Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ACTIONS TO ACCELERATE ADOPTION	**)**	
AND ACCESSIBILITY OF BROADBAND-	**)**	**GN Docket No. 16-46**
ENABLED HEALTH CARE SOLUTIONS	**)**	**FCC 17-46**
AND ADVANCED TECHNOLOGIES	**)**	

Comments of
NTCA–THE RURAL BROADBAND ASSOCIATION

May 24, 2017

NTCA–The Rural Broadband Association
4121 Wilson Blvd., Suite 1000
Arlington, VA 22203
703-351-2000
www.ntca.org

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Telemedicine offers opportunities for improved patient outcomes throughout populations, but is especially beneficial for rural areas where increased incidences of chronic and other health conditions conspire with distance from medical facilities and an overall physician shortage to create mounting health care challenges. The health benefits of telemedicine applications and adoption have been documented in numerous studies addressing various medical conditions. The economic benefits of telemedicine and telehealth have been modeled to create substantial health care savings, as well as ancillary savings relating to travel to distant facilities and lost wages. These benefits are especially compelling in rural areas.

Members of NTCA–The Rural Broadband Association have successfully implemented telemedicine deployments in their service areas, often working collaboratively with local or regional health care providers. The benefits of these and other prospective efforts will be realized in rural areas where they are needed the most only if sufficient broadband networks are built and maintained. The full benefits of telemedicine must be envisioned beyond monitoring of vital statistics to encompass the full range of consultations and physician/patient interactions. NTCA has demonstrated its commitment to these principles and the actions of its members demonstrate the commitment and ingenuity of rural broadband providers in these regards.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ACTIONS TO ACCELERATE ADOPTION AND ACCESSIBILITY OF BROADBAND-ENABLED HEALTH CARE SOLUTIONS AND ADVANCED TECHNOLOGIES	**)** **)** **)** **)**	**GN Docket No. 16-46** **FCC 17-46**

Comments of
NTCA–THE RURAL BROADBAND ASSOCIATION

To the Commission:

I. INTRODUCTION

A. TELEMEDICINE RELIES UPON CAPABLE BROADBAND NETWORKS

NTCA–The Rural Broadband Association (NTCA)[1] hereby submits these comments in response to the Public Notice[2] issued in the above-captioned proceeding. In the instant Public Notice, the Commission seeks comment on a range of telehealth issues, including technical matters related to network requirements; telehealth technology; perceptions of usefulness in obtaining improved patient outcomes; and, the relative costs and anticipated benefits of deploying and adoption of relevant technology. In these Comments, NTCA will describe rural health issues, generally; the role of telemedicine in addressing chronic and other medical

[1] NTCA is an industry association composed of nearly 850 rural local exchange carriers (RLECs). While these entities were traditional rate-of-return-regulated telecommunications companies and "rural telephone companies" as defined in the Communications Act of 1934, as amended, all NTCA's members today provide a mix of advanced telecommunications and broadband services, and many also provide video or wireless services to the rural communities they serve.

[2] "FCC Seeks Comment and Data on Actions to Accelerate Adoption and Accessibility of Broadband-Enabled Health Care Solutions and Advanced Technologies," Public Notice, GN Docket No. 16-46, FCC 17-46 (Apr. 24, 2017).

conditions; the broadband deployment achievements of NTCA members; and the overall positive economic impacts that can be anticipated through telehealth usage in rural areas. These presentations will demonstrate that telehealth is necessary for rural America; can be deployed *if* sufficiently capable broadband networks are built and maintained; and, will create improved medical and economic outcomes. NTCA will illustrate these comments with descriptions of successful telemedicine deployments by NTCA rural broadband provider members in their respective communities, often undertaken in collaboration with health care providers.

NTCA represents approximately 850 small, locally-operated rural telecom providers. All NTCA members have deployed broadband to some extent in their networks.[3] NTCA's most recent annual survey reveals that 49 percent of respondents' broadband customers are served via fiber to the home (FTTH); 29 percent via copper loops; 15 percent via cable modem; 6 percent via fiber to the node (FTTN); 1 percent via licensed and unlicensed fixed wireless; and 0.1 percent via satellite. Fifty-percent of survey respondents with a fiber deployment strategy plan to offer FTTN to more than 75 percent of their customers by year-end 2018, while 78 percent plan to offer fiber to the home to at least 50 percent of their customers over the same time-frame.[4] The capabilities of NTCA member networks are enhanced by their interconnections with larger regional networks: in 28 states, rural telecom providers own and operate regional fiber networks that can ensure the speed and capacities demanded by data-heavy telemedicine services.[5]

---

[3] *See*, "NTCA 2015 Broadband/Internet Availability Survey Report," NTCA–The Rural Broadband Association (Jul. 2016) (https://www.ntca.org/images/stories/Documents/Advocacy/SurveyReports/2015ntcabroadbandsurveyreport.pdf) (last viewed May 9, 2017, 11:25) (NTCA 2015 Broadband Survey Report).

[4] NTCA 2015 Broadband Survey Report at 3.

[5] These states are: Arkansas; California; Colorado; Idaho; Illinois; Indiana; Iowa; Kansas; Michigan; Minnesota; Missouri; Montana; Nebraska; New York; Nevada; North Dakota; Ohio;

The broadband foundation for rural telehealth deployments exists in NTCA member service areas. The task, however, is not complete. Telemedicine in all areas of the United States relies upon the ubiquitous deployment of broadband networks that can support healthcare applications. The implementation of suitable regulatory mechanisms to support broadband infrastructure in high-cost rural and insular areas must be viewed as "dual use," as those mechanisms enable not only the deployment and maintenance of the networks, but applications and benefits that would be unavailable if those networks did not exist. Moreover, future upgrades must be contemplated to ensure compliance with the "evolving" and "reasonably comparable" standards of Section 254 of the Communications Act, as amended.[6]

B. NATIONAL USE AND ACCEPTANCE OF TELEMEDINCE IS INCREASING

National use and acceptance of telemedicine is increasing. The practice of telemedicine is no longer characterized as "if," but "when." In the first half of 2015, the number of telemedicine interactions exceeded the cumulative amount of all that had preceded that point.[7] The broader use of telemedicine will rely upon the disposition of technological and policy issues, including, but not limited to, network deployment, healthcare technology, and medical licensing and reimbursement. The drivers that can be expected to determine the ultimate impact of telemedicine include consumer expectations, health care reform, health workforce shortages, aging populations, and connectivity.

Oklahoma; Oregon; South Carolina; South Dakota; Tennessee; Texas; Utah; Virginia; Washington; Wisconsin; Wyoming. *See*, http://www.indatel.com/content/maps-members-network. Indatel is a national association whose members are statewide network providers.

[6] 47 U.S.C. § 254.

[7] Jill Degraff Thorpe, "Doctors Without Wires," Consumer Electronics Show, Las Vegas (panel presentation, Jan. 5, 2016).

A 2015 Nielsen survey probed physicians' opinions on telemedicine, and uncovered encouraging results. While 19 percent of those polled worried that telemedicine would not be good for their practice revenue, and 21 percent worried it would not be good their personal income, 22 percent saw telemedicine as an important step toward reducing the costs of care, and 39 percent surmised it is good for patients. An impressive 42 percent see telemedicine as "an important evolution in the practice of medicine" (31 percent shrugged that is "not worth the hype," yet 39 percent agreed that it is "good for patients").[8] The survey results did not indicate whether or how physician perceptions were affected by age, area of practice, or other demographic factors.

The Nielsen survey indicates trends toward greater acceptance of telemedicine. Perceived reluctance among some practitioners may stem from general wariness to adopt new technology, a condition that exists in many fields. Conditions to increase telehealth, however, are ripe: data demonstrate better patient outcomes and economic benefits. These effects should, over time, tip the scales toward greater adoption and use even among skeptics. The overall impact of telemedicine will be measured well only after years of data can be studied. In the interim, reports that examine the impacts of telemedicine on specific conditions offer encouraging information.

By way of example, diabetes is identified as the leading cause of blindness in the United States. Despite recommendations form the American Diabetes Association for annual eye exams, approximately only 60 percent of patients comply.[9] The potential for positive impacts of

---

[8] "Better Together: High Tech and High Touch: Consumer Health Care Survey Results," Council of Accountable Physician Practices, Washington, D.C., at 37 (Nov. 4, 2015) (http://accountablecaredoctors.org/wp-content/uploads/2015/11/CAPP-SHP-Consumer-Survey_Full-Presentation_103015.pdf) (last viewed May 23, 2017, 11:06) (Nielsen 2015).

[9] Zimbalist, Richard J., Scharnweber, Amber R., "Teleretinal Imaging for Diabetic Retinopathy," Review of Optometry (Dec. 15, 2016) (https://www.reviewofoptometry.com/article/teleretinal-

telehealth interventions can be illustrated by observing the results of studies that focused on teleretinal imaging to diagnose diabetic retinopathy. An article notes,

> The economic burden of vision loss from diabetes is enormous and has been calculated at $132 billion in direct and indirect costs. These include medical costs, including hospitalizations and the costs of medications, vision rehabilitation, loss of productivity, and the impact on quality of life. The benefits of detecting and treating sight-threatening retinopathy in patients with diabetes have been borne out by many cost-effectiveness and cost-utility studies.[10]

The article explains that although initial studies failed to reveal an economic benefit, subsequent studies demonstrated "important cost benefit[s]." However, another article cautions,

> Teleretinal imaging does not take the place of a comprehensive eye examination. There is a common misperception that the use telemedicine will result in fewer referrals for eye care services. The goal of TRI (teleretinal imaging) is to capture the 40% of diabetes sufferers who are noncompliant with annual retinal examinations.[11]

Capturing the non-compliant is especially important, as TRI screenings have intercepted *other* conditions, including cataracts, age-related maculopathy, and glaucoma. And, patient satisfaction was found to be "universally positive."[12]

Prospective patients seem ready, if not willing and able, to move forward on implementing telemedicine applications into their health care. The Nielsen survey revealed U.S. demand for telehealth. Thirty-six percent of respondents want access to a 24/7 medical line (14

---

imaging-for-diabetic-retinopathy) (last viewed May 23, 2017, 11:53) (internal citations omitted) (Zimbalist, Scharnweber).

[10] Cavallerano, Anthony A., Conlin, Paul R., "Teleretinal Imaging to Screen for Diabetic Retinopathy in the Veterans Health Administration," Journal of Diabetes Science and Technology (Jan. 2008) (internal citations omitted) (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2769713) (last viewed May 23, 2017, 12:07) (Cavvallerano, Conlin).

[11] Zimbalist, Scharnweber (internal citations omitted).

[12] Cavallerano, Conlin (internal citations omitted).

percent reported already having one); 19 percent want access to a video consult with their primary physician (only two percent reported having one); and 26 percent want the ability to submit a photo of their condition or treatment as an antecedent to receiving a telephone or email consult (three percent of respondents currently have this ability).[13] This last category, which is essentially an electronic referral, can help to avoid unnecessary office visits and associated costs (as described more fully below, these implicate not only health care costs, but ancillary costs such as travel or lost wages incurred by the patient). A dermatological condition illustrated by a high definition photo could tell a doctor whether an over the counter remedy or an office visit might be in order. To be sure, patient care, whether by wire or not, will require sustained personal interaction between the physician and the patient. However, Kaiser Permanente, which performed 14 million "virtual visits" in 2015, predicts that telemedicine interactions will surpass in-person visits by 2018.[14] And, it is estimated that 50 million Americans would switch their primary care providers to obtain access to video visits.[15] In addition to reducing travel costs and lost wages, these interactions can also address the phenomenon of patients who delay care.

A 2017 survey found that 67 percent of patients acknowledge that they have delayed care, citing a variety of reasons, including: cost (23 percent); time needed to see a doctor or nurse (23 percent); assumption that "problem would go away on its own" (36 percent); and, "too busy"

---

[13] Nielsen 2015, *supra.* n.8, at 14, 20, 24, 30.

[14] Pearl, Robert, "Engaging Physicians in Telehealth," New England Journal of Medicine: Catalyst (http://catalyst.nejm.org/engaging-physicians-in-telehealth/) (updated Mar 29, 2016; last viewed May 23, 2017, 11:44).

[15] Telehealth Index: 2017 Consumer Survey, American Well at 2 (on-line polling of 4,000 adults conducted by Harris Poll) (http://go.americanwell.com/rs/335-QLG-882/images/American_Well_Telehealth_Index_2017_Consumer_Survey.pdf) (last viewed May 23, 2017, 12:36) (American Well 2017).

(13 percent).[16] Costs and time for doctor visits are of special concerns in rural areas where residents face either poverty or distance from physicians, or both. Telehealth interactions can mitigate against these reasons, which are especially concerning whether compared with data that reveal that among those who delayed care, 31 percent characterized their health issues as "somewhat serious" and "very serious."[17]

Veterans' care offers another lens through which the benefits of telemedicine can be viewed. Veterans constitute 11 percent of the U.S. population. In 2011, approximately 3.9 million veterans lived in rural America.[18] U.S. veterans' health spending was estimated at $59 billion in 2014.[19] As noted above, telemedicine offers savings opportunities for both patients and providers. The potential impact of telemedicine can be discerned by distilling data to the state level. By way of example, data indicate that more than nine percent of Iowa's three-million residents are veterans[20] who utilize Veterans Administration (V.A. or VHA) medical care that is estimated to be approximately $638,221,000 annually in Iowa, alone. [21] Virginia is home to

---

[16] American Well 2017 at 5.

[17] *Id.*

[18] Rural Veterans at a Glance, U.S.D.A. Economic Research Service Brief No. 25 (2013).

[19] *See,* Tara O'Neill Hayes, "Primer: Veterans Health Care," American Action Forum (Oct. 7, 2015), *citing* Veterans Administration Budget Summary, www.va.gov/budget/docs/summary/Fy2016-BudgetInBrief.pdf (https://www.americanactionforum.org/insight/primer-veterans-health-care/#_edn31) (last viewed May 24, 2017, 14:09).

[20] Krier, Dan C., Stockner, Richard, and Lasley, Paul, *The Economic and Cultural Impacts of Veterans on Rural America: The Case of Iowa,* Journal of Rural Social Sciences, 26(3), pp. 57-82 (2011) (http://www.ag.auburn.edu/auxiliary/srsa/pages/Articles/JRSS%202011%2026/3/JRSS%202011%2026%203%2057-82.pdf) (last viewed Jul. 15, 2015, 12:16).

[21] http://www.va.gov/vetdata/Expenditures.asp (last viewed Jul. 15, 2015, 12:06).

nearly 800,000 veterans who utilize approximately $1,443,669,000 in medical care services annually. These data are pulled into focus by referring to the discussion of diabetes and blindness in Section I.B, above: 25 percent of V.A. patients suffer from diabetes, as compared to nine (9) percent of the general population.[22] It has been estimated (looking across all conditions, including diabetes, congestive heart failure, hypertension, COPD and emotional health issues) that the V.A. telehealth program is associated with a 25 percent reduction in bed days of care and 19 percent reduction in hospital admissions. On average, these and other savings account to $6,500 per patient savings in 2012.[23]

Data from various sources, including those studying specific medical issues or those focused on discrete populations, reveal consistently the promise of telehealth adoption.

C. RURAL AREAS ARE PARTICULARLY SUITED FOR TELEMEDICINE

The imperative to deploy telehealth is set forth logically and comprehensively in the Public Notice. NTCA submits that the reasons established in the Public Notice are accentuated in rural areas, where telehealth promises beneficial results. Residents of rural areas experience greater incidences of chronic and other conditions as compared to their urban counterparts. When combined with distance from or lack of access to physicians and health care facilities and prevailing socioeconomic challenges, obstacles to the acquisition of affordable health care arise. Broadband-enabled applications can shatter these barriers and result in improved healthcare at lower costs, benefiting rural users while lowering National healthcare costs.

---

[22] Zimbalist, Scharnweber, *supra.* n.9 (internal citations omitted).

[23] "Telehealth: Helping Hospitals Deliver Cost-Effective Care," American Hospital Association, Washington, D.C., at 2 (2016) (http://www.aha.org/content/16/16telehealthissuebrief.pdf) (last viewed May 23, 2017; 16:42). The cost to deploy telehealth was estimated at $1,600 per patient per year.

More than 20 percent of the U.S. population faces at least two chronic conditions. Rural areas contain about 20 percent of the U.S. population but are on average poorer and older; rural residents also have higher dependency rates than urban areas.[24] Rural poverty *increases* the risk of complications from chronic conditions and *decreases* the likelihood of health insurance that can enable consistent treatment and preventative care.[25] Increased incidences of medical conditions in rural areas include: diabetes (17 percent higher),[26] hypertension,[27] obesity (in women, 23 percent vs. 16 percent in large metro areas),[28] cancer, edentulism (total tooth loss) among persons 65 and older,[29] and injury. Higher rates of high-risk behaviors including smoking, physical inactivity, poor diet and limited use of seatbelts are also present in rural areas.[30] Rural health challenges are compounded by physician shortages and lack of access to nearby health care facilities. Although 25 percent of the U.S. population resides in rural areas, only 10 percent of the Nation's physicians are in rural America.[31] And, rural areas have 70

---

[24] *See, Rural Women's Health,* National Rural Health Association Policy Brief at 1 (NRHA) (internal citations omitted). *See, also, Rural Populations and Health: Determinants, Disparities and Solutions: Book Review,* Preventing Chronic Disease, Centers for Disease Control and Prevention, Vol. 10 (Jun. 27, 2013) (CDC).

[25] NRHA, *supra* n.24, at 1.

[26] NRHA, *supra* n.24, at 2.

[27] "What's Different About Rural Health Care?" National Rural Health Association, at 1 (www.ruralhealthweb.org/go/left/about-ruralhealth) (NRHA II).

[28] NRHA, *supra* n.24, at 2.

[29] Rural Health Disparities, Rural Health Information Hub at 2 ((ruralhealthinfo.org/topics/rural-health-disparities).

[30] CDC.

[31] NRHA II, *supra* n.27, at 2.

percent fewer specialists per 100,000 people. Rural residents tend to travel further for medical care than urban counterparts.[32]

In addition to the greater incidences of certain chronic conditions that occur with greater prevalence in rural areas, the physician shortage and distance from facilities complicates treatment of traumatic injuries. Telemedicine is useful, as well, to enable remote therapy for substance abuse, occupational, physical and speech, as well as psychotherapy and counseling; access on Tribal lands; and, pediatric care. And, in addition to improved patient outcomes, telemedicine may aid research by facilitating research that is grounded in "big data" obtained from a larger universe of connected patients. At the same time, and as discussed more fully below, legal implications, including licensing, Medicare/Medicaid, HIPPA regulations and privacy must be addressed.

D. TELEMEDICINE ENABLES ECONOMIC BENEFITS

Many forays into telemedicine focus on anticipated gains in medical treatments and patient outcomes. The economic benefits of telemedicine are an equally important aspect of this inquiry. Recent studies support both qualitative and quantitative benefits of telemedicine. By way of example, one program that focused on common acute care diagnoses among Medicare Advantage and Medicaid patients resulted in "hospital at home" costs that were 19 percent lower than costs for in-patients. Patient outcomes for "hospital at home" users in the groups were equal to or better than their in-patient counterparts.[33] Another study examined the role of telemedicine

[32] NRHA, *supra* n.24, at 4.

[33] Lesley Cryer, Scott B. Shannon, Melanie Van Amsterdam and Bruce Leff, "Costs for 'Hospital at Home' Patients Were 19 Percent Lower, With Equal or Better Outcomes Compared to Similar Inpatients," *Health Affairs June 2012, 31:61237-1243; doi:10.1377/hlthaff.2011.1132.*

benefits for chronic care patients, whose treatment collectively constitutes nearly 80 percent of U.S. health care costs. In this study, costs for Medicare beneficiaries decreased approximately 7.7-13.3 percent.[34]

NTCA recently published a paper that documents the anticipated economic benefits of rural telehealth deployments; that paper is attached to these comments as Appendix A. In summary, the economic incentives to deploy rural telemedicine are compelling. The United States spends more on health care than any other Organization for Economic Cooperation and Development (OECD) nation, both in absolute terms and as a percentage of gross domestic product (GDP).[35] Although the decision to implement telemedicine is unique to each medical facility, the anticipated benefits are notable. Factors include not only health care costs, but also nonquantifiable and quantifiable benefits accruing to parties other than the medical facility, such as the patient and local labs and pharmacies located in the communities where telemedicine takes place. National average estimates of cost savings include:

- Travel expense savings: $5,718 per medical facility, annually;
- Lost wages savings: $3,431 per medical facility, annually;
- Hospital cost savings: $20,841 per medical facility, annually;
- Increased local revenues for lab work: from $9,204 to $39,882 per type of procedure, per medical facility, annually; and

[34] "Integrated Telehealth and Care Management Program for Medicare Beneficiaries with Chronic Disease Linked to Savings," Laurence C. Baker, Scott J. Johnson, Dendy Maculay and Howard Birnbaum, *Health Affairs September 2011, 30:91689*1697; doi:10.1377/hlthaff.2011.0216.*

[35] "Health Expenditure and Financing," Organization for Economic Cooperation and Development, "OECD.Stat," (http://stats.oecd.org/Index.aspx?DataSetCode=SHA) (last viewed May 23, 2017, 13:03).

- Increased local pharmacy revenues: from $2,319 to $6,239 per medical facility annually, depending on the specific drug prescribed.

Complete realization of these benefits, however, will first require focused attention at two distinct categories of issues. One relates to health care matters, including reimbursements, cost, patient privacy and licensing. The other relates to the fundamental need to ensure the availability of an underlying future-proof, fiber-based broadband infrastructure. Further investment in, and expansion of, broadband infrastructure is a critical need for our Nation. These strategies will depend upon regulatory certainty and policies aimed at providing sufficient resources to support rural deployments.

E. NTCA IS ENGAGED ACTIVELY IN PROMOTING RURAL TELEMEDICINE

NTCA has championed rural telemedicine deployment in several efforts. In 2012, NTCA's Foundation for Rural Service (FRS) released a ground-breaking paper addressing rural aging in place.[36] In March 2016, NTCA worked closely with the White House Rural Council to host a Rural Telehealth Summit.[37] In December 2016, the FRS in conjunction with Smart Rural Community,[SM] an initiative of NTCA,[38] hosted a rural telemedicine program in Washington,

[36] "Aging in Place and the Role of Broadband," Foundation for Rural Service, Arlington, VA (2012) (available at https://www.ntca.org/images/stories/Documents/Press_Center/2012_Releases/aging%20in%20place%20final.pdf) (last viewed May 24, 2017, 14:21).

[37] *See, i.e.*, "Madison Official Convenes with White House Rural Council," The BenGil Post (Apr. 23, 2016) (http://www.thebengilpost.com/madison-official-convenes-white-house-rural-council) (last viewed May 19, 2017, 13:17).

[38] Smart Rural Community (SRC) comprises programming relating to and promoting rural broadband networks and their broadband-enabled applications that communities can leverage to foster innovative economic development, education, health care, government services, public safety and other vital public functions. *See*, www.ntca.org/smart.

D.C., that featured noted academic experts, telemedicine technology demonstrations, and a discussion of data security issues in telemedicine environments.[39] And, in March 2017, NTCA published "Anticipating Economic Returns of Rural Telehealth," which explores data surrounding rural health conditions, generally, and an analysis of data that reveal cross-sector economic gains that can be attributed to telehealth adoption.[40]

These events and resources provide an opportunity for NTCA members to obtain a deeper introduction to health care technology, and for policy makers and health providers to learn more about opportunities for health care deployment in rural America. NTCA is currently working with Federal agencies to identify opportunities to leverage NTCA member network capabilities to meet a variety of rural health needs. These discussions are exploring pilot programs to deploy telemedicine access in rural areas.

III. RESPONSE TO SPECIFIC PUBLIC NOTICE INQUIRIES

A. THE PROMOTION OF EFFECTIVE POLICY AND REGULATORY SOLUTIONS IS NECESSARY TO ENCOURAGE BROADBAND ADOPTION AND PROMOTE HEALTH IT

1. Successful Telemedicine Gains Will Require Suitable Policy Implementations from Several Agencies

The Commission seeks comment on the promotion of effective policy and regulatory solutions to encourage broadband adoption and promote health IT. NTCA submits that this goal

[39] This program featured Dr. Karen Rheuban, Medical Director, Office of Telemedicine, University of Virginia, and Dr. Andrew Coburn, Research Professor, Public Health, University of Southern Maine.

[40] Schadelbauer, Rick, "Anticipating Economic Returns of Rural Telehealth," Smart Rural Community, NTCA–The Rural Broadband Association, Arlington, VA (2017) (available at http://www.ntca.org/images/stories/NTCA_images/SmartRuralCommunity/anticipatingeconomicreturnsofruraltelehealth_epub.pdf) (last view May 19, 2017, 13:38). This paper is attached to these comments as Appendix A.

will implicate several issues, some of which are within the jurisdiction of the Commission. The disposition of other issues will rely upon legislative action and implementation among multiple agencies. Those efforts, however, are ripe to be informed and encouraged by the Commission's keen attention and interest.

The Commission states effectively the benefits of telemedicine, including EHRs, the mitigation of geographic burdens, video consultations and remote monitoring.[41] The Commission asks how, working through its own authority and with other agencies, it can "ensure that such services are fully available and accessible to all Americans, including those living in rural and remote areas, low density populations, Tribal lands," and other areas.[42] NTCA submits that the first step of successful telemedicine is the availability of broadband throughout the geographic areas the Commission delineated. Only sufficient broadband resources can support the range of interactions contemplated by telemedicine, including remote monitoring that may require wired and/or wireless services, as well as wired connections that boast the security and capacity to underpin full-video capabilities for diagnoses and treatment interactions. The latter may include physician-to-physician consultations in the presence or absence of a patient, as well as physical, occupational, speech, or mental health therapy. Treatment of substance abuse may also benefit from telemedicine interactions. This is of particular concern for rural areas that witness the depths of the current opioid abuse crisis,[43] and which is currently the subject of an on-going

[41] PN at 9.

[42] PN at 10.

[43] *See, i.e.,* "Understanding the Rural-Urban Differences in Nonmedical Prescription Opioid Use and Abuse in the United States," Katherine M. Keyes, *et al*. *See, also*, "Why is the Opioid Epidemic Hitting Rural America Especially Hard," Luke Runyon, NPR Illinois (Jan. 4, 2017) (http://nprillinois.org/post/why-opioid-epidemic-hitting-rural-america-especially-hard#stream/0) (last viewed May 10, 2017, 10:59).

Federally-funded program that is training rural healthcare providers in medication-assistant therapy (MAT).[44] NTCA's concerns with adequate high-cost support are documented in the relevant dockets.[45] NTCA takes this opportunity to reiterate that the necessity of adequate high-cost support speaks not only to the network but also to the direct and indirect impacts of that deployment. High-cost support, therefore, enables not simply communications but the spillover benefits of telehealth, among other activities. These impacts warrant consideration as high-cost support policies are considered. Moreover, the coordinated functioning of several programs in the Universal Service Fund (USF) must be considered.

Access *by patients* to remote health care via affordable broadband connections and equipment can exist only if adequate support is available to build and maintain last-mile networks. A rural clinic, as an "anchor institution," may enjoy sufficient capacity to provide telemedicine services, but if a rural consumer cannot access either the equipment or broadband connection, the clinic's capabilities lie fallow. Three of the four USF programs working in tandem are essential to filling the prescription for rural telemedicine. The High Cost program provides support for deploying broadband infrastructure/connectivity; the Lifeline program allows low-income Americans to obtain affordable services to support their telemedicine usage;

---

[44] *See*, "Increasing Access to Medication-Assisted Treatment of Opioid Abuse in Rural Primary Care Practices," Agency for Healthcare Research and Quality (AHRQ) (Nov. 2016) (https://www.ahrq.gov/professionals/systems/primary-care/increasing-access-to-opioid-abuse-treatment.html) (last viewed May 10, 2017, 13:18). AHRQ is housed within the Department of Health and Human Services.

[45] Generally, NTCA's filings in Docket No. 10-90 and related proceedings set forth the Association's position on a host of issues that implicate the collective factors (limitations on operational and capital expenses, overall budget controls, and others) that contribute to rural provider's ability to build and maintain a future-proof network.

and, the Rural Health program helps healthcare providers afford connectivity to the broadband infrastructure they need to *provide* telemedicine services. These, however, must contemplate sufficient support for broadband in rural and insular areas, as well as the need for planned broadband build-out to capacities that can support telemedicine in remote and rural areas. To meet the goal of useful telemedicine services, the networks must support high-resolution results for X-rays, CT scans, or MRIs taken at a local rural hospital and transmitted to distant experts in major metro areas.

2. Telemedicine Should Tend to Increase Broadband Adoption

An add-on advantage of promoting broader use of telemedicine, in addition to the health care gains, is the increased broadband adoption that it can be expected to generate. A paper exploring broadband adoption noted,

> Like many other life-changing technologies (such as electricity, the automobile, or voice telephone service), broadband Internet service's benefits are better experienced than described. And like these other innovations, once end users have experienced the benefits to be gained from the use of the new technology, they are hard pressed to imagine their life without it.[46]

The proverbial analytical construct of "chicken and the egg" in this context, *i.e.*, should telemedicine adoption drive broadband deployment, or should broadband deployment drive telemedicine adoption, is resolved by the statutory mandate to ensure reasonably comparable services in rural and insular areas.[47] The statutory obligation to deploy reasonably comparable

[46] Schadelbauer, Rick, "Conquering the Challenges of Broadband Adoption," Smart Rural Community, NTCA–The Rural Broadband Association, at 9 (2014) (http://www.ntca.org/images/stories/Documents/Advocacy/CCBA_Whitepaper.pdf) (last viewed May 10, 2017, 13:34).

[47] 47 U.S.C. § 254.

broadband in rural and insular areas exists *independently* of the telemedicine gains that are enabled by the support infrastructure. Those gains, however, are a component of the validating reasons that underlie the statutory mandate. Accordingly, proper promulgation and implementation of universal service policies will ensure the availability of services that are necessary to underpin telehealth. The availability of those technologies, and promotion of their use by interested parties, should then encourage broader adoption by users in the regions in which the broadband services are deployed. The absence of sufficient networks, however, will hamstring telemedicine and its attendant benefits.

3. NTCA Members Leverage Broadband to Enable Telemedicine

The Commission asks for information on "the types, impact, scale and benefits of broadband-enabled services and technologies used for the delivery of health care."[48] In response to this inquiry, NTCA provides the following series of examples culled from its members' experiences. These represent only a sample of the innovative offerings the community-oriented, locally-operated broadband provider members of NTCA have introduced:

> ***Hawkinsville, GA:*** In Hawkinsville, Georgia, ComSouth serves an area of more than 275 square miles with a population of 11,542. The median income in the ComSouth service area is $15,000 below the National average. ComSouth partnered with the county public school system to deploy telehealth equipment in school nurses' offices. These are connected to physicians at Taylor Regional Center. Working with the Georgia Partnership for Telehealth, the hospital, school and ComSouth facilitate better health care for students who might not otherwise be able to be seen by a physician. A blue-tooth stethoscope enables distant physicians to hear a student's breath tones and heartbeat; an otoscope and ophthalmoscope camera enables doctors to view not only ears and eyes, but to also evaluate and provide diagnoses for rashes, pink eye, and lice. The video conference capabilities support conferences among parents, students, teachers and mental health professionals for ADD and ADHD consultations. These measures are especially beneficial where parents cannot afford to take off time from work and absorb lost wages.

[48] PN at 10.

Greenfield, Indiana: In 2001, the predecessor entity to NineStar Connect, Hancock Telecom, partnered with Hancock Regional Hospital to install approximately 13 miles of fiber optic facilities from its main Greenfield location to a Knightstown health clinic, establishing what is believed to be the first fiber optic telemedicine link in the State of Indiana. At that time, Knightstown was considered a medically underserved rural area and through its fiber optic connection, residents could be "seen" by a doctor in Greenfield while sitting in the clinic in Knightstown. Using high quality cameras and large screen monitors, many doctors commented that they could see affected areas on patients better than if they were examining the patients in person. More importantly, however, was that using the speeds available through a fiber optic connection, the patients and physicians could see and communicate with one another in real time. Since that original endeavor, NineStar now also provides similar connectivity for Hancock Regional Hospital at a clinic it owns and operates in Fortville, and has recently committed to provide identical connectivity to a facility the hospital is currently constructing in McCordsville.

Ellendale, North Dakota: Dickey Rural Networks (DRN) provides service across 5,444 square miles with a population of approximately 19,000. DRN provides its local hospitals, clinics and nursing homes with fiber to the premises (FTTP). This high-speed connection enables high-definition video and instant data transfers, whereby patients can consult with doctors in urban areas and receive diagnoses equivalent to in-person consultations. DRN worked with a local hospital to implement a telehealth service that enables emergency room physicians in rural areas to connect instantly with peers in urban hospitals, ensuring that the rural practitioner has immediate access to a colleague who might have more experience with a certain condition or set of presenting symptoms.

***Brandon, Minn.*:** As part of NTCA's Smart Rural Community initiative, Gardonville Telephone Cooperative of Brandon, Minnesota obtained a grant to support an in-home technology pilot that connects hospice patients with their loved ones, caregivers, and medical team. Gardonville, which serves a rural area of approximately 1,350 square miles with a population of 54,000, partnered with a nonprofit organization that specializes in senior care to enable in-home hospice patients to view pictures, receive incoming messages, watch medical videos, video chat with family and friends, and listen to music. The system also connects to a variety of wireless activity sensors placed in the patient's home that can alert designated caregivers by phone, email or text message if necessary, and offers the capability for real-time biometric feedback from the system.

***West Jefferson, N.C.*:** Smart Rural Community also awarded a grant this past year to Skyline Membership Corporation in West Jefferson, North Carolina, to implement technology at the Ashe Assisted Living Center's memory wing. This grant was supported in part by matching funds provided by Ashe Assisted Living, and supports video and other monitoring equipment to ensure patient safety and security.

***Lenora and Hays, Kan.*:** In Lenora, Kansas, Nex-Tech serves an area of 9,300 square miles with a population of approximately 98,000, and provides broadband services to 11 hospitals, 14 rural health clinics and many small physician practices. Of the 11 hospitals in its service territory, 10 have already adopted telemedicine and all plan to use it more

extensively in the future. These facilities use the broadband connection for several applications that are critical to patient care, including teleradiology and teleconsultations, while also facilitating continuing education for practitioners. A physician stationed at another, large facility can virtually consult with a patient at a rural health clinic. Patients who visit the clinic can interact with the doctor through a robot, which is equipped to conduct diagnostic testing. The broadband connection also enables access to patient electronic health records stored in the cloud. Data storage and backup is also an area of increasing demand. For example, Hays Medical Center, a regional state-of-the-art hospital center, provides software and data hosting services for six critical access facilities in western Kansas. Additionally, HaysMed is in the process of upgrading its telemedicine equipment for the Cardiac Rehab unit from analog to digital. This rehab equipment enables a cardiac rehab nurse at HaysMed to monitor a patient (via EKG, blood pressure, oxygen levels, etc.) in one of the 12 hospitals they contract with in western Kansas.

***Sioux Center, Iowa*:** Premier Communications of Sioux Center, Iowa, found that its Sioux Center Community hospital was outgrowing its facilities and built a new, state-of-the-art building. This new hospital building is interconnected with the Avera hospital system in Sioux Falls, South Dakota, 60 miles away. Premier worked closely with Sioux Center Health and Avera Hospital to establish a connection that allows Sioux Center Health to send diagnostic images to radiologists in Sioux Falls, and utilize e-emergency video technology, enabling Emergency Room doctors in Sioux Falls to remotely monitor patients in Sioux Center through live feeds. The hospital also features live information boards and a patient tracking system that permit family members in the waiting room to see the status of a patient's procedure. Nurses use customized computer and projection tools to update the boards, passing on important information while still maintaining patient privacy. These new features require excellent bandwidth, sophisticated wiring, and complex machine installations.

***Westby, Wis.*:** In Westby, Wisconsin, Vernon Telephone Cooperative serves a 3.8 square-mile area with a population of 4,362. Vernon Memorial Healthcare (VMH) employs more than 500 employees at the hospital in Viroqua, four outreach clinics, two pharmacies in outlying communities and the Bland Bekkedal Center for Hospice Care. VMH is located 40 miles from the nearest critical access hospital and provides essential medical services, including emergency care for area residents. VMH utilizes private metro Ethernet connections provided by VTC for all network connectivity between its outreach facilities and its hosted cloud-based services in Madison, Wisconsin. Medical providers at VMH utilize the broadband network to access and maintain electronic medical records. The View My Health Patient Web portal facilitates patient information, scheduling and prescription filling. The broadband network creates more reliable, efficient and faster patient services. The radiology department can transfer CT or CAT images to any clinic in the network in less than ten minutes using a 3-D Picture Archiving and Communication System. Patients can be treated locally because the image processing time is shortened dramatically. Community outreach and education are a constant challenge for VMH, and conversations have begun in partnership with VTC to create a

dedicated VMH community television channel for video content created and uploaded from the hospital.

These are but several rural telemedicine success stories. All of them rely upon adequate network capabilities that are supported by FCC high-cost support programs, USDA mechanisms, and private investment – all of which combine to enable the deployment in rural areas of networks that not only power communications, but which also enable telemedicine and its many benefits.

4. Telemedicine Technology is Developing Rapidly and the Nation's Network Capabilities Must Keep Pace

The Commission seeks comment on how health technologies can "take advantage of new technological applications and emerging communications networks."[49] NTCA submits that this track of investigation contemplates not only technological development but also the attendant concerns of systems integrity and network security.

By way of example, during a presentation at the Consumer Electronics Show in 2014, a physician discussed the difficulty of managing Type 1 diabetes and observed, "We ask [Type 1 diabetes] patients to climb mountains daily" as they monitor glucose levels, manage diets and adjust insulin.[50] Emerging technology includes subcutaneous monitors linked to the cloud that can be integrated with pumps.[51] This blending of technological applications promises easier and

---

[49] PN at 10.

[50] Francine Kaufman, "Digital Health – The Internet of You," Consumer Electronics Show, Las Vegas (panel presentation, Jan. 6, 2014).

[51] "Digital Health – The Internet of You," Consumer Electronics Show, Las Vegas (panel presentation, Jan. 6, 2014). *See, generally*, Keith-Hynes, Patrick; Mize, Benton; Robert, Antoine; Place, Jerome, "The Diabetes Assistant: A Smartphone-Based System for Real-Time Control of Blood Glucose," Electronics (http://www.mdpi.com/2079-9292/3/4/609/htm) (last viewed May 23, 2017, 13:33).

more efficient treatment while a cellular cure is developed. These types of devices rely upon sensors whose prices are decreasing rapidly. It is reported that numerous trials are testing algorithms, pump control, data transfer to the cloud and matrices intended to predict glucose levels. Ultimate approval in the United States will require the sanction of the Food and Drug Administration (FDA) and may implicate Commission involvement, as well. Regulatory sanction will likely come only after data from hundreds of cases, measured over hundreds of days, can be assimilated into a clear picture of process and results. In addition to the necessary medical inquiries, the cloud-based approach implicates data security and device integrity. Challenges include maintaining clear and secure data channels for users that will not be corrupted by mixing with the devices of other users. Particular concern could arise in a summer camp setting (for example, a camp for children with diabetes), or at a "diabetes walk"[52] where numerous users might gather in close geographic proximity.

The benefit of these approaches, whether utilizing devices intended to monitor diabetes, cardiological events, or neurological conditions, extends beyond the instant user. Data gathered from numerous users across numerous geographic regions, ages, and other demographic variables can be pooled to ultimately transform medicine from a paradigm of reactive treatment to one of predictive and preemptive management. Moreover, the development of smaller connected sensors may be utilized in high-risk patients to trigger alerts of impending events. For example, researchers have found that severely diseased arteries shed endothelial cells for up to

[52] *See, i.e.*, Juvenile Diabetes Research Foundation, (http://www2.jdrf.org/site/TR/Walk/GreaterChesapeakeandPotomacChapter4116?pg=entry&fr_id=6667) (last viewed May 10, 2017, 15:05).

two weeks before a heart attack.[53] "The ability to diagnose an imminent heart attack has long been considered the Holy Grail of cardiovascular medicine,"[54] reports one article. Research to combine nanotechnology with cloud connectivity promises monitoring and early detection for at-risk patients,[55] offering the prospect of alerts that can warn patients of an impending heart attack. These potential discoveries, however, must be accompanied by attention to network and device security. News articles have reported the hacking of cars,[56] and the medical industry could be considered a vulnerable target. Even if individual users are not at risk, medical device firms may need to consider the threat of ransomware activities that could threaten to disrupt active monitoring or patient treatment.[57]

[53] "Scientists a Step Closer to Heart Attack Test After Cell Discovery," CBS News Staff (Mar. 22, 2012) (http://www.cbsnews.com/news/scientists-a-step-closer-to-heart-attack-test-after-cell-discovery/) (last viewed May 10, 2017, 15:45).

[54] "Blood Test May Predict," Heart Care Foundation (http://heartcarefoundation.com/Articles/articleDetails.aspx?linkid=6&artlId=4) (last viewed May 10, 2017, 15:38).

[55] "Medical Labs 'On a Chip' Will Serve as Health Detectives for Tracing Disease at the Nanoscale," IBM Research (http://research.ibm.com/5-in-5/nanotech-for-healthcare) (last viewed May 23, 2017, 13:40).

[56] "Hackers Remotely Kill a Jeep on the Highway – With Me In It," Andy Greenberg, Wired (Jul. 21, 2015) (https://www.wired.com/2015/07/hackers-remotely-kill-jeep-highway) (last viewed May 23, 2017, 13:42).

[57] "Medical Devices Are the Next Security Nightmare," Lily Hay Newman, Wired (Mar. 2, 2017 (https://www.wired.com/2017/03/medical-devices-next-security-nightmare/) (last viewed May 10, 2017, 15:57).

5. A Concentrated and Multi-Stakeholder Approach Will be Necessary to Address Potential Non-Technical Impediments

The Commission seeks comment on "non-technical" impediments,[58] as well as specific information on Tribal deployment.[59] Non-technical impediments include, but are not limited to: medical licensing; insurance and other reimbursement for telehealth interactions; and affordable access to broadband. Medical licensing remains a formidable issue in enabling greater use of telehealth. Medical practitioners are generally licensed by individual states, and the physician's legal authority to practice medicine is limited to the state in which the license is issued. These limitations may be overcome by states that agree to reciprocal recognition of the others' licenses, and useful encouragement from Federal or state authorities may aid these or other efforts that result in the ability to offer telemedicine across state lines. As of April 2017, 19 states had joined that Interstate Medical Licensure Compact (IMLC), which is intended to "expedit[e] licensure for qualified physicians who wish to practice in multiple states."[60] These efforts are aimed at easing state regulatory issues that can frustrate the practice of telemedicine across state lines. However, many difficult issues remain. For example, how will HIPPA regulations in video streams be addressed? Will high-cost support mechanisms consider the bandwidth needed to complete different types of interactions? Will health care reimbursement structures contemplate different reimbursement for video interactions while setting the exchange and review of

---

[58] PN at 12.

[59] PN at 13.

[60] "Nebraska Becomes 19th State to Enact Interstate Medical Licensure Compact," Federation of State Medical Boards, Washington, D.C., (Apr. 26, 2017) (http://www.fsmb.org/Media/Default/PDF/Publications/Nebraska_Enacts_Compact4272017.pdf) (last viewed May 23, 2017, 12:55).

monitored patient data at a different rate? These are questions that warrant examination. It is critical, however, that policy surrounding mechanisms and tools, whether arising out of the Commission, the Department of Agriculture (U.S.D.A.) or others to build rural broadband infrastructure must account telemedicine into their other considerations.

Physicians and patients must also consider whether health insurance carriers or various government programs will provide payment or reimbursement for telehealth interactions. Resolution of this issue will revolve around legislative and/or regulatory activity related to Medicare and Medicaid, as well as individual analyses undertaken by private health insurance providers. Toward that end, the private health insurance industry may be encouraged to greater telehealth participation if there is evidence of sufficient incentives and support from the Federal government and the states. These issues are discussed at length in the Government Accounting Office report, "Telehealth and Remote Patient Monitoring Use in Medicare and Selected Federal Programs," released last month.[61]

The Commission's attention to the usefulness of telemedicine for Tribal areas is of special concern to NTCA. Certain of NTCA members constitute a Tribal Affairs Committee (N-TAC) within NTCA. This Committee is charged with providing counsel and information on issues that implicate Tribal concerns. The Commission's 2016 Broadband Progress Report confirms the perspectives shared by the N-TAC: broadband deployment in Tribal areas, on average, occurs at a lower rate than the National average.[62] Coupled with distressing health

---

[61] "Telehealth and Remote Patient Monitoring Use and Selected Federal Programs," United States Government Accountability Office, Washington (Apr. 2017) (http://www.gao.gov/assets/690/684115.pdf) (last viewed May 11, 2017, 16:16).

[62] *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the*

statistics that emerge from Tribal areas,[63] a portrait of opportunity for the deployment of broadband and telehealth is apparent. According to the National Congress of American Indians, Native people endure tuberculosis at rates that are 600 percent higher than other Americans; alcoholism at rates 510 percent higher than other Americans; and vehicle accidents at rates 189 percent higher than other Americans. However, as NTCA clarifies in these comments and the Universal Service Fund/Connect America Fund dockets, generally, telemedicine and other applications that are integrating rapidly in normal and ordinary daily living can exist *only* where the underlying broadband infrastructure is available. Absent the necessary infrastructure, the benefits of telemedicine will remain unavailable in the regions that stand to benefit from it most.

B. IT WILL BE CRITIAL TO RAISE CONSUMER AWARENESS ABOUT THE VALUE PROPOSITION OF BROADBAND IN THE HEALTH CARE SECTOR AND ITS POTENTIAL FOR ADDRESSING HEALTH CARE DISPARITIES

NTCA submits that the usefulness of telemedicine, and its many benefits, are fast achieving axiomatic status. The qualitative benefits of improved care, reduced hospitalizations, more consistent monitoring and treatment of chronic conditions, and access to specialists for trauma and specialized care have been demonstrated in numerous media accounts and are validated by the rapid development and deployment of new technologies.[64] The quantitative benefits are emerging as positive even in the relative early stages of analysis. However, the full

---

Broadband Data Improvement Act: 2016 Broadband Progress Report, Docket No. 15-191, FCC 16-6 (2016). Table 1 summarizes deployment data.

[63] Invoking the example of diabetes used previously in these comments, the incidence of diabetes in Tribal lands ranges from 16 to 33.5 percent, as compared to nine (9) in the general population. Zimbalist, Scharnweber, *supra* n.9 (internal citations omitted).

[64] *See, i.e.,* Jake Iversen, "North Dakota Girl Gets Chance to Meet Her Sioux Falls Heroes," KSFY (Aug. 28, 2016) (http://www.ksfy.com/content/news/North-Dakota-girl-gets-chance-to-meet-her-Sioux-Falls-heroes-391467301.html) (last viewed May 24, 2017, 14:32).

benefit of telemedicine will require a coordinated effort among policy makers, the medical community, users, and broadband providers.

As telemedicine remains an emerging trend, the usefulness of publicizing its benefits, exploring its possibilities, and introducing its potential participants cannot be understated. This is true on micro and macro levels. By way of example, and from an intra-agency perspective, the impacts of telehealth must be introduced to discussions that contemplate support for high-speed broadband networks in rural, insular, and Tribal areas. The various measures that determine Commission measures to fund networks in those regions must contemplate the qualitative and quantitative returns across various industry sectors, including telehealth, that are enabled by those network investments. On a macro level, and as broadband is the single underpinning that enables telemedicine, the Commission stands with responsibility to identify and convene partners in this cause. These may be gathered from other Federal organizations such as the Department of Health and Human Services, the Department of Agriculture, the Centers for Disease Control, the FDA, and others; participants may be gathered, as well, from the fields of academia and, necessarily, the medical community. These groups must also include those who are identified as being most eligible to benefit from telemedicine, specifically, users in rural, insular and Tribal areas and the broadband service providers there.

The convening of these parties in workshops or other gatherings, on both regional and national bases, should be envisioned as a series of steps to identify core issues and options for resolutions. They can be the fora in which solutions and opportunities at which those solutions can be deployed may be identified. These “workshops” can be a consolidated opportunity for these disparate parties, the “macro community,” to converge to address solutions.

III. CONCLUSION

Telemedicine offers opportunities for improved patient outcomes throughout populations, but is especially beneficial for rural areas where increased incidences of chronic and other health conditions conspire with distance from medical facilities and an overall physician shortage to create mounting health care challenges. The health benefits of telemedicine applications and adoption have been documented in numerous studies addressing various medical conditions. The economic benefits of telemedicine and telehealth have been modeled to create substantial health care savings. And, the analytical benefits aggregating data from connected telemedicine users promises the possibility of changing medical care from reactive treatment to predictive preemption.

These gains, however, will be realized in rural areas where they are needed the most only if sufficient broadband networks are built and maintained. The full benefits of telemedicine must be envisioned beyond monitoring of vital statistics to encompass the full range of consultations and physician/patient interactions. NTCA has demonstrated its commitment to these principles and the actions of its members demonstrate the commitment and ingenuity of rural broadband providers in these regards.

Respectfully submitted,

By:
/s/ Joshua Seidemann
Joshua Seidemann
Vice President of Policy
4121 Wilson Boulevard, Suite 1000
Arlington, VA 22203
jseidemann@ntca@ntca.org
703-351-2000 (Tel)

May 24, 2017

ANTICIPATING ECONOMIC RETURNS OF RURAL TELEHEALTH

March 2017

Rick Schadelbauer
Manager, Economic Research and Analysis
NTCA–The Rural Broadband Association

NTCA THE RURAL BROADBAND ASSOCIATION®

4121 Wilson Blvd, Suite 1000
Arlington, VA 22203
703-351-2000
www.ntca.org

ANTICIPATING ECONOMIC RETURNS OF RURAL TELEHEALTH

March 2017

Rick Schadelbauer
Manager, Economic Research and Analysis
NTCA–The Rural Broadband Association

ACKNOWLEDGEMENTS

The author gratefully acknowledges David Charles, M.D., medical director, telemedicine at Vanderbilt University Medical Center, and Jennifer Dittes, PA-C, founder and chief executive officer of HOPE Family Health, Macon County, Tenn., for their thoughtful contributions to the original manuscript of this paper. Jesse Ward, NTCA director, industry & policy analysis, also provided valuable insight and advice.

Smart Rural Community acknowledges the support of its program sponsors: Mapcom, National Information Solutions Cooperative (NISC) and NRTC.

CONTENTS

EXECUTIVE SUMMARY

- The United States spends more on health care than any other Organization for Economic Cooperation and Development (OECD) nation, both in absolute terms and as a percentage of gross domestic product (GDP).

- Within the United States, there is a distinct health disparity between rural and nonrural Americans, primarily as a result of demographics and limited access to health care.
    - Rural Americans tend to be older, less well off financially and subject to higher instances of chronic disease, and they have lower life expectancy than their nonrural counterparts.
    - The economics of rural America have led to a growing number of rural hospital closures.

- Telehealth/telemedicine—"the remote delivery of health care services and clinical information using telecommunications technology"—holds potential to improve the quality, cost and availability of health care in rural areas.

- According to the Center for Connected Health Policy, adoption of telehealth is driven by policy, technology, financing, health system transformation, evidence and consumer demand.

- Telemedicine is not viable without access to robust, reliable broadband service.
    - Rural areas currently lag in broadband deployment, but continue to make impressive gains due in large part to the efforts of small telecommunications providers.
    - Wireless applications require wireline infrastructure in order to be viable options.

- Among the nonquantifiable benefits of rural telehealth are access to specialists, timeliness, comfort, transportation, provider benefits and improved outcomes.

- Among the quantifiable benefits of rural telehealth are transportation cost savings, lost wages savings, hospital cost savings, and increased revenues to local labs and pharmacies.

- National average estimates of cost savings include:
    - Travel expense savings: $5,718 per medical facility, annually;
    - Lost wages savings: $3,431 per medical facility, annually;
    - Hospital cost savings: $20,841 per medical facility, annually;
    - Increased local revenues for lab work: from $9,204 to $39,882 per type of procedure, per medical facility, annually; and
    - Increased local pharmacy revenues: from $2,319 to $6,239 per medical facility annually, depending on the specific drug prescribed.

- Realizing these benefits will first require overcoming the challenges to rural telehealth, which include reimbursement, cost, patient privacy and licensing.

- The decision to implement telemedicine is unique to each medical facility, and should take into account not only costs but also nonquantifiable benefits and quantifiable benefits accruing to parties other than the medical facility, such as the patient and local labs and pharmacies located in the communities where telemedicine takes place.

- Rural telemedicine's ultimate role in addressing the significant health problems inherent to rural areas will depend in large part on the availability of an underlying future-proof, fiber-based broadband infrastructure. Further investment in, and expansion of, broadband infrastructure is a critical need for our nation.

INTRODUCTION - TELEHEALTH

According to statistics from the Organization for Economic Cooperation and Development (OECD), the United States spends more on health care than any other OECD nation, both in absolute terms and as a percentage of gross domestic product (GDP). In 2015, the United States spent $9,450 per capita on health care, representing 16.9% of GDP. That represents an inflation-adjusted increase of nearly 23% since 2005.[1] Forecasts show these expenditures continuing to grow. The Centers for Medicare & Medicaid Services, for example, forecasts total U.S. health expenditures to grow by 5.6% per year between 2016 and 2025, and to outpace GDP growth by 1.2% per year over that period.[2]

Slowing or even reversing this trend will require a multifaceted approach that will combine more efficient expenditure of health care dollars and reducing the need for health care through encouraging healthier lifestyles and giving consumers greater control over their own health. One possible piece of the eventual solution that will address both of these objectives is increased deployment and adoption of telemedicine technologies.

The American Telemedicine Association (ATA) defines telemedicine as "the remote delivery of health care services and clinical information using telecommunications technology. This includes a wide variety of clinical services using internet, wireless, satellite and telephone media."[3]

There are subtle but distinct differences between the terms telehealth and telemedicine. Telemedicine refers specifically to the use of technology to provide remote clinical services, while telehealth includes telemedicine, as well as remote nonclinical services, such as provider training, administrative meetings and continuing medical education. In practice, however, the two terms are frequently used interchangeably, and will be applied as such in future references in this paper.

Many different types of patient services fall under the umbrella of telemedicine. Perhaps the most intriguing is the use of telemedicine for *remote consultations*, which allow a physician—perhaps a specialist located many miles away—to speak with, examine and diagnose the patient in real time.

Remote patient monitoring allows a physician to monitor the patient outside the clinical environment, allowing for the identification of trends that might warrant further treatment. By allowing the health care provider access to more timely data, patients can receive treatment for medical issues faster and with greater precision.

Health Information Technology (HIT) refers to the use of technology to store, share and analyze health information, such as a patient's electronic health records. Telemedicine intersects with HIT in many areas, such as interoperability, infrastructure, privacy and security.

Telemedicine also facilitates physician *teaching and education*. Medical professionals are able to view procedures that they would not otherwise have access to and ask questions of specialists. They are able to

[1] Organization for Economic Cooperation and Development, "OECD.Stat," http://stats.oecd.org/Index.aspx?DataSetCode=SHA. (Switzerland was a distant second, at 11.5% of GDP.)

[2] Centers for Medicare & Medicaid Services, "National Health Expenditure Projections, 2016–2025," https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/proj2016.pdf.

[3] American Telemedicine Association (ATA), "Q&A About Telemedicine," http://www.americantelemed.org/main/about/telehealth-faqs-.

participate in real-time patient examinations and thus increase the depth and breadth of their medical knowledge.

Telemedicine services take place in a wide variety of settings, including but not limited to hospitals, clinics, physicians' offices, and patients' homes and workplaces. In fact, with the increased ubiquity and capabilities of the smartphone, there are no geographic barriers at all to the practice of telemedicine. (It is important to emphasize, however, that a relatively small portion of any "wireless" telecommunication is actually wireless. In the absence of a viable wireline network, many of the most valuable applications that smartphones have to offer are simply not feasible—including telemedicine.[4])

Currently, there are more than 200 telemedicine networks in the United States, with 3,500 service sites throughout the country. It is estimated that half of all U.S. hospitals currently employ telemedicine in one form or another.[5] As impressive as that may be, there still remains much work to be done. This report will detail the potential benefits of telemedicine; while much has been gained, much more work—and resultant gain—remains.

One thing is clear, however. The continuing advancement of telemedicine and the accrual of its potential benefits to patients, health care providers, health care facilities and the communities that house them will not be possible without high-quality, reliable broadband infrastructure. Moreover, this infrastructure must include both high-capacity fiber-based networks and a complementary layer of fixed and mobile wireless networks. Highly advanced, state of the art telemedicine applications—including some not even yet developed—can only be possible when accessed via a high-speed, reliable broadband network. This is particularly critical in rural America, where the highest potential benefits from telemedicine—and the greatest challenges to deploying broadband—can be found.

RURAL HEALTH CARE CHALLENGES

As noted previously, health care expenditures in the United States are forecast to continue rising. Despite that, there is a distinct health disparity between rural and nonrural Americans, primarily as a result of demographics and limited access to health care.

A number of factors tend to work against rural Americans in terms of their overall health. First, the demographics of the rural population are such that rural Americans have a greater need for health care than their nonrural counterparts. Rural Americans tend to be older than those living in urban areas. The U.S. Census Bureau's 2011–2015 American Community Survey reports that the median adult age in rural America was 51, versus 45 in nonrural areas.[6] In addition, America as a whole is aging, as well—thanks to the aging of the baby boomers, the elderly population in the United States is forecast to nearly double

[4] *See*, for example, "Wireless Needs Wires," The WK&T Connection, West Kentucky and Tennessee Telecommunications Cooperative, Jan. 15, 2014, http://wkt.mytelcoconnection.com/wireless-needs-wires/.

[5] ATA, "Q&A About Telemedicine."

[6] U.S. Census Bureau, "New Census Data Show Differences Between Urban and Rural Populations," December 8, 2016, https://www.census.gov/newsroom/press-releases/2016/cb16-210.html.

over the next several decades, from 43.1 million Americans age 65 and over in 2012 to an estimated 83.7 million in 2050.[7]

Rural Americans earn lower average incomes than nonrural Americans. According to the U.S. Census Bureau's 2011–2015 American Community Survey, the median household income in rural America was $52,386, versus $54,296 in urban America.[8] Lower income levels have repercussions for health, in terms of lower quality of diet, less health maintenance and fewer available expenditures for treatment of chronic illness. Lower-income households are less likely to have health insurance, meaning that many preventable illnesses are not detected early, but rather only after they become severe and possibly life threatening.

"Very often, by the time a patient shows up in our waiting room, it's too late to reverse the long-term course of their illness," says Jennifer Dittes, PA-C, founder and chief executive officer (CEO) of HOPE Family Health, a Federally Qualified Health Center in rural Macon County, Tenn. "Cancer, heart disease, diabetes, chronic kidney disease and substance abuse are all killers in our rural community, where the life expectancy is almost 20 years shorter than the national average due to poverty, other socioeconomic disparities, and lack of access to preventive, primary, behavioral and specialty care. "

Population density in rural areas is well below that of nonrural areas. The U.S. Census Bureau estimates population density within cities to be 46 times greater than that outside of cities: 1,593.5 residents per square mile versus 34.6 per square mile.[9] Population density directly affects the economics of health care facilities, and thus influences the placement of these vitally important resources. The result is that rural citizens have fewer options for health care treatment, and typically must travel much further than their urban counterparts to receive treatment.

In addition to—and to a certain extent, because of—these demographic challenges, the overall state of rural health is troubling. While living in rural America has numerous benefits, including lower cost of living, affordable housing and abundant green space, the Centers for Disease Control and Prevention (CDC) finds that rural residents are at higher risk of death from five leading causes than their urban counterparts.

According to a CDC study "Leading Causes of Death in Nonmetropolitan and Metropolitan Areas—United States, 1999–2014," the five leading causes of death in the United States between 1999 and 2014 were heart disease, cancer, unintentional injury, chronic lower respiratory disease and stroke. Together, these accounted for more than 1.6 million deaths (approximately 62% of all deaths) in 2014.

CDC found that annual age-adjusted death rates for these five causes were higher in nonmetropolitan areas than in metropolitan areas between 1999 and 2014. Age-adjusted death rates for unintentional injury were approximately 50% higher in nonmetropolitan areas. While the overall rate of deaths from stroke, heart disease and cancer decreased in both metropolitan and nonmetropolitan areas over the period, the

---

[7] U.S. Census Bureau, "An Aging Nation: The Older Population in the United States," May 2014, https://www.census.gov/prod/2014pubs/p25-1140.pdf.

[8] Bishaw, Alemayehu and Kirby G. Posey, "A Comparison of Rural and Urban America: Household Income and Poverty," Census Blogs, U.S. Census Bureau, " December 8, 2016, https://www.census.gov/newsroom/blogs/random-samplings/2016/12/a_comparison_of_rura.html.

[9] U.S. Census Bureau, "U.S. Cities are Home to 62.7 Percent of the U.S. Population, But Comprise Just 3.5 Percent of Land Area," March 4, 2015, https://www.census.gov/newsroom/press-releases/2015/cb15-33.html.

rate of decrease in deaths due to heart disease and cancer was slower in nonmetropolitan areas, and the rate of deaths due to stroke was about the same.

Overall, chronic diseases affect rural residents disproportionally. Rural residents tend to be older and sicker than their urban counterparts, have higher rates of cigarette smoking, high blood pressure, and obesity.

According to 2010 U.S. Census Data, five of the ten most rural states in the United States also rank within the top 10 in adult obesity (Mississippi, Alabama, West Virginia, Kentucky and Arkansas), and all except for Arkansas also rank in the top 10 in the rate of diagnosed diabetes.[10]

Due in large part to increasing costs and the challenges noted previously, rural hospital closures continue to climb at an alarming rate. According to the National Rural Health Association (NRHA), more than 70 rural hospitals have closed since 2010. In addition, the rate of closures is accelerating—six times higher in 2015 than in 2010. Currently, more than 670 additional rural facilities, representing more than one-third of all rural hospitals in the United States, are considered "vulnerable" and in danger of closing.[11]

Put simply, the economics are stacked against rural hospitals. As one physician observes, "You don't have the volumes. You still have to provide the same quality. You still have to buy the same equipment. You don't have the economy of scale on the equipment, so your overhead is more and your reimbursements are less."[12]

While approximately 46 million Americans, or 15% of the U.S. population, lives in rural areas, only 10% of the nation's physicians practice in rural areas. And while there are 40 specialists per every 10,000 rural residents, there are 134 per every 10,000 urban residents.[13]

Taken together, the demographic challenges—leading to an increased demand for health care in rural America—coupled with the growing rate of closures among rural health care facilities—which results in a decreased supply of health care—poses very significant health challenges for rural Americans going forward.

---

[10] 2010 U.S. Census Bureau, quoted in De Peña, Kristen and Kelly A. Sanders, "Bumps Along the Rural Road: Using Telemedicine to Treat Chronic Disease in Rural Communities," Altarum Institute, March 22, 2016, http://www.healthcareitnews.com/blog/bumps-along-rural-road-using-telemedicine-treat-chronic-disease-rural-communities.

[11] National Rural Health Association, "Rural Health Closures Decimating Rural Health Care Delivery," https://www.ruralhealthweb.org/getattachment/Advocate/Save-Rural-Hospitals/PI-2016-SRH-Act-Talking-Points-economic-impact-(1).docx.aspx?lang=en-US.

[12] Dr. Wendell Smith, Virginia Regional Medical Center, Duluth, MN, quoted in American Hospital Association, "The Opportunities and Challenges for Rural Hospitals in an Era of Health Reform," http://www.aha.org/research/reports/tw/11apr-tw-rural.pdf, p.3.

[13] National Rural Health Association, "About Rural Health Care," https://www.ruralhealthweb.org/about-nrha/about-rural-health-care.

TELEHEALTH ADOPTION

As in most markets, consumer demand will be a primary driver of telehealth adoption. A recent poll of 4,017 adults conducted by American Well found that 20% would be willing to switch doctors if a different primary care physician offered telehealth services. Seventy-four percent of parents with young children would be willing to make the switch.[14]

The American Telemedicine Association conducted a consumer survey[15] in 2016 that found that 22% of the 429 respondents had used video conferencing to meet with a health provider. Of the 78% who had not used telehealth in the preceding year, a majority felt that telehealth would be more convenient: 72% indicated that telehealth appealed to them for time savings, and 59% noted the distance they need to travel to meet with their doctor. Seventy-three percent, however, noted that their doctor does not currently offer telemedicine service.

The Center for Connected Health Policy identifies six key drivers of telehealth adoption:[16] These include:

- Policy: national and state policies that support and promote telehealth;
- Technology: new advancements that improve usability and decrease costs;
- Financing: includes government and private payers/accountable care organizations (ACOs);
- Health System Transformation: incorporation of telehealth into standard of care practices;
- Evidence: increasing body of research; and
- Consumer Demand: consumer interest in telehealth.

Successful efforts to increase telehealth deployment will need to take place on a number of different fronts, and will require coordinated efforts on the part of several different parties.

According to a study conducted by researchers at the Center for Connected Health Policy, the University of Michigan, and Brigham and Women's Hospital, telehealth adoption at rural hospitals is outpacing that at urban areas.[17] They also found that population density was slightly inversely correlated with telehealth adoption, with the chances of telehealth availability increasing as population density decreased.

Estimates of the market for telemedicine vary greatly. A recent study conducted by Pharmaion estimated that the telemedicine market in the United States would surpass $13 billion by 2021.[18] The study forecasts

---

[14] PR Newswire, Jan. 23, 2017, http://www.prnewswire.com/news-releases/one-in-five-consumers-would-switch-to-a-doctor-that-offers-telehealth-visits-300394562.html.

[15] American Telehealth Association and WEGO Health Solutions, "Consumer Survey," https://higherlogicdownload.s3.amazonaws.com/AMERICANTELEMED/3c09839a-fffd-46f7-916c-692c11d78933/UploadedImages/Policy/SURVEY%20RESULTS%20WEGO%20ATA%202016.pdf.

[16] Center for Connected Health Policy, http://www.cchpca.org/sites/default/files/uploader/Telehealth%20Adoption%20Graphic%201.pdf.

[17] Adler-Milstein, Julia, Joseph Kvedar, and David W. Bates, "Telehealth Among US Hospitals: Several Factors, Including State Reimbursement and Licensure Policies, Influence Adoption," *Health Affairs* 33, no. 2 (2014), http://content.healthaffairs.org/content/33/2/207.full.pdf+html, p. 210.

[18] Press Release, "U.S. Telemedicine Market to Cross $13 Billion by 2021: Pharmaion Consultants Report," Feb. 15, 2016, http://www.prnewswire.com/news-releases/us-telemedicine-market-to-cross--13-billion-by-2021-pharmaion-consultants-report-568841771.html.

that the technology sector of the industry will experience dramatic growth, and the service sector will remain strong. Another study, by Grand View Research, estimates a more modest U.S. market of $2.8 billion, which still represents 400% overall growth from 2014.[19] Regardless of the exact numbers, dramatic growth seems inevitable. As ATA CEO Jonathan Linkous stated, "Telemedicine is an exploding field both in terms of the number of services delivered and the types of services being delivered using technology. It's almost overwhelming."[20]

Though it may seem obvious, there can be no telehealth without robust, reliable broadband service. Real-time consultations, in particular, require a high-speed, high-quality connection. According to the Federal Communications Commission (FCC), in 2016 10% percent of all Americans—34 million people—lacked access to 25 megabits per second (Mbps) downstream/3 Mbps upstream service, a speed that would make telemedicine viable. Broken down along rural/urban lines, 39% of rural Americans—23 million people—lacked access to 25 Mbps/3 Mbps service, as opposed to 4% of urban Americans lacking access to that same level of broadband service.[21] Rural areas are more difficult and more expensive to serve with broadband, due to higher costs resulting from lower population densities, rugged terrain and fewer customers over which to spread costs. Despite these obstacles, however, a number of small rural providers is making excellent progress in bringing high-quality broadband service to their customers. A recent survey conducted by NTCA–The Rural Broadband Association (NTCA) found that their member companies were offering service of 25 Mbps or better to 71% of their customers, on average.[22] This percentage has steadily grown over the years, as small rural providers continue to deploy their fiber networks and/or upgrade their services further out into rural America, despite the obstacles they face.

Once the underlying broadband infrastructure is in place, a number of end-user technologies can be used to maximize the benefits of telemedicine. On the physician's end, use of technologies such as tablets and cellphones can allow them to keep in contact with their patients, as well as with other health care professionals. Patients can make use of apps to track their vital data and transmit the results to their physician. Smartphones can serve as the platform for video conferences between patients and health care providers. Given the ubiquity of smartphones, the devices represent a critical tool that can potentially play a significant role in giving individuals more control over their health care. This role will only grow, as new apps with expanded capabilities are developed and downloaded. It must be emphasized, however, that wireless telemedicine applications can only take place when supported by a robust wireline broadband network. Wireless telecommunications require wires in order to be viable.[23]

---

[19] Grand View Research, "U.S. Telehealth Market Analysis, by Product (Hardware, Software, Services), by Delivery Mode (Web based, Cloud based, On Premise), by End-Use (Providers, Payers) and Segment Forecasts to 2022," March 2016, http://www.grandviewresearch.com/industry-analysis/us-telehealth-market.

[20] Siwicki, Bill, "Telemedicine Is 'An Exploding Field' ATA CEO Says," Healthcare IT News, Dec. 16, 2016, http://www.healthcareitnews.com/news/telemedicine-exploding-field-ata-ceo-says.

[21] FCC, "2016 Broadband Progress Report," FCC 16-6, rel. Jan. 29, 2016, https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-6A1.pdf, p. 3.

[22] NTCA–The Rural Broadband Association, "NTCA 2015 Broadband/Internet Availability Survey," July 2016, http://www.ntca.org/images/stories/Documents/Advocacy/SurveyReports/2015ntcabroadbandsurveyreport.pdf, pp. 6–7.

[23] See *supra* note 4.

POTENTIAL BENEFITS OF RURAL TELEHEALTH: NONQUANTIFIABLE

Many of the benefits of telemedicine are qualitative, rather than quantitative. Simply put, it is not always possible to assign a dollar figure to a beneficial health care outcome. By offering patients access to a wide variety of medical specialists, oftentimes in situations where time is of the essence, telemedicine can greatly increase the overall quality of health care.

Among the nonquantifiable benefits of telemedicine:

Access to specialists. Gaining access to a specialist can be particularly challenging in rural areas. Telemedicine opens up the available universe of health care providers well beyond the patient's geographic location.

Timeliness. The availability of telemedicine allows for patients to be diagnosed and treated more quickly, at a time when immediate treatment will have a tremendous effect on the patient's ultimate outcome. In the case of heart attacks, strokes or severe physical trauma, a trip of hundreds of miles to the nearest medical facility may result in long-term disability, or, in the extreme, death.

Comfort. Telemedicine resources can allow patients to remain in their community with their family and friends, thus contributing to their overall comfort level and potentially shortening the length of their recovery. Often, the very ailment for which they seek treatment precludes them from being able to travel comfortably. The prospect of remaining within the comfort of one's home, rather than having to stay in an unfamiliar hospital or similar acute care environment, can be appealing.

Transportation. Some patients do not have the resources to be able to travel to a doctor. They may not have access to a car, and other forms of transportation may be prohibitively expensive. Patients may not have family or friends who have the available time and resources to take them to the treatment site.

Provider Benefits. Telemedicine can offer benefits to the provider as well as the patient. Engaging with health care experts in varying medical fields can help alleviate the sense of isolation that rural health providers may face. Working with specialists to help treat unusual cases, the rural provider can keep his or her skills sharp while gaining experience that will ultimately help him/her to become a more skilled practitioner. Broadband-enabled telemedicine also allows health care providers to avail themselves of the benefits of continuing education and training.

Improved Outcomes. Evidence suggests that the use of telemedicine results in a decreased need for follow-up visits to medical providers. One recent study found that 6% of patients using telemedicine required a follow up for a similar condition, compared to 13% of those visiting a physician's office and 20% of those visiting an emergency department.[24] Additionally, the study found that use of telehealth resources tends to rise on weekends and holidays, when patients otherwise have little recourse other than to visit the closest emergency room, since physicians'

[24] Uscher-Pines, Lori and Ateev Mehrotra, "Analysis of Teledoc Use Seems to Indicate Access to Care for Patients Without Prior Connection to a Provider," Health Affairs 33:12 (2014), cited in American Hospital Association "Issue Brief—Telehealth: Helping Hospitals Deliver Cost-Effective Care," http://www.aha.org/content/16/16telehealthissuebrief.pdf, p. 3.

offices tend to be closed at those times. Collectively, these results point to an overall reduction in medical expenditures.

A recent study of almost 119,000 patients from 56 intensive care units (ICUs) in 32 hospitals found that mortality in the ICU telemedicine intervention group was significantly better than that of control subjects, and that the adjusted hospital length of stay was decreased by 0.5 days for those staying in the ICU for ≥ 7 days, by 1.0 days for those staying ≥ 14 days, and by 3.6 days for those staying in the ICU for ≥ 30 days.[25]

POTENTIAL BENEFITS OF RURAL TELEHEALTH: QUANTIFIABLE

Some of the potential benefits of telemedicine can be quantified. These fall into two main categories: *opportunity costs*, or current costs that would not need to be incurred if telemedicine were implemented; and *direct benefits*, or real financial gains realized through the use of telemedicine.

There are three primary opportunity costs that could be eliminated or reduced: the costs incurred in procuring transportation to a distant treatment site, lost wages resulting from missed time at work by patients and their caregivers when in transit to treatment, and the need for local hospitals to spend precious resources employing specialists that may not make full use of their skills in rural facilities. The primary direct benefit is an increase in business for local labs and pharmacies, business that would otherwise be shipped out to establishments at distant treatment sites.

Among the quantifiable benefits of telemedicine:

Transportation costs. These costs include all travel costs incurred in visiting a distant health care provider, for the patient as well as for his or her caregiver. This includes, but may not be limited to, gas, tolls, parking, accommodations for the patient and/or caregiver and meals.

Lost wages. Traveling to distant health treatment often requires time away from the job. Many hourly workers are not compensated for the time they do not work. Salaried workers may be able to use accrued paid leave, but run the risk of not having sufficient leave or not having leave later in the year should another medical situation arise. The problem of lost wages confronts not only the patient, but also his or her accompanying caregiver.

Hospital costs. Retaining highly trained health care professionals on staff is challenging, particularly for rural hospitals. The realities of rural hospitals are such that these specialists may not see many cases in their areas of expertise. As noted previously, the economics of rural hospitals make it extremely difficult to justify such expenditures. Telemedicine can offer a cost-effective means of "sharing" personnel with other health care facilities.

Lab/pharmacy revenues. Hospitals have lab work done locally. Often, patients have their prescriptions filled close to the location where they were written. When local residents travel to distant locations for their treatment, these expenditures go with them. Telemedicine allows these expenditures to remain local, and those dollars to remain in the local economy.

[25] Lilly, Craig M., MD, *et. al.,* "A Multicenter Study of ICU Telemedicine Reengineering of Adult Critical Care," The American College of Chest Physicians, Chest Journal, March 2014, http://journal.publications.chestnet.org/article.aspx?articleid=1788059.

ESTIMATING THE ECONOMIC BENEFITS OF RURAL TELEHEALTH

While identifying the quantifiable benefits of telemedicine may be relatively simple, the process of actually quantifying those benefits is far more difficult. Brian E. Whitacre, an associate professor and extension economist in the department of Agricultural Economics at Oklahoma State University took an interesting approach toward estimating the potential economic benefits of telemedicine adoption in four states: Arkansas, Kansas, Oklahoma and Texas.[26]

Whitacre examined 24 rural hospitals located in various communities within those four states. For each of the four categories detailed in the preceding section of this paper (transportation costs, lost wages, hospital costs, and lab/pharmacy revenues), he set out to quantify the potential economic benefit to be gained by the hospital, the patient, and/or the community from the implementation of telemedicine.

Patients who avail themselves of telemedicine services do not incur travel expenses that they otherwise would to visit a far-off treatment site. In quantifying this potential cost saving, Whitacre looked at the average distance traveled, the average cost per mile, and the number of encounters per year—taking into account the percentage of encounters that required immediate attention, as opposed to those who could wait until a specialist was available locally. The estimated annual cost savings ranged from $2,303 to $109,080, with a mean of $32,671 and a median of $24,210.

In calculating the value of lost wages, Whitacre used a similar methodology to that for travel expenses, but replaced the average cost per mile and distance with the average hourly wage rate and time spent traveling. The estimated annual cost savings ranged from $4,188 to $68,269, with a mean of $19,761 and a median of $16,769.

In looking at hospital cost savings, Whitacre operated under the assumption that "a group of physicians specializing in a particular modality (such as radiology or oncology) in a more urban area can [through the use of telemedicine] then market themselves to several rural hospitals and serve a larger number of hospitals and serve a larger number of patients, which supports the idea that telemedicine increases efficiency."[27] Whitacre looked at two examples involving converting radiology and psychology consultations to telemedicine. In one example, the hospital reduced its use of a full-time radiologist from five days a week to one. Using rural specialists' salaries from the Physician Compensation and Production Survey, the estimated annual cost savings was $101,600. In another example, a hospital using a part-time radiologist and psychiatrist eliminated the need for these specialists altogether. In this case, the estimated annual cost savings was $61,600.

Finally, in order to estimate the value of lab work and pharmacy revenues that would remain local as a result of telemedicine Whitacre spoke with medical professionals in the target facilities and gathered data on typical follow-up procedures and medications resulting from psychiatric and radiology visits. By using the number of yearly encounters along with the percentage of patients using each, the monthly cost per

[26] Whitacre, Brian E., "Estimating the Economic Impact of Telemedicine in a Rural Community," *Agricultural and Resource Economics Review 40/2,* August 2011, http://ageconsearch.umn.edu/bitstream/117770/2/ARER%2040-2%20pp%20172-183%20Whitacre.pdf.

[27] *Id*, p. 176.

prescription or test costs, he was able to come up with his estimates. For telepsychiatry, the yearly cost of Adderall ranges from a low of $10,710 annually to a high of $44,100, and for Xanax, a low of $3,024 annually to a high of $15,120.[28] For teleradiology lab work, bloodwork ranges from a low of $24,000 to a high of $288,000; MRIs, low of $19,200 and high of $192,000; CT scan, low of $48,000 and high of $240,000; and biopsy, low of $14,400 and high of $57,600. For pain medication, yearly costs ranged from a low of $36,000 to a high of $216,000. Again, these are expenditures that, in the absence of telemedicine, likely would go outside of the local community. When telemedicine is available locally, these expenditures tend to remain in the local economy.

Table 1. Summary of Anticipated Annual Cost Savings: AR, KS, OK, TX

(Annual savings, per facility, 2011 $)

	Low	High	Median
Travel Expenses	$2,303	$109,080	$24,210
Lost Wages	4,188	68,269	16,769
Hospital Cost Savings	61,600	101,600	81,300
Lab Work			
Bloodwork	24,000	288,000	156,000
MRI	19,200	192,000	105,600
CT Scan	48,000	240,000	144,000
Biopsy	14,400	57,600	36,000
Pain Meds.	36,000	216,000	126,000
Pharmacy Revenues			
Adderall	10,710	44,100	24,405
Xanax	3,024	15,120	9,072

Source: Whitacre, Brian E., "Estimating the Economic Impact of Telemedicine in a Rural Community."

While these results give an idea of the cost savings that could be procured through the increased adoption of telemedicine in four states, what might the results look like in the rest of the country? Using these numbers as a baseline, state-specific indices were applied to customize the forecasts to other states. While sufficient uncertainty exists to preclude matching the level of precision of the above numbers, it is possible to determine in general terms what the potential cost savings would be relative to those for the above states.

The determining factors in estimating the travel expense savings per state are distance traveled and cost per mile. In calculating the distance traveled, the average number of hospitals per square mile for each individual state was applied to the Whitacre benchmark. The average cost per mile was the same as that used in the previous study—the official IRS mileage rate. (As this was a U.S. average, no per-state adjustment needed to be made.) A state population index was applied to account for the relative number of patient trips.

[28] Whitacre looks at revenues accruing to local pharmacies for prescriptions of Adderall and Xanax in examining the role of telepsychiatry, as these are commonly prescribed medications for certain psychiatric disorders. It must be noted, however, that abuse of these and other prescription medications is a serious problem in both rural and nonrural areas, and a substantial contributor to the rural health challenges detailed earlier in this paper. For more information about the problem of drug abuse in rural America see, for example, "Substance Abuse in Rural Areas," RHIhub, https://www.ruralhealthinfo.org/topics/substance-abuse.

The determining factors in estimating lost wages are similar to those for travel expense savings. Distance traveled (as estimated by the hospitals per square mile calculation) served as a proxy for time spent traveling. The average hourly wage rate for each state was compared to that for the benchmark, and that index applied to the calculation. The state population index was also applied.

The determining factors in estimating hospital cost savings resulting from staffing reductions are the forecast reduction levels and the prevailing wage rate in each particular state. Here, Whitacre's assumptions about staffing level reductions were retained, and the average wage rates index was applied. The state population index was also applied to account for the varying number of patient visits. (See Table 2.)

Table 2. State Breakdown of Expected Savings for Travel Expenses, Lost Wages, Hospital Costs (2016 $)

(Annual savings, per facility)

	Travel Expense Savings*	Lost Wages Savings*	Hospital Cost Savings
Alabama	$2,600	$1,019	$10,263
Alaska	$34,547	$19,917	$2,304
Arizona	$10,289	$4,430	$16,073
Arkansas	$3,049	$1,114	$5,878
California	$17,384	$8,599	$104,564
Colorado	$10,427	$5,026	$14,383
Connecticut	$499	$272	$10,483
Delaware	$228	$107	$2,404
Florida	$5,025	$1,985	$43,844
Georgia	$5,132	$2,130	$23,050
Hawaii	$642	$309	$3,702
Idaho	$8,027	$3,176	$3,587
Illinois	$4,945	$2,291	$31,949
Indiana	$2,379	$972	$14,598
Iowa	$4,290	$1,793	$7,056
Kansas	$4,018	$1,681	$6,552
Kentucky	$2,272	$913	$9,598
Louisiana	$1,903	$756	$10,017
Maine	$1,917	$827	$3,091
Maryland	$1,108	$576	$16,848
Massachusetts	$671	$380	$20,762
Michigan	$5,262	$2,314	$23,508
Minnesota	$7,688	$3,712	$14,352
Mississippi	$2,020	$727	$5,796
Missouri	$4,673	$1,938	$13,604
Montana	$9,291	$3,689	$2,229
Nebraska	$4,953	$2,082	$4,317
Nevada	$11,714	$4,902	$6,626
New Hampshire	$838	$388	$3,328
New Jersey	$879	$600	$32,875
New Mexico	$6,687	$2,684	$4,499
New York	$4,637	$2,396	$54,937
North Carolina	$4,484	$1,843	$22,458
North Dakota	$5,123	$2,428	$1,935
Ohio	$3,127	$1,360	$27,209
Oklahoma	$2,694	$1,085	$8,509
Oregon	$10,132	$4,666	$10,153

	Travel Expense Savings*	Lost Wages Savings*	Hospital Cost Savings
Pennsylvania	$3,189	$1,844	$39,802
Rhode Island	$90	$44	$2,759
South Carolina	$2,323	$902	$10,380
South Dakota	$2,475	$946	$1,782
Tennessee	$2,487	$983	$14,157
Texas	$18,914	$10,934	$86,747
Utah	$6,638	$2,802	$6,936
Vermont	$809	$372	$1,548
Virginia	$3,435	$1,629	$21,485
Washington	$7,428	$3,891	$20,561
West Virginia	$1,200	$451	$3,704
Wisconsin	$4,100	$1,788	$13,570
Wyoming	$3,979	$1,892	$1,500
U.S. AVERAGE	**$5,718**	**$3,431**	**$20,841**

Data sources for Tables 2 through 4:

Hospitals per state: American Hospital Directory: https://www.ahd.com/state_statistics.html

Square miles per state: State Symbols USA: http://www.statesymbolsusa.org/symbol-official-item/national-us/uncategorized/states-size

Average hourly wage rate, by state: US Dept. of Labor, Bureau of Labor Statistics, May 2015 State Occupational Employment and Wage Estimates: https://www.bls.gov/oes/2015/may/oessrcst.htm

Population, by state: US Census Bureau, State Population Totals Tables: 2010 - 2016: https://www.census.gov/data/tables/2016/demo/popest/state-total.html

Relative price level, by state: Bureau of Economic Analysis, "Real Personal Income for States and Metropolitan Areas–2014": https://www.bea.gov/newsreleases/regional/rpp/rpp_newsrelease.htm

Bureau of Labor Statistics' consumer price index (CPI) data used to convert all estimates to constant 2016 dollars: http://www.bls.gov/cpi/cpidr.htm#2016.

In determining the cost savings for lab work (blood work, MRI, CT scan, biopsy and pain meds), Whitacre's benchmark was used, and the regional price parity (RPP) index (to account for variations in relative price levels) and population index (to account for number of patient visits) for each state applied. (See Table 3.)

---

*It should be noted that the calculations for travel expense savings and lost wages savings above do not account for those situations where the nearest hospital may be across a state line. In those instances, the numbers above would be overestimated by the difference between the distance to the nearest in-state hospital and the less distant, out-of-state hospital. For the purposes of this analysis, however, only in-state hospitals are considered.

Table 3. State Breakdown of Increased Local Revenues for Lab Work (2016 $)

(Annual savings, per facility)

	Bloodwork	MRI	CT Scan	Biopsy	Pain Meds
Alabama	$26,407	$17,875	$24,376	$6,094	$21,329
Alaska	$4,850	$3,283	$4,477	$1,119	$3,917
Arizona	$41,321	$27,971	$38,142	$9,536	$33,374
Arkansas	$16,170	$10,946	$14,926	$3,732	$13,061
California	$272,833	$184,687	$251,846	$62,961	$220,365
Colorado	$34,950	$23,658	$32,261	$8,065	$28,229
Connecticut	$24,064	$16,290	$22,213	$5,553	$19,436
Delaware	$6,000	$4,061	$5,538	$1,385	$4,846
Florida	$126,326	$85,513	$116,609	$29,152	$102,033
Georgia	$58,661	$39,709	$54,149	$13,537	$47,380
Hawaii	$10,319	$6,985	$9,525	$2,381	$8,334
Idaho	$9,722	$6,581	$8,974	$2,244	$7,852
Illinois	$79,723	$53,966	$73,590	$18,398	$64,391
Indiana	$37,493	$25,380	$34,609	$8,652	$30,283
Iowa	$17,505	$11,850	$16,159	$4,040	$14,139
Kansas	$16,307	$11,039	$15,053	$3,763	$13,171
Kentucky	$24,339	$16,476	$22,467	$5,617	$19,658
Louisiana	$26,463	$17,913	$24,427	$6,107	$21,374
Maine	$7,995	$5,412	$7,380	$1,845	$6,458
Maryland	$41,040	$27,781	$37,883	$9,471	$33,148
Massachusetts	$45,117	$30,541	$41,646	$10,412	$36,441
Michigan	$57,777	$39,111	$53,333	$13,333	$46,666
Minnesota	$33,318	$22,554	$30,755	$7,689	$26,910
Mississippi	$16,025	$10,848	$14,792	$3,698	$12,943
Missouri	$33,687	$22,803	$31,095	$7,774	$27,209
Montana	$6,073	$4,111	$5,606	$1,402	$4,905
Nebraska	$10,686	$7,233	$9,864	$2,466	$8,631
Nevada	$17,764	$12,025	$16,398	$4,099	$14,348
New Hampshire	$8,568	$5,800	$7,909	$1,977	$6,921
New Jersey	$63,336	$42,874	$58,464	$14,616	$51,156
New Mexico	$12,226	$8,276	$11,286	$2,821	$9,875
New York	$141,282	$95,637	$130,414	$32,604	$114,112
North Carolina	$57,542	$38,952	$53,116	$13,279	$46,477
North Dakota	$4,289	$2,903	$3,959	$990	$3,464
Ohio	$64,141	$43,419	$59,207	$14,802	$51,806
Oklahoma	$21,862	$14,799	$20,181	$5,045	$17,658
Oregon	$25,062	$16,965	$23,134	$5,784	$20,242
Pennsylvania	$77,638	$52,555	$71,666	$17,917	$62,708

	Bloodwork	MRI	CT Scan	Biopsy	Pain Meds
Rhode Island	$6,448	$4,365	$5,952	$1,488	$5,208
South Carolina	$27,766	$18,796	$25,630	$6,408	$22,427
South Dakota	$4,710	$3,188	$4,348	$1,087	$3,804
Tennessee	$37,102	$25,115	$34,248	$8,562	$29,967
Texas	$166,452	$112,675	$153,648	$38,412	$134,442
Utah	$18,304	$12,390	$16,896	$4,224	$14,784
Vermont	$3,909	$2,646	$3,608	$902	$3,157
Virginia	$53,374	$36,130	$49,268	$12,317	$43,109
Washington	$46,784	$31,669	$43,185	$10,796	$37,787
West Virginia	$10,067	$6,815	$9,293	$2,323	$8,131
Wisconsin	$33,379	$22,595	$30,811	$7,703	$26,960
Wyoming	$3,483	$2,358	$3,215	$804	$2,813
U.S. AVERAGE	**$39,882**	**$26,997**	**$36,814**	**$9,204**	**$32,212**

The determining factors in estimating the cost savings from pharmacy revenues are the number of patient trips and the overall price level within the state. Thus the state population index and state RPP index were applied to the Adderall and Xanax benchmarks to obtain the state cost savings estimates. (See Table 4.)

Table 4. State Breakdown of Increased Local Pharmacy Revenues (2016 $)
(Annual savings, per facility)

	Adderall	Xanax
Alabama	$4,131	$1,536
Alaska	$759	$282
Arizona	$6,464	$2,403
Arkansas	$2,530	$940
California	$42,683	$15,866
Colorado	$5,468	$2,032
Connecticut	$3,765	$1,399
Delaware	$939	$349
Florida	$19,763	$7,346
Georgia	$9,177	$3,411
Hawaii	$1,614	$600
Idaho	$1,521	$565
Illinois	$12,472	$4,636
Indiana	$5,865	$2,180
Iowa	$2,739	$1,018
Kansas	$2,551	$948
Kentucky	$3,808	$1,415
Louisiana	$4,140	$1,539
Maine	$1,251	$465
Maryland	$6,420	$2,387
Massachusetts	$7,058	$2,624
Michigan	$9,039	$3,360
Minnesota	$5,212	$1,938
Mississippi	$2,507	$932
Missouri	$5,270	$1,959
Montana	$950	$353
Nebraska	$1,672	$621
Nevada	$2,779	$1,033
New Hampshire	$1,340	$498
New Jersey	$9,908	$3,683
New Mexico	$1,913	$711
New York	$22,102	$8,216
North Carolina	$9,002	$3,346
North Dakota	$671	$249
Ohio	$10,034	$3,730
Oklahoma	$3,420	$1,271
Oregon	$3,921	$1,457
Pennsylvania	$12,146	$4,515

	Adderall	Xanax
Rhode Island	$1,009	$375
South Carolina	$4,344	$1,615
South Dakota	$737	$274
Tennessee	$5,804	$2,158
Texas	$26,040	$9,680
Utah	$2,863	$1,064
Vermont	$612	$227
Virginia	$8,350	$3,104
Washington	$7,319	$2,721
West Virginia	$1,575	$585
Wisconsin	$5,222	$1,941
Wyoming	$545	$203
U.S. AVERAGE	**$6,239**	**$2,319**

Other real-world examples of the savings possible through telemedicine are equally impressive. The Veterans Health Administration (VHA) has long been a pioneer in the use of telemedicine. Between 2000 and 2003 the VHA conducted a pilot program in Florida, Puerto Rico and the Virgin Islands, which included seven hospitals, 10 multispeciality outpatient clinics and 28 community-based primary care clinics.[29] The 900 patients in the trial were able to utilize home telehealth devices, which allowed them to self-manage their health. The results were dramatic: a 40% reduction in emergency room visits, a 63% drop in hospital admissions and an 88% decrease in nursing home bed days of care. While the total cost savings resulting from the dramatic decrease in resource utilization was substantial, perhaps even more impressive was the 94% patient satisfaction rate.

The cost savings have been substantial: the VHA estimates the cost per patient participating in their Care Coordination/Home Telehealth (CCHT) program to be $1,600 per year. By comparison, the direct cost of VHA's home based primary care is $13,121 per patient per year, while nursing home care rates average $77,745 per year.[30] Couple this with the rapidly growing number of veterans who will require significant health assistance in the coming years, and the potential cost savings are nothing short of staggering.

The VHA has measured a significant decrease in days of hospital stay for those veterans participating in CCHT. Between 2004 and 2007, days of hospital stay for a patient suffering from depression decreased 56.4% among those utilizing telehealth; those suffering post-traumatic stress disorder saw a 45.1% decrease; other mental health issues were down 40.9%; hypertension, down 30.3%; congestive heart

[29] Broderick, Andrew, "The Veterans Health Administration: Taking Home Telehealth Services to Scale Nationally," The Commonwealth Fund Case Studies in Telehealth Adoption, Jan. 2013, http://www.commonwealthfund.org/~/media/Files/Publications/Case%20Study/2013/Jan/1657_Broderick_telehealth_adoption_VHA_case_study.pdf, p. 5.

[30] *Id.,* p. 6.

failure, down 25.9%; chronic obstructive pulmonary disease, down 20.7%; and diabetes down 20.4%.[31] Again, this decrease in hospital usage directly translates to cost savings.

More recently, the VA's telehealth efforts have taken off dramatically. In 2015, the VA did 2.1 million episodes of telehealth care, including home telehealth, site-to-site telehealth, and store and forward. Included in that total is 400,000 telemental health visits.[32] The VA's financial commitment is equally impressive: the 2017 VA budget provided $1.2 billion for telehealth.[33]

While various estimates of the monetary gains to be realized from the increased adoption of telemedicine differ, they are all substantial. Taken together with the positive, nonquantifiable benefits of telemedicine, they present a compelling argument for pursuing policies to encourage adoption of these technologies.

CHALLENGES TO RURAL TELEHEALTH

While the potential benefits to telemedicine are plentiful, there are also a number of impediments inhibiting the widespread implementation of telemedicine technology.

Reimbursement. Medicare has extremely strict requirements for reimbursing for telemedicine. Currently, Medicare does not provide reimbursement for "store-and-forward" delivered services, nor for remote patient monitoring services.[34] In order to be considered for reimbursement, the originating site must be located in a nonmetro county or in a designated Health Professional Shortage Area in a rural census tract of a metropolitan county.

Obtaining Medicaid reimbursement for telehealth can be a confusing process. Generally, it is up to each individual state to determine whether or not specific telehealth services are covered by Medicaid. As of August 2016, the Center for Connected Health Policy reported that Medicaid coverage for live video telehealth is available in 48 states. Twelve states offer some reimbursement for store-and-forward.[35] However, every state varies in its policies.

Medicare places strict limits on the professionals who may provide eligible telehealth services. These include physicians, nurse practitioners, physician assistants, nurse midwives, clinical nurse specialists, clinical psychologists and clinical social workers, and registered dieticians or nutrition professionals.[36]

---

[31] *Id.*, p. 7.

[32] Comstock, Jonah, "How Telehealth is Helping the VA Address Its Access Crisis," MobiHealthNews, May 17, 2016, http://www.mobihealthnews.com/content/how-telemedicine-helping-va-address-its-access-crisis.

[33] Department of Veterans Affairs, "Budget in Brief–2017," https://www.va.gov/budget/docs/summary/Fy2017-BudgetInBrief.pdf, p. BiB-9.

[34] Center for Connected Health Policy, "Telehealth and Medicare," http://www.telehealthpolicy.us/telehealth-and-medicare.

[35] Center for Connected Health Policy, "Telehealth Medicaid & State Policy," http://www.telehealthpolicy.us/telehealth-medicaid-state-policy.

[36] Center for Connected Health Policy, "Telehealth and Medicare."

Medicare also imposes restrictions on the originating sites where reimbursed telemedicine services can take place. Currently, these include provider offices, hospitals, critical access hospitals, rural health clinics, federally qualified health centers, skilled nursing facilities, community mental health centers, and hospital-based or critical access hospital-based renal dialysis centers.[37] These reimbursement challenges are having an impact on the adoption of telemedicine. A survey of 1,557 physicians conducted by the Robert Graham Center, American Academy of Family Physicians, and Anthem, found that only 15% were utilizing telehealth in their practice. Nearly 90% indicated that they would use telehealth if they were reimbursed.[38]

According to the REACH Health 2016 U.S. Telemedicine Industry Benchmark Survey, 80% of the organizations surveyed classified managed care reimbursement as a "challenge" which is unaddressed or only partially addressed, 78% found Medicare reimbursement to be a challenge, and 78% Medicaid reimbursement.[39] Further, 35% said that Medicare reimbursement was a contributor to telemedicine return on investment (ROI), 34% said Medicaid reimbursement was a contributor to ROI, and 33% said managed care reimbursement contributed to ROI.[40]

Cost. Implementing telemedicine in a hospital can be an expensive proposition. Equipment costs can be substantial, ranging from $7,000 to $30,000 for a digital scanner, $20,000 to $250,000 for digital radiography equipment (for example, CT or MRI machines), and $15,000 to $20,000 for a video conferencing suite.[41] Upfront costs are only part of the overall picture—equipment must also be maintained and upgraded, as necessary. But the upfront costs are mostly one-time expenditures, and can be offset by ongoing cost savings over time.

In addition to equipment costs, there are also necessary expenditures for installation and training. Training is available through telemedicine associations, universities and colleges, vendors and peer-to-peer training through telemedicine programs. The cost for this training will vary according to the type of training provided.

Malpractice insurance is another significant cost. Currently, some malpractice insurance will cover services provided via telehealth, but not all do. As a result, additional coverage may be necessary. It is the responsibility of individual providers to ascertain whether they may need to seek out additional coverage.

As noted in the preceding section of this paper, not all of the potential quantifiable benefits of telemedicine accrue to the parties undertaking the requisite investments. In addition to the health care facility, tangible financial benefits may also accrue to patients and to businesses in the communities where telemedicine takes place. While this schism between costs and benefits may affect the investment decision to a certain degree, it is important to consider the complete picture to the extent possible.

---

[37] *Ibid.*

[38] Men, Jessica, "Lack of Reimbursement Barrier to Telehealth Adoption," AJMC Peer Exchange, Dec. 14, 2015, http://www.ajmc.com/newsroom/lack-of-reimbursement-barrier-to-telehealth-adoption.

[39] Saluke, Andrew, "Telemedicine Reimbursement a Challenge in 2016," REACH Health, March 15, 2016, http://reachhealth.com/telemedicine-reimbursement-2016/.

[40] *Ibid.*

[41] Whitacre, p. 182.

where telemedicine takes place. While this schism between costs and benefits may affect the investment decision to a certain degree, it is important to consider the complete picture to the extent possible.

Patient Privacy. The Health Insurance Portability and Accountability Act of 1996, or HIPAA, is intended to protect individuals' personal health information (PHI). The use of telemedicine does not relieve medical facilities or health care providers of their obligation under HIPAA to protect PHI—the standards are exactly the same as they would be for a face-to-face encounter. It is vitally important that all reasonable steps be taken to insure that PHI remains protected including, but not limited to, the use of such security measures as data encryption and password protection. These are but a part of an overall data security strategy, however—each entity's strategy for HIPAA compliance must be flexible enough to encompass telemedicine, as well.

Licensing. Dealing with various state licensing regulations is a challenge for many telemedicine providers. While virtually all physicians must be licensed in the state in which they physically practice, a number of states require that physicians must also have a valid license in the state where the patient is located. While the concept of a national licensure compact has gained support over recent years, such a solution is still evolving. Eliminating the need for dealing with different regulations in different states will make practicing telemedicine considerably simpler.

CONCLUSIONS/NEXT STEPS

Residents of rural areas face a number of health-related challenges. Demographics tend to work against rural Americans—on average, they are older than their urban counterparts, have fewer financial resources, and exhibit higher incidences of obesity, diabetes and heart disease. Studies have shown that rural Americans, on average, have a lower life expectancy than their urban counterparts.

In addition to these issues, rural Americans face a diminishing supply of health care options, as economic pressures are leading to the closing of an increasing number of rural hospitals. The result is that many rural residents must now travel longer distances to obtain access to the health care that they require.

Telemedicine holds tremendous potential for improving the overall quality of health care in rural America. By facilitating access to specialists located outside of the patient's community, telemedicine can reduce or eliminate costs related to traveling for treatment and lost time from work. It can offer patients access to experts in their particular field, while allowing them to remain in the comfort of their own town. By allowing physicians to remotely monitor their patients' health on an ongoing basis, illness can be identified and treated early on, before the situation becomes severe or even life-threatening.

Several efforts to quantify the cost-saving potential of telemedicine have been undertaken. These savings include reduced travel expenses, reduced time off from work, and hospital savings resulting from "sharing" specialists. In addition, telemedicine allows for lab and pharmaceutical work to be done locally, benefitting the local economy.

There are also costs associated with telemedicine, including equipment purchase, installation and maintenance; training of personnel, and possible increases in malpractice insurance.

The decision to implement telemedicine is unique to each medical facility. The quantitative savings and benefits must be calculated, and the nonquantitative quality of care benefits must also be considered. Like most investments, the long-term picture must be evaluated—while capital investment is higher in the early years, they will significantly decline over time, while costs savings will continue to accrue at a

steady rate. Quantifiable benefits will accrue over time not only to the medical facility, but also to patients and to businesses in the communities where telemedicine takes place.

One particularly critical, but often overlooked, piece of the equation is the need for high-quality, reliable broadband service. Particularly in rural areas, with lower population densities, rugged topography and greater distances between customers, this can be challenging due to the higher costs to serve.

But more and more, fiber-based broadband is being deployed throughout the country, which will enable the adoption of such life-changing technologies as telemedicine. And if the myriad challenges to rural health outlined in this paper are to be addressed in any substantial manner, then telemedicine solutions, built upon a foundation of reliable, future-proof, fiber-based broadband infrastructure, will be a significant part of the solution. Further involvement in, and expansion of, that infrastructure is a critical need for our nation.

References

American Hospital Association, "Issue Brief—Telehealth: Helping Hospitals Deliver Cost-Effective Care," http://www.aha.org/content/16/16telehealthissuebrief.pdf.

Broderick, Andrew, "The Veterans Health Administration: Taking Home Telehealth Services to Scale Nationally," The Commonwealth Fund Case Studies in Telehealth Adoption, Jan. 2013, http://www.commonwealthfund.org/~/media/Files/Publications/Case%20Study/2013/Jan/1657_Broderick_telehealth_adoption_VHA_case_study.pdf.

Brown, Rachel, "Making Health Care Accessible via Telemedicine," NTCA–The Rural Broadband Association, Rural Telecom, March–April 2016, http://www.ruraltelecom-digital.com/ruraltelecom/march_april_2016?pg=NaN#pgNaN.

Centers for Disease Control and Prevention, "Leading Causes of Death in Nonmetropolitan and Metropolitan Areas—United States, 1999–2014," January 2017, https://www.cdc.gov/mmwr/volumes/66/ss/ss6601a1.htm?s_cid=ss6601a1_w.

Davidson, Charles M. and Michael J. Santorelli, "The Impact of Broadband on Telemedicine: A Study Commissioned by the U.S. Chamber of Commerce," April 2009, https://www.uschamber.com/sites/default/files/legacy/about/0904Broadband_and_Telemedicine.pdf.

De Peña, Kristen and Kelly A. Sanders, "Bumps Along the Rural Road: Using Telemedicine to Treat Chronic Disease in Rural Communities," Altarum Institute, March 22, 2016, http://www.healthcareitnews.com/blog/bumps-along-rural-road-using-telemedicine-treat-chronic-disease-rural-communities.

Govette, Jonathan, "Rural Hospital Closures: How Telemedicine Could Provide Relief," Referral MD, https://getreferralmd.com/2015/02/rural-hospital-closures-telemedicine-provide-relief.

Kung, Kristi VanderLaan, "Recent Relaxation of State-level Challenges to Expansion of Telemedicine but Barriers Remain," National Law Review, Aug. 18, 2016, http://www.natlawreview.com/article/recent-relaxation-state-level-challenges-to-expansion-telemedicine-barriers-remain.

Larkin, Tara, "Telehealth Enhances Care in Rural Communities," American Hospital Association, Hospitals & Health Networks, Jan. 14, 2016, http://www.hhnmag.com/articles/6833-telehealth-enhancing-care-in-rural-communities.

McCann, Erin, "Telehealth Takes Off in Rural Areas," Healthcare IT News, Feb. 4, 2014, http://www.healthcareitnews.com/news/telehealth-takes-nationwide.

National Advisory Committee on Rural Health and Human Services, "Telehealth in Rural America: Policy Brief," March 2015, https://www.hrsa.gov/advisorycommittees/rural/publications/telehealthmarch2015.pdf.

Tipton, JT and C. Stefan Winkler, "How Telemedicine is Transforming Treatment in Rural Communities," Becker's Health IT & CIO Review, April 8, 2016, http://www.beckershospitalreview.com/healthcare-information-technology/how-telemedicine-is-transforming-treatment-in-rural-communities.html.

Vo, Alexander, Ph.D., G. Byron Brooks MD EE, Ralph Farr, and Ben Raimer MD, "Benefits of Telemedicine in Remote Communities & Use of Mobile and Wireless Platforms in Healthcare," UTMB Telemedicine and Center for Telehealth Research and Policy, sponsored by Internet Innovation Alliance, https://telehealth.utmb.edu/presentations/Benefits_Of_Telemedicine.pdf.

Vo, Alexander H., Ph.D., "The Telehealth Promise: Better Health Care and Cost Savings for the 21st Century," The University of Texas Medical Branch, March 2008, https://telehealth.utmb.edu/presentations/The%20Telehealth%20Promise-Better%20Health%20Care%20and%20Cost%20Savings%20for%20the%2021st%20Century.pdf.

Whitacre, Brian E., "Estimating the Economic Impact of Telemedicine in a Rural Community," *Agricultural and Resource Economics Review 40/2,* August 2011, http://ageconsearch.umn.edu/bitstream/117770/2/ARER%2040-2%20pp%20172-183%20Whitacre.pdf.

Wicklund, Eric, "Survey: Telemedicine Helps the Patient More Than the Provider," Health News, mHealthIntelligence, March 29, 2016, http://mhealthintelligence.com/news/survey-telemedicine-helps-the-patient-more-than-the-provider.

About NTCA–The Rural Broadband Association: *NTCA–The Rural Broadband Association is the premier association representing more than 800 independent, community-based telecommunications companies that are leading innovation in rural and small-town America. NTCA advocates on behalf of its members in the legislative and regulatory arenas, and it provides training and development; publications and industry events; and an array of employee benefit programs. In an era of exploding technology, deregulation and marketplace competition, NTCA's members are leading the IP evolution for rural consumers, delivering technologies that make rural communities vibrant places in which to live and do business. Because of their efforts, rural America is fertile ground for innovation in economic development and commerce, education, health care, government services, security and smart energy use. Visit us at www.ntca.org.*

About Smart Rural Community: *Smart Rural Community*[SM] *is an initiative of NTCA–The Rural Broadband Association. Smart Rural Community comprises programming related to and promoting rural broadband networks and their broadband-enabled applications that communities can leverage to foster innovative economic development, commerce, education, health care, government services, public safety and security and more efficient energy distribution and use. Smart Rural Community hosts educational events for communications and noncommunications professionals, including government policy-makers; administers an award program that invites and reviews applications of rural broadband providers for certification and recognition; and provides resources to rural broadband providers to assist their achievement of goals promoted by Smart Rural Community. Smart Rural Community also publishes original research and white papers that investigate issues relating to rural broadband deployment, adoption and use. For information please visit www.ntca.org/smart.*

About the Author: *Rick Schadelbauer is manager, economic research and analysis at NTCA–The Rural Broadband Association. He provides economic and financial analysis to support the work of NTCA's Industry Affairs and Business Development Division, and offers policy advice and advocacy to NTCA membership on telecommunications and related telephone company issues. He is the author of numerous articles that have been published in NTCA's Rural Telecom magazine and a regular contributor to the NTCA tech blog, New Edge. Mr. Schadelbauer holds an A.B. degree from Duke University and an M.A. degree from George Mason University, both in economics.*

Additional Smart Rural Community White Papers:

Seidemann, Joshua, "Beyond Rural Walls: Identifying Impacts and Interdependencies Among Rural and Urban Spaces," NTCA–The Rural Broadband Association (http://www.ntca.org/images/stories/Documents/Advocacy/SmartCommunity/src_beyond_the_rural_walls_white_paper.pdf) (2015).

Schadelbauer, Rick, "Conquering the Challenges of Broadband Adoption," NTCA–The Rural Broadband Association (http://www.ntca.org/images/stories/Documents/Advocacy/CCBA_Whitepaper.pdf) (2014).

Ward, Jesse, "The Smart Rural Community," NTCA–The Rural Broadband Association (http://www.ntca.org/images/stories/Documents/Advocacy/Issues/Broadband/TheSmartRuralCommunity.pdf) (2012).

4121 Wilson Boulevard, Suite 1000 • Arlington, VA 22203-1801
Phone/703-351-2000 • Fax/703-351-2001 • www.ntca.org