

Advancing Telehealth In Rural Appalachia

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RURAL LSC

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Executive Summary

Healthcare is entering a new frontier. Technology-enabled care has never been more essential to the delivery of quality healthcare^[4]. The versatility of telehealth has never been clearer than in 2020 where it became the primary healthcare modality amidst the COVID-19 pandemic. Compounding challenges of evolving population dynamics, widening health disparities and a global pandemic demand innovative, economical and scalable health solutions.

The unique health challenges in rural Appalachia make it an ideal candidate for telehealth advancement. Telehealth services aim to address the poor health behaviors^[10, 11], outcomes^[13, 14] and disparities^[15, 16] stemming from personal and economic loss^[11, 17], as well as inability to access healthcare facilities. However, longstanding digital inequity and illiteracy impede progress^[18].

Community resources and engagement have been a primary focus of social development initiatives in rural Appalachia. Improved workforce development, education, social services, and healthcare opportunities have been proposed as supports that could minimize health disparities in the region^[11]. As a sector-crossing technology, high-speed broadband internet has the potential to benefit all such programs affordably and practically for rural Appalachia^[11, 17]. In particular, telemedicine could improve health outcomes by mitigating the rural physician workforce shortage^[18], modulating behavior change^[19] through promotion of regular maintenance of mental and chronic disease management plans^[20] and by providing deeper insights into patients' cultural contexts and social determinants of health.

However, broadband inaccessibility and historic lack of insurance reimbursement has hindered the rapid uptake of telemedicine services in rural Appalachia. While temporary Medicare, Medicaid and insurance parity for telemedicine services was available during the COVID-19 pandemic^[21], the digital divide still persists^[22] [9]. Moreover, the path forward for telehealth reimbursement remains unclear.

Given their disparate need, remote communities have traditionally been amongst telehealth's earliest adopters^[23]. While the burgeoning telehealth industry presents clear clinical advantages for improved patient outcomes in rural Appalachia, it is evident a direct translation of urban telehealth models would prove unsustainable. The 423-county Appalachian region lags the nation in per capita income and high school graduation rates. As a persistent-poverty rural region, it is useful to consider the economic, patient and institutional determinants that would further the expansion of telehealth.

This investigation considered the success of telehealth in Kentucky, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia through the lens of a Health Technology Assessment Framework. What barriers prevent the expansion of telehealth in rural Appalachia? How does this inform policy, advocacy, and community partnerships?

FIGURE 1

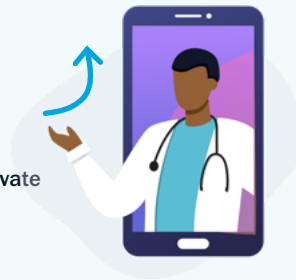
Telehealth Growth During COVID-19

Telehealth has exploded during the COVID-19 crisis, building upon the incremental growth that has been occurring in recent years. Digital technologies have become more accepted by both consumers and providers, and telehealth appears to be fulfilling its promise as a significant part of the health care system.

Many policy changes have been made during the pandemic to significantly expand the use of virtual healthcare. If these changes go away, telehealth may be rolled back rather than becoming a sustained and transformational approach to patient care.

**4,347%
Growth**

in telehealth claims to private insurers year-over-year.

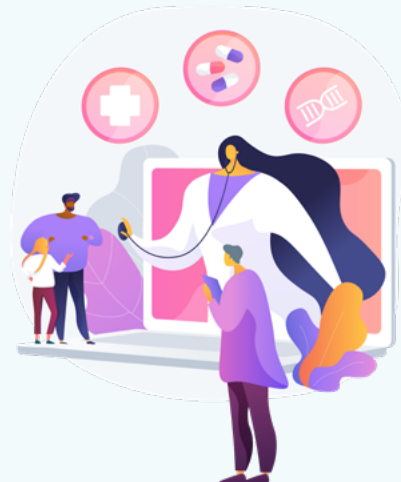


34%

FAIR Health found that one third (33.91%) of telehealth claims to private insurers during the COVID pandemic were for mental health conditions.

64.3% Growth

Research from CivicScience indicates that this growth in demand came across all ages and demographics like seniors and rural customers.



The Present Landscape of Telemedicine in Rural Appalachia

Telemedicine could improve health outcomes by mitigating the rural physician workforce shortage, modulating behavior change through promotion of regular maintenance of mental and chronic disease management plans, and providing deeper insights into patients' cultural contexts and social determinants of health.

Declining industry in the Coal Belt states of Appalachia have perpetuated significant personal, economic and healthcare accessibility loss^[17]. In these states, the diminishing coal industry has had follow-on effects to healthcare in the region. Residents in these communities rely heavily on employer-provided health insurance and are largely ineligible for Medicaid^[17]. As industry withdraws from these regions, employment and thus health benefits also diminish. Healthcare facilities no longer have a viable model of operation and similarly withdraw. The lack of auxiliary services and confidentiality concerns surrounding diagnostic services such as mammography in small townships fuel screening avoidance thereby leading to delayed diagnosis and poorer health outcomes. Competing demands for limited monetary and transportation resources also hamper motivation to access care in neighbouring towns^[17]. The absence of community-focused organizations and health resources speaks to a need for social and tangible support; some rural townships boast ten dollar-stores but no primary care, domestic violence or crisis facility for hundreds of miles. Death from cardiovascular disease, diabetes, stroke, opioid use, chronic obstructive pulmonary disease and unintentional injury are all significantly higher in these regions, with strong correlations to economic disparities, environmental hazards^[13] and poor quality of life^[13]. Cultural norms and reduced medical access also increase vulnerability to “diseases of despair” including depression^[14], alcoholism and substance use^[11].

Telehealth encompasses a suite of digital solutions that could support such virtual clinical healthcare, patient and professional health education and public health. Live synchronous video conferencing, asynchronous consultations (i.e store-and-forward sharing platforms) and remote patient monitoring provide primary and specialist care at with greater efficiency. Despite its potential to boost mental health care^[24], women’s health^[24, 25] and chronic disease management^[26], telehealth initiatives have met with legislative, cultural and economic resistance. These barriers were key focuses of this investigation.

This investigation surveyed telehealth policy as it differs between states and was developed from interviews with telehealth advocates, practitioners, and industry representatives across seven Appalachian states to understand current practice and barriers to telehealth implementation. Two priority areas for policy and funding to improve telehealth access in the region were identified.

OUR FINDINGS INCLUDE:

- None of the surveyed states have legislated payment parity for private health insurance third-parties
- Remote Patient Monitoring (RPM) is not legislated/reimbursed even at a Medicaid level for any of the surveyed states with the exception of Virginia
- Many community leaders in the 20 most coal-affected communities of North Carolina continue to prioritise telehealth expansion in local strategic planning^[17] but broadband deployment does

State	Medicaid Reimbursement			Private Payer Law [#]		Professional Requirements	
	LIVE VIDEO	STORE-AND-FORWARD	REMOTE PATIENT MONITORING (RPM)	LAW EXISTS	PAYMENT PARITY	LICENSURE COMPACTS*	CONSENT REQUIREMENT
KENTUCKY	👍	👍	👎	👍	👎	IMLC, PTC, NLC	👍
OHIO	👍	👎	👎	👍	👎	👎	👍
PENNSYLVANIA	👍	👎	👎	👎	👎	IMLC, PSY	👍
SOUTH CAROLINA	👍	👎	👎	👎	👎	NLC, PTC, EMS	👍
TENNESSEE	👍	👍	👎	👍	👎	IMLC, PTC, NLC, EMS	👍
VIRGINIA	👍	👍	👍	👍	👎	PTC, NLC, EMS, PSY	👍
WEST VIRGINIA	👍	👍	👎	👍	👎	IMLC, PTC, NLC, EMS, ASLP-IC	👍

TABLE 1 ▶

Data sourced from Center for Connected Health Policy¹²¹

KEY

[#] Private payer laws mandate that private entities such as insurance companies and health maintenance organizations (HMOs) to cover and/or reimburse providers for telehealth services in the same manner and magnitude as for in-person services. Where laws exist, equivalent reimbursement may only be mandated for specific services out of a larger treatment schedule^[27] or be specific to Medicaid services only

- 👍 Reimbursement and/or law exists
- 👎 Reimbursement and/or law does not exist

- ASLP-IC Audiology & Speech-Language Pathology Interstate Compact
- IMLC Interstate Medical Licensure Compact
- PTC Physical Therapy Compact
- PSY PSYPACT
- NLC Nurses Licensure Compact

not necessarily translate to broadband (and thus telehealth) adoption due to digital literacy barriers and cultural resistance

- The effect of COVID-19 on legislative and payer parity amendments has been very gradual and many remain uncertain about ongoing reimbursement, service delivery, private payer, consent, online prescribing, and licensure policies. Institutions and practitioners are thus reticent to scale and invest further in telehealth infrastructure

SOME OF THE MOST RESTRICTIVE STATE LAWS:

- **Ohio:** In Ohio, physicians cannot write prescriptions without doing a physical exam. The state's Medicaid program limits reimbursement to video visits.
- **Pennsylvania:** Lawmakers in Pennsylvania have been hammering out legislation to address Covid-19, including expanding telehealth. Currently, the state does not have any laws governing how payers cover the cost of telemedicine.
- **West Virginia:** For Medicaid to pay for a telehealth visit in West Virginia, it must take place at one of a handful "originating sites", including a physician's office or a rural health clinic.^[12]

THE MOST COMMON USE CASES FOR TELEMEDICINE IN RURAL APPALACHIA INCLUDE:

- **Telepsychiatry, teleradiology, telestroke^[26] and telecardiology^[18]**
- **Chronic Disease Management** via remote patient monitoring, medication surveillance and behavior change communication ^[19]
- **Lifestyle & Nutritional** Counselling^[28]
- **Obstetric and women's health** particularly in states where all counties are designated professional shortage areas (South Carolina, West Virginia)^{[24] [25]}
- **Mental Health** including addiction recovery support systems (e.g. A-CHESS, Kentucky) and statewide acute telepsychiatry networks that have reduced wait times from 4 days to less than 10 hours^[24] (South Carolina, North Carolina)
- **School e-Health** services including sexual health education and virtual consultations. Patient and provider acceptance has been very positive due to the reduced student absence, tardiness, parental work disruption^[17], and unnecessary school nurse commuting^[29]



Top: Looking south into Scott County, Tennessee from Kentucky. Access to medical care can be expanded in rural areas with telehealth. BRIAN STANSBERRY/WIKIMEDIA

Bottom: Entrance to a COVID-19 vaccination clinic in Westover, West Virginia. Lack of access to telemedicine during the pandemic forced some vulnerable patients to risk exposure to infection in order to receive medical attention. XACKERY IRVING/SHUTTERSTOCK.COM

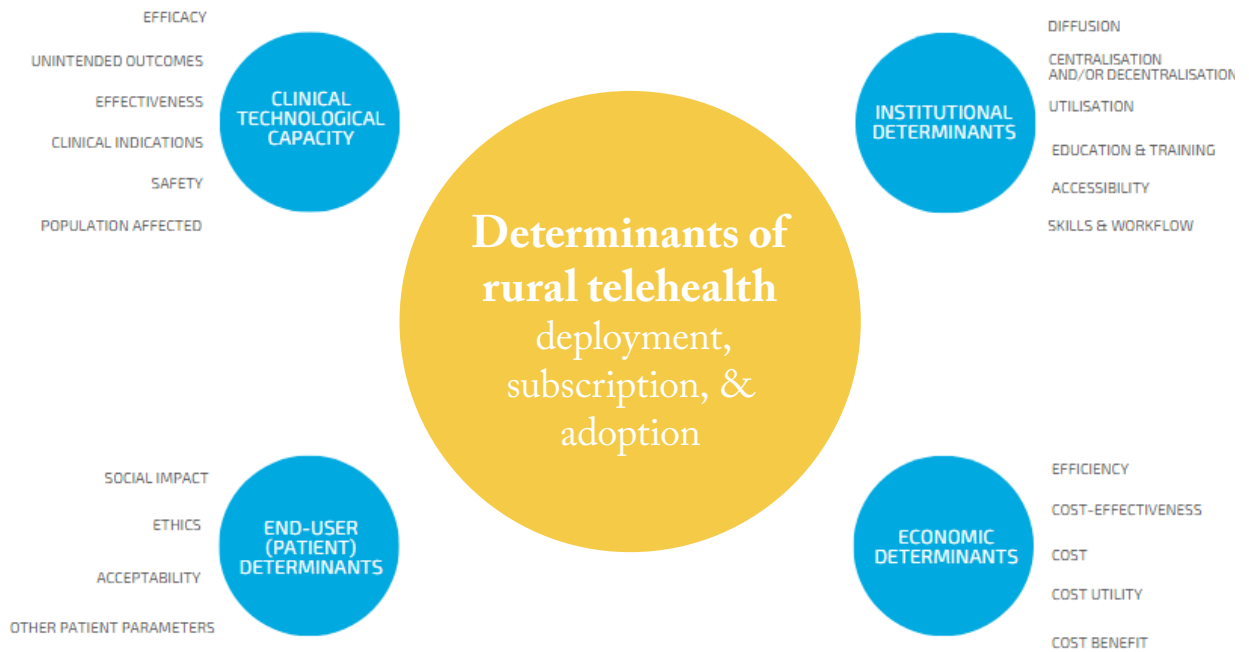
Identifying Barriers to Telehealth Adoption

A Health Technology Assessment Framework

This investigation focused on understanding the barriers to telehealth adoption by examining the clinical, institutional, end-user (patient) and economic determinants of telehealth deployment, subscription, and adoption in rural Appalachia. The telehealth advocate, industry and practitioner interviewees spoke to their experience with each domain of determinants, offered suggestions for potential development, and highlighted some successes to date. Considerable evidence points to the strong clinical use cases for telehealth as an adjunct or alternative treatment modality. Equally, it is clear several institutional, economic, and patient determinants require attention if telehealth is to advance successfully.

FIGURE 2

Adapted Health Technology Assessment Framework outlining the major determinants of successful clinical technology solutions such as telehealth^[1]



Clinical Determinants

The versatility of telehealth has never been clearer than in 2020 where it became the primary healthcare modality amidst the COVID-19 pandemic. As in-person visits all but ceased overnight, telehealth visits rapidly increased and altered the landscape of care delivery. But its future remains uncertain. After several months of telehealth usage surges, the number of telehealth visits plateaued and even declined slightly.

The versatility of telehealth has never been clearer than in 2020 where it became the primary healthcare modality amid the COVID-19 pandemic. As in-person visits all but ceased overnight, telehealth visits rapidly increased and altered the landscape of care delivery. But its future remains uncertain.

FIGURE 3 ▶

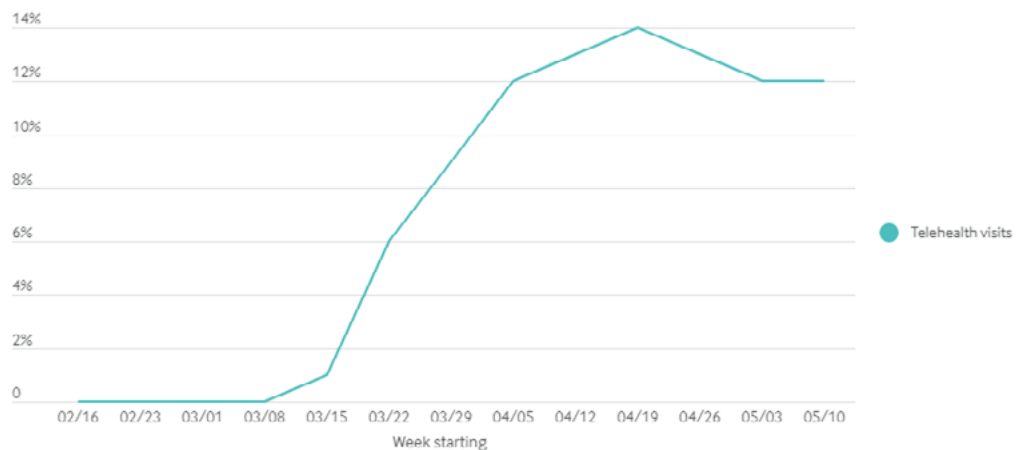
Why might the demand for telemedicine be diminishing? ^[30]

The number of telemedicine visits rose rapidly through mid-April but then leveled, and even declined slightly, in the last three weeks. ▶

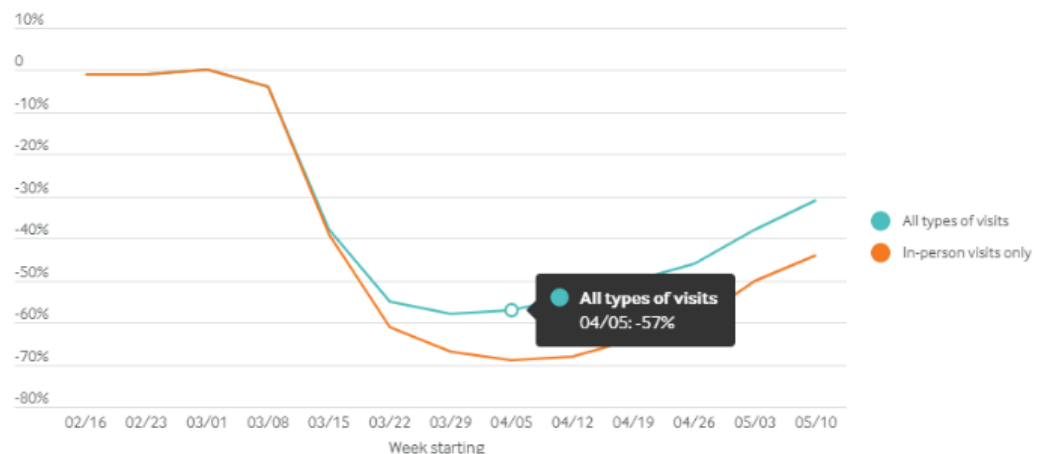
As in-person visits dropped, telehealth visits increased rapidly before plateauing. The rebound in visits is due to more in-person visits rather than more telemedicine visits. ▶

The decline among in-person visits is steeper than the decline among visits of any type (telemedicine and in-person).

Number of telehealth visits in a given week as a percent of baseline total visits



Percent change in visits from baseline



Until recently, reimbursement for telehealth services have been a fraction of that for equivalent in-person consultations. Provider compensation is traditionally based on the amount of time spent with the patient, procedural complexity, and risk. Given telehealth was formerly used for simpler procedures including reviews and in-home monitoring for chronic disease patients, they were priced accordingly. Sustained payer parity makes care more convenient and accessibility. This could lead people to use their insurance coverage more thus costing private insurance companies more money. Financial pressures on insurance companies could be fuelling reticence to pursue long-term parity^[31].

Myriad economic and institutional factors have culminated in this downturn, but it is also clear telehealth needs further clinical development to become a robust complement to in-person care. Several limitations of telehealth's clinical capacity were discussed:

- Despite some suggestions that observing patients in their 'native context' may provide deeper insights into social determinants of health, clinicians acknowledge this is highly subjective and of minimal diagnostic value. An exception of telepsychiatry assessment of children with behavioral disorders^[32].
- Clinicians' diagnostic and rapport-building powers of observation are often limited^[20]
- The accuracy and usability of digital peripheral examination devices (e.g. Tytocare digital stethoscopes, dermatoscopes, intraoral scopes)^[20] remains uncertain; and would be conditional on digital inclusion and significant end-user (patient) training^[20]. In certain cases, the lack of broadband could be life-threatening as in the case of pacemaker and defibrillator implantable devices that require periodic monitoring and calibration^[33]. These resources are unlikely to be imminently available in rural areas^[18].
- Selective application of telemedicine to targeted monitoring of chronic disease may be a more profitable and efficient application of telehealth than in primary or acute care^[20]

Institutional Determinants

The discussion around telehealth often assumes that healthcare facilities are infrastructurally capable of offering patients this service. However, barriers to establishing broadband in healthcare facilities and homes are the most significant ^[34]. Many smaller institutions including health departments and community clinics are still unable to afford broadband access at satisfactory bandwidths to support ongoing telemedicine. The Federal Communications Commission (FCC) subsidies providing 65% discounts for rural healthcare providers' broadband is the only way some rural providers are able to afford broadband infrastructure but even so, some still find the cost prohibitive ^[34].

This paper explores the legislative and policy barriers that are the most significant impediment to greater rural institutional telehealth adoption.

- Hospitals not officially servicing rural catchment areas are not eligible to receive Medicare or Medicaid benefits for any rural patients they may service via telehealth^[5]. With no further incentives for telehealth-capable hospitals to extend care rurally, telehealth has not effectively minimised rural workforce shortages^[5, 32, 35]. **At best, telehealth has helped to mitigate severe specialist care shortfalls rurally^[35].**
- Reimbursement schedules lacked the flexibility to accommodate for patient care needs. Billing for remote patient monitoring (RPM) currently requires 20 minutes (or more) of monitoring for at least 16 days/month. This precludes many acute care patients who

During COVID-19, some rural hospitals signed temporary hospital-to-hospital agreements with larger hospitals for telehealth services many of which could not be honoured by small hospitals under financial distress ^[5].

do not require such protracted monitoring. **The lack of pro rata allowances dissuade providers and institutions from investing further**^[36].

- During the COVID-19 public health emergency, the Center for Medicare Services (CMS) allowed for temporary coverage of 144 telehealth services^[37]. Nine of these will become permanent in rural regions and 59 will receive temporary extension. A further 76 are being investigated for potential in remote patient monitoring but the legislative uncertainty around telemedicine's role going forward, **many institutions did not have a strong business case to make infrastructural investments in telehealth**^[30] technology. This contributed to the shortfall between in-patient visits that were cancelled and those who received care via telehealth.

Practitioners also reported a lack of familiarity with telehealth workflow, noting that this had not been a meaningful part of professional training^[38]. Navigating care across multiple non-integrated telehealth technology systems was another significant workflow challenge. Providers often had to familiarise themselves with new tools and procedures for each telehealth application; many of which did not mesh with that of other health networks. Information sharing across networks for expedient and coordinated care was thus hampered^[22].

The digital divide in America affects approximately 42 million residents that do not have access to broadband. Fifty percent of the country cannot access the internet at minimum browsing broadband speed of 25 Mbps download/3 Mbps upload.

The decentralisation of telehealth has also allowed insurance companies and commercial entities to establish private, standalone telemedicine platforms. These direct-to-consumer services focus on isolated acute episodes of care with minimal context of pre-existing medical history. Quality of care may be compromised if patients treat these dial-in services as their emergency room over seeking the specialist or tertiary coordinated care they require^[35]. It remains to be seen whether private insurance companies will still

provide payer parity over promoting their own platforms. To date, Virginia is the only state that has legislated a ban on insurance companies mandating provider subscription to their commercial telehealth platforms in order to receive any telehealth reimbursement^[38].

End-user (Patient) Determinants

The digital divide in America affects approximately 42 million residents that do not have access to broadband^[3]. Fifty percent of the country cannot access the internet at minimum browsing broadband speed of 25 Mbps download and 3 Mbps upload. Teleconferencing requires even greater bandwidth^[39]. Less than half of the residents on rural tribal lands have access to fixed broadband; a number that has likely increased since COVID.

Digital exclusion is modulated by income, language, literacy, culture, and ethnicity. This investigation explored four domains of the digital divide that lies at the core of patient telehealth inaccessibility:

1. **Broadband is unavailable.** Major telecommunication companies have avoided fiber deployment to rural communities due to high installation costs. While low-orbit satellite

and cellular are viable options, community-based internet service providers (ISP) remain an untapped, affordable alternative. Yet, there is considerable policy resistance to the expansion of municipal broadband. Greenlight Community Broadband in Wilson, North Carolina is one such example. Despite its notable economic and educational benefits, the North Carolinian and Tennessee state governments gained Federal Appeals Court support to prevent Greenlight Community Broadband from expanding its reach beyond county perimeters^[40]. This precedent severely limits business development for any prospective municipal broadband companies and hampers broadband competition.

2. **Broadband is unaffordable.** Subscription costs are the primary deterrent for 33% of non-adopters nationally^[17]. Medicare or insurance reimbursements may cover appointments, but patients still incur telecommunication costs. Where limited broadband is available, long phone consultations, call and interpreter waiting times quickly drain patients' prepaid credit limits making remote consultations unattainable for many^[41].
3. **Broadband quality is inadequate.** Sufficient bandwidth and adequate connection speed are often inadequate in rural areas^[36]. Within one of our focus states, North Carolina, only 59.4% of households adopt a broadband subscription with 25 Mbps/3Mbps speed^[17].
4. **Individuals lack devices or digital skills.** 18.55% of North Carolinian households have no access to broadband-compatible devices. Americans with disabilities are 20% less likely to own a device due to financial disadvantage despite a demonstrated desire to use telehealth^[42]. As a result, internet connectivity and thus telehealth lack meaningful relevance and digital literacy is deprioritised^[17]. This also detracts from providers' time who often spend substantial appointment time troubleshooting technical issues^[43]. Patients that are not fluent in English or struggle with technology preferentially choose in-person care^[21].

Despite concerns about data security and confidentiality, patient acceptance has generally superseded that of providers^[44] now that legislative requirements requiring patient attendance at small rural satellite clinics has been waived during COVID-19.

Economic Determinants

The economic argument for telehealth deployment is compelling. Launching convenient urgent care services may be an efficient way to acquire new patients, retain existing patient bases and extend brand recognition^[18, 45]. Approximately \$250 billion (20%) of all Medicare, Medicaid and Commercial OP, office and home healthcare spending could be virtualised, leaving more capacity for in-person visits to be concentrated to new patient acquisition for business growth, or procedural visits with higher billings^[46]. Prior to legislation amendments permitting at-home consultations, providers were incurring auxiliary staff costs for the same amount of reimbursement; approximately \$25 per patient to cover staff, administration and consultation costs^[35]. Present models are more profitable.

However, without legislative certainty regarding **ongoing service reimbursement**, initial **infrastructural costs** (home broadband connections or institutional platform establishment) are a daunting barrier to widespread deployment. Promisingly, rural fiber deployment plans that were once expected to cost trillions have now been repeatedly modelled to reach 90% of U.S. households by 2019 for an incremental \$70 billion beyond planned investments including more

Digital technologies have become more accepted by both consumers and providers, and telehealth appears to be fulfilling its promise as a significant part of the health care system.



CASE STUDY

Greenlight Community Broadband

REVITALIZING WILSON'S ECONOMY SINCE 2008^[6]

- Broadband has helped local businesses succeed and has been ranked the 10th best small city (2019) in the USA to start a business.
- Greenlight has co-sponsored the GigEast Exchange Conference since 2016; a technology hub, incubator and networking space for local innovation.
- All schools in Wilson County were connected to the fast broadband network as of 2012.
- In 2019, Greenlight partnered with Wilson Community College to develop a curriculum to train the next generation of network technicians and managers.



- Throughout the pandemic, Greenlight has gone even further to support its community. When schools quickly converted to remote learning in the spring of 2020, the network installed more than 3,000 feet of fiber to make sure a local history teacher, Michelle Galloway, could teach from home. The network has also made its Lifeline program permanent, offering basic video conference-capable connections for \$10/month for residents to activate as needed.

rural areas than anticipated^[47]. Rural communities have shown particularly high fiber uptake with the support of government subsidies^[47]. The business case for further deployment in low density areas is strengthening.

Yet, a recurrent line of funding for ongoing telemedicine reimbursement is still needed. Without assurance of ongoing payer parity, telemedicine infrastructure is inaccessible to many small institutions. There are suggestions some state Medicaid programs are under such financial distress they may not be able to comply with further reimbursement at pre-COVID levels even if legislation changes were made. Counties are also likely to avoid the high personnel costs of fiber installation if the use case for broadband is weakened^[48].

Some rural counties have successfully engaged partnerships with large metropolitan hospital networks to mitigate these costs. While financial duress during COVID-19 jeopardised some of these agreements for small hospitals, it is a potential area for future federal grant support in rural Appalachia.

While rural Appalachia faces considerable clinical and economic hurdles to widespread deployment, the future of telemedicine largely hangs in the balance between patients' broadband accessibility and healthcare institutions' sustained commitment to telehealth. As the healthcare industry grapples with the evolving landscape of digital care, institutions have heightened sensitivity to the value of infrastructural investment for what is likely to remain a significant part of healthcare.

Yet herein lies what is, perhaps the greatest irony of current efforts to advance telehealth in rural Appalachia. While the healthcare industry advocates for telehealth expansion, our investigation failed to identify any healthcare institutions or entities that were willing to investment in patient broadband deployment as an equally necessary step to enabling telehealth.



Intermountain Health and Connect Care Pro

Intermountain is a hospital conglomerate of 24 hospitals and 160 clinics in Utah/Idaho who also operate Connect Care Pro; a network of 40 telehealth services across seven Western states. Connect Care Pro is a 24/7 telehealth centre in Salt Lake City with full-time staff and 500 on-call providers in a wide range of medical specialties. Service care centres outside the Intermountain network are also part of this offering⁽⁹⁾.

- ▶ A baby was born with a hole in their lung at a rural hospital, requiring urgent specialist care. Intermountain's 24/7 on-demand system supported the infant and saved an \$18,000 transfer to an Intermountain NICU, and the patient and family were able to stay in their supportive community instead of making a 400 mile return trip daily to a larger hospital. **The rural hospital was also able to retain the revenue for caring for the baby.**
- ▶ Connect Care Pro has decreased in unnecessary emergency room and urgent care utilization, decreased mortality and length of ICU stay, improved door-to-needle time for stroke patients, decreased evaluation time for mental health patients in crisis – as the health industry moves towards a **value-based model that rewards providers for better outcomes** at lower costs (rather than fee-for-service rewarding volume).
- ▶ It provides small facilities with the resources, access to infectious disease specialists, pharmacists and data analysts that they wouldn't otherwise have to **meet federal standards of antibiotic stewardship.**

Connecting Patients: Empowering Communities

Making communities telehealth-ready requires focused strategies for each of the four domains of the digital divide.

Broadband availability could be boosted by a greater focus on last-mile broadband deployment. Grants such as the Growing Rural Economies with Access to Technology (GREAT) program focus on last-mile deployment to underserved areas. Cellular, satellite (e.g. Starlink, Space Hex) and municipal broadband options are viable alternatives for last-mile deployment inaccessible to fiber^[34]. A strong case for municipal broadband ISPs could be made in conjunction with middle-mile institutions^[38] in line with the work of the Schools, Health & Libraries Broadband Coalition (SHLB)^[49]. Electrical cooperatives are a newer but equally promising broadband deployment market with a 7-year return on investment based on a 30% adoption rate. Given the minimal viable alternatives, subscription rates to any electrical co-operative service can spike to above 70%^[48].



FIGURE 4 ►

Targeting the Digital Divide
(Information adapted^[3])

Broadband unavailable

- Local ISPs & Electric Co-ops invest in quality last mile deployment

Broadband unaffordable

- Subsidies/Grants
- Increase competition (*municipal broadband & Electrical Co-ops)

Broadband quality inadequate

- Legislation
- Open access infrastructure

Individuals lack devices or digital literacy

- Technology Amalgamation
- Collect Quality of Service data
- Legislation
- Institution-supported connections
- Legislation
- Digital Navigators
- AHECS
- Device upcycling

IMPACT



3200
devices donated

\$180,000
raised

425
volunteers

26
states

105
partner clinics



A synergistic model of device sponsorship, digital literacy and digital connectivity has connected seniors and low-income communities with telehealth solutions during COVID-19^[54]

CREDIT: MELINDA NAGY

Broadband affordability is an ongoing policy focus but at a community level, many rural citizens are unaware of existing grants. Information regarding federal Lifeline programs and state-level benefits for low-income consumers should be circulated. The proposed Accessible Affordable Interact Access Act & Heroes Act would provide further subsidies for connectivity during the COVID pandemic. The United States Department of Agriculture ReConnect Grant Program and Universal Service Administration's Healthcare Connect Funds (HCF) support increased residential and safety net site establishment^[17]. Increasing competition for affordable broadband involves lobbying for municipal broadband and electrical co-operatives. Lobbying for Open Access Infrastructure would restructure the telecommunication market by shifting infrastructural responsibility to the federal government. Broadband companies would lease this, making it more affordable for companies to service a community. Reframing broadband as an essential social service could open the door for managed care organizations to provide direct-to-consumer financial support

Telehealth requires connectivity speeds of 10Mbps/1Mbps but many are presently unable to regularly access such internet. **Broadband of inadequate quality** could be combatted by technology amalgamation options that combine data streams from patients separate devices to provide enough bandwidth for a synchronous video call^[38]. Connected Nation Michigan has demonstrated success in medical technology that provides telehealth savings in the

rural areas of greatest need and are currently exploring partnerships with Michigan's public universities to serve as hub for research and development targeting the digital divide. They could be encouraged by tax abatements, funding and promotion to national and international markets via the Pure Michigan Business Connect Initiative^[22]. Where patients are unable to access high-speed internet, healthcare facilities could consider call-back services or freephone numbers where long waiting times or interpretations are required. Rural telehealth services have designated space within their premises to provide access to phones and remote consultations^[35, 50] with great success.

Health care institutions have a role to play in defining value-based healthcare in the context of virtual care and prioritizing interventions that will improve outcomes for populations with the most significant health needs in rural Appalachia. Investing in high-quality last-mile broadband deployments and providing ongoing devices and digital literacy support, including early digital skill education via Area Health Education Center initiatives, are some examples of promising practices that could boost telehealth service adoption.

Given that the future of telehealth is in the home rather than the local clinic, personal inaccessibility barriers require urgent attention^[35]. As necessity arose during COVID-19, it became evident that only a very small percentage of the population faced insurmountable inaccessibility barriers. With the assistance of a first degree relative or community member, less than 10% of patients were lost to the system once care transitioned to virtual models. Local Area Health Education Centers (AHEC) programs also help build a pipeline of school-aged children with awareness of future health professional pathways and telehealth acumen. Children are taught to use telehealth to care for their own health needs and in turn, support their family members who need telehealth support^[35]. Telehealth Access for Seniors' synergistic model of device sponsorship, digital literacy and digital connectivity have pioneered scalable digital inclusion initiatives in low-income communities. This enterprise connects seniors and low-income citizens to telehealth services, friends and family using digital connectivity and wellness applications. Their model delivers devices, instructions and free technical support^[54].

Connecting Providers: Transforming Healthcare

As the landscape of telemedicine rapidly transforms, providers need federal support to make affirmative legislative change to telehealth reimbursement. Congressional action is required to make telehealth changes permanent outside rural catchment areas^[37]. If passed, the H.R. 8702: Holding Providers Harmless from Medicare Cuts During COVID-19 Act of 2020^[52], H.R. 7338: Advancing Telehealth Beyond COVID-19^[53], H.R. 7663 Protecting Access to Post-COVID-19 Telehealth Act of 2020^[53] and H.R. 7391 Protect Telehealth Access Act of 2020^[53] would advance telemedicine in rural Appalachia by temporarily increasing payments to providers under Medicare, authorizing Centres for Medicare & Medicaid Services to waive time and geographical restrictions for billing, allowing flexibility for provider/patient locality and allowing beneficiaries to receive benefits for telehealth received in the home.

As telehealth becomes an inevitable and increasingly significant part of healthcare, providers could also be supported in several other ways.

- ▶ The **University of Virginia** has modelled successful centralised telehealth. In partnership with community clinics, the Virginia network supplies the hardware and network connection through grant funding. While permanent funding streams would provide this model increased stability, the standardisation of care facilitates much more co-ordinated care^[35].
- ▶ The **Association of American Medical Colleges** is starting to formulate a telehealth-specific set of learning objects that providers would need to fulfil in order to graduate, including technology-enabled medication management, virtual examination and 'bedside' manner^[38].
- ▶ Interprofessional support between specialists and rural practitioners has become a key element of successful rural telehealth:
 - **Project Extension for Community Health Outcomes (ECHO)** training commenced in New Mexico 10 years ago in response to a hepatitis epidemic requiring specialist referral with a six month wait. Project ECHO facilitated connections between primary care providers and specialists for 8 to 10 weeks for the upskilling of primary care providers^[54]. Based on this evidence, the four major components of the program – namely physical broadband infrastructure, referral networking, training and incentivisation for junior providers via mentorship and telesupervision – have provided a strong basis for tele-mental health^[38], lung^[55] disease and opioid^[56] training.
 - Large academic centres with interdisciplinary teams have also modelled how integrated telehealth care that brings specialist care to the primary care patients. The **East Carolina University MOTHERS project** combines the efforts of numerous specialists in the virtual care of low-income mothers with high-risk pregnancies that wouldn't otherwise be able to access such providers due to geography^[32].

Bestsenny et al. suggests five models for virtually or virtually-enabled, non-acute care with increasing requirements to engage increasing portions of the healthcare system^[46]:

- 1. ON-DEMAND VIRTUAL URGENT CARE** Urgent care services are a potential practice growth mechanism but has significant and exclusive applications in certain disciplines. The NC Statewide Telepsychiatry Program (NC-STeP, Greenville North Carolina) has provided on-demand emergency psychiatric assessments. Hospital policy mandates that any emergency department (ED) patients admitted with behavioral issues must receive a thorough psychiatric assessment before discharge or admission. In a state where 94 of 100 counties are classified as mental health shortage areas, there are often delays of over 72 hours delay before psychiatrists were able to reach these rural counties during which three other patients could have been serviced^[32]. NC-STeP has successfully decreased ED boarding, increased department throughput in over 50 hospitals and 9 outpatient clinics. Over 40,000 patients have been seen, saving the state \$34 million in ED boarding costs^[57]. There are plans to expand this to an additional 20 outpatient clinics. North Carolinian psychiatrists report greater workflow efficiency and expanded practice reach as NC-STeP makes unplanned downtime productive^[32]. Whereas patients with post-traumatic stress disorder, a history of trauma, acute psychosis or mania often decline in-person consultations, telehealth consultation rejection rates are negligible^[32].
- 2. VIRTUAL OFFICE VISITS** In addition to synchronous video consultations, store-and-forward asynchronous care has become commonplace in areas of specialist shortage. In Hawaii, an area of ophthalmology service shortage, diabetic retinopathy screenings increased 80% via store-and-forward systems^[5]
- 3. NEAR-VIRTUAL OFFICE VISITS** including “near-home” testing, immunization, worksite and retail clinics to optimise contact time for procedural needs thereby reducing auxiliary staff costs for consultation visits. It would also increase efficiency for both (virtual) consultation and procedural clinics.
- 4. VIRTUAL HOME HEALTH SERVICES** Remote patient monitoring is a key focus of telehealth innovation and physician shortages in rural areas may propel and catalyse further development where synchronous consults are not always possible^[5, 58]. Reconnect4Health (Greenville, NC) is a remote patient monitoring platform for chronic disease management. Its team of staff nurses report a nurse : patient ratio of 1:100 (as opposed to a clinical ratio of 1:7) while still providing patients the continuity of care from this experienced workforce^[36]. Patients are able to report daily vital biometrics within 15 minutes instead and are contacted only if these exceed acceptable thresholds. Keeping patients healthy at home minimises hospital readmissions. RPM has enabled^[36]:
 - ▶ Three hospitals in rural Kentucky to decrease inpatient costs by between 61-80% within 30 days of RPM implementation; a saving of \$253,268
 - ▶ A health system-wide saving of \$821,736 of combined in-patient costs within 30 days of RPM implementation across three hospitals
 - ▶ Remote patient monitoring and mHealth devices also allowed rural Californian patients to participate in Stage IV non-small cell lung cancer clinical trials via multidisciplinary tumour consultations and RPM-mediated therapy^[59]. RPM may have future applications for family-elder relative monitoring, thereby decreasing need for aged care^[4].

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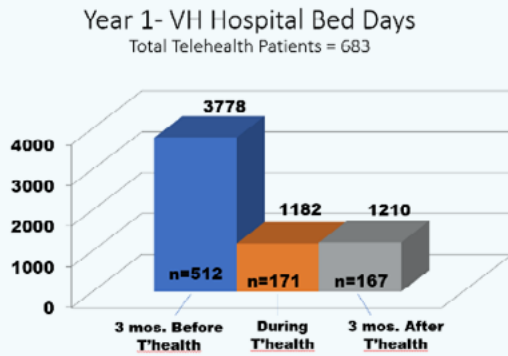
CASE STUDY

Near-Virtual Office Visits: Satellite Medicine Inc.

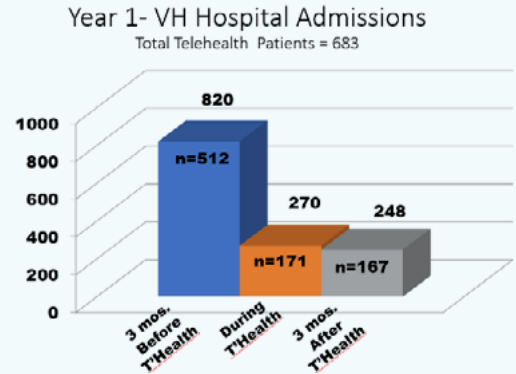
Satellite Medicine (Cookeville, TN) engages telehealth practitioners and schools/businesses interested in receiving emergency consultations for on-demand acute care. Liaison with patients' regular primary care provider follows each visit^[7]:

- Satellite Med. Inc ran contract telemedicine services to three schools in Putnam County, TN
- In 2018, the entire school system had to shut down due to widespread illness and the only three schools that were deemed well populations were those with Satellite Med. Inc on-site diagnostic testing and synchronous video conferencing.
- Once fibre broadband networks were established in 2012 for Putnam County, bandwidths were able to increase from 6 Mbps to 100 Mbps for faster consults.
- Remote Patient Monitoring and Store-and-Forward capability further improved telehealth workflow efficiency by shortening video conferencing from an average of 45 mins to 5 minutes in duration.

Reconnect4Health worked with Vidant Health (an integrated health system including a tertiary care centre, 8 rural hospitals, 70+ primary care provider clinics, home health and hospice.) This network serviced 29 counties with 1.4 million people including an extensive regional network. Vidant Health engaged a remote patient monitoring program aimed at reducing emergency department usage and readmissions within <30 days^[8]



Bed days decreased by 68% during Telehealth



Hospitalizations decreased by 67% during Telehealth

5. TECHNOLOGY-ENABLED HOME MEDICATION ADMINISTRATION Telehealth of tomorrow may look very different. Exciting realms of research and development include:

- ▶ Portable ultrasound imaging via mobile devices
- ▶ Remote-monitored chemotherapy delivery in the home
- ▶ Pharmaceutical repeat prescription services and disease adjustment based on real time monitoring through wearable technology^[58].
- ▶ Digital therapeutics including^[60]:
 - Retail diagnostic kits (e.g., home pulse oximeters, sphygmomanometer, digital stethoscopes)
 - Wearable electrophysiological monitors for muscle disorder changes in patients with neurological conditions
 - Tactile pressure sensors providing physicians with accurate real-time tracking for patients with cardiovascular, ophthalmology and pulmonary disease
 - Chemical sensors detecting disease markers and environmental contaminants^[46]

As we survey the landscape of telehealth in rural Appalachia, one thing is clear. The time to act is now. Telemedicine has never been more relevant nor empowered. Advancing the health of Appalachia will only come from concerted, urgent focus on the people and the providers that serve them. As we act decisively, invest to build capabilities at scale and reimagine care delivery models, we pursue a higher quality of care for rural Appalachia.

An Action Roadmap Forward: What Steps Can Healthcare Stakeholders Take?

Many policy changes have been made during the pandemic to significantly expand the use of virtual healthcare. If these changes go away, telehealth may be rolled back rather than becoming a sustained and transformational approach to patient care.

► **Actions that healthcare institutions and health systems could take:**

1. Explore strategies and partnerships with smaller rural health services and clinics to provide a broader range of services to those facing geographical barriers to care
2. Integrate ongoing remote patient monitoring and virtual chronic disease support into patient care plans for improved patient outcomes and reduced hospital utilisation
3. Buttress infrastructural investment in telehealth for specialties with severe workforce shortage (e.g., psychiatry)
4. Build the capabilities and incentives of the provider workforce to support virtual care through workflow design, continuing education and physician practice economics
5. Define value-based healthcare in the context of virtual care and prioritising interventions that will improve outcomes for populations with the greatest health needs in rural Appalachia
6. Invest in broadband deployment that would, in turn, boost telehealth service adoption

► **Actions investors, technology firms and health services could consider:**

7. Research and develop scenarios of telehealth usage going forward
8. Explore potential options and investment strategies for the virtual health market including partnerships between private insurance companies and technology platforms that could create sustainable value
9. Support municipal broadband service providers
10. Invest in alternatives to fiber broadband in geographically challenging regions of rural Appalachia such as low-orbit satellite and cellular

► **Actions community organizations and telehealth advocates could take:**

11. Provide ongoing devices and digital literacy support to rural Appalachians, including early digital skill education via AHECs initiatives for school-aged children
12. Investigate cost-benefit models of including broadband subscription as a social service that could be funded by managed care organizations
13. Advocate for the permanent legislative changes supporting permanent increases to reimbursement, flexibility and expanded scope of telehealth services
14. Advocate for municipal and affordable internet service provision to boost broadband competition in rural Appalachia

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