
ALS	amyotrophic lateral sclerosis
APHA	American Public Health Association
ATA	American Telemedicine Association
CMMI	Center for Medicare & Medicaid Innovation
CMS	Centers for Medicare & Medicaid Services
CPT	current procedural terminology
CT	computed tomography
DHMH	Maryland Department of Health and Mental Hygiene
DHSS	Delaware Department of Health and Social Services
DICOM	Digital Imaging and Communications in Medicine
DoD	U.S. Department of Defense
ECHO	Extension for Community Healthcare Outcomes
ED	emergency department
ERS	USDA's Economic Research Service
FCC	Federal Communications Commission
FDA	U.S. Food and Drug Administration
GAO	U.S. Government Accountability Office

HHS	U.S. Department of Health and Human Services
HITECH	Health Information Technology for Economic and Clinical Health
HRSA	Health Resources and Services Administration
ICCC	Iowa Chronic Care Consortium
ICU	intensive care unit
IHS	Indian Health Service
IOM	Institute of Medicine
IP	Internet protocol
IT	information technology
LVHN	Lehigh Valley Health Network
MedPAC	Medicare Payment Advisory Commission
mHealth	mobile telehealth
MMTC	Minority Media and Telecommunications Council
MRI	magnetic resonance imaging
NASA	National Aeronautics and Space Administration
NIH	National Institutes of Health
NOBEL	National Organization of Black Elected Legislative (Women)
NRHA	National Rural Health Association
OIG	Office of Inspector General
OMB	Office of Management and Budget
ONC	Office of the National Coordinator for Health IT
ORHP	HRSA's Office of Rural Health Policy
PACS	picture archiving and communication system
PCMH	patient-centered medical home
RCT	randomized controlled trial
RHCPP	Rural Health Care Pilot Program
RUCA	rural-urban commuting area
S&F	store and forward
STARPAHC	Space Technology Applied to Rural Papago Advanced Health Care
tPA	tissue plasminogen activator

USDA	U.S. Department of Agriculture
VA	U.S. Department of Veterans Affairs
VISN	Veterans Integrated Service Network

Appendix C

Workshop Agenda

Institute of Medicine Workshop on
The Role of Telehealth in an Evolving Health Care Environment

August 8-9, 2012
Location: National Academy of Sciences Building
2100 C Street, NW
Washington, DC

Sponsored by: The Health Resources and Services Administration

Workshop Objectives

- **Delineate the evidence base for telehealth (outcomes, costs).**
- **Highlight special implications for rural populations.**
- **Discuss the actions HHS and others can undertake.**
- **Identify what in particular warrants further study.**

WEDNESDAY, AUGUST 8

8:00-9:00	**REGISTRATION**
9:00-9:45	**Welcome and Opening Remarks** *Karen S. Rheuban, University of Virginia Health System, Planning Committee Chair* *Mary Wakefield, Health Resources and Services Administration, Project Sponsor*
9:45-10:15	**Keynote: "The Evolution of Telehealth: Where Have We Been and Where Are We Going?"** *Thomas S. Nesbitt, University of California, Davis, Health System* *Q&A with Audience*

10:15-12:00	**TOPIC #1: Challenges in Telehealth**
	Panel Moderator: *Spero M. Manson, University of Colorado Denver*
	Overview of Common Challenges *Jonathan Linkous, American Telemedicine Association*
	Licensure *Gary Capistrant, American Telemedicine Association*
	Federal Communications Commission Rural Health Care Support Programs *Dale C. Alverson, University of New Mexico*
	Misalignment in the Definition of "Rural" *Steve Hirsch, HRSA Office of Rural Health Policy*
	Q&A with Audience
12:00-1:00	**LUNCH BREAK**
1:00-2:30	**TOPIC #2: Telehealth and Payment**
	Panel Moderator: *Thomas S. Nesbitt, University of California, Davis, Health System*
	Rural Medicare Payment *Jeff Stensland, MedPAC*
	Challenges to the Traditional Payment Models *Karen E. Edison, University of Missouri Health System*
	Private Pay *Manish N. Oza, Wellpoint Comprehensive Health Solutions*
	New Models for Payment *Linda Magno, Centers for Medicare & Medicaid Services*
	Q&A with Audience
2:30-3:00	**BREAK**

3:00-4:15 **TOPIC #3: The Health Care Continuum**

Panel Moderator: *Sherilyn Z. Pruitt, HRSA Office of Rural Health Policy*

Promoting Health, Preventing Disease, Prompting Population Progress
William Appelgate, Iowa Chronic Care Consortium

Acute Care
Joseph A. Tracy, Lehigh Valley Health Network

Chronic Disease Management (Project ECHO)
Sanjeev Arora, University of New Mexico

Q&A with Audience

4:15-5:00 **CLOSING REMARKS**

Planning committee members will reflect on the day and then engage in discussion with the audience.

Panel Moderator: *Karen S. Rheuban (Chair), University of Virginia Health System*

- *Nina M. Antoniotti, Marshfield Clinic*
- *Kamal Jethwani, Partners Healthcare Center for Connected Health; Harvard Medical School*
- *Spero M. Manson, University of Colorado Denver*
- *Thomas S. Nesbitt, University of California, Davis, Health System*
- *Sherilyn Z. Pruitt, Health Resources and Services Administration*

Q&A with Audience

5:00 **ADJOURN**

THURSDAY, AUGUST 9

8:30-8:35 **Overview of Day**
Karen S. Rheuban, University of Virginia Health System, Planning Committee Chair

8:35-10:00 **TOPIC #4: Current Evidence Base**

Panel Moderator: *Kamal Jethwani, Partners Healthcare Center for Connected Health; Harvard Medical School*

Current Research Base
Elizabeth Krupinski, University of Arizona

Using Data to Change Policies or Standards of Care (Tele-Stroke)
Lee Schwamm, Massachusetts General Hospital; Harvard Medical School

Q&A with Audience

10:00-11:30 **TOPIC #5: Technological Developments**

Panel Moderator: *Kamal Jethwani, Partners Healthcare Center for Connected Health; Harvard Medical School*

Patients' Provision of Data, Including Patient-Generated Data
David Muntz, Office of the National Coordinator for Health Information Technology

Remote Patient Monitoring
Bonnie Britton, Vidant Health

Patient Support Groups, Social Networking, Etc.
Dave Clifford, PatientsLikeMe

The Future of Wireless Health
Mohit Kaushal, West Wireless Health Policy Institute

Q&A with Audience

11:30-12:15 **LUNCH BREAK**

12:15-1:45 **TOPIC #6: State-Based Perspectives**

Panel Moderator: *Karen S. Rheuban, University of Virginia Health System*

Individual State Perspectives
Laura Herrera, Maryland Department of Health and Mental Hygiene
Cindi Jones, Virginia Department of Medical Assistance Services
Rita Landgraf, Delaware Department of Health and Social Services

State Advocacy
Maurita K. Coley, Minority Media & Telecommunications Council

Q&A with Audience

1:45-3:00 **TOPIC #7: Experiences of VA and IHS**

Panel Moderator: *Spero M. Manson, University of Colorado Denver*

Speakers
Adam Darkins, Department of Veterans Affairs
Mark Carroll, Flagstaff Medical Center/Northern Arizona Healthcare
Jay H. Shore, University of Colorado Denver

Q&A with Audience

3:00-3:15 **BREAK**

3:15-4:00 **TOPIC #8: Stakeholder Perspectives**

Panel Moderator: *Nina M. Antoniotti, Marshfield Clinic*

National Rural Health Association
Alan Morgan

American Telemedicine Association
Stewart Ferguson

American Public Health Association
Georges Benjamin

Q&A with Audience

4:00-5:00 **Planning Committee Concluding Remarks and Open Discussion**

Planning committee members will reflect on the day and then engage in discussion with the audience.

Panel Moderator: *Karen S. Rheuban (Chair), University of Virginia Health System*

- *Nina M. Antoniotti, Marshfield Clinic*
- *Kamal Jethwani, Partners Healthcare Center for Connected Health; Harvard Medical School*
- *Spero M. Manson, University of Colorado Denver*
- *Thomas S. Nesbitt, University of California, Davis, Health System*
- *Sherilyn Z. Pruitt, Health Resources and Services Administration*

Q&A with Audience

5:00 **ADJOURN**

PLANNING COMMITTEE

Karen S. Rheuban (*Chair*), University of Virginia Health System
Nina M. Antoniotti, Marshfield Clinic
Kamal Jethwani, Partners Healthcare Center for Connected Health; Harvard Medical School
Spero M. Manson, University of Colorado Denver
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