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White Paper

The Future of Telehealth:

Guidelines and Guesses

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Executive Summary

This White Paper was commissioned by the Northwest Regional Telehealth Resource Center’s (NRTRC) Advisory Board of Directors. Their charge to NRTRC staff was to determine the future of telehealth. In order to complete that project, the following steps were taken:

**Review telehealth history.** Operating on the premise that we can’t know where we’re going if we don’t know where we’ve been, we have taken a brief look at the history of telehealth and its growth up to today.

**A look at telehealth as it is today.** A brief sketch of the prevailing method of providing care across telehealth networks goes into a discussion of the classic hub-and-spoke (or legacy) network, from the early days of telehealth networking to the present.

**A look at the current telehealth climate.** While the classic telehealth network structure is still prevalent in the United States, technology changes, patient preferences and care methodology are all in a state of flux. In addition, regulatory and licensing issues currently cloud the horizon. While steps are being taken to ease some of those challenges, they must be considered in any prediction of the future of telehealth.

This unsettled state leads to several possible paths forward and discussing each of the aspects of the health care milieu sets us up for the future.

**A concluding prediction.** Or, more accurately, a concluding group of predictions. With healthcare approaches, patient demand and technology changes driving the industry, one path forward is highly unlikely. Therefore we predict several likely facets of telehealth in the next five years:

- Legacy networks will become less common than they are today. Technology advances and approaches to medicine will drive a shift from the classic hub-and-spoke system to a more *ad hoc* series of connections.
- Small-facility-centered networks, or *ad hoc* networks will become much more common. Small hospitals, recognizing the value of offering care to their patients through telehealth, but concerned about the costs and restrictions of being connected to one large hub site will start using new technology offerings such as cloud-based communications to begin to contract with specialty providers of their choosing at several different locations to provide care.
- Virtual urgent care clinics, i.e., clinics in which patients see providers through Internet connections will become a large part of the health care scene. While we are already seeing several for-profit and not-for-profit organizations featured in industry reports, we believe that the virtual clinic will become much more widespread as patients demand to be seen as soon as possible, but choose not to travel to brick-and-mortar facilities that provide similar services.
- Mobile healthcare (mHealth) will continue to grow as more and more providers take to using smart devices to meet patient demand. Current industry press reports consistently report that up to 60% of patients want their physicians to be available through mHealth devices. Eric Topol, MD, predicts that the smartphone will become a powerful driver of mobile health in his book *The Patient Will See You Now*.
- Connected care will burgeon. While the above items can be considered to be connected care, there are many other modalities by which patients can be remotely cared for. Remote Patient Monitoring (RPM) for chronic illness care will become...
much more ubiquitous, especially as Medicare begins paying for remote care. An aging population faces more chronic illness and the growth of in the number of older adults as a percentage of population has often been called “The Silver Tsunami.” With more and more retired and aging patients to care for, RPM offers a way to maximize patient loads while increasing close monitoring of illnesses and allowing seniors to age in place.

Regulatory issues will slowly be resolved. Primary concerns among telehealth providers are cross-state licensure and credentialing and privileging at originating sites. The Federation of State Medical Boards has proposed an Interstate Medical Licensure Compact, which has been adopted by nine states as this document is finalized (establishment of the Compact required seven states to enact, so development of the Compact will start soon), providing relief from current licensing burdens that providers face. Further, we believe that credentialing and privileging will become easier as small facilities see the value of telehealth.

More detail on each of these issues is contained in the pages of this white paper.

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Section 1. Introduction

Recently the Northwest Regional Telehealth Resource Center (NRTRC) Board of Directors set a task for the staff members: Determine the future of telehealth.

This is a challenging and somewhat daunting task.

In the world of technology, little can be predicted accurately. Technology changes rapidly, focus changes frequently, interest changes regularly and the rate of change accelerates rapidly. Moore’s Law\(^2\) predicted that the density of components in integrated circuits would double roughly every two years. This prediction led to corollaries in which computing power and capacity would double every 18 months. Add to those exponential changes in power and capacity the ever-increasing consumer demand for computer-based products and communication devices and the rate of change in devices is sometimes staggering. We have often heard the remark (or lament) that technology is driving telehealth. It is easy to understand this claim with new devices and software being offered with a sometimes dizzying frequency.

In the world of health care, things change as well. Although the pace of change may not be as rapid as with technology, it can be, nonetheless, rapid. This pace of change makes it extremely difficult to know where the field will be in five years. Different specialties change at varying rates as research uncovers new treatments and diagnostics.

In addition, there is a growing need to bring more care to underserved areas, and telehealth is clearly the means of doing so. As providers rely more and more on technology to deliver care, telehealth becomes a means of delivering advanced care to patients everywhere. The Patient Protection and Affordable Care Act strives to make health care more available and less expensive. Telehealth can help meet those goals.

With technology advances and the never-ending growth and change in technology and healthcare, it is important to remember that telehealth is only a delivery system; a system that can bring care to underserved populations. NRTRC often feels the need to point out that telehealth is not a medical specialty; it is simply a means of bringing patient and provider together. This delivery method is essential for moving healthcare closer to the patient (whether in the home, workplace or school) and meeting the need to expand care availability to underserved populations.

With those thoughts in mind, staff set out to find out where telehealth was headed. We start with a review of where telehealth has been, operating on the concept that if we don’t know the path we’ve taken, we may not accurately choose the path to the future. In addition, there are concerns, attitudes and considerations that carry over from the past to the present and, one can expect that these will continue into the future.

Predicting the result of combining healthcare and technology to form telehealth, then, is a doubly daunting task. This White Paper represents the best prognostications the staff could arrive at given the flux in the two disciplines.

What you will not see in this paper: A discussion of electronic health records (EHR) or electronic medical records (EMR). While these records are an important part of health care and telehealth, there is currently much discussion of the challenges of working between different vendors’ record system and controversy over whether all records should be interoperable or not. Until those issues are resolved, we will steer clear of any discussion of the matter.
Section 2. Legacy Systems

Various starting points are cited for telehealth (or telemedicine: for purposes of this paper, telehealth, the more encompassing term, will be used).

*Electrical Experimenter* magazine printed a story in its February, 1925 issue predicting that physicians would see patients through a radio that included real-time pictures of the patients and a remote device that a physician could control from his office to examine the patient through instruments and by ‘feeling’ physical signals.³

Some observers say that the first real use of telehealth was accomplished through the first phone conversations between doctor and patient. Such a conversation may have allowed for the delivery of care to a patient and saved the physician a house call.

Nevertheless, the first telehealth installation that looked like what we see today was probably the installation of a medical suite in Boston’s Logan Airport. The suite featured a closed-circuit, microwave-based television connection between the airport and physicians at Massachusetts General Hospital in Boston.⁴ With this connection, a physician at Mass General could see and hear the airport-located patient in real-time.

No matter the starting point, telehealth became a viable healthcare delivery method when large hospitals started building hub-and-spoke care networks. The idea was simple and effective: A hub, or central hospital, provided subspecialty care to smaller hospitals and clinics located on communication ‘spokes’ that radiated from the providing facility. The electronic connections were generally made on dedicated, private telephone lines to ensure both data security and availability of the connection and appropriate bandwidth when it was needed.
Advantages were apparent to both the hub and the spoke sites:
- Hubs would be able to employ specialists and offer them a patient flow that would keep providers productive and engaged
- Hubs could enjoy the benefits of increased revenue as they could bill for more patient encounters and direct management of patients located in remote sites
- Spoke sites benefitted because they could provide ‘big city’ care to their patients no matter how rural or distant they were. Keeping patients local offered several benefits beyond the provision of care (and it still does). Patients who needed hospitalization could be kept ‘at home’ and managed by local care providers under the direction of specialty physicians at the hub site, thus enhancing local revenue
- The spoke facility’s image was enhanced because they were able to provide ‘big city’ care to their patients
- Protocols and procedures were put in place by the hub hospitals and this made care predictable and understandable. These documents made it convenient for staff on both sides of the connection to effectively participate in a telehealth encounter
- Specialty providers who ‘rode a circuit,’ that is, who traveled to distant clinics on a regular schedule, could stay in their offices and increase the number of patients they could see by avoiding time lost in travel
- And, of course, patients benefitted because they didn’t have to lose excessive time from work or school and didn’t need to incur the expense of travel to where the specialist was located

Telehealth was then and is to this day a “win-win-win” proposition

Yet, while significant pluses were realized by patients, providers and hospitals, there were challenges that accompanied the provision of health care across an electronic connection:
- As with every new technology, the equipment purchased by early adopters was expensive and often difficult to use. As the discipline matured, equipment prices came down and ease-of-use came up, but even today, the equipment used in these traditional systems (the term “Legacy System” often describes them), is a major investment
- Network control remained with the hub hospital. While this was clearly a plus for the hub site, it could have been seen as a negative for the spoke facilities. If the hub controls usage and sets the standards and requirements for participating in the network, the spoke sites are constrained to agree to the terms or forego telehealth services unless they could find and join another network, which would set its own terms and standards
- Control issues were not the only concern: Sometimes hub hospitals didn’t have the specialty care a remote patient needed. If spoke sites were ‘tied in’ to one network and the needed care is not available, the remaining options were few. Most hubs would, of course, allow their spoke sites to go ‘off network’ if the hub did not provide the specialty service. Then the biggest challenge was finding a specialist who could connect into the network temporarily
- Early on, equipment used proprietary communications protocols, which meant that a videoconferencing unit from one manufacturer could not or would not interface with that from another manufacturer. This lack of a common communication protocol caused problems when it became necessary to connect between networks.
Eventually, manufacturers agreed on a common communication protocol and that problem was solved. However, as will be pointed out in the next chapter, a new communication scheme came along and that disrupted the classic legacy model. Spoke sites were often required to pay a membership fee for being connected to the network. Whether monthly or annual, the fee may have been a financial challenge for small facilities. These fees and financial considerations remain today. The ability for remote sites to make ad hoc connections, for which a one-time payment was made (or not required) would have been a significant advantage.

Many of these issues have been resolved, but many still remain in the legacy system model.

**Economics of the hub-and-spoke system**

As mentioned previously, early adopters of the hub and spoke systems faced very high equipment costs. In addition to physical equipment, dedicated communication lines were expensive. Costs were daunting for the early networks and telehealth systems were rare.

The United States government started several telehealth grant programs, which allowed networks to purchase equipment and connectivity and start operations. However, telehealth operators were warned that the government’s largesse wouldn’t last forever and that they would be required to operate sustainably or subsidize costs of their systems because this grant funding was finite. Adding to the economic challenge was the fact that, early on, reimbursement by insurers was rare, exacerbating the problem. Gatherings of telehealth operations managers frequently offered presentations on “What to do when the grant goes away.”

Fortunately, equipment costs moderated as manufacturers were able to recognize economies of scale. Telehealth expanded and sales increased, and the cost of equipment followed the traditional course of most electronic products and decreased fairly steadily. Connectivity became more available and prices for communication services went down as well. These cost reductions helped on the expense side.

In the early days of telehealth, private insurers rarely reimbursed for telehealth encounters. The few private payers that did reimburse based payments on which telehealth services the Centers for Medicaid and Medicare Services (CMS) covered for Medicare recipients. CMS gradually increased the number of encounters they would reimburse for when telehealth was used and paid spoke sites a small originating site fee. While CMS reimbursement has expanded, it is still the case that CMS will only reimburse when the patient is located at a rural site and in a fairly restrictive set of locations. Some private payers followed CMS’ policies, some a portion of those policies and many did not reimburse for telehealth at all. Further complicating matters was the fact that reimbursements went to the care provider, not the network. If the provider was employed by the network’s host institution, then the reimbursement would come to the host. Originating sites were eventually allowed to charge a facility fee and consumable equipment costs to CMS to recapture a little of the cost for the use of space and to help defray the cost of paying the health care professional who presented the patient to the specialist at the distant site.

Operations costs of legacy networks are not covered by reimbursement except for originating site fees. Therefore it becomes necessary for legacy networks to charge membership or access fees to their spoke members. These fees can be offset, however, by cost-avoidance.

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* CMS has defined the terms that are used for telehealth. The originating site is the site where the patient is located when the encounter takes place. The distant site is the provider’s location. These definitions also have an effect on licensure because the provider must be licensed in the state where the originating site is located.
opportunities for the spoke sites. Networks can provide education, research and administrative programs which can create value and help reduce spoke sites’ cost for travel and travel time.

The challenge of convincing private payers to reimburse for telehealth services occupied many network executives, who tried to convince the payers that they should cover telehealth-based care. Data continually show that telehealth is as effective as in-person care, yet some payers balked at reimbursing for telehealth. Some state legislatures agreed with providers and passed laws requiring reimbursement for telehealth encounters. At the time this paper was being prepared, 28 states had enacted laws that require private payers to reimburse for telehealth if they reimburse for that procedure for in-person care. As reimbursement widened, networks became less dependent on grant funding for network operations.

**What’s next for hub-and-spoke?**

While funding has become less of an issue, it is still a primary concern for telehealth networks. Dedicated telehealth equipment prices have come down, but are still difficult for small organizations to work into their budget. Communication costs, too, have come down, but the cost of a T1 line into a small facility may well overload their Information Technology (IT) budget. Fortunately, the Universal Services Administrative Company (USAC), an independent, not-for-profit company, has been designated by the Federal Communications Commission (FCC) to offer financial assistance to rural providers and networks for communication services. USAC has programs aimed at subsidizing health care communication costs for rural providers. For more information on USAC, visit [http://www.usac.org](http://www.usac.org).

Beyond cost, some small hospitals or clinics (and their patients) may push back against being ‘tied’ to one major hospital and want the freedom to be able to choose other provider groups.

Those smaller hospitals may choose to move from the classic hub-and-spoke system to a system of *ad hoc* connections for securing specialty care to their patients. One way this can be accomplished is discussed in the next Section.
Section 3. Cloud-Based Networks

Cloud computing has become a widespread business model. In cloud computing, a service provider offers storage and communication services from their location, freeing users from the need to invest in servers and storage devices. With approval from the primary customer, other associated business entities could gain access to the cloud storage and data could be conveniently shared among a wide number of locations.

As cloud computing has evolved, several companies started offering standards-based telehealth services that use Internet-based technology and connectivity to establish virtual connections to provide encrypted communication and storage for telehealth providers.

Cloud-based videoconferencing has the potential to be a true game changer for telehealth. This is because cloud providers open up a new set of options for care providers, both large and small. Standards-based cloud technology can bring medical care closer to the patient (into their own home in some cases), meeting the demand for a wider range of care options to underserved patients.

Perhaps the most interesting opportunity cloud service providers offer, particularly to small hospitals and clinics is the opportunity to develop networks of their own. Small clinics or hospitals can become care-receiving hubs with spokes going out to specialty providers they and their patients choose to work with rather than being contracted to a particular network or set of specialists. Bryan Ennis and his co-authors recognized this when they said, “By utilizing voice and video conferencing, online file sharing, and real time reporting, healthcare members and doctors can facilitate virtual visits, which could be implemented through a cloud computing platform.”

Cloud-based videoconferencing has aroused the interest of providers at all levels of care. The idea behind the cloud-based systems is simple. The communications vendor offers videoconferencing connectivity to health care providers who are willing to pay a subscription fee. The subscription fee is attractive to smaller operations in particular, because the fee is generally lower than the cost of purchasing servers, connectivity and employing staff to maintain the network. Most capital items and the staff required to maintain them are owned by the communications service provider, while the customer need only provide connectivity and endpoint equipment.

As with any new communication methodology, however, cloud computing raises questions about security and privacy. Most cloud-based providers offer end-to-end encryption and data protection. Additionally, most cloud providers state that their service is compliant with the Health Information Portability and Accountability Act (HIPAA), which spells out requirements for safeguarding patients’ Protected Health Information (PHI). However, critics point out that equipment or services, cannot be HIPAA compliant, that only providers using that service or equipment can comply. The equipment, they maintain, is only HIPAA compatible, suggesting that the equipment can be used in a HIPAA-compliant manner by providers. According to Ross Friedberg, who presented a Brown Bag Webinar for the Center for Telehealth and e-health Law (CTeL), “[A]lthough many cloud providers suggest online that they are HIPAA-compliant, covered entities can’t always rely on this being true.” Who is right and who is wrong on this terminology question is not the subject of this paper, however, so we will direct our attention to the potential uses of cloud-based connectivity in healthcare and let others decide whether these systems are compliant or compatible.
NRTRC encourages potential cloud customers to employ due diligence in determining if a proposed provider can deliver the security necessary.

**Shifting the Hub-and Spoke paradigm**

Of course, legacy networks can move to standards-based cloud delivery to replace their costly legacy systems, and some have started to move in that direction. Such a move could reduce their capital expenditures and be financially attractive. However, with cloud-based videoconferencing, small hospitals, e.g., Critical Access Hospitals (CAH), and even primary care practices can be the hub for a telehealth network. The providers at the hub can select their preferred specialty providers based on their personal knowledge of the providers and the needs and wants of their patients. While convincing the providers to become members of their networks may be somewhat challenging, it can be done and we are aware of CAHs that have done just that. The advantages to these smaller organizations are clear:

- They are not tied to one large hospital and are not required to use that hospital’s specialty providers exclusively
- They do not pay dues to the large hospital to be a member network
- Standards-based cloud computing allows the hospitals to use the commodity Internet rather than purchasing dedicated lines (see, however the challenges discussion on the Internet)
- Administrators in this ‘reverse’ network are in complete control of their equipment, time and finances
- Patients receive care in their home communities without having to travel to larger population centers (an equivalent advantage exists in traditional hub-and-spoke networks, of course)
- The cost of equipment is significantly lower than in the proprietary network: practices can use desktop PCs or even tablets and smart phones for conducting an encounter and need only purchase high-definition web cameras rather than expensive video cameras often required by legacy systems
- There are several vendors offering cloud-based videoconferencing, and that competition may help drive the price of service down
- Most of the vendors offer tiered service options, so that smaller providers don’t have to buy into a system that is bigger than they need

It must be noted, however, that cloud-based solutions are not without challenges to smaller provider organizations:

- While maintenance of system availability and servers is the responsibility of the communication service providers, management of the connection and network operations at the local level falls on the practice’s staff
- Scheduling and planning devolve to the local staff
- It may be more difficult to secure the cooperation of a subspecialist if the connection is to a CAH or primary care practice rather than a large hospital that can guarantee patient flow
- Commodity Internet connectivity, while constantly improving, is still subject to bandwidth slowdowns and outages; dedicated lines, a higher-cost alternative to the commodity Internet, are usually available and not heavily oversubscribed
Physician licensing may be a challenge if the provider resides in a different state from the originating site. (As explained in Section 2, the originating site in a patient encounter is the site at which the patient is physically located.) That means that providers from other states must be licensed in the state where the patient is physically located during the encounter. It falls to the receiving entities to ensure the remote specialist is licensed in their state.

Credentialing and privileging of specialists in a CAH that initiates the service should not be a problem, as it is in the hospital’s interest to provide the service to its patients. However, internal policy changes to facilitate credentialing may be required.

Beyond the advantages and challenges listed here, there are significant questions that must be answered. As stated above, most vendors claim to be “HIPAA Compliant.” Beyond the discussion of what, exactly that means, there is the question of where these providers fit in the healthcare privacy and security envelope.

Will a vendor sign a Business Associate Agreement, required by HIPAA when service bureaus are employed and handle protected health information (PHI) in the fulfillment of their service obligations? Should they? The question of whether these organizations fall under HIPAA rules is one that will have to be decided definitively. As stated, discussions of that nature are beyond the scope of this paper. It is mentioned here simply for the purpose of full disclosure.
Section 4. Evolution of the Telehealth Network

Cloud-based care may facilitate a sort of reversal of the classic hub-and-spoke telehealth system in which the receiving locus of care is a Critical Access Hospital (CAH) or a community health clinic (the hub), and specialty providers reside on the spokes. Other changes are appearing on the health care scene and these changes may totally alter the face of health care in the future.

There are several advantages and challenges that could be faced by a CAH- or clinic-centered telehealth network. Careful preliminary planning can enhance the advantages and minimize the challenges:

- CAH or clinic-based telehealth providers know their patients. At least they have probably dealt with them before and have records available to share with both ends of the connection
- Local clinicians probably know the specialty providers and refer patients to these known caregivers
- Systems that use the commodity Internet may face bandwidth problems at certain times. It may become necessary to arrange for expanded bandwidth at peak times
- Specialty providers at distant care facilities may push back against providing care via telehealth, requiring referring physicians to provide encouragement to connect
- Local providers may hesitate to refer their patients to telehealth-based specialists
- While development costs for networks may go down over time for established hub sites, those costs may still represent a large portion of operating expenses for clinics

An additional force for driving change in the healthcare delivery system may be patient demand. The growth of availability of smart devices and the widening use of text messaging, e-mail and video-based communication with these devices has led to a movement referred to as mobile Heath, or mHealth. This interest has stimulated growth of development of health-related applications (or apps) for mobile devices and an increasing demand for health care providers to be available when patients want them.

Eric Topol, MD, in his book The Patient Will See You Now, explores the existing and potential uses of the smart phone as a major driving force in the evolution of medical care. Topol suggests that with the explosive growth of smart phone use, health-related applications and devices that attach to the phones (and, in effect, make them medical devices), the smart phone will drive the collection of medical data and become the patients’ chosen means of interfacing with the physician, whether by video, voice or text.

There are thousands of health-care related apps available and the number seems to grow daily. Some apps are aimed at tracking patient information, some in providing medical information and some can be prescribed by providers to help patients with specific health needs. Additionally, several recent studies report that around 60% of the population uses mobile devices or Internet connectivity to search for health information.

Further support for the increase in smart phone use for medical care is contained in reports that continually suggest that because of delays in scheduling appointments for primary care, patients are seeking alternatives to traditional face-to-face office-based care.

Larger cities have urgent care facilities, where patients can walk in and be seen the same day. This sort of care has become more common and well-accepted, but patients are still required to go to the facility, sometimes a challenge in large cities or with moderately ill patients (we
assume that very ill patients will present at the emergency room). This trend is accented by a survey recently reported on by Healthcare IT News, which stated, “Patients have said it, and they’ll keep saying it until they get what they want: More and more of them want their docs to go digital.” There are several ways to accomplish digital health care.

The Virtual Walk-in Clinic

To meet patient demand, a recent trend in healthcare has been virtual clinics, in which a patient can contact the clinic through a web browser, pay a fee with a credit card and see a physician within a few minutes. Virtual clinics have been established by both hospitals and commercial enterprises. While this paper makes no judgment of the value or efficacy of these clinics, recent coverage in the press has highlighted both plusses and minuses regarding these delivery systems. A recap of discussions appears below.

Advantages of virtual clinics:
- Care can be had ‘right now.’ Connection to the clinic through the Internet is generally quick and care providers are available shortly after the patient signs in and reports symptoms
- Protocols are in place. These protocols, as in face-to-face care, guide the provider through the appropriate steps in making a diagnosis and suggesting treatment options
- Immediate connections reduce patient wait time and travel to physical clinics, greatly increasing convenience
- Employers can see an increase in productivity by installing virtual clinic connections in the workplace. Employees can take a few minutes off the job for their virtual encounter rather than having to take hours off to see a provider in a brick-and-mortar clinic
- The use of virtual clinics may help decrease Emergency Room overuse by offering care quickly and easily to individuals who may otherwise wait too long to seek care or who may present at an emergency room simply because they couldn’t get a primary care appointment that met their schedule
- It may be possible for more primary care patients to be seen because of efficiencies built in to the virtual clinic business plan

The list of advantages clearly suggests that virtual clinics are important for expansion of care to underserved populations and the convenience is a huge factor. However, there may be some downsides to the virtual clinic as well:
- Providers may not know their patients well or at all. The virtual clinic may have a pool of providers who rotate among patients as they become available, and, unless the clinic has a means of allowing the patient to select a provider, patients may never see the same provider twice
- Records may be sketchy. Virtual clinics offered by hospitals might have an advantage because they may see only or mostly established patients and allow providers access to these patients’ records. Other configurations may maintain records of visits to their enterprise, but may not have access to the patients’ full record
- Licensure could be an issue as well. Current telehealth policies dictate that the provider be licensed in the state in which the patient is physically located when the
encounter occurs. Unless careful planning and a wide base of licensure for providers in a virtual care organization are maintained, this issue could become significant.

Prescribing medications through a virtual connection can offer challenges as well. Many states ban providers from writing prescriptions for patients they have not seen in person, at least for an initial meeting. Some organizations try to overcome this regulation by listing their providers as consultants to the patient’s primary care provider and rather than directly writing a prescription, transmit their suggestion to the patient’s primary care provider of record.

Some critics of commercial virtual clinics have stated a concern about the possibility of overprescribing of antibiotics. It must be noted that this is a concern in face-to-face health care as well. Critics claim that without proper lab tests, providers may write prescriptions for antibiotics almost as a placebo or, ‘just in case.’ Clear protocols and vigilance in both face-to-face and virtual clinics are required to counter this general trend.

Certain diagnoses may be difficult to make without laboratory testing and direct patient contact. In cases like these, protocols should clearly indicate that the virtual provider needs to escalate the case to a physical clinic or an emergency room (depending on acuity) for the appropriate tests (This is a plus if the protocol is in place, a challenge if it is not.)

Virtual clinics appear to be a growing phenomenon in telehealth. Ready access to the Internet in many homes combined with the challenge of getting an appointment in an overbooked primary care office makes virtual clinics attractive to patients. This convenience of seeing the provider from home can stimulate the growth and expansion of virtual clinics.

Virtual clinics are not limited to physical medicine, either. As this paper was being prepared, NBC news carried a feature article on its website reporting on text-based psychological counseling. While there were several unanswered questions, this sort of virtual connection may be growing. The point of the article is, however, that with only a smart phone, a person can have an interchange with a licensed psychology professional.

Electronics-based personalized care leads to another question: With all the data that will be generated through electronic health care, who will store, use or benefit from them? The next section discusses that issue.
Section 5. The Patient Side of Telehealth

The rapid growth of virtual care testifies to the ease-of-use and availability of cloud-based services provided across the commodity Internet. In addition, it demonstrates that patients are willing to use smart phones, tablets, desktop or laptop computers to meet with health care providers. But that interest does not stop with patient-provider encounters.

Personal devices and monitors are widely used by individuals to monitor their own health. Often times these devices are purchased without consulting with care providers and data gathered by the devices are transferred by the users’ electronic devices for storage on a server operated by the device manufacturer.

As this White Paper is being prepared there is a wide range of monitoring devices available and a wide range of data is being collected, including:

- Number of steps taken
- Heart rate
- Body temperature
- Blood pressure
- Heart rhythms
- Sleep efficacy
- Falls

These personal devices are often wearable, that is, they can be readily attached to the user’s person or clothing or are available as smart phone apps. They gather data constantly when they are worn and are often connected to a smart phone or computer via Bluetooth® for transmittal of data. Data that can be collected range from the basic and non-medical data to lifestyle information that could be valuable to a provider in diagnosing and treating medical issues.

While these data are often stored just for the use of the device owner, there is some movement in the personal device industry to make these data available to the wearer’s care providers. This gathering, storing and transmission of patient data is one aspect of the growing Connected Care movement.

Connected Care suggests, as the name implies, a connection, whether constant or *ad hoc* between the device owner and his/her physician. This transfer of data keeps the patient and provider connected, to be sure, but there has also been some discussion as to whether or not these data are useful. Partners Health Care has established a Center for Connected Health. They encourage their patients to keep track of activity and nutrition, saying,

> We know that if we give people -- young and old -- insights into their health and help them understand how lifestyle choices impact quality of life, they feel more accountable, engaged and live a healthier, more active life. Integrating ‘self-health’ tools like activity and nutrition trackers and sleep monitors into our daily lives, we can learn from our own behaviors and make positive changes to take charge of our health. 9

Some say that the flood of data about a patient’s pulse rate or body temperature is simply ‘static’ that interferes with the discussion of the patient’s condition. The Health IT.gov website offers insights into such concerns about patient-generated health data (PGHD), commenting that,
Providers will need to build processes and allow time to evaluate whether and what information to include in the patient record, and to determine when to promote PGHD use as part of the care plan. Providers may be concerned about any potential additional burden on their workflow, about increased liability and accountability, and about patient expectations. Access, usability, education, health literacy, economic disparities, and similar factors can be barriers to PGHD use by patients.\textsuperscript{10}

Others say that these data are critical for determining a patient’s baseline for certain health measures. Certainly knowing what a person’s average blood pressure is over a time could be helpful in determining if things are going the wrong way towards heart disease or hypertension. A person whose blood pressure is traditionally lower than that which is considered normal for an entire population might be facing hypertension issues if their pressure suddenly moved into the ‘high normal’ range. A diabetic whose personal monitoring device stored glucose readings over time could help in determining insulin dosages and times. These data can, indeed be helpful, according to HealthIT.gov:

The use of PGHD supplements existing clinical data, filling in gaps in information and providing a more comprehensive picture of ongoing patient health. PGHD can:

- Provide important information about how patients are doing between medical visits.
- Gather information on an ongoing basis, rather than only at one point in time.
- Provide information relevant to preventive and chronic care management.

The use of PGHD offers an opportunity to capture needed information for use during care, with potential cost savings and improvements in quality, care coordination, and patient safety.\textsuperscript{11}

However, there is a potential problem with too much or the wrong kind of data: Some types of data don’t really help with diagnosis or treatment plans, and they can overwhelm a provider. This flood of data may be stored in the patient’s medical record along with medical histories, and could mask truly important information. While it might be nice to know the average number of steps a patient takes each day for a year, each day’s number isn’t really of much value in itself. Self-reported data are also sometimes subject to misreporting and can be called into question. Because this influx of electronically-generated data is relatively new, there is little guidance on its use or control. Writing for the Office of the National Coordinator for Health Information Technology, Mary Jo Deering, PhD, says, “[T]here are no widely established policies and practices to define the optimal use of PGHD much less to support its growth as a viable health care tool.”\textsuperscript{12}

While the preceding discussion can make it appear that connected health faces a significant number of issues that make it undesirable, it can be a valuable health care delivery method. Several projects involving remote patient monitoring (RPM) have demonstrated the value of the discipline.

Chronic illness management via telehealth has proven itself to be a valuable means of deploying health care. Such illnesses as diabetes, congestive heart failure, COPD and others have proved to be ideal candidates for RPM. Patients receive equipment that will automatically take readings needed to monitor the illness and report them to a central facility. At the central facility, readings are monitored by case managers. If a patient’s readings start moving out of pre-established parameters or if the information doesn’t come in, staff at the monitoring center will either call the patient to investigate and discuss the situation with the patient, arrange a primary care visit for follow-up, or call for emergency help, depending on the protocol for the particular illness.
RPM allows for monitoring patients more closely than previously possible without provider-time-consuming daily house calls or requiring patients to check in in person each day. In addition, the data gathered can be used for tracking trends. When the trends start to move in a potentially dangerous direction, intervention can be initiated and it is very likely that the trend can be stopped before hospitalization or emergency room visits become necessary.

Another advantage of RPM can be patient education. Through coaching and discussions with care managers, patients can learn more about their illness and how to manage the condition between provider visits.

NRTRC and the Mid-Atlantic Telehealth Resource Center (MATRC) have partnered with two community health centers to monitor a project instituting RPM in Oregon. The ‘home base’ for the project is the Roanoke-Chowan Community Health Center (RCCHC) in North Carolina. RCCHC is providing leadership and education for the development of an RPM program in Central Oregon, at the Mosaic Medical Community Health Center. The Mosaic Medical Staff has commented positively about the project after articulating initial concerns over a new care method: As they learned the procedures and became accustomed to the new RPM program they came to like it. Their patients also speak positively about the program, with some stating that they feel they are being ‘cared for’ more closely. The Central Oregon project has been highly successful and clearly demonstrates the value of RPM to patients, community health centers and payers who can forego the expense of admission or readmission for chronically ill patients. Information about the Central Oregon Telehealth Network project can be reviewed at http://www.cotnexperience.blogspot.com/.

Staying at Home

Aging in place is another way of using RPM and telehealth in general that has been widely discussed. By using RPM in the home, elders can carefully monitored in a location where they are comfortable and avoid moving to long-term care facilities. With some modifications to their existing homes, seniors can be monitored for a wide range of age-related issues and delay or avoid transfer to skilled nursing facilities. Homes can be modified to be wheelchair-friendly, sensors can monitor movement and fall monitors and remote health monitoring devices can make daily checks on the person and potentially reduce primary care visits or emergency room visits. Fall prevention is probably the most important part of home modification for aging in place, because falls tend to be the largest source of injury to seniors.

By helping seniors stay at home, several benefits can be realized:
- Long term care or skilled nursing facility costs can be delayed or avoided
- Monitoring can detect trends in health status that lead to early intervention and thereby avoid emergency room visits
- Monitoring can follow health-related trends in patients recently released from a hospital and help to avoid readmissions
- Avoiding depression from having to give up one’s home and move into a ‘facility’

Of course, there is some cost involved with aging in place if the person’s home must to be remodeled to accommodate the needs of an aging person. Louis Tenenbaum, in a white paper written for and distributed by MetLife, discusses the cost factor:

Low-cost interventions have clear payback in terms of fewer hospitalizations and medical costs in a very short timeframe. More substantial but basic design and structural modifications average $9,000–$12,000 per one-story residence.
Using $10,000 as a sample cost for basic structural modifications compared to assisted living costs at $3,000+/month, a simple equation shows that avoiding those costs for a little more than three months will pay for home modifications.\(^{13}\)

Tenenbaum goes on to state that the cost of care in the home should be considered in the cost of aging in place, but asserts that after three years, the costs, including the remodel costs would reach a break-even point with residential care.

**Patient Communications**

Another aspect of the Connected Health movement that is being explored is communication between care providers and patients. CMS requires that hospitals incorporate patient portals into their IT systems as part of their Meaningful Use requirements. These portals are intended to allow patients access to their medical records, lab reports, etc. and as a means of communicating with their providers.

But there are other electronic methods available for communicating with providers, including text messaging, video conferencing and e-mail, to name a few.

Several electronic methods of keeping patients in touch with providers to facilitate health care are being tested, including:

- Making appointments for visits
- Receiving lab results
- Depression screening
- PTSD screening and treatment
- Smoking cessation adherence
- Well baby care
- Many more are under study

The rapid growth of device development and continuing expansion of broadband connectivity suggest that more and more devices and applications will come on the market in the near future. Whether this expansion of devices will provide genuine help to patients or simply flood practitioners with data they can’t use remains to be seen.

As with all aspects of electronic communication, with this more readily-available, easily-transferrable information, security becomes a major concern. The security of protected health information (PHI) is, of course, the responsibility of the providers while those data are in their possession, whether the PHI is being stored in the provider’s facility or being transmitted to another provider. HIPAA is uncompromising about protecting PHI. Potentially severe penalties for failure to hold PHI strictly confidential, even if the providers system is attacked by hackers, are clearly spelled out in the law.

However, what happens if a patient should allow PHI to be compromised? This scenario becomes more and more possible as patients gain access to their health data. It may well become the case that the HIPAA laws will have to be modified to take patient storage of PHI into consideration.
Section 8. Regulatory Concerns

Along with connectivity and access come a variety of concerns over regulation and legal issues. It is well-established that the telehealth encounter occurs at the patient location. That means that a provider must be licensed in the state where patient is physically located during the encounter. With most states having their own licensing requirements and procedures, it becomes a challenge for a physician to acquire licenses in several states if he or she chooses to provide telehealth services in those several states. Some state Boards of Medicine have the option issuing telehealth-only licenses, some offer the opportunity for physicians to provide care on a limited (or very limited) basis without receiving a license and many require full licensing to practice telehealth with patients inside the state borders.

A potential solution has arisen, however. The Federation of State Medical Boards (FSMB) has outlined an Interstate Medical Licensure Compact. This compact will establish policy that allows a state Medical Board to license a physician based on that Board’s acceptance of the investigation and background checks of another Compact state. Such an agreement should eliminate the need for the often time-consuming, repetitive and expensive undertaking of going through a licensing process in each state the physician wishes to practice in. In effect, the Compact members agree that the due diligence of other members is sufficient for licensing a physician in their own state. At the time this paper is being prepared, nine states have enacted the necessary legislation to initiate the Compact. This number is above the threshold for activating the Compact and we expect to see the development start soon.

Credentialing and privileging are issues that often cause concern for telehealth providers as well. In the past, physicians were required to go through a credentialing and privileging process for each hospital in which they wished to provide service. CMS changed their rules recently and allowed for ‘proxy credentialing.’ That is, a hospital is now allowed to accept the credentialing of another hospital as proof that the provider is qualified to provide care. The CMS action parallels that of the Joint Commission.

Proxy credentialing has streamlined the process to some extent, but NRTRC members have reported that some hospitals choose not to accept proxy credentialing. Whether proxy credentialing will become a standard process for telehealth remains to be seen.

Physicians, of course, are not the only ones who provide care via telehealth and the licensing issues for non-physician care providers is even more diverse. Some states allow, for instance, physical, occupational or speech therapists to practice in their states if they are licensed elsewhere and some prohibit any of these services from out-of-state providers. NRTRC believes that as telehealth becomes more ubiquitous and common, regulations will be changed to eliminate the confusion and streamline licensing processes.

Beyond care provision, a major issue is reimbursement for that care. CMS sets the standard for telehealth reimbursement by covering a limited number of encounters conducted by interactive telehealth in rural areas. However, they do not cover store-and-forward telehealth or telehealth care in urban settings. In fairness, it must be stated that CMS is continually expanding the services they cover as evidence builds for the efficacy of care.

Private payers operate on a totally different playing field, with a wide variety of coverage policies. Some payers have embraced telehealth and support it by reimbursing for distant care. Others refuse to pay for telehealth procedures at all, and still others have started telehealth services they provide to their policy holders.
This wide variance in reimbursement policy makes it a challenge in some areas to provide telehealth care. To overcome this disparity, 28 states have passed legislation requiring private payers to reimburse for telehealth care. Again, these state laws are all unique to the state in which they were passed. Some require reimbursement only for procedures that are covered by CMS, some require all procedures to be reimbursed and many fall between the two requirements.

The Affordable Care Act has had an influence on health care and will likely have significant effects in the future. Telehealth appears to fit well with most aspects of the ACA, and analysts have predicted that telehealth will grow significantly as the capability for providing care to underserved areas gains traction through expanded use of telehealth. In addition to the potential for growth telehealth looks forward to, there are other changes being manifested in health care under the ACA.

Millions more Americans are now covered by health insurance than were insured before the Act became law, for instance. In other health care arenas, changes have been seen as well. The move to capitated care will change the face of care provision. Providers will no longer be reimbursed for procedures, but rather for outcomes. This is a significant shift in reimbursement patterns and will no doubt have an effect on the future of medicine in general. Additionally, wellness or disease prevention will be accented, based on the idea that it is better to avoid illness than to treat it. A further change will be in care coordination. Patients will see providers who coordinate the individual’s care rather than having patients visit different providers with little coordination between the care sites. Different options are being tested to verify their effectiveness in patient care management and it is too soon to determine which model will eventually become the norm.
Conclusion

What is the future of telehealth? It’s hard to say.

This paper has looked at the history of telehealth, the current state of the art and the technology, equipment, health care and patient demand sides of the equation and has come up with several predictions. This is not simply the clairvoyant’s method of throwing out several guesses and claiming accuracy if one of them is right, however.

If only one aspect of the reviewed facets of health care were leading the way, we could readily make one prediction. But that isn’t the case.

We could make arguments in favor of any of the following assertions and justify a prediction based on that single statement:

- Medicine is driving telehealth
- Technology is driving telehealth
- Software development is driving telehealth
- Patient demands are driving telehealth
- Government and regulators are driving telehealth

The truth is that each of these segments is influencing telehealth to some degree and an upsurge in activity in any one area could change the equation dramatically. But we believe, based on the current research, that all of the drivers will have a significant impact on one segment of telehealth or another and each will lead to slightly different approaches, all of which will come together to form the telehealth environment of the future.

With such a wide range of possible paths to follow, all leading to the goal of improved and expanded patient care, we suggest that telehealth in the future will look something like a prism, refracting light of slightly different colors in multiple directions, but all those refractions will emanate from one place: Health Care. The following discussion features the various ‘colors’ of telehealth in the future.

Legacy networks, which represented, until very recently, the state of the art in technology and remote health care will become less common than they are today. Technology advances, coupled with available communication structures and approaches to health care will drive a shift from the classic hub-and-spoke system to a more ad hoc series of connections. Legacy networks will be found to be expensive, technologically cumbersome and restrictive and will have to adapt to rapidly-advancing changes. Many legacy networks will adapt to the new technology and the demand for a more ‘open’ health care environment, and may evolve into different models of care provision, including some of those predicted in the following paragraphs. And, of course, some legacy systems will remain in place because they work, and work well.

Ad hoc networks will become much more common. As Critical Access Hospitals (CAH), primary care providers (PCP) and community health clinics come to realize that they can afford technology that will replace the legacy networks’ expensive proprietary systems, we believe that more and more small facilities will become telehealth hubs.

But a different kind of hub entirely:

Rather than being the monolithic supplier of specialty care to a group of affiliated sites, they will become recipient hubs. That is, they will identify and form alliances with specialty providers who are willing to make temporary connections for patient encounters. This ad hoc concept will allow small facilities to control their referral patterns, keep patients local and still provide top-
quality care that patients would otherwise have to travel to receive. (We recognize that elimination of patient travel and quality of care are advantages of legacy networks as well. Our contention is that CAH, PCP and clinics will enjoy a level of control that they have not felt with legacy systems.)

One driver of this potential future is the changing technology field. Standards-based cloud communications providers are now offering a wide range of options for connecting care sites, requiring less-expensive equipment and, with downloadable software drivers for remote PCs, a far wider universe of specialty providers to choose from. Small facilities can use specialists to whom they normally refer their patients or can negotiate with providers that patients have worked with in the past and have built rapport with.

CAHs, especially can benefit from ad hoc networking by keeping patients local and managing them under the supervision of remote specialists (again, we acknowledge that this option is available with legacy networks).

NRTRC staff has seen 25-bed critical access hospitals with intensive-care units managed by out-of-state intensivists and one hospital on a remote Alaskan island that has a one-bed ICU, managed by intensivists in Anchorage.

We believe these ad hoc networks will disrupt the traditional telehealth delivery paradigm and continue the expansion of care to underserved populations.

**Virtual urgent care clinics,** i.e., clinics in which patients see providers through Internet connections will become a large part of the health care scene. We are already seeing several for-profit and not-for-profit organizations offering virtual urgent care. These organizations, both free-standing for-profit clinics and hospital-based clinics are offering convenience and streamlined care for patients who cannot see their primary care providers in a timely fashion. Many virtual urgent care providers do not accept insurance, but offer pricing that is competitive with co-payments many patients are required to pay through their insurance. These lower-cost alternatives may make virtual clinics attractive to insured patients as well as un- or under-insured patients.

Virtual Urgent Care clinics offer many conveniences to patients, including travel avoidance, cost savings and the opportunity to see a physician without leaving home when they are ill. Clinics have protocols in place to assure proper care, of course, and to escalate the care to primary care or emergency visits if necessary.

There has been some controversy around virtual urgent care in several regions of the United States, however. Some states have sanctioned out-of-state physicians for prescribing without first meeting the patient in person, some providers have been challenged for providing care without first meeting the patient in person and some observers raise concerns about prescribing antibiotics without prior laboratory testing.

There are further issues revolving around virtual urgent care. Among them is provider licensure in the state where the patient is seen. However, the FSMB Interstate Medical Licensure Compact can resolve that issue for states which adopt it.

Other issues will include those that might appear with any new business paradigm, we believe these issues will continue to float to the surface for the first several years that virtual care is offered, but will eventually be solved through legislation, regulation or agreements with individual states.

We believe that hospital-based virtual clinics will fare much better in the startup phase because they will likely cater to patients in their service area first and foremost. This localization
of care will enhance the probability that providers will have met patients and have patient records available and licensure issues will likely not appear.

**Mobile healthcare (mHealth)** will continue to grow as more and more technology companies introduce health-care-related devices. Along with more devices, of course, more software applications, or “apps,” will become available, expanding the often confusing number of mHealth options for consumers. Beyond the consumer aspect of mHealth, providers will be pressured by patients to incorporate smart devices into their practices. Current industry press reports consistently indicate that up to 60% of patients want their physicians to be available through mHealth devices.

Additionally, we have heard reports from numerous hospital managers and IT departments that physicians working in the facility have started insisting that their smart phones and tablets be allowed to access patient data and to interface with both patients and other providers. This increased connectivity is, of course, an advantage, but it is also a significant challenge to IT departments, which must develop a means of vetting the equipment and protecting data that are accessed and possibly stored on those devices. This need for data security has led to yet another industry expansion: the development of apps that partition patient data in discrete sections of device memory and, perhaps, erase those data if the device is lost or falls into the wrong hands.

A further question of protected health information arises when patients use mHealth to access their data: Who is responsible for protecting the data that reside on a patient’s phone? As hacker-generated attacks on hospital systems increase, the question of whether consumer-owned devices will be targeted as well must be addressed.

**Connected care,** as it is associated with mHealth and with more classic telehealth provision will burgeon. While the aspects of telehealth mentioned in the previous discussions can be considered to be connected care, there are many other methods in which patients can be remotely cared for. We anticipate a large increase in providers offering Remote Patient Monitoring (RPM) for chronic illness. As Medicare begins paying for remote care, RPM will become a cost-effective means of caring for patients living with congestive heart failure, COPD, diabetes or other chronic conditions.

RPM may also lead to a decrease in the cost of care overall in several ways. First, with constant monitoring of patient data, care providers will be able to detect trends that could lead to serious complications and intervene before those trends become critical issues and lead to expensive emergency room visits. Monitoring these trends can not only lead to reduced ER usage, but also lead to interventions that can help avoid 30-day and even 90-day readmissions to hospitals and thereby avoid penalties from payers.

An aging population faces more chronic illness and the growth in the percentage of older adults of the population has often been called “The Silver Tsunami.” With more and more retired and aging patients to care for, RPM offers a way to maximize patient loads while increasing close monitoring of illnesses.

Additionally, remote monitoring can be incorporated into home design, allowing seniors to ‘age in place,’ or to stay at home and remain independent much longer than they do today. Avoiding moving seniors with relatively good health to long-term care facilities can add significant cost savings to the health care picture. Monitoring general health, monitoring for falls and for activity can help families keep elders at home, where they will feel more comfortable and independent, and may help avoid senior depression.

**Regulatory and legal issues** will slowly be resolved. Cross-state licensure concerns will be eased by the Federation of State Medical Boards’ Interstate Medical Licensure Compact. As the
Compact matures, more states will likely adopt it and the multi-state licensing of providers will be streamlined across the nation.

Proxy credentialing will become more common. As more small hospitals start using ad hoc telehealth connections, we believe they will come to see the value of accepting credentialing from providers’ home hospitals and will waive the requirement for those providers to go through the process of credentialing at their facility. We expect that some states will consider regulation or legislation that requires facilities to accept proxy credentialing.

Twenty-eight states now have some version of a telehealth parity law on the books. These laws set a number of different requirements for reimbursement by private payers: Some require payers to reimburse for telehealth care at the same rate they reimburse for in-person care; some require private payers to reimburse for the same telehealth encounters as Medicare; some states specifically mention which encounters must be reimbursed. As private sector payers come to see the value of telehealth we expect that they will more routinely reimburse for telehealth care and possibly even require it if it is available.

In conclusion, we see a wide spectrum of telehealth care coming in the future. It will be impossible to predict exactly what telehealth will look like in a few years simply because we see a family of telehealth options growing out of today’s climate. And, while members of a family may bear a resemblance to each other, few are identical. Indeed, even these predictions are somewhat tenuous because of the rapid advancement of technology and health care. There may be a discovery in the very near future that changes everything ‘overnight.’
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