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Informing telehealth public policy: Lessons learned from Virginia Telehealth usage pre-and post-March 2020

Shelly Smith
Virginia Commonwealth University

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Shelly P. Smith, DNP, APRN-BC, FAAN, FNAP

L. Douglas Wilder School of Government and Public Affairs, Virginia Commonwealth University

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Dissertation Committee:

Richard Huff, PhD, BS, MSW (chair), VCU Wilder School of Government and Public Affairs

Michael Bleich, PhD, RN, NEA-BC, FAAN VCU School of Nursing

Rebecca Etz, PhD, BA VCU School of Medicine

Robyn McDougle, PhD, BS, SW, VCU Wilder School of Government and Public Affairs

Nancy Morris, PhD, BA, BS, MS VCU Wilder School of Government and Public Affairs

Virginia Commonwealth University, Richmond, Virginia

February, 2023

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Collaborative projects result in extraordinary outcomes; as such, one must choose a team with a diverse skillset who share a collective goal. My work did not occur in isolation but rather was the result of partnering with content experts who wanted me to succeed. I am grateful for the support of my committee, without them, my success would be limited. I was fortunate to have the support of faculty colleagues outside of my committee including Dr. R.K. Elswick, Dr. Terry Jones and Dr. Sarin Adhikari. I would like to thank the chair of my committee, Dr. Richard Huff, for his professionalism and mentorship. He role modeled the ideal teacher to pupil scenario; I never felt alone in my work. My pursuit of this degree was to gain skills to improve health outcomes by addressing macrosystem issues; my committee fostered my growth in developing these important skills and for that, I express sincere gratitude.

"Alone we can do so little, together we can do so much" Helen Keller

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Abstract

INFORMING TELEHEALTH PUBLIC POLICY: LESSONS LEARNED FROM VIRGINIA TELEHEALTH USAGE PRE-AND POST-MARCH 2020

By: Shelly Smith, PhD, DNP, APRN-BC, FAAN, FNAP

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

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PhD Committee Chair: Dr. Richard Huff, Associate Professor

The enactment of Waiver 1135, in response to the COVID-19 pandemic, enabled healthcare systems to deliver care via telehealth. A descriptive analysis of the impact of Waiver 1135 on increasing access to care in Virginia was conducted. Guided by Andersen's Behavioral Model of Health Service Use (BMHSU) theory, this study used a longitudinal, monthly-level data from the Virginia's All Payers Claim Database to examine telehealth utilization rates between January 2019 and December 2020. Observations in insurance coverage, healthcare clincians role and specialty and geographic location were all examined. Results suggest that while Virginia's overall volume of telehealth services increased post Waiver 1135, contextual factors outside of payment parity negatively impacted its use for rural Virginians. This macro-level study provides a population level examination of Virginia's telehealth utilization which can inform post pandemic policy agendas.

Keywords: telehealth, COVID, Waiver 1135, healthcare utilization

A Population Level Examination of Virginia's Telehealth Utilization Pre and Post COVID-19

Chapter 1: Introduction

Telehealth is a safe and effective clinical care delivery option (Fowler et al., 2019), yet its adoption by both healthcare systems and consumers lagged until the 2020 COVID-19 pandemic. Historical barriers to telehealth use include: lack of reliable broadband access, lack of payment parity (the requirement for the same payment rate be reimbursed via telehealth as would be if it had been delivered in-person) across state lines, inability of healthcare clinicians[1] to legally provide care, limited eligible population (due to reimbursement restrictions), unprepared workforce training in telehealth methods, an office culture that does not embrace changes to support telehealth workflows, and high opportunity costs (technology costs) for specialists (Nesbitt, 2012; Kim et al., 2019). The term telehealth encompasses many forms of electronic healthcare which includes nonclinical services delivered at a distance, for example remote patient monitoring (Byrne, 2020). The Health Resources Services Administration (HRSA) broadly defines telehealth as technology to "support long-distance clinical health care, patient and professional health-related education, public health and administration" (Office of the National Coordinator for Health Information Technology, n.d.). The Centers for Medicare and Medicaid Services (CMS) categorizes telehealth as synchronous versus asynchronous and audio only versus videoconferencing; within each of these categories there are a variety of services including store and forward, remote patient monitoring and mobile health (CMS, 2020; U.S.

[1] The term healthcare clinician is used in this paper to describe any clinicial role that is authorized to bill for services; this includes physicians, advanced practice nurses, physician assistants, psychologists, licensed clinical social workers and doctors of osteopathy.

Department of Health and Human Services [HHS], 2021). As the options for telehealth increased over time, so did federal, state, local and organizational policies surrounding its use. Measuring the impact of these policies changes is complex and most studies limit their focus to telehealth usage from either a single payer or a single system (Park et al., 2018).

The events of 2020 accelerated the adoption of telehealth by shifting healthcare needs. The global COVID-19 pandemic required social distancing mandates, the conservation of limited personal protective equipment, and the prioritization of health care resources for suspected cases. The U.S. Healthcare System was prompted into delivering care in alternative formats, prompting systems to expand or in some cases, adopt, telehealth services in an unprecedented way (Centers for Disease Control [CDC], 2020). Healthcare clincians and administrators rapidly responded to the COVID disaster by transforming regulations and their daily operations. Due to the rapid influx of telehealth technologies there was limited time and opportunity to structure an evaluation of its impact at a patient, organizational, or population-level. In March 2020, as a direct response to the COVID crisis, the federal government accelerated telehealth by the passage of a payment parity plan for a time-limited period. The federal government used its authority to enact a Waiver 1135. The Waiver 1135 allows the Department of Health and Human Services to waive administrative requirements during national emergencies in an effort to increase access to care; two requirements must be met to enact a Waiver 1135:

1. Presidential declaration of a national emergency/disaster under either the Stafford Act or National Emergenices Act.
2. The Secretary of Health and Human Services declares a public health emergency under Section 319 of the Public Health Services Act. (Centers for Medicare & Medicaid Services, 2020).

The enactment of Waiver 1135 promotoed Virginians access to telehealth services and ensured that healthcare clinicians would engage with this effective care delivery model. Yet, a formal assessment of the impact of the enactiment Waiver 1135 on telehealth utilization in Virginia has not not conducted and, whether continuance of the telehealth parameters allowed for by the enactment of the Waiver is being continue by policymakers.

This research provides a population level descriptive analysis of the impact of the enactiment Waiver 1135 on telehealth utilization rates in Virginia between January 2019 and December 2020. Results from this study will offer insight into the strengths and potential liabilities of existing telehealth services, and provide direct recommendations for health care policy. The events of COVID-19 necessitated an unprecedented societal change. The impact of rapid policy changes to enable payment for telehealth is not known and warrants investigation to inform policy agendas moving forward. This is particularly relevant in areas with limited broadband capabilities.

Study Significance

Policy solutions attempt to solve wicked problems that have many root causes and are situated within a complex system (Rittel & Weber, 1973). Therefore, public policy making is often cyclic. The notion of solution shifts to repeated resolutions over time as urgency for solutions waxes and wanes based on public interest and focusing events (Goodin, Rein & Moran, 2006; Kingdon, 2011). The COVID-19 pandemic served as a focusing event, setting the tone for a shift from incrementalism toward the pluralistic approach of punctuated equilibrium model for policy making (Lindblom, 1959; Baumgartner & Jones,1993). The pandemic created conflict expansion on the topic of public health, increasing numbers of groups/subsystems focusing their attention on health equity (Schattschneider, 1960; National Collaborating Centre for Healthy

Public Policy [NCCHPP], 2018). Given the conditions surrounding the enactment of Waiver 1135, a population level examination is ideal to examine the impact of this policy modification to inform the next cycle of policymaking. Societal factors that drove the implementation of Waiver 1135 are shifting due to evolution of the pandemic and its effects. Therefore, understanding relationshipts between telehealth variables and utilization pre and post Waiver implementation can inform both policymaking and future telehealth research. Understanding these relationships is one step in achieving health equity through policymaking. Health inequity is not a new phenomenon; it is fueled by systemic classism, racism and overall societal conditions.

Overcoming these societal conditions requires public policy to address the underlying factors: economic stability, education access and quality, health care access and quality, neighborhood and built environment and social and community context (Office of Disease Prevention and Health Promotion [ODPHP], n.d.). Therefore, policy modifications can attempt to improve equitable access to healthcare by addressing enabling resources on a system level. Public policy is an enabling factor on a contextual level. When considering equitable access to telehealth, policies that address telehealth payment and broadband access serve to enable its equitable use. The focusing event of the COVID-19 pandemic prompted reactive policy changes to address telehealth payment parity. However, broadband policy did not immediately change. In this way access to broadband was a pre-disposing characteristic within the built domain. The outcomes of this research can be used to inform both Virginia's telehealth payment policies as they relate to Virginia's broadband infrastructure plans.

Research Questions

Using population level data for Virginia, this study provides a descriptive analysis of observations in telehealth utilization rates between January 2019 and 2020, with a special focus

on changes in telehealth utilization post implementation of the enactiment Waiver 1135 (March 2020). This study will examine the following questions:

1. To what extent, if any, did the advent of Waiver 1135 shift telehealth usage in Virginia?
2. To what extent, if any, did the advent of Waiver 1135 influence or shift utilization patterns and observations by
    a. Insurance coverage (public and private options)
    b. Healthcare clinician discipline and specialization (physician and other healthcare clincianss, primary care and specialists)
    c. Geographic classifications (regional differences along with metropolitan and rural designations)
    d. Patient location when receiving telehealth service
    e. Patient and/or healthcare clinicians access to broadband internet services
3. Do other contextual factors suggest a positive, neutral, or negative impact of telehealth usage by healthcare clinicians, patients, or in regions of Virginia that could inform policy options?

A review of literature, including the discussion of a pertinent theoretical framework, will explore contextual characteristics that influence a clinician's ability to delivery care via telehealth. The identification of these characteristics and their relevance to theory will support the hypotheses used to explore the proposed research questions.

Chapter 2: Literature Review

This literature review examines the contextual characteristics (themes) for telehealth utilization from a healthcare clincians/system lens. Therefore, Andersen's Behavioral Model of Health Services Use (BMHSU) framework will be explored. This framework provides an organizing structure to discuss the contextual characteristics that influence telehealth utilization. The contextual characteristics reviewed included pre-disposing characteristics for telehealth which include an exploration of healthcare clincians and system barriers and facilitators to its implementation both pre and post COVID-19. Telehealth utilization is also examined from the enabling resource perspective through review of telehealth policies both pre and post COVID-19; both Federal and State level policies are reviewed to capture all forms of insurance. Finally, the BMHSU's third contextual characteristic, need, is explored in its relation to telehealth utilization. See Appendix A for search strategy.

Theoretical Framework

History of Model

BMHSU was developed in the late 1960's by sociologist Ronald Andersen. His intention was to provide a framework to understand why families access health services. At the same time, Andersen sought to provide a mechanism to define and measure equitable access which would foster the creation of equitable access policies. BMHSU provided a framework to analyze large healthcare datasets to determine population trends (Andersen, 1995). Scholars questioned whether the model was intended for prediction versus explanation (Mechanic, 1979; Rundall, 1981). Critics claimed BMHSU did not place adequate emphasis on the impact of social networks and cultural influences on healthcare utilization (Bass & Noelker, 1987; Guendelman, 1991; Portes, Kyle, & Eaton, 1992). Andersen contended that the model is nonnormative with the purpose of discovering factors that contribute or do not contribute to utilization (Andersen,

1995). However, his consideration of feedback and the evolution of the healthcare system prompted him to collaborate with colleagues to revise the model.

The second iteration of the model appeared in the 1970's and was the result of collaboration between Aday, Andersen and a team from the University of Chicago. The reimagined model provided a broader macro system view of healthcare utilization by recognizing healthcare systems and national policy (Aday & Andersen, 1974). The model's evolution accounted for contextual characteristics that influence healthcare utilization which became increasingly significant as a result of legislated healthcare reform (Andersen, Davidson, & Baumeister, 2014). The most recent version of the model includes feedback loops to demonstrate the cyclic relationship between health behaviors and predisposing and perceived need (Andersen, Davidson & Baumeister, 2014). The emphasis on aggregate level contextual factors accounts for individual characteristics through membership. Meaning, the aggregate includes units such as families and national level organizations. The model therefore accounts for individual health behaviors as a result of both contextual and individual characteristics (Andersen, 1995).

Healthcare utilization is multifaceted and complex; Andersen's model accounts for both structural and individual factors yet allows for aggregate reporting which had led to its use in multiple populations. The advent of the electronic health record and mandated outcomes reporting created large healthcare databases which can be analyzed to determine population level outcomes. The continuous improvement of the model considered these macro level changes resulting in its current version which is broadly used in population level health research (Andersen, 2008).

Application of the BMHSU Model

The BMHSU model has been widely used to examine individual characteristics that influence healthcare services utilization. These population level studies commonly find

predisposing characteristics, particularly race, gender and socioeconomic status, and need influence utilization (Travers, Hirschman & Naylor, 2020; Pilar, Cunningham-Williams& Woodson, 2019; Guilcher et al., 2012). A systematic review of studies that used Andersen's model found inconsistencies in categorization of factors which led to the conclusion that determining the relationship between predictor variables and high order utilization constructs is important (Babitsch et al. 2012).

The BMHSU proposes to explain patients' utilization of healthcare services based on predisposing factors, enabling factors and need factors across a number of levels (Andersen, 1995 & 2008). Predisposing factors are characteristics and beliefs at the individual and contextual levels that are exogenous to health care services. Classic examples of predisposing factors include individual demographics and attitudes and beliefs about health as well as contextual factors such as cultural norms. Enabling and impeding factors likewise present at the individual or contextual level and are related to availability of tangible and intangible resources. Individual enabling factors include income and health insurance while contextual factors include resources at a population level such as the distribution of insurance or per capita income and access to broadband. Need factors are the most immediate cause for utilization as they typically represent an acute disruption of health or management of a chronic health problem.

Health Behavior: Utilization

An assumption of the BMHSU is that utilization, along with other health behaviors by individuals (personal health practices) and healthcare clincians (processes of care), influence health outcomes. Therefore, monitoring access to healthcare allows researchers to predict its utilization, promote social justice and improve efficiency of services (Andersen, Davidson & Baumeister, 2014).

Measuring access is not dichotomous but rather access is conceptualized in dimensions: potential access, realized access and equitable access (Andersen, Davidson & Baumeister, 2014). The most straightforward, realized access, is the actual use of services. For the purposes of this population level evaluation, access will be measured using telehealth claims data. The claim serves as a proxy for individual level use while simultaneously serving as an indicator of clinician use.

The potential for access relies on ensuring equitable access. Equitable access is value laden and dependent on individual interpretation. Classically, Andersen defines equitable access as possible when demographic and need factors account for variance in utilization (Andersen, 1968). Need factors are positively correlated with healthcare services utilization while enabling factors can lead to inequity if attention to social determinants are not considered (Aday, 2004; Andersen et al., 2014; Li et al., 2016). Inequitable access and its influence on social inequity occurs when social structure, health beliefs, and enabling resources determine who gets medical care (Andersen, 1995). Equitable access and its favorable effects on patient and population health occurs when utilization is well-distributed across populations and need variables account for most of the variance in utilization. Like most problems, access to healthcare and therefore, utilization, has many root causes (Rittel & Weber, 1973).

BMHSU Applied to Clinicians

In order for a health care delivery option to be utilized, it must be provided by the healthcare industry (realized access). Prior to the COVID-19 pandemic, approximately 15% of physicians in the United States delivered care via telehealth (Kane & Gillis, 2018); thereby limiting its potential access. Clinicians and health systems reported contextual characteristics that impeded its use; including lack of infrastructure and payment parity. These lack of supporting

contextual characteristics created inequitable access to telehealth services for patients. This study applies Andersen's model to clinicians use of telehealth as a care delivery model. The principles of the model remain constant despite the shift in the population. Clinicians need policy to support telehealth use to ensure equitable access.

Public Policy as an Enabling Contextual Characteristic

Policy initiatives serve as a mechanism to create enabling contextual factors which can improve health equity. Policy efforts must account for mutability in order to promote equitable access (Andersen & Newman, 1973). Individual factors such as demographics are not mutable while contextual factors such as infrastructure and payment models are mutable. Therefore, policy initiatives can impact equitable access by driving contextual changes that ensure equitable potential (Aday & Andersen, 1974). In order for policy to modify mutable factors, the factor must be considered an agenda item by policymakers.

Telehealth as policy agenda item

The "agenda universe" includes all possible societal issues (Birkland, 2011). The goal of policy makers is to advance preferred problems from the agenda universe to the systemic agenda. The systemic agenda is the furthest from legal enactment but the political community agrees that the issues in this domain merit government attention (Cobb & Edler, 1972). The ultimate goal of groups is to push their problems to the institutional agenda and then finally to the decision agenda (Birkland, 2011). Thereby, advancing their preferred solutions to problems.

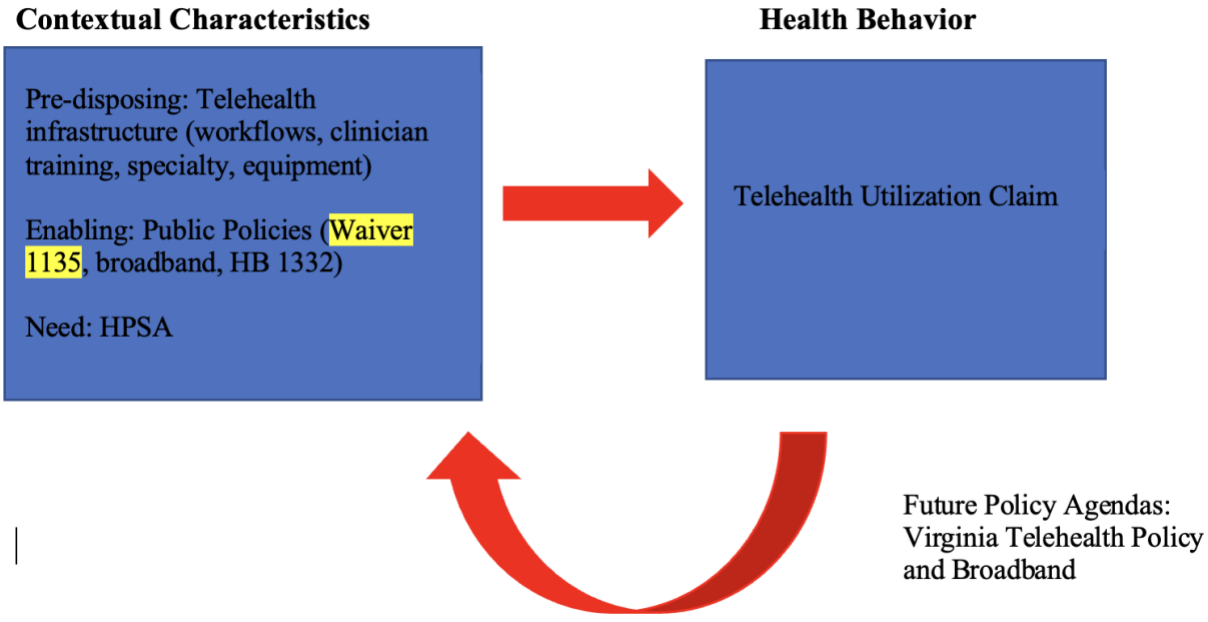
Problems are not stagnant and they are numerous in nature. Their prominence depends on systematic indicators bringing them to the forefront. Policy makers rely on indicators to monitor changes in issues and to assess their magnitude (Kingdon, 2011). Indicators alone are insufficient to push problems to the decision-making level. Rather, focusing events, crises and symbols

create a sense of urgency for problems, propelling them to the forefront of the agenda (Birkland, 2011). The COVID-19 pandemic served as a focusing event to reframe the access to healthcare problem and ensure its place on the agenda (Fisher, 1995).

To inform public policy agendas, research is needed that examines the impact of contextual characteristics. Telehealth utilization was impacted in real time by the events of COVID-19; these events shifted the needs of the entire system. Contextual level characteristics were addressed by emergency policies and procedures. Understanding the impact of which is important to inform policy agendas as society continues to grapple with the pandemic. An adaption of Andersen's BMHSU will be used to examine the impact of policy changes on Virginians utilization of telehealth services pre and post COVID-19.

Figure 1

Modified BMHSU



Note: from Andersen, R., Davidson, P. & Baumeister, S. (2014). Chapter 2: Improving access to care, pp. 33-70. In G.F. Kominski (Ed). Changing the U.S. health care system: Key issues in health services policy and management (4th ed). San Francisco, CA: John Wiley & Sons, Inc.

Contextual Characteristics

Pre-disposing Characteristics

Pre-COVID 19, adoption of telehealth services in the United States was low. Medicare claims data indicate that in 2009 less than 14,000 beneficiaries had telehealth visits and only 369 individual clinicians submitted claims for 10 or more visits (Gilman & Stensland, 2013). By 2016 the number of telehealth visits increased moderately to 9.5 visits per 1,000 beneficiaries and the majority of use was by a small number of beneficiaries (repetitive use) (Medicare Payment Advisory Commission, 2018). Pre-disposing characteristics contributed to low uptake. Contextual level pre-disposing factors for telehealth utilization include healthcare clincians individual characteristics and system readiness for adoption. Access to broadband is one such contextual factor; both patients and clinicians require access to this enabling factor. An example of how this enabling factor impacted use can be found in an analysis of 16.7 million US insurance claims between January 1, 2020 to June 16, 2020. While nearly one-third of total visits were conducted via telehealth, a lower proportion of telehealth visits occurred in rural counties (Patel et al., 2021). Rural Americans are ten times more likely to lack binary access to the internet than their metropolitan counterparts (Congressional Research Service, 2019). Telehealth utilization in rural populations is adversely impacted by health care healthcare clincians shortages, broadband access, and Medicare and commercial coverage (Jonk et al., 2020). Having broadband access is a pre-disposing characteristic; those impacted by the digital divide do not have equal opportunity to use telehealth.

Data from the National Telecommunications and Information Administration (NTIA) indicates a rapid uptake of internet use by the American public over the last thirty years with only 11% of households reporting online access in 1994 and nearly 99% reporting either fixed or mobile access in 2014 (NTIA, 1995; NTIA, 2014). This expeditious uptake coupled with the report that nearly all Americans have internet access creates a false sense of digital equity. The misconception of digital equity is rooted in the fact that primary investigations of internet access are based on binary considerations, specifically, either households have access or do not have access to the internet (DiMaggio et al., 2004). Access alone does not ensure equity; rather equal opportunity must also exist. Digital opportunity implies affordability as well as digital literacy (Davis et al., 2007). A longitudinal examination of NTIA's research publications identified the following variables as impacting one's digital opportunity: place of residence, employment status, income, educational attainment, race-ethnicity, age, gender and family structure (Davis, et al., 2007).

The Institute for Healthcare Improvement's recent report provides recommendations for overcoming digital inequity to improve telehealth uptake; improving digital skills for vulnerable populations, including the elderly is imperative to the feasibility of telehealth (Perry, Federico, & Huebner, 2021). Virginia's telehealth utilization patterns pre-Waiver 1135 align with national trends in that despite multiple modes of connection, rural Virginians do not have equal access to telehealth interventions, suggesting that digital literacy also plays a role (DeGuzman et al., 2020). The notion of digital inequity is commonly referred to as the digital divide.

While the monumental shift in healthcare delivery to telehealth was necessitated by the pandemic, it further highlighted the impact of digital divide. The population most at risk for experiencing the digital divide are those who are socio-culturally disadvantaged. Those who are

socio-culturally disadvantaged experience poor social determinants of health. Evidence clearly demonstrates that communities with poor social determinants of health experience poor health outcomes such as low birth weights and overall increases in morbidity and mortality (CDC, 2020; World Health Organization [WHO], 2020). The same variables that adversely impact health outcomes also predispose individuals to the digital divide, thus indicating the possibility that the digital divide has a duplicative effect on existing health inequities.

Other essential contextual level pre-disposing factors for telehealth utilization include healthcare clinicians individual characteristics and system readiness for adoption. Historical barriers (pre-pandemic) to telehealth use included: lack of reliable broadband access, lack of payment parity across state lines, licensing issues across state lines, limited eligible population (due to reimbursement restrictions), unprepared workforce, a culture that does not support adaptation to telehealth workflows, and high opportunity costs for specialists (Nesbitt, 2012; Kim et al., 2019).

In order for health systems to be ready to integrate telehealth services they require a trained workforce who demonstrate their willingness to use the services. Through an analysis of the 2016 National Ambulatory Medical Survey, researchers concluded primary care physicians would rely on the majority of telehealth care as telephonic only (Jetty et al., 2021). Prior to the pandemic, the adoption of telehealth was impeded by staff perceptions of its use. Directors of home health agencies (N=20) reported that "buy in" from staff and support from leadership were instrumental in the adoption of telehealth services (Kim et al., 2019). This clinician survey feedback mirrors trends in pre-COVID claims analysis.

Gilman and Stensland (2013) postulate that high opportunity costs coupled with lack of need (sufficient face to face patient panels) in their analysis of a single year of Medicare claims. Their

findings align with Yu and colleagues (2018) population level analysis. Their analysis of 2010-2015 Minnesota All Payer Claims Database reported that non-physicians were more likely to render telehealth care (lower opportunity costs) and that while telehealth utilization grew over the study period, overall utilization remained low (Yu et al., 2018). The authors concluded that physicians often cited lack of infrastructure, such as lack of equipment and workflows, as a barrier to use (Yu et al., 2018).

The COVID-19 pandemic prompted systems to rapidly offer telehealth as an option to sustain access to care during shelter in place mandates, comply with social distancing guidelines and preserve personal protective equipment. As such, systems overcame contextual level barriers in real time thereby changing their pre-disposing characteristics. In response to the COVID-19 pandemic, clinicians rapidly integrated telehealth into workflows and were optimistic about its long-term feasibility (Saliba-Gustafsson et al., 2020: Volcy et al., 2021). Specialists and healthcare clinicians who provide primary care shared optimism of its use post-pandemic, predicting up to 25% of post pandemic visits could be rendered via telehealth (Saiyed, Nguyen & Singh, 2021). The Mayo Clinic reports that after shifting back to in-person healthcare visits, 20% of Psychiatry and Psychology visits continue to be delivered via telehealth; suggesting telehealth is a sustainable option for this patient population (Gentry et al., 2021). The evidence is evolving but early trends suggest that telephonic only visits were used early in the pandemic, suggesting the importance of infrastructure to support full integration of telehealth (Volcy et al., 2021).

Telehealth utilization increased universally with clinical specialties showing greater uptake (Chu et al., 2021; Patel, et al, 2021). Early evidence of telehealth utilization in response to the COVID-19 pandemic identifies three primary facilitators to telehealth implementation in US ambulatory settings: patient engagement, operational workflow and organizational readiness, and

regulatory changes surrounding reimbursement parity for telehealth care. Key attributes to successful telehealth adoption in real time included shifts in attitudes by both clinicians and patients, administrative support to adapt workflows (Kreider et al., 2022).

Specialties who historically rely less on physical exam and more on history taking, such as psychiatry, endocrinology, and neurology had the greatest uptake of telehealth (Patel et al, 2021). While specialties that rely on a more specialized physical exams had the lowest uptake; suggesting the lack of physical exam is a barrier to full integration of telehealth (Patel et al, 2021; Saiyed, Nguyen, & Singh, 2021). This aligns with the finding that individual clinician satisfaction with telehealth as a modality correlates with the quality of video used to conduct physical exams (Saiyed, Nguyen & Singh, 2021). It is unclear if the lack of ability to conduct the physical exam is a perception versus a preference in certain clinical populations. Previously identified clinician barriers such as lack of familiarity with telehealth, were less significant than pre-COVID. Therefore, increased need may have offset previous system level barriers (Gentry et al., 2021).

Clinicians provided new insight on other contextual factors that may limit telehealth sustainability including a need for training and clinical guidelines; this gap in clinician knowledge threatens the sustainability of telehealth (Doraiswamy et al., 2021). Other threats to long-term sustainability include institutional support/infrastructure and integration of high-quality technology into existing electronic health record capabilities, patient limitations and financial considerations (Meyer et al., 2020; Gentry et al, 2021; Saiyed, Nguyen & Singh, 2021; Mohammed et al., 2021; Lieneck, Weaver & Maryon, 2021). Garfan and colleagues (2021) systematic review of telehealth utilization during the pandemic concluded the feasibility of sustained telehealth delivery post pandemic relies on the creation of privacy/security regulation

development, system/data integration and improving infrastructure to support its use. Clinicians in rural areas were concerned about inconsistent Wi-Fi and limited connectivity while urban clinicians were concerned about patients overusing virtual care services (Mohammed et al., 2021).

The pre-disposing factors for telehealth utilization changed pre and post COVID-19. The change was secondary to policy implementation and increased need. Understanding the influence of these pre and post disposing factors on telehealth utilization is an important factor in creating policy to sustain its use for appropriate patient populations.

Enabling Characteristics: Public Policy

Telehealth Payment Parity

Health policy serves as a contextual level enabling resource for utilization. Systems (and individuals) require policies that support payment. In the US context, this means health insurance coverage that adequately covers services for patients, adequately reimburses health systems, and, within an equity ideal, ensures coverage for all patients. Prior to the COVID-19 pandemic, US health systems lacked financial incentivization to integrate telehealth services due, in part, to lack of universal coverage (Kim et al., 2019). Medicare began providing payment for telehealth services in 1999 using a split model where 75% of the fee was allocated to the distant site and 25% to the originating site (Gilman & Stensland, 2013). State and federal policies aimed at improving parity of coverage for telehealth caused some uptake of its use, yet overall utilization remained disproportionately low (Neufeld et al., 2016; Harvey et al., 2019; Gilman & Stensland, 2013; Yu et al., 2018).

Despite this payment reform, usage of telehealth services by healthcare systems was low. Consequently, in 2001, the Benefits and Improvements Protection Act authorized paying distant

healthcare clinicians at the same rate as face to face encounters and eliminated the splitting of payment by instead instituting a $24 per facility to be paid to the originating site. Originating sites included ambulatory care offices, hospitals, rural health clinics, federally qualified health centers, certain renal dialysis centers, skilled nursing facilities and mental health centers. The originating site had to meet eligibility requirements such as being located in a rural health professional shortage area (Brotman & Kotloff, 2021).

The facility fee caused healthcare consumers to pay more for a telehealth visit than for a traditional face to face visit; the increased cost was a disincentive to use telehealth (Gilman & Stensland, 2013). Through a series of incremental reforms, coverage for telehealth gradually expanded to include a variety of services which led to modest increase of use but stop short of providing telehealth payment parity. For example, by 2018 Federal legislation passed to reimburse for stroke telehealth care to include mobile stroke units (Bipartisan Budget Act, 2018). While telehealth utilization gradually increased among fee-for-service Medicare enrollees between 2006 and 2016; utilization remained low with visits reported as 9.5 visits per 1,000 beneficiaries (Medicare Payment Advisory Commission, 2018). Federal incremental policy changes addressing telehealth payment parity resulted in only slight adoptions of telehealth use.

Pandemic Policies

The COVID 19 pandemic shifted needs and as such the US Healthcare System was accelerated into offerring telehealth services system wide, regardless of payment parity. On March 17, 2020, as part of the Coronavirus Preparedness and Response Supplemental Appropriation Act, the Secretary of the Department of Health and Human Services enacted the Social Security Act Section 1135 (Waiver 1135) which expanded access to telehealth services by allowing Medicare to reimburse for telehealth services in broader circumstances.

Waiver 1135 enabled telehealth utilization on a population level by approaching payment parity for telehealth services. Specifically, Waiver 1135 mandated that telehealth visits be paid at the same rate as traditional face to face visits, pay for professional services delivered to patients in all settings (including the patient's home), allowed for audio only visits and reduce cost-sharing for telehealth visits in federal healthcare programs (CMS, 2020). The contextual enabling factor of payment parity was partially addressed by Waiver 1135 in that it set the tone for all insurance companies to follow CMS's lead. The adoption of telehealth services by both health care organizations and consumers of healthcare exemplifies the importance of insurance coverage an enabling factor.

COVID prompted other immediate policy changes in an effort to promote the up of telehealth and avoid disruptions in care. The US Department of Health and Human Services Office for Civil Rights issued a Notification of Enforcement Discretion in March of 2020. This allowed clinicians expanded use of all communication tools under a good faith provision thereby preventing facing penalties imposed by the US Department of Health and Human Services Office for Civil Rights for violations of the Health Insurance Portability and Accountability Act of 1996 (HIPAA). This act allowed clinicians and patients to use popular technology such as FaceTime and the Google Suite to interact during the pandemic, regardless if the care rendered was to treat COVID or not (Office for Civil Rights, n.d.).

On December 3, 2020, the Department of Health and Human Services, Office of the Secretary announced a fourth amendment to the Public Readiness and Emergency Preparedness (PREP)Act. This amendment precluded state and local governments from enforcing more restrictive policies that keep "qualified persons" from administering countermeasures recommended by a PREP Act declaration. Specifically, allowing for interstate practice of

telemedicine to improve public health outcomes in an emergency. This amendment provides liability protection when delivering specific COVID-19 related services, expands telehealth access, and makes it easier to treat and prevent COVID-19. In addition, the amendment made it possible for individuals to provide care across state lines using telehealth (Department of Health and Human Services, Office of the Secretary, n.d.).

Collectively, these emergency acts removed barriers to telehealth implementation by creating payment parity, liberalizing where services could be rendered, alleviating fears of repercussions for using less secure but more affordable technology and lifting state licensing restrictions.

Virginia Telehealth Payment Policies

As the case with Federal policy, Virginia's legislative body has taken incremental steps in increasing access to telehealth services by addressing payment. In 2015, Virginia code was amended to expand commercial insurance coverage of telehealth services. The following year, the Virginia General Assembly passed SB 369 which funded a pilot telehealth program with the goal of expanding medical services in rural communities (Virginia LIS, n.d.). The primary focus of the pilot was to assess the effectiveness of telehealth technology enabled patient care teams to improve access to care to underserved populations. Telehealth technology would essentially provide as a mechanism for rural nurse practitioners to collaborate with physicians by providing technology, training and protocols. Seven sites including Federally Qualified Health Centers, free clinics, nurse managed clinics and hospital clinics were provided the aforementioned telehealth resources. The outcomes revealed that many barriers existed to this proposed access solution. Notably, the 2-year pilot concluded that access to technology alone was not sufficient in overcoming external structural barriers (Commonwealth of Virginia, 2017). The report concluded that technology and training are imperative but alone cannot drive utilization

suggesting that managing individual's perceptions and processes of care was challenging. Fear of change, skepticism of telehealth efficacy and lack of digital skills were all cited as barriers (Commonwealth of Virginia, 2017).

Virginia's Medicaid program and most private insurers in the state followed CMS's lead in creating temporary payment parity for telehealth services in 2020 as allowed for by the implementation of the Federal Waiver 1135. Ironically, just prior to statewide shelter in place mandates related to the pandemic, HB 1332: Telehealth services, definition was passed by Virginia's General Assembly. The bill requires the creation of a Statewide Telehealth Plan that addresses the following provisions: the use of remote patient monitoring services and store-and-forward technologies, including in cases involving patients with chronic illness; the promotion of the inclusion of telehealth services in hospitals, schools, and state agencies; and a strategy for the collection of data regarding the use of telehealth services (Virginia LIS, n.d.). The creation of the Statewide Telehealth Plan must consider equitable access as part of its goal. Virginia's 2016 investment in the telehealth pilot program concluded that funding alone was insufficient to support full implementation of telehealth. As Virginia considers the possibility of telehealth as a mechanism to improve access to care, larger infrastructure considerations must be considered.

Need

Need is often the most predictive variable when using Andersen's model (Graham et al., 2016; Pilar et al., 2019). Examining need on a contextual level requires the consideration of population level indices. From a population level, need implies a sufficient workforce to meet the healthcare demands of a specific population. HRSA and the State Primary Care Offices (PCOs) collaborate to determine Health Professional Shortage Areas (HPSA); HPSA are further divided into three categories: dental, primary care and mental health. Virginia has one hundred and

twenty-four primary care HPSAs (Kaiser Family Foundation [KFF], 2021). The Virginia Office of Health Equity (VOHE) identifies communities with the greatest health disparities and collaborates with key stakeholders to overcome barriers, such as access to primary care. Virginia's rural communities demonstrate persistent healthcare shortages with the greatest shortages demonstrated in Lee, Scott, Rockbridge, Danville counties (Virginia Department of Health, 2016; Sherlock, 2022). Access to primary care is not the only problem Virginia's rural communities face. The Virginia Healthcare Foundation (VHF) recent assessment of access to behavioral health identified that seventy percent of Virginia's localities are deemed mental HPSAs; signifying that over three million Virginians lack access to behavioral health services (VHF, 2022).

Telehealth is documented as an important mechanism to increase access to preventive and specialty care among rural underserved populations, where access is negatively affected by transportation barriers and healthcare workforce shortages (Kearly et al., 2020). As such, the VOHE's 2016 Primary Care Needs Assessment proposed telehealth utilization as a mechanism to overcome access disparity. The report specified three criteria to make telehealth feasible: site must 1) have technology and broadband connectivity, 2) exist in a supportive regulatory environment, and 3) employ clinicians trained in telehealth (Virginia Department of Health, 2016). Similarly, telehealth is often viewed as an option to improve access to behavioral health services given that there is a limited physical exam (KFF, 2022).

However, rural communities are disproportionately impacted by a lack of broadband connectivity. Eighty-two percent of Virginian households' report having an internet connection, yet over 600,000 homes and business in Virginia lack access to high speed internet (Pew Foundation, 2020). The majority of these cases are found in Southwest, Southside and the

Tidewater regions of the state. Residents in these same localities have some of state's poorest health outcomes (Robert Woods Johnson, 2019). The area of Virginia with persistent need does not have the required contextual enabling factor of broadband to make this option feasible.

Summary

Pre-COVID 19, telehealth utilization by US healthcare system was low, particularly among primary care clincians (physicians, nurse practitioners, physician assistants, doctor of osteopathy). Specialty healthcare clincianss were the most common utilizers of telehealth pre and post pandemic, likely due to less reliance on physical exam. Rural areas were the least likely to have access to telehealth pre and post pandemic as they lacked the enabling resource of access to broadband. Barriers to telehealth use included lack of workflows and clinician perceptions; yet, when accelerated to implement telehealth due to increased need created by the pandemic, clinicians and systems were able to overcome barriers in real time. This uptake was facilitated by pandemic policies addressing payment parity, licensing and HIPPA. The rapid uptake of telehealth in response to increased need aligns with Andersen's model. The sustainability of this uptake is in question as a main barrier to telehealth utilization was not addressed by pandemic policies; specifically, access to reliable, high-speed broadband.

Understanding these contextual factors can inform policy agenda setting post-COVID-19. Policy initiatives should promote effective and efficient access of healthcare services so that population health status and satisfaction can improve relative to the amount of services consumed (Aday et al., 1993). More importantly, policy initiatives can target contextual level enabling characteristics to improve equitable access to telehealth. The review of literature identifies a gap in the literature in understanding the impact of the enabling factor, emergency

Waiver 1135. The BMHSU provides a framework for population level analysis of Virginia's telehealth utilization pre and post COVID-19 to facilitate understanding of the waiver's impact.

Hypotheses

The review of literature supports the follow hypotheses regarding telehealth utilization in Virginia:

1. Waiver 1135 is associated with healthcare clincianss of care increasing telehealth utilization to improve access to care for:
    a. Primary care
    b. Specialty care
2. Changes in telehealth utilization post Waiver 1135 vary by geographic location for:
    a. rural and urban designations
    b. Rural HPSA designated areas
3. Changes in telehealth utilization post Waiver 1135 by patients will vary by location of service:
    a. Home
    b. Office
    c. Other facility

Chapter 3: Methodology

Research Design

Guided by Andersen's Behavioral Model of Health Service Use (BMHSU) theory, this study used longitudinal, monthly-level data from the Virginia's All Payers Claim Database to examine telehealth utilization rates between January 2019 and December 2020. This macro-level study provides a population level examination of Virginia's telehealth utilization. This study focuses on telehealth utilization during two distinct periods; 2019 and 2020 and therefore does not represent trends but rather observations. The study explores the correlations (as opposed to causation) between variables and Virginia's telehealth utilization. While non-experimental, correlational studies advantages include lack of manipulation of variables and allowing for examination of naturalistic observations. Studing naturaling occurring relationships as opposed to caustion provides evidence that is transferrable to real life scenarios, making correlational studies an ideal evaluation process to study complex phenomena. This project built on the methods used by Yu and colleagues in their 2018 examination of Minnesota's population level utilization of telehealth services using the Minnesota All Payer Claims Database (Yu et al., 2018). Telehealth reimbursement codes signify the delivery of telehealth services by clinicians in Virginia.

Data Source

No new (original) data or identifiable data were collected for the study. The data source for this study was Virginia's APCD. APCDs represent a new approach to data collection for health services research introduced by the Agency for Healthcare Research and Quality (AHRQ) (AHRQ, 2017). Before the advent of state-level APCDs, available administrative datasets were limited by payer groups (e.g. Medicare and Medicaid) and/or levels of care (e.g. inpatient discharge claims). APCDs allow creation of a more comprehensive picture of care for population

level analysis. By collecting data from all payers, state APCDs capture encounters for almost all patients across settings and healthcare clincianss, thus capturing full episodes of care and enabling the identification of variations in the type of care received within populations.

Virginia APCD's is managed by a collaborative effort between the Virginia Department of Health (VDH) and the Virginia Health Innovation (VHI). Virginia's APCD includes over 260 data fields. Each claim submitted to the Virginia APCD includes information such as patient demographics, location of care across all settings, who provided care to the patient, any diagnoses presented by the patient, and the actual allowed amount or "cost" of a particular service (Virginia Health Innovation, n.d). VDH/VHI staff de-identifies the claims data and makes the data file available to health services researchers to answer specific research questions. An encrypted unique key is provided by VDH/VHI that can be used to link services to the same patient over time.

The dataset is robust, capturing the overwhelming majority of claims in Virginia. This is resultant of Virginia Senate Bill 1216 which mandated reporting by insurers of individual or group sickness insurance policies, third party administrators/entities that collect or settle healthcare claims for at least 1,000 Virginia covered lives or who do so on behalf of an employer, the Virginia Department of Medical Assistance Services (DMAS), state government health insurance plans, local government insurance plans and federal health insurance plans to the APCD. This act went into effect in July 2019 (Virginia LIS, n.d.).

The dataset includes descriptive information about each individual telehealth claim. See Appendix B. These categories include specifics about date of service (month, date, year, quarter), payment (date, status, allowable charge), primary international classification diagnosis, insurance type and eligibility, location of service (facility type/specifics), geographic location of service

(zip codes), member (demographics, health district, age banding), clinician (specialty, professional role, location) and visit (procedure code, CPT classification).

Sample

The sample in this study consists of telehealth encounters between patients and clinicians that occurred between January 2019 and December 2020.[2] Population was identified using telehealth reimbursement codes as described above. The Virginia APCD file was obtained from VHI/VDH. Under the guidance of a consultant from VHI, the reimbursement codes were used to filter the claims data and identify encounters billed for telehealth services only. All patient encounters billed for telehealth services during the study period were included in the study. The primary unit of analysis is the telehealth visit defined as the services provided to a client; all telehealth claims, specialty and primary care were included in the analysis.

Variables

Recoding of the encrypted data file was necessary to manage the large data set. The primary dependent outcome variable was frequency of telehealth service encounters. The telehealth service claim served as a proxy for delivery of a telehealth visit by a clinician. The telehealth claim is representative of either a standard office visit or a consultation/new patient. The American Medical Association maintains the numeric coding system of common procedural codes (CPT) that are used by healthcare professionals to bill both private and public insurance (CMS, 2020). These codes were used to determine if a telehealth visit occurred.[3]

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[2] Virginia requires mandated reporting to the APCD and APCD captures approximately seventy-five percent of claims. However, the 2016 Supreme Court ruling in Goveille v Liberty Mutual Insurance company ruled that self-insured employer plans under the federal Employee Retirement Income Security Act (ERISA) are not mandated reporters. Therefore, this group's claims are not included in the analysis.

[3] CPT for a new patient evaluation will be designated by the evaluation and management codes: 99201, 99201, 99203, 99204 and 99205. While the evaluation and management CPT codes 99211,99212, 99213, 9924 and 99215 will designate follow up visits. The claim must also include the 02 place of service

The independent variable was the enactment of Waiver 1135 which occurred in March 2020. New variables were created to capture insurance type, healthcare clincians characteristics and geographic location of the patient. Below is a discussion of the coding schema that was used to create the new variables. See Appendix C.

Variable: "Service Healthcare clincians Specialty Category" was collapsed as either medical specialty (cardiology, endocrinology, etc.), primary care or behavioral health services which includes psychology, neuropsychology and addiction health. Healthcare clincians specialty category was recoded as Psychology/Psychiatry, Neuropsychology and Addiction (1), Other Medical Specialties (2), Primary Care (internal medicine, family practice and general care) (3) and Unable to Determine (4).

Variable: "Healthcare clincians Discipline" will be recoded as Medicine (1), Nursing (2), Physician Assistant (3), Social Worker (4), Clinical Psychologist (5), Physical Therapist (6), Facility (skilled nursing facility, long term care facility) (7), Other (8) and Unknown (9).

Variable: "Classification of Service Healthcare clincians State" was coded as Virginia (1), Border State (2) or Non-Border state (3). Border states include North Carolina, Maryland, West Virginia and Kentucky.

Variable: "Geographic location of service" is coded in the master data in accordance with the US Department of Agriculture's Rural Urban Commuting Area (RUCA) codes. This classification system was developed based on 2010 census and American Community Survey results; it parallels the Office of Management and Budget's system for defining metropolitan and micropolitan areas. The RUCA classification system contains ten primary codes. These ten codes

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modifier and a CPT modifier 1 or 2 of either 95, GT or GQ to designate that care was delivered via telehealth (as opposed to face to face). The evaluation CPT codes 98970, 98972, 98973, G2010, G2012, 99421, 99422 and 99423 are included as each indicates a telehealth claim

will be recoded based on the 2022-2026 State Rural Health Plan (Virginia Rural Health Plan, n.d.). This plan used the Office of Management and Budget Standards (OMB) classification for metropolitan, micropolitan, and non-metropolitan counties. In Virginia, micropolitan and nonmetropolitan counties are classified as rural, while metropolitan counties are classified as non-rural. This system is county-based, because while some data is reported at the sub-county level, much more is available at the county level. RUCA codes 1-3 were recoded as metropolitan (1), RUCA codes 4-10 were coded as rural (2) and RUCA code 99 was coded as unknown (3).

Variable: "Place of service" refers to the location where telehealth services were rendered. This was coded as home (1), office (2), other facility (inpatient hospital, emergency room) (3) and unknown (4).

Variable: "Insurance Type" was recoded as Medicaid (1), Medicare (2) and Commercial (3). Insurance type refers to the payer source for the claim, public insurance refers to either publicly funded insurance plans through either the state (Medicaid) or Federal government (Medicare). Commercial insurance does not rely on government funding and is typically funded through individual consumers of healthcare with cost sharing by their individual employer.

Data Analysis

This study quantitatively analyzed patterns of telehealth utilization between January 2019 and December 2020 in Virginia. First, descriptive statistics were used to determine annual baseline telehealth utilization rates for 2019 and 2020. This initial analysis examined rates of telehealth use per 10,000 enrollees by coverage type, including enrollees in the denominator if they had any professional service claims during the year and will include geographic descriptors by zip code. The numerator consisted of the telehealth population, or all patients who encountered a telehealth claim in the specified year. To control for multiple claims by one

patient, unique patient identification keys were used to identify duplicates. The initial patient encounter was coded as the index visit.

Second, a descriptive analysis examining quarterly telehealth utilization rates was conducted to examine changes pre and post Waiver 1135 implementation (March 2020).

Third, this study examines quarterly telehealth utilization rates across several types of contextual characteristics, such as healthcare clincians specialty, healthcare clincians role, healthcare clincians state, geographic region of care, place of service and insurance type. The enabling resources of broadband access and clinical infrastructure did not change.

Chapter 4: Findings

Descriptive Statistics

The sample for this study consisted of telehealth claims made in Virginia from January 1, 2019 to December 31, 2020. The total number of claims in the sample was 9,820,060 with 1,670,189 claims in 2019 and 8,149,871 claims in 2020. Telehealth claims increased by 4.9 fold in 2020 when compared to 2019. Telehealth increased from 1.95% of distinct claims in 2019 to 9.75% of distinct claims in 2020. Total health care utilization claims (telehealth and all other claims combined) dropped from 2019 (N = 85,582,381) to 2020 (N = 83,559,157). Table One displays annual percentages of telehealth utilization by insurance type, service place, healthcare clincians specialty, healthcare clincians role and healthcare clincians state for 2019 and 2020.

The initial analysis consisted reviewing quarterly totals for each sample. See Appendix D for Quarterly Tables. Descriptive analysis of the 2019 and 2020 data by quarter failed to demonstrate variability in insurance type, service place, healthcare clincians specialty, healthcare clincians role and healthcare clincians state. Therefore, annual percentages of telehealth claims by insurance type, service place, healthcare clincians specialty, healthcare clincians role and healthcare clincians state for 2019 and 2020 are discussed.

Table 1

Annual Percentages of Telehealth Utilization in Virginia

	2019		2020	
Insurance Type	**N**	**Column %**	**N**	**Column %**
MA (Medicaid)	877852	43.45%	2511111	30.81%
MC (Medicare)	602435	29.82%	3537369	43.40%
CO (Commercial)	540129	26.73%	2101391	25.78%
Service Place				
Home	273990	13.56%	1991151	24.43%
Office	518549	25.67%	1833682	22.50%
Other Facility	490053	24.26%	1964485	24.10%
Other Not Specified	737824	36.52%	2360553	28.96%
Healthcare clincians Specialty				

	2019		2020	
Insurance Type	**N**	**Column %**	**N**	**Column %**
Internal Medicine, Family Practice, General Care	71826	3.65%	418554	5.27%
Other Specialty	1588829	80.69%	7030374	88.53%
Psych, Neuropsych, Addiction (Behavioral Health)	308355	15.66%	492181	6.20%
Healthcare clincians Role				
Clinical Psychologist	51134	2.60%	161508	2.03%
Facility	796133	40.43%	2532382	31.89%
Medicine	1020642	51.84%	4843796	61.00%
Nursing	62533	3.18%	237988	3.00%
Other	934	0.05%	3061	0.04%
Physician Assistant	15288	0.78%	91503	1.15%
Social Work	22346	1.13%	70871	0.89%
Healthcare clincians State				
Border State	215142	10.71%	963778	11.90%
Non-Border State	145723	7.25%	569315	7.03%
Virginia	1648420	82.04%	6568807	81.08%
Patient Geographic Location				
1 Metropolitan	1286361	64.12%	6929226	85.69%
2 Rural	719725	35.88%	1157520	14.31%

Insurance Type

In 2019, public insurance accounted for the majority of claims with Medicaid at 43.45%, and Medicare at 29.82%; commercial insurance accounted for the remaining 26.73%. In 2020, public insurance continued to be dominant, however, Medicare filed the bulk of claims (43.40%) with Medicaid only filing 30.81%. Commercial insurance remained fairly constant at 25.78%. Public insurance remained the primary payer source, however, state funded insurance was more predominant in 2019 with Federal funded insurance more dominant in 2020.

Healthcare clincians Role

Various types of healthcare clincianss are able to bill for telehealth services; billing healthcare clincianss were categorized by their professional role. In 2019, medicine (physicians) provided half of all telehealth services (51.84%) with facilities representing the next largest

percentages of claims at 40.43%. In 2020, medicine (physicians) filed the majority of claims (61.00%) with facilities filing the second highest percentage, 31.89%. The percentage of telehealth claims filed by medicine (physicians) increased from 2019 to 2020; the only other discipline with an increase were physician assistants who rose from 0.78% of claims in 2019 to 1.15% of claims in 2020. All other disciplines experience a decrease in percentage of claims from 2019 to 2020.

Healthcare clincians State

Telehealth services can be rendered by out of state healthcare clincianss; in 2019 those healthcare clincianss would require licensing in each state that the billed while provisions in 2020 made interstate operability possible. Healthcare clincians state refers to the physical location of the billing healthcare clincians at the time the telehealth service was rendered. In 2019, the vast majority of claims were submitted by Virginian clinicians (82.04%) with border states filing more claims than non-border states, 10.71% and 7.25% respectively. The pattern of claims filed in 2020 was the same as though filed in 2019 with vast majority of claims were submitted by Virginian clinicians (81.08%) and border states filing more claims than non-border states, 11.90% and 7.03% respectively.

Analysis of Hypotheses

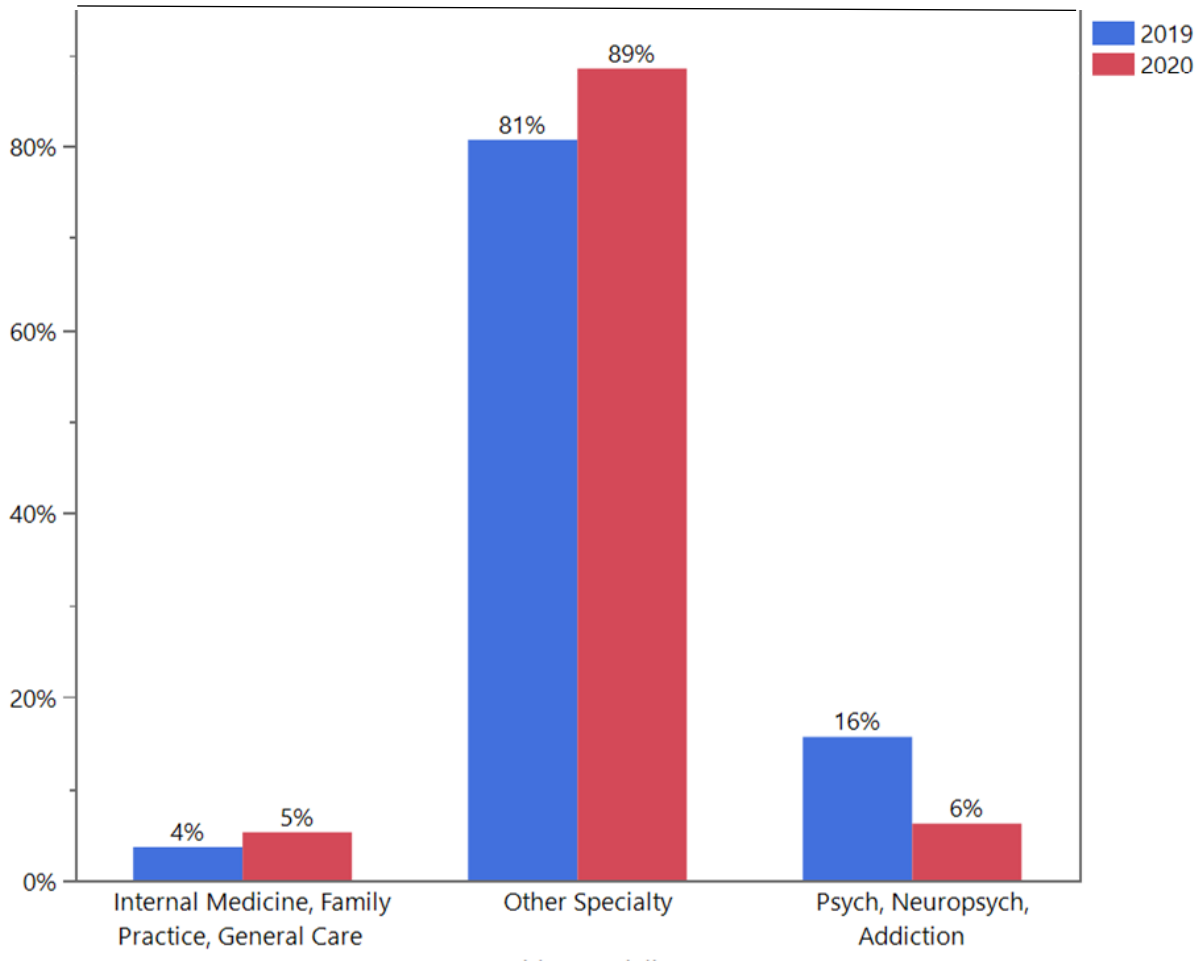
Hypothesis #1 questioned the association of Waiver 1135 on telehealth utilization in Virginia as a mechanism to increase access to both primary and specialty care. To explore access to both primary care and specialty care, the healthcare clincians specialty uses were analyzed by year. Annual analysis indicates that access to primary care via telehealth increased between 2019 and 2020. See Figure Two. Total primary care visits in 2019 were 71,826 while total volume of

visits in 2020 were 418,554; constituting 3.65% versus 5.27% percent of all telehealth claims respectively.

The volume of other medical specialty care visits increased from 2019 (n=1,588,829) to 2020 (n=7,030,374) as did the percentage of telehealth specialty claims (80.69%, 88.53%). While the overall volume of behavioral health claims increased from 2019 to 2020, the percentage of telehealth claims that were filed by behavioral health dropped from 15.66% in 2019 to 6.20% in 2020.

Figure 2

Healthcare clincians Specialty for 2019 and 2020



The analysis failed to demonstrate quarterly variance in telehealth utilization in either 2019 or 2020. See Appendix D. However, Waiver 1135 was implemented at the end of Q1 in 2020 which coincided with Virginia's shelter in place mandates. Therefore, 2020 quarterly utilization of telehealth services was further explored to identify longitudinal observations that may have correlated with clinical adaption to telehealth as patients complied with shelter in place mandates. The percentage of primary care and other specialty did not significantly vary by quarter, remaining consistent with annual percentage rates. See Appendix D. Psychology/psychiatry, neuropsychology, addiction (behavioral health) specialties experienced an initial increase between quarter one (5.65%) and quarter two (7.53%) but then dropped and remained consistent between quarters three and four. The analysis did not demonstrate an increase in telehealth claims after shelter in place mandates took effect.

Hypothesis Two

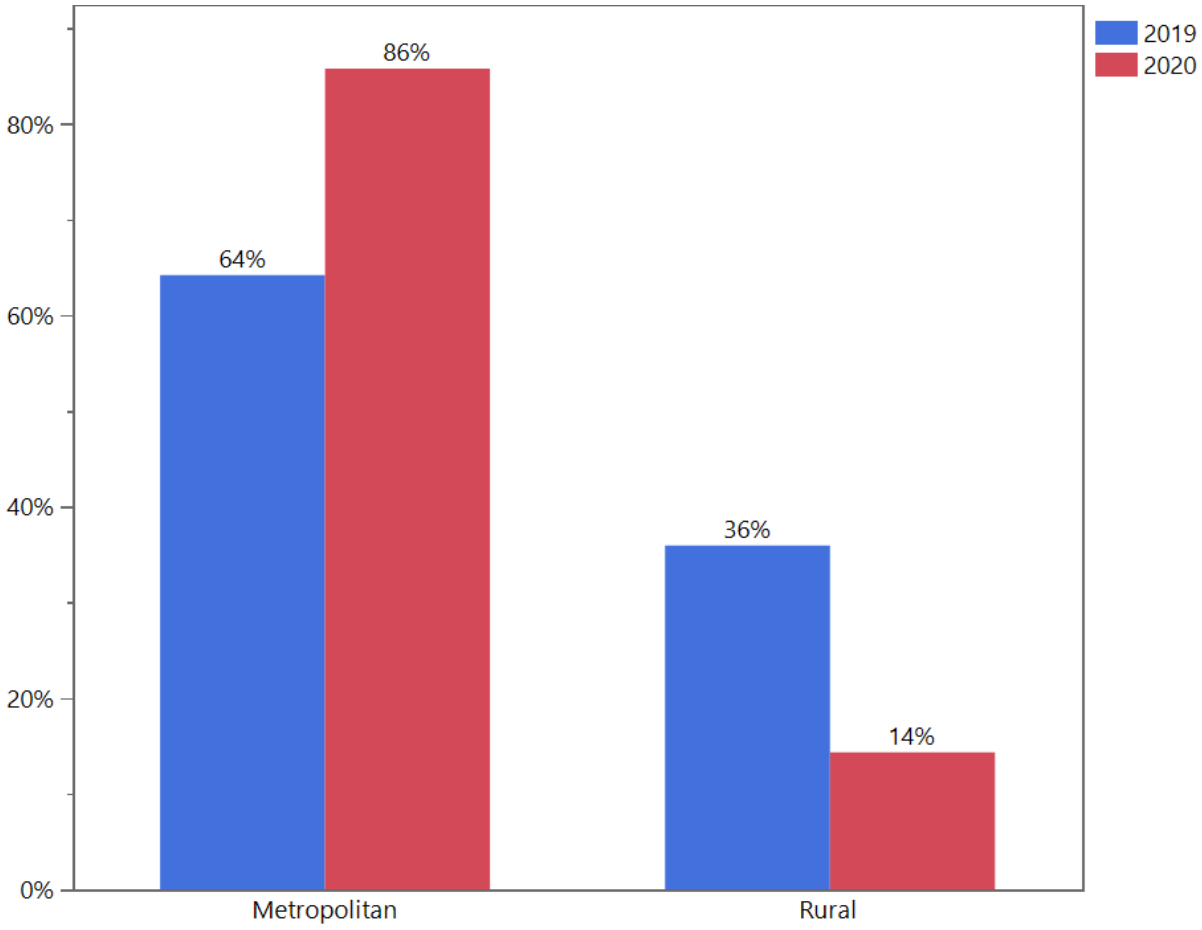
Hypothesis #2 explored the association between the enactment of Waiver 1135 and observations in utilization by geographic region to include health care healthcare clincians shortage areas (HPSA).

Annual observations for metropolitan versus rural telehealth utilization were explored through a descriptive analysis of geographic location. See Table One. The geographic location at the time of the telehealth service refers to the physical location of patient at the time telehealth services were rendered. There was a change in observations when comparing 2019 and 2020. The majority of claims were provided to those in metropolitan areas in both 2019 and 2020; the percentage increased from 2019 (64.12%) to 2020 (85.69%). In 2019, 35.88% of claims were rendered to those in rural areas and in 2020, this number dropped to 14.31%. The distribution of claims for metropolitan versus rural changed significantly between 2019 and 2020; metropolitan

claims increased by 25.67 percentage points while rural claims dropped by 21.57 percentage points. See Figure Three.

Figure 3

Geographic Location of Patient



Hypothesis two examines Waiver 1135's impact on telehealth utilization in Virginia's HPSAs. HPSAs are divided into primary care and mental (behavioral) health shortage areas. Rural areas are more likely to be designated as HPSAs; meaning need for care is higher in these regions. The Rural Health Information Hub (RHIH) uses data collected the Health Services and Research Administration (HRSA) to create maps of Virginia's HPSAs. Figure four depicts Virginia's nonmetropolitan (rural) Mental Health HSPA by county; figure five depicts Virginia's

nonmetropolitan (rural) Primary Care HPSA by county. The majority of Virginia's rural mental health and primary care are HPSA counties are located along the state's borders. Conceptually clinicians living along borders are more likely to hold a license in two states making rendering care possible in both states to meet increased demand.

Figure 4

Mental Health Rural HPSA

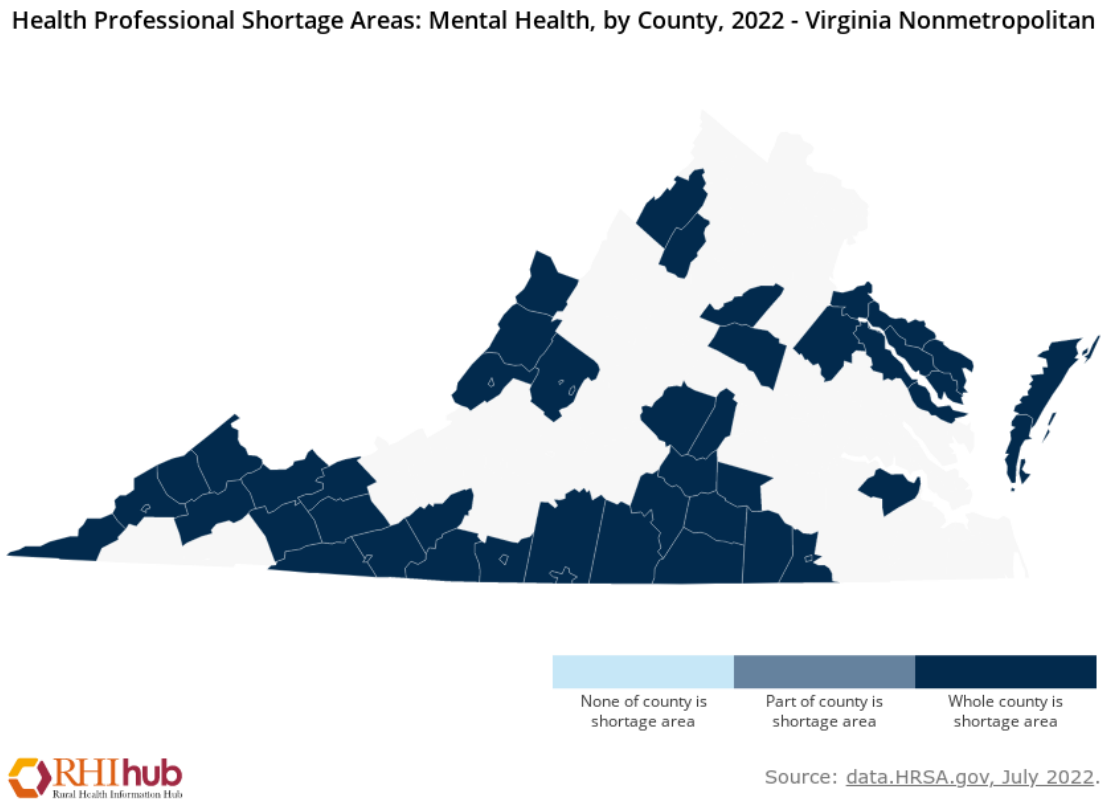
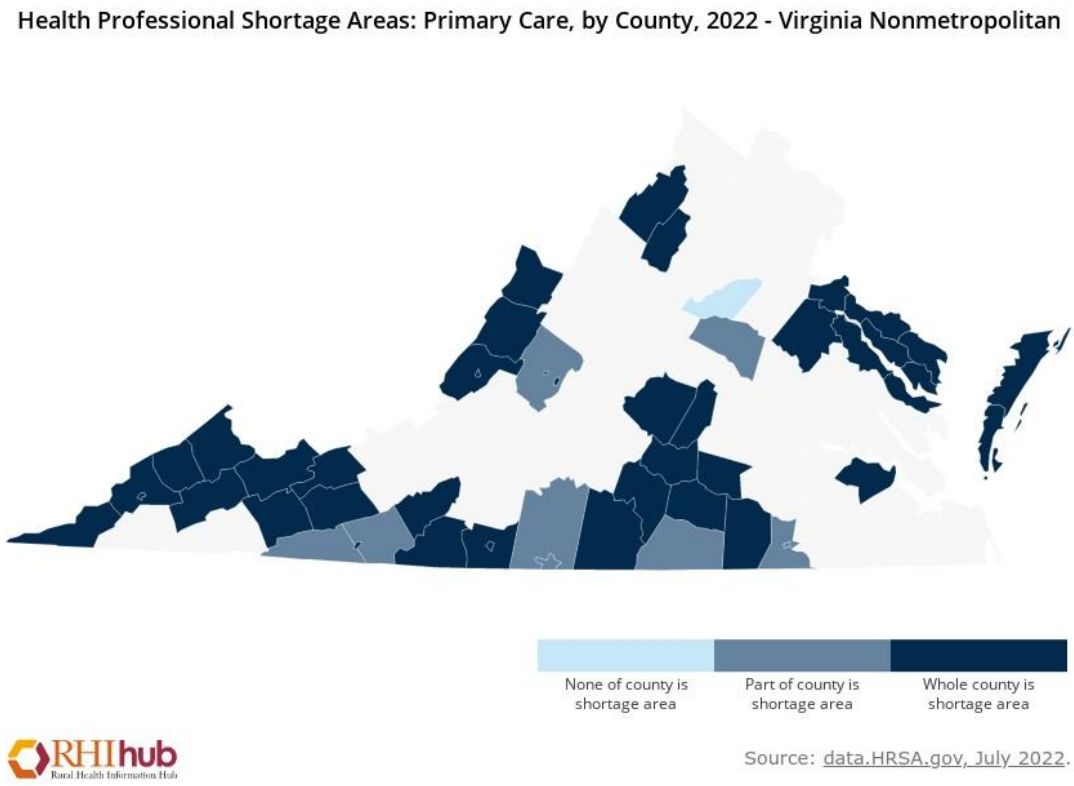


Figure 5

Primary Care Rural HPSA



Note: Maps are downloaded from The Rural Health Information Hub which is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services under Grant Number U56RH05539. The data visualization chart gallery by state is available for download at: https://www.ruralhealthinfo.org/charts/states

Post Waiver 1135, licensing requirements for out of state healthcare clincianss to render care via telehealth were relaxed. Conceptually, to meet demands, rural dwelling residents in HPSAs may have been more likely to receive care from border state healthcare clincianss. Given these contextual elements, contingency analysis for geographic location and healthcare clincians state was conducted. See Tables Two and Three. A two by three way contingency table analysis for both 2019 and 2020 were conducted to evaluate whether healthcare clincians state was associated with the geographic location of the patient. The variables were healthcare clincians

state (border, non-border and Virginia) and geographic location of the patient (metropolitan, rural). A chi-square test of independence was performed to examine the relationship between healthcare clincians state and geographic location. For 2019 data, the association between these variables was significant, X^2 (2, N =1994994) = 4663.36, $p < .0001$. Likewise, for 2020, the association between these variables was significant X^2 (2, N = 8038879) = 10046.52, $p < .0001$. Living in a metropolitan area was associated with receiving telehealth services from Virginian healthcare clincianss as well as healthcare clincianss in border and non-border states. Living in a rural region was not associated with receiving care from a border state.

In 2019, 65.73% of TH claims filed by border state clinicians were delivered to metropolitan patients while 34.27% of TH claims filed by border state clinicians were delivered to rural dwelling patients. While in 2020, 82.28% of TH claims filed by border state clinicians were delivered to metropolitan patients while 17.72% of TH claims filed by border state clinicians were delivered to rural dwelling patients. In 2020, rural dwelling patients received a lower percentage of claims from border state clinicians than they did in 2019.

Table 2

Contingency Analysis of Healthcare clincians State By Patient Geographic Location for 2019

Count Column %	Border State	Non-Border State	Virginia	Total
Metropolitan	140,109 65.73%	103,515 71.79%	1,033,195 63.09%	1,276,819 64.00%
Rural	73,041 34.27%	40,678 28.21% 5.66	604,456 36.91% 84.17	718,175 36.00
Total	213,150 10.68%	144,193 7.23%	1,637,651 82.09%	1,994,994

N	DF	-LogLike	RSquare (U)
1994994	2	2404.0002	0.0020

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	4808.000	<.0001*
Pearson	4663.356	<.0001*

Table 3

Contingency Analysis of Healthcare clincians State By Patient Geographic Location for 2020

Count Column %	Border State	Non-Border State	Virginia	Total
Metropolitan	788,592 82.28%	490,140 86.69%	5,603,762 86.01%	6,882,494 85.62%
Rural	169,885 17.72%	75,272 13.31%	911,228 13.99%	1,156,385 14.38%
Total	958,477 11.92%	565,412 7.03%	6,514,990 81.04%	803,8879

N	DF	-LogLike	RSquare (U)
8038879	2	4782.2923	0.0010

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	9564.585	<.0001*
Pearson	10046.52	<.0001*

As a mechanism to gain insight into HPSA use, particular attention was focused on the association between rural geographic location and primary care and psychology/psychiatry, neuropsychology, addiction (behavioral health) specialties. Two by three way contingency table analysis for both 2019 and 2020 were conducted to evaluate whether healthcare clincians specialty was associated with the geographic location of the patient. See Tables Four and Five. The variables were healthcare clincians specialty (internal medicine/family practice/general care,

other specialty and psychology/psychiatry, neuropsychology, addiction) and geographic location of the patient (metropolitan, rural). A chi-square test of independence was performed to examine the relationship between healthcare clincians specialty and geographic location which was significant, X^2 (2, N =1954792) = 17829.12, $p < .0001$ for 2019 and X^2 (2, N = 7880024) = 94801.38, $p < .0001$ for 2020.

In considering column values for both 2019 and 2020, individuals living in metropolitan areas were the primary users of telehealth services for all healthcare clincians types. In metropolitan areas, the percentage of claims for the three healthcare clincians specialties increased when compared to 2019. While rural areas experienced a decrease in claims across all three specialties in 2020, including claims for both types of HPSAs, primary care and behavioral health services. Telehealth claims for primary care (internal medicine, family practice, general care) delivered to rural dwelling patients decreased from 26.88% in 2019 to 11.89% in 2020. Telehealth claims for behavioral health (psychology/psychiatry, neuropsychology, addiction) services for rural patients dropped from 46.10% to 29.32% in 2020.

Table 4

Contingency Analysis of Healthcare clincians Specialty By Patient Geographic Location for 2019

Count Column%	Internal Medicine, Family Practice, General Care	Other Specialty	Psych, Neuropsych, Addiction	Total
Metropolitan	52,228 73.12%	1,033,828 65.56%	165,211 53.90%	1,251,267 64.01%
Rural	191,99 26.88%	543,014 34.44%	141,312 46.10%	703,525 35.99%
Total	71,427 3.65%	1,576,842 80.67%	306,523 15.68%	1,954,792

N	DF	-LogLike	RSquare (U)
1954792	2	8760.8558	0.0077

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	17521.71	<.0001*
Pearson	17829.12	<.0001*

Table 5

Contingency Analysis of Healthcare clincians Specialty By Patient Geographic Location for 2020

Count Column %	Internal Medicine, Family Practice, General Care	Other Specialty	Psych, Neuropsych, Addiction	Total
Metropolitan	366,992 88.11%	6,034,041 86.50%	344,771 70.68%	6,745,804 85.61%
Rural	49,530 11.89%	941,691 13.50%	142,999 29.32%	1,134,220 14.39%
Total	416,522 5.29%	6,975,732 88.52%	487,770 6.19%	7,880,024

N	DF	-LogLike	RSquare (U)
7880024	2	39101.987	0.0114

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	78203.97	<.0001*
Pearson	94801.31	<.0001*

Hypothesis Three

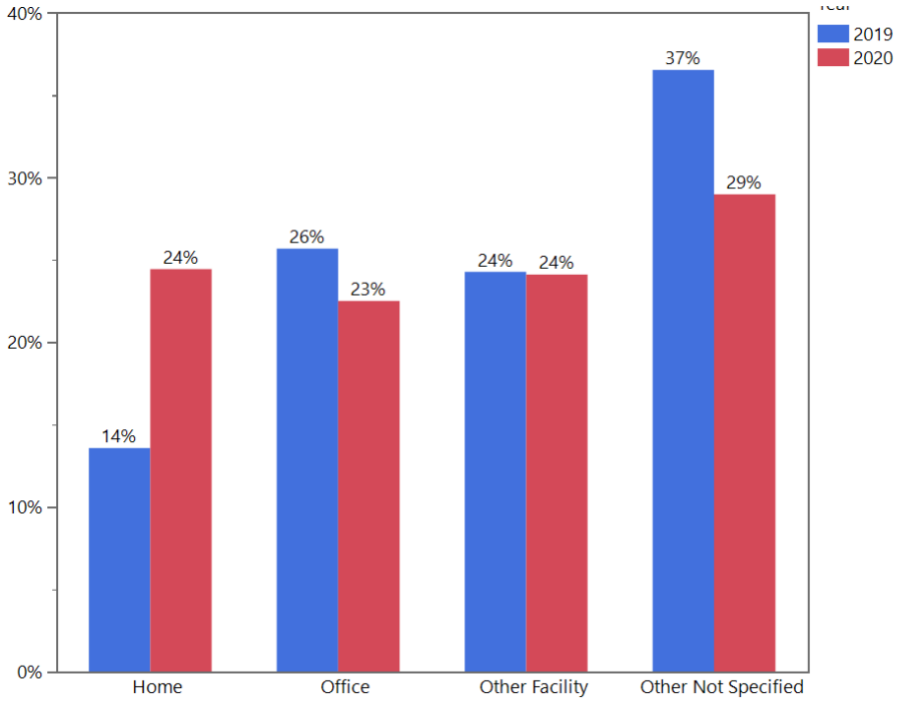
Hypothesis # 3 explored the association between Waiver 1135 and where Virginians received care. Service place refers to the physical location of the patient while receiving care via telehealth and requires that the clinician designates such using the appropriate code. Waiver 1135

allowed telehealth services to be delivered to patients in their homes, prior to enactment of the Waiver this was restricted to certain circumstances. Rural Virginians are less likely than their metropolitan counterparts to have broadband access in their homes, thereby limiting their ability to receive telehealth services in their homes (Virginia Rural Health Plan, n.d.).

For both 2019 and 2020, the majority of telehealth claims documented other, nonspecific, as the location of services rendered (36.52%, 28.96%). In 2019, location of service for telehealth care was fairly consistently distributed at either an office setting (25.7%) or other facility (24.3%). The minority of telehealth visits occurred in the patient's home (13.6%). In 2020, there was with a fairly even distribution of claims across facility (24.1%), home (24.4%) and office (22.5%). In 2020, the rendering of services in patients home (24.42%) was greater than in 2019 (13.56%). See Figure Six.

Figure 6

Comparison of Annual Observations by Service Place



A two way contingency table analysis for both 2019 and 2020 were conducted to evaluate whether service place was associated with the geographic location of the patient. See Tables Six and Seven. The variables were service place (home, office, other facility and other not specified) and geographic location of the patient (metropolitan, rural). A chi-square test of independence was performed to examine the relation between service place and geographic location. For 2019 data, the association between service place and geographic location variables was significant, X^2 (3, N =200060886) = 65495.84, $p < .0001$. Likewise, for 2020, the association between these variables was significant X^2 (3, N = 8086746) = 48739.39, $p < .0001$. For both 2019 and 2020, living in a metropolitan area was associated with all places of service. In 2020, 11.27% of telehealth visits that occurred in the home were in a rural setting as opposed to 46.79% of home visits in 2019. Those living in rural areas are less likely to have broadband access in their home to enable a home telehealth visit.

Table 6

Contingency Analysis of Service Place By Patient Geographic Location for 2019

Count Column%	Home	Office	Other Facility	Other Not Specified	Total
Metropolitan	144,639 53.21%	399,495 77.52%	276,285 56.87%	465,942 63.56%	1,286,361 64.12%
Rural	127,195 46.79%	115,857 22.48%	209,564 43.13%	267,109 36.44%	719,725 35.88%
Total	271,834 13.55%	515,352 25.69%	485,849 24.22%	733,051 36.54%	2,006,086

N	DF	-LogLike	RSquare (U)
2006086	3	33905.332	0.0127

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	67810.66	<.0001*
Pearson	65495.84	<.0001*

Table 7

Contingency Analysis of Service Place By Patient Geographic Location for 2020

Count Column%	Home	Office	Other Facility	Other Not Specified	Total
Metropolitan	1,763,500 88.73%	1,599,170 88.05%	1,599,203 81.96%	1,967,353 84.37%	6,929,226 85.69%
Rural	223,927 11.27%	217,039 11.95%	352,076 18.04%	364,478 15.63%	1,157,520 14.31%
Total	1,987,427 24.58%	1,816,209 22.46%	1,951,279 24.13%	2,331,831 28.84%	8,086,746

N	DF	-LogLike	RSquare (U)
8086746	3	24330.703	0.0022

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	48661.41	<.0001*
Pearson	48739.39	<.0001*

Summary

The COVID-19 pandemic created a need for telehealth services; Andersen's model designates need as the least mutable but most potent driver of access. Public policy addressed contextual barriers in real time by approaching payment parity through the implementation of Waiver 1135 in March 2020. This population level evaluation used telehealth claims as a measure of access to telehealth services.

While the annual volume of telehealth claims increased from 2019 to 2020, the proportion of claims for telehealth claims in 2020 was less than ten percent, despite the shelter in place

mandates. Access to primary care via telehealth increased from 2019 to 2020 as did access to other medical specialty care. Access to behavioral health services (psychology/psychiatry, neuropsychology, addiction) decreased in 2020; the actual volume of claims increased but the percentage of claims dropped significantly from 15.26% (2019) of claims to only 6.04% (2020).

Rural dwelling patients experience with telehealth differed from their metropolitan counterparts; living in a metropolitan area was associated with receiving care with all healthcare clincians specialties in both 2019 and 2020. In 2020, patients in rural areas experienced a lower percentage of telehealth claims than in 2019, while those in metropolitan areas experienced an increase. Virginia's rural locales are often designated at HPSAs for both primary care and mental (behavioral) health services. Telehealth claims delivered to rural patients for both primary care (internal medicine, family practice, general care) and behavioral health (psychology/psychiatry, neuropsychology, addiction) services dropped in 2020.

One mechanism to offset shortages is to increase access by allowing services from out of state clinicians. Living in a rural area was not associated with receiving services from non-Virginia healthcare clincianss. Quarterly analysis of 2020 claims did not demonstrate an increase in telehealth services occurring in patients homes after shelter in place mandates went into effect.

Chapter 5: Discussion

Anderson's BMHSU supports that need drives healthcare utilization (Anderson, 1995). The COVID pandemic created an increased need for both clinicians and patients to use telehealth services. Waiver 1135 made the enabling resource of payment parity more possible, in an attempt to respond to increased need. Yet despite these factors, exisiting health disparities were exacerbated by the pandemic as nearly one quarter of patients reported delaying or forgoing care during the pandemic (Lane et al., 2022). The United States experienced an overall decrease in healthcare utilization in 2020. Nationally telehealth utilization during 2020 varried with proproption of claims ranging from ten to fifty percent of all healthcare visits (Harju & Neufeld, 2022). Despite shelter in place mandates driving exisiting need and the enabling of payment reform, telehealth did not become the dominant type of healthcare claim in 2020. This study examined telehealth utilization by using the telehealth claim as a proxy for use. It is plausible that using telehealth claims as a sole indicator of use is insufficient.

Given the rapid uptake of telehealth and changes in policies regarding reimbursement, it is possible that clinicians may have delivered telehealth services without assigning the appropriate evaluation and management code. Without the proper code to designate services were delivered via telehealth, the claim may not be captured. The flux of regulations during the pandemic may have caused inadvertent discrepancies in documentation. Telehealth payment parity meant that telehealth visits could be reimbursed at the same rate as face to face visits. Therefore, documentation discrepancies would not have necessarily resulted in a lack of reimbursement. Inaccuracies in coding for services is a phenomenon that predates the pandemic (Gilman & Stensland, 2013).

The claim as a proxy for use was complicated by variability in uptake of pandemic policies. While the enactment of Waiver 1135 by the Federal government prompted Medicare reimbursement changes, it did not mandate changes to private insurance. Insurance companies had variable uptake of payment reform. Some variation may be attributed to inconsistencies in participation with risk mitigation strategies. Post-pandemic evaluation of risk mitigation strategies by location suggest that rural dwelling residents were less likely to comply with risk mitigation strategies for a variety of reasons (Callaghan et al., 2021; Probst, Crouch & Eberth, 2021). Therefore, raising the possibility that rural clinics were more likely to continue face to face delivery of healthcare. Rural locales experienced the effects of the pandemic differently than their urban counterparts.

National analysis of telehealth trends during the pandemic indicate that telehealth utilization was greater in urban areas (Harju & Neufeld, 2022). The results of this study are comparable to national trends as rural Virginians accounted for a lower percentage of telehealth claims in 2020 than in 2019, while metropolitan Virginians percentage of claims increased in 2020. Regional variation in telehealth patterns of use appears to be state specific and mirror pre-pandemic disparities (Harju & Neufeld, 2022). Rural locales pre-pandemic disparities included poor profit margins with nearly half of rural healthcare clincianss citing negative operating margins; which prompted the closure of many health care service centers (Telehealth HHS, 2022; HHS, 2021).

Pre-pandemic disparities in rural healthcare organizations included poor recruitment and retention of qualified staff. Workforce shortages in the setting of caring for an older, sicker population further potentiated access to care problems for rural locales (Telehealth HHS, 2022). Pre-pandemic, rural Virginians encountered more avoidable hospitalizations than their urban

counterparts (20.6 per 1000 versus 12.2); avoidable hospitalizations are attributed to a lack of access to healthcare (Virginia Rural Health Plan, n.d.). Lack of access to non-emergent care in rural counties aligns with the fact that rural communities are more likely to be designated as healthcare healthcare clincians shortage areas (HPSA) (Dobis & Todd, 2022). While rural Virginians are more likely to experience diseases such as cancer, hypertension and chronic obstructive pulmonary disease, they are less likely to utilize non-emergent care (Telehealth HHS, 2022; HHS, 2021; Virginia Rural Health Plan, n.d.). This suggests that contextual drivers may have a greater bearing on telehealth utilization than need alone (Harju & Neufeld, 2022; Andersen, 1995). These contextual factors may have contributed to the drop in telehealth utilization by rural Virginians in 2020.

This research study examined the impact of Waiver 1135's implementation in Virginia on Virginians telehealth use examining observations in insurance coverage, healthcare clincians role and specialty, geographic location of services and patients' locations when receiving care pre and post Waiver 1135 uptake in Virginia. The study's findings aligned with national trends, despite increased need and the enabling of payment, while overall volume of telehealth increased in 2020, Virginia's proportion of telehealth claims only approached ten percent. Rural Virginians experienced an ever greater drop in telehealth claims when comparing 2019 and 2020. While not a causation study, results suggest that while Virginia's overall volume of telehealth services increased post Waiver 1135, contextual factors outside of payment parity may have negatively impacted its use, particularly for rural Virginians.

Equitable access to telehealth in post-pandemic setting requires creating public policies that address enabling characteristics; which includes policies that not only address payment parity, such as Waiver 1135, but also policies that create a supportive infrastructure for telehealth

utilization by both clinicians and patients. Access to care quickly advanced from a condition to a problem during the pandemic, thereby securing its place on the systems agenda. Indicators of the problem include an average lower life expectancy for rural Americans, which in part, is secondary to less access to healthcare services, including less intensive care structure, and insurance when compared to metropolitan areas (Singh & Siahpush, 2014; Probst et al., 2004; Chartis Center for Rural Health, 2020). Advocates, interest groups, citizens and policymakers are focusing on potential solutions for the inequities in healthcare. The galvanizing event of the pandemic shifted the politics stream as public concern for health inequities caused increased pressure on policymakers to act. Therefore, the window of opportunity to create sustainable policies to promote the adoption of telehealth is open in Virginia (Kingdon, 2011).

The following discussion explores both the major findings of the study as well as the potential influence of extraneous variables. Undering understanding? both direct outcomes and contextual factors provides a scoping view of the problem of inequitable use of telehealth. Promoting equity requires policy recommendations that consider the full breadth of a problem. Furthermore, policy reccomendations should appreciate the cyclic nature of policymaking by using evidence to inform the next iteriation of policymaking. Virginia prioritized access to telehealth when the General Assembly legislated that the Virginia Statewide Telehealth Plan (VSWTHP) be developed. The plan has not yet been implemented. Findings from this research may prove useful for the implementation and subsequent evaluation of the VSWTHP.

Public Policy Recommendations: Building on Current Plans

Overview of Virginia Statewide Telehealth Plan

The VSWTHP charged a stakeholder group with the task of creating a plan to address the promotion of telehealth utilization and a data analytics plan to assess use (HB 1332). HB1332 set forth six priorities for the VSWTHP:

1. Delivery: Promoting the uptake of telehealth hospitals, primary care, schools, and emergency medical services (EMS)
2. Remote Patient Monitoring: Promoting the use of remote patient monitoring and store and forward technology for the management of chronic conditions
3. Criteria for Use: Criteria guidelines for telehealth use in pre-hospital and inter-hospital triage and transportation of patients
4. Integration: A mechanism to integrate the VSWTHP with other related statewide plans such as the statewide EMS plan
5. Sustainability: Strategy for sustaining the VSWTHP through innovative payment models for both medical and behavioral health care
6. Data: Data collection strategy to measure not only utilization but also quality metrics for care delivered via telehealth

The Virginia Department of Health convened a workgroup for the purposes of designing the VSWTHP with an implementation goal of January 2021. Given the events of the pandemic, an implementation extension was granted until March 2021. In April 2022, SB436 and HB81 were signed to amend §32.1-122.03:1 of the Virginia Code (Virginia LIS, n.d.). Thereby, stipulating that the Virginia Board of Health consult with the Virginia Telehealth Network to maintain the VSWTHP and facilitate changes to align with the evolution of both clinical practice and technology.

By mandate, the VSWTHP plan provides provisions for the use of remote patient monitoring and store and forward technologies, including the management of chronic illness, the promotion of telehealth services in hospitals, schools and state agencies as well as a data

collection strategy (Virginia Department of Health, 2021). To achieve these goals, the workgroup established six core strategies in the VSWTHP:

1. Inclusion in Operating Procedures
2. Remote Patient Monitoring Strategic Initiative
3. Uniform and Integrated Criteria
4. Integration into Other Plans
5. Maintenance of the Plan
6. Data Collection

To inform the implementation of VSWTHP, the Virginia Telehealth Network conducted a benchmarking survey (N=9,257) of telehealth use by licensed health care healthcare clincianss across the Commonwealth (Virginia Telehealth Network, 2022). The initial survey yielded a high number of responses from behavioral clinicians, therefore a follow-up survey separated responses by behavioral health clinicians (N=574) from all other clinicians (N=147). Survey results indicated that the majority of respondents cared for adult patients (86%) by providing behavioral health services (56%), with only a fraction of responses from primary care (11%). Clinicians reported the greatest barrier to use was internet connectivity and greater than half of those surveyed stated that they plan to continue to use telehealth as a care delivery option for patients. To date, the VSWTHP has not been implemented. The VSWTHP survey results within the context of this study's results could inform the implementation of the VSHTHP. The survey supports behavioral health clinicians intention to sustain telehealth services post-pandemic. Conceptually, telehealth provides a safe, high quality care delivery option that could help to mitigate Virginians poor access to behavioral health services. Yet, the results of this study

suggest that post Waiver 1135 implementation that access to behavioral health services dropped in Virginia. This contradicts national trends.

Nationally, behavioral health services experienced the most uptake of telehealth services during the pandemic, likely secondary to familiarity with use and increased need (Harju & Neufeld, 2022; The Commonwealth Fund, 2021). However, Virginians experienced a sharp decrease in behavioral health services delivered via telehealth in 2020. This drop was even more dramatic for rural dwelling Virginians; for whom telehealth claims for behavioral health dropped by nearly seventeen percentage points from 2019 to 2020. Rural Virginians pre-pandemic disparities seemed to drive telehealth use post Waiver 1135 as both behavioral health and primary care telehealth claims were lower for rural Virginians in 2020. Primary care delivered via telehealth to rural Virginians dropped nearly fifteen percentage points from 2019 to 2020. Contextual elements not addressed by Waiver 1135 include state level workforce shortages and lack of broadband infrastructure.

Policy reccomendations for VSHTHP based on study outcomes

HB1332 prioritized innovative payment models as a mechanism to promote the sustainability of VSWTHP. The implementation strategy for VSWTHP should include continuation of the payment policies enabled by Waiver 1135. A key to success lies in creating an implementation strategy that includes caveats to ensure equitable access to telehealth for all Virginians. Payment models should consider the unique challenges that rural Virginians face when trying to use telehealth as an access to healthcare solution.

Reimbursement for behavioral health services. The Medicare Physician Fee Schedule for 2023 proposes to extend coverage for some telehealth services amended during the public health emergency through the end of the 2023 and permanently extended coverage for behavioral health services delivered to patients in their homes and receive as audio-only visits (Augenstein, Marks

& Pfister, 2021). Improving access to behaioral health services is a national healthcare goal; CMS's payment reform for 2023 seems to recognize the valuable role of telehealth for improving access to these services. State funded and commercial insurance plans should follow CMS's lead on the continuation of allowing patients to receive telehealth services in their home and reimbursement for audio only visits. The inclusion of audio only visits is particularly well suited for behavioral health services as often a physical exam is not required (Patel et al., 2021). Allowing patients to receive care in the home and audio only visits reduces burdens for rural communities by eliminating the need for broadband and travel.

In a seemingly contradictory rule, CMS is finalizing details on the requirement that to receive telehealth for behavioral health services, the beneficiary must also be seen in a face to face visit within a designated time period by the telehealth healthcare clincians (Health and Human Services, 2022). This ruling requires patients to travel to see the treating clinician at least annually, creating a barrier to the feasibility of telehealth as a solution to improve access. Compliance with this new CMS criteria would require the nearly forty percent of Virginians who received care via telehealth to comply with this face to face requirement. Yet, the results of this study suggest that Virginia was an outlier in 2020, with a drop in behavioral health claims statewide and a disproportionate drop for rural dwelling Virginians. The VSWTHP should look to minimize potential barriers such as requiring face to face visits by recommending deviations in CMS policy for state and privately funded insurance.

While forty percent of Virginia's telehealth claims were reimbursed by Medicare, the majority (nearly sixty percent) were reimbursed by either state funded or commercial insurance plans. State funded and commercial insurance plans should consider abandoning the face to face requirement for behavioral telehealth services, particularly for rural Virginians. The results of

this study suggested that telehealth alone was insufficient to increase access to behavioral health services in rural communities. Rural dwelling residents experience at least the same rate of behavioral health issues as their urban counterparts; yet, rates of suicide for rural patients doubles that of their urban counterparts (Mack, Whetsell & Graves, 2022). Rural residents lack of access to behavioral health services should not be potentiated by their lack of access to both public and private transportation as reliable transportation which is necessary for a face to face visit (Rural Health Information Hub, n.d.).

Licensing requirements for telehealth services. This study examined observations in care by healthcare clincians location (in state versus out of state) for 2019 and 2020 as well as discipline. Prior to the pandemic, clinicians who wished to provide telehealth care to Virginians were required to obtain a Virginia license. The public health emergency prompted waivers of licensing requirements as a mechanism to meet excessive demand for healthcare services. Pre- and post-Wavier 1135 implementation, Virginia healthcare clincians were the most likely to provide telehealth services. While Virginia's implementation of Waiver 1135 only slightly increased Virginians ability to receive care from out of state healthcare clincians (17.96% non-Virginian in 2019 versus 18.92% non-Virginian in 2020), consideration should be given to allow continuation for out of state healthcare clincians to render care via telehealth in Virginia. Particularly in areas designated as HPSAs as even slight increases would yield a positive impact on access to care. Yet, Virginia sunsetted waivers that allowed clinicians to provide care across state lines.

Policy makers should reconsider options that would allow for greater mobility of clinicians across state lines; particular attention should be paid to licensing of the largest provider of telehealth services in Virginia in both 2019 and 2020 in this study, physicians. While the

implementation of Waiver 1135 waived state licensing requirements to render telehealth services, optimizing pre-Waiver options could be a viable solution. Prior to the pandemic the ability to provide care across state lines was accomplished through interstate licensing compacts. Interstate licensing compacts reduce barriers for clinicians who wish to provide services across state lines by streamlining standards to provide a multistate license (Health and Human Services, 2022).

The Code of Virginia should be amended to prompt Department of Health Professions' boards to participate in licensure compacts. Precedent exists, as in 2020, Virginia SB760 amended Virginia code to allow for clinician inclusion in the Psychology Interjurisdictional Compact (PSYPACT); thereby allowing out of state psychologists to provide behavioral health services via telehealth in Virginia (Virginia LIS, n.d.). In 2022, Virginia HB527: Interstate Medical Licensure Compact and Creation was introduced but was later stricken from the docket. If passed, this bill would have allowed out of state physicians to render care via telehealth to Virginians (Virginia LIS, n.d.). While pandemic waivers expanded privileges for other disciplines to provide care via telehealth, medicine (physicians) were the top healthcare clincians of telehealth claims for both 2019 and 2020 in Virginia. The striking of HB527 limited the supply of the physicians to provide care via telehealth, thereby further reducing access to care.

The limitation of access through licensing constraints applies to advanced practice nurses in Virginia. While nurse practitioners are the most likely clinicians to provide care to rural and underserved communities, Virginia limits access to their services as advanced practice nursing licensure is regulated by the Joint Board of Nursing and Medicine (American Association of Nurse Practitioners [AANP], 2019; Phillips, 2022). While the Virginia Board of Nursing participates in the interstate nursing licensure compact, advanced practice nurses are not included

in multistate licensure. Virginia's regulatory model using Joint Board regulation is the only such model in the United States (Phillips, 2022). Amending Virginia's code to move the regulation of advanced practice nursing solely to the Board of Nursing not only modernizes regulation to align with the rest of the nation, it also has the potential to improve access to care by allowing interstate licensing for telehealth services.

The implementation of VSWTHP must include strategies to promote the sustainability of telehealth as a mechanism to improve access to care in Virginia, particularly for HPSAs. Stakeholder analysis suggests that Virginia clinicians plan to continue to render care via telehealth, particularly for behavioral health services, thereby creating a possible solution to address rural Virginians who live in a mental health HPSA. The amendment of Virginia code allowing for PSYPACT participation was one step to increase access to potential healthcare clincians of behavioral health services. Virginia stopped short of providing increased access to physicians and advanced practice nurses, both of which are qualified healthcare clincians of primary care and behavioral health services. Amending code to allow for interstate licensing for other health professions would improve the sustainability of VSWTHP.

Coding of telehealth services. This study evaluated place of service for telehealth services for 2019 and 2020. The distribution for place of service for both 2019 and 2020 was similar with "other, not specified" being the most common selection for both years. This alludes to clinician difficulty with selecting the place of services as the other options (home, office and other facility) are inclusive of locations where care occurs. Current practices in documentation vary from entering data manually in to fields versus using drop down menus to select certain data points. Variations in documentation are attributed to individual clinician variations as well as system variation with electronic health record platform selection. Concerns about accuracy and

thoroughness of coding are relevant when considering using electronic health record data for research (Office of the Assistant Secretary for Planning and Evaluation (ASPE), 2022). Measuring the impact of VSWTHP's on access to care requires a robust data management plan. The VSWTHP data collection strategy should include clinician training on best practices in telehealth documentation to help promote the accuracy of telehealth coding. By doing so, the pre-disposing contextual factor of a prepared workforce (telehealth infrastructure) would be addressed.

Potential influence of extraneous variables

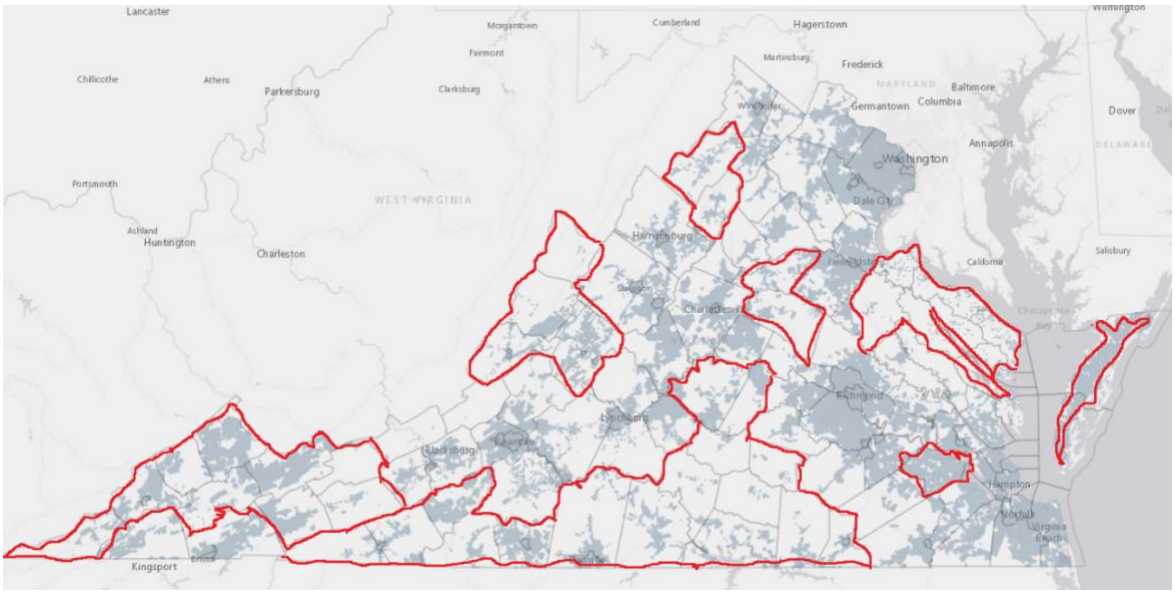
A lack of access to broadband may have limited rural Virginians access to telehealth services post implementation of Waiver 1135. VSWTH study concerns identified by clinicians mirror concerns brought forward in this study; as broadband infrastructure appeared to limit telehealth utilization for rural residents who are medically underserved. Thirty-three percent of rural residents in Virginia lack access to broadband, compared to ten percent of metropolitan residents (Virginia Rural Health Plan, n.d.). The sustainability of telehealth as a care delivery model to offset healthcare clincians shortages is questionable as some of Virginia's most underserved communities lack access to reliable, high-speed broadband. The Virginia Telecommunications Initiative (VATI) tracks broadband access in Virginia (Virginia Department of Housing and Human Development, n.d.). VATI defines access to broadband as having access to internet speeds of at least 100 megabits per second to download and 20 megabits per second to upload (Horn & Holmes, 2023). VATI's interactive map depicts Virginia locales who have at least ninety-five percent of the population reporting access to broadband.

On Figure 7, the light gray regions designate that at least ninety five percent of addresses in that area have access to broadband, while the counties outlined in red are rural mental health HPSA counties. Figure 8 also demonstrates regions with ninety five percent of addresses with

access to broadband, the counties outlined in green are rural primary care HSPA counties. The maps help to demonstrate that generally, rural HPSAs lack access to broadband. When considering the feasibility of telehealth in a post-pandemic era, policy makers should make efforts to address the digital divide. Improving access to healthcare through the use of telehealth services for rural Virginians requires that public policy officials consider the complexity of the root causes of health disparities and as such, create multi step plans.

Figure 7

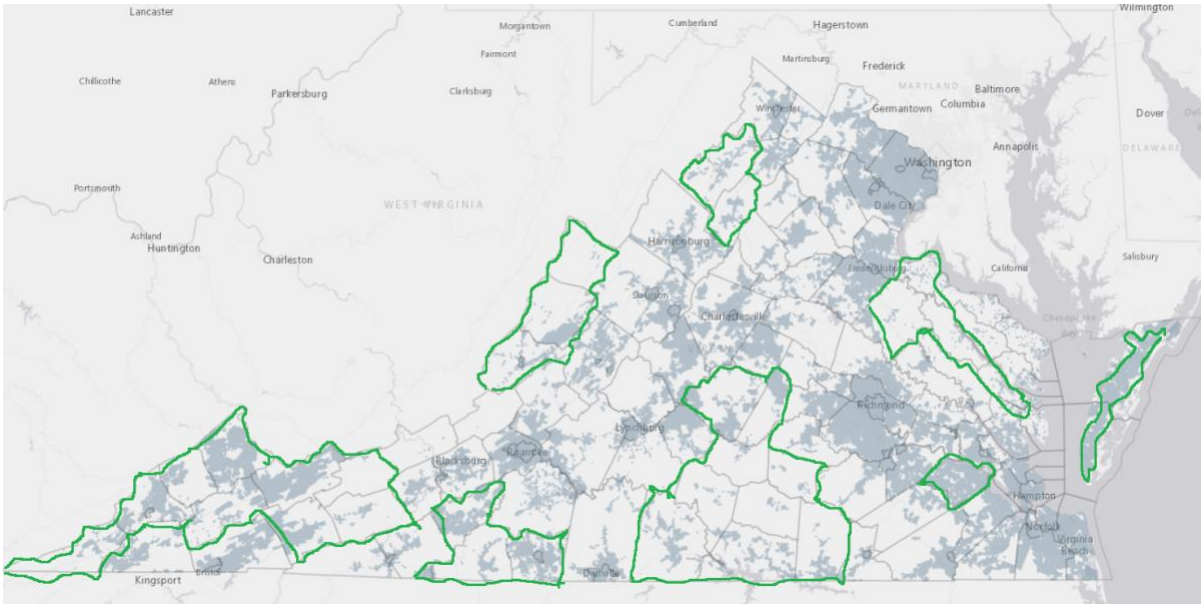
Broadband Access and Rural Mental Health HPSA



Legend: Gray shading depicts areas download speeds of 100 mbs and upload speeds of 20 mbs
Red outline depicts rural counties designated at Mental Health HPSA

Figure 8

Broadband Access and Rural Primary Care HPSA



Legend: Gray shading depicts areas download speeds of 100 mbs and upload speeds of 20 mbs
Green outline depicts rural counties designated as Primary Care HPSA

Note: Virginia Department of Housing and Community Development statewide broadband map indicates broadband coverage including speeds in the Commonwealth, interactive broadband map available from Commonwealth Connection : https://commonwealth-connection.com/

The Virginia State Office of Rural Health (VA-SORH), housed within the Virginia - Department of Health's Office of Health Equity, receive federal funding to address the health disparities of rural Virginians. VA-SORH's stakeholder analysis and needs assessment identified seven priorities to address health disparities in rural Virginia: education, broadband, nutrition/food security, healthy moms and babies, access to healthcare services, behavioral health, substance use disorder and recovery and employment/workforce development (Virginia Health Rural Health Plan, n.d.). These priorities align with a Health in All Policies (HiAP) model; a framework that creates policy through a lens to advance the health and social equity benefit for *all* people (CDC, 2016). The HiAP framework addresses upstream factors to optimize health outcomes for vulnerable populations. By integrating health considerations into

policymaking across sectors, health equity is promoted. VA-SORH's plan specifies access to healthcare services which conceptually can be achieved through telehealth. Yet, in order to operationalize this solution, another on of VA-SORH's priorities must be addressed, access to broadband. Broadband access is not classically considered a health policy agenda item but aligns with HiAP principles as well as Andersen's BMHSU. Broadband infrastructure, which falls into built neighborhood domain of the social determinants of health, is considered an enabling contextual characteristic in the BMHSU model. Policies aimed at addressing poor social determinants of health improve population-level health outcomes (Milstead & Short, 2019; ODPHP, n.d.).

Public Policy Recommendations for Extraneous Variables: Building on Current Plans

Overview of Virginia Broadband Plan

Lack of access to reliable broadband is a barrier for both clinicians and patients when considering telehealth as potential mechanism to improve access to care. This study demonstrated disparate telehealth utilization between rural and metropolitan dwelling Virginians. Rural regions of Virginia have less access to broadband services. Overcoming need requires policy that addresses amenable contextual factors such as the enabling resource of broadband. Therefore, creating equitable access to telehealth requires consideration of broadband policy in Virginia.

In 2016, the Virginia Department of Housing and Community Development (VDHCD) enacted VATI, tasking them with creating infrastructure to provide broadband access to underserved communities (VDHCD, n.d.). Virginia set the goal of universal access by 2028 and defined access as speeds at or above 100 megabits per second to download and 20 megabits per second to upload (Pew Research Center, 2021; VDHCD, 2022). Fortunately, VATI's mapping of access relates to street level addresses as opposed to census block data (VDHCD, 2022). Data

reported at the census block level is misleading in rural areas; if one entity receives broadband within the block, then the entire block is reported as served. In addition, the FCC allows the reporting of satellite broadband as access (FCC, 2019; Zimmer, 2018). This form of reporting can lead to a false sense broadband access in rural communities (Ali, 2020). Virginia's reporting structure more accurately captures broadband access, increasing the truth when discussing achieving the goal of universal access. To achieve universal access, VATI amends the Commonwealth Connect strategy annually to align with incremental policy changes aimed at improving access (VDHCD, 2022).

In 2018, the Virginia General Assembly passed SB966: Electric utility regulation; grid modernization, energy efficiency (Virginia LIS, n.d.). The act required Virginia's two largest energy companies, Dominion Energy and Appalachian Power, to conduct a needs assessment for creating affordable, efficient broadband service using their existing infrastructure (Pew Research Center, 2021). While both companies identified barriers, they also concluded that integrating broadband fiber access was feasible to include in smart grid modernization projects (Queen, 2021). Interest groups, such as Dominion Energy and Appalachian Power, garner political capital through their access to policymakers, funding and membership size (Birkland, 2011). In the case of high-speed broadband, large industry leaders yield power given their wealth, lobbying ability and blocking power through legal action (Birkland, 2011; Stone, 2012). When the Federal government attempted to enforce net neutrality by mandating that internet healthcare clincianss treat all communication on the net equally and not limit content or speed by setting charges, industry leaders blocked their action through lawsuits. After years of legal battles, Federal appeals court upheld the net neutrality giving the FCC control by deeming the internet services

part of telecommunications (Brotman, 2017). Virginia's plan to engage large industry stakeholders will foster their support as opposed to encouraging similar blocking behaviors.

Given their engagement, Dominion Energy and Appalachian Power created feasibility plans for middle-mile infrastructure completion by adjusting electric fees to financially incentivize developers; the Commonwealth Connect report endorsed this approach by permitting companies to lease their infrastructure to internet healthcare clincianss (Pew Research Center, 2021; Commonwealth Connect, 2019). These recommendations led to the passage of HB2691: Electric utilities: provision of broadband services to unserved areas (Virginia LIS, n.d.). HB2691 piloted the Virginia Utility Leverage Program which was later codified by the General Assembly in 2021 (Virginia LIS, n.d.; VDHCD, 2021). This strategy focuses on modernizing existing electrical infrastructure as a mechanism to expand broadband access by creating partnerships between utilities, internet service healthcare clincianss and localities (VDHCD, 2021; Pew Research Center, 2022).

While Virginia has made strides in improving binary access to broadband, the effort stops short of recognizing broadband as a common good. Strides have been made in securing access but rural America is largely left out of highspeed options as they not included in 5G infrastructure deployment (van Dijk, 2020; Ali, 2020). Seventy-five percent of rural households report that DSL provides their internet access; this antiquated infrastructure is not suitable to meet contemporary bandwidth needs (Crawford, 2019; Gallardo & Whitacre, 2019). Satellite provides the other option for rural Americans access; satellite is slow, expensive and sensitive to weather conditions (Whitacre et al., 2018). Yet, both of these options meet the current FCC definition of internet access implying that how one defines access plays a significant role in overreporting and subsequently funding (Ali, 2020).

Policy reccomendations for Virginia's Broadband Plan

Defining high speed access. Access to broadband in Virginia is defined as having internet speeds of at least 100 megabits per second to download and 20 megabits per second to upload. The Commonwealth Connects 2023 draft Program Guidelines and Criteria prioritizes areas who lack the FCC minimum requirements of 25 megabits per second download and 3 Megabits per second upload speeds. This proactive strategy of exceeding Federal minimum requirements should be continued as the FCC announced it is considering updating the definition to download speeds of one gigabit per second and upload speeds of 500 hundred megabits per second (FCC, 2022). The updated definition more accurately captures Americans average internet usage (FCC, 2022). If enacted, this consideration would require Virginia to reconsider their benchmark and expand prioritizing beyond the 25/3 speed threshold. Virginia's public policies should not be based on specific technologic goals, as the current context of net neutrality coupled with subpar speed thresholds creates an attitude of good enough access for rural Americans (Ali, 2020).

Affordability of access. State policymakers should strategically leverage Federal funding to optimize the vast revenue stream required to support broadband infrastructure. In 2022, the Broadband Equity, Access and Deployment (BEAD) Program provided five million dollars in Federal funding to support Virginia's Department of Housing and Community Development's broadband expansion plan (Warner, 2022). This funding is an important step in implementing Virginia's broadband plan but is insufficient to meet all infrastructure requirements making broadband accessible to all Virginians. Therefore, the plan should include funding mechanisms independent of government subsidiaries. Digital equity includes consideration of the cost (Davis et al., 2007). The average per capita income for rural Virginians is nearly twenty thousand below the state average and the poverty rate approaches fifteen percent (compared to nine percent in

urban areas) (U.S. Department of Agriculture Economic Research Service, 2022). Policymakers should avoid burdening individual citizens with bearing the cost of access to broadband.

Improving digital literacy. Ensuring that Virginia's rural communities have physical access to broadband is an essential first step. But Virginia's broadband plan should consider mechanisms to overcome the second level of the digital divide. The second level of the digital divide includes consideration of the lack of digital skills and sophisticated use of internet. The expansion of the definition of the digital to extend beyond mere binary access captures the complexity of digital inclusion (Selwyn, 2006). Merely having access to the internet does not mean that one possesses the skills and knowledge to use the information in a meaningful way (van Dijk, 1999). Increasingly, focus on digital equity includes mechanisms to enhance digital skills (Selwyn, 2006; Zillien & Hargittai, 2009). If individuals lack digital literacy, their digital outputs are unlikely to result in favorable outcomes, specifically, those with higher socioeconomic status tend to benefit economically, politically and educationally (van Deursen & Helsper, 2015).

Improving digitial literacy to ensure equitable access to telehealth is recognized by national organizations (Rural Health Information Hub, n.d.). The Office of Disease Prevention and Health Promotion (2018), the National Library of Medicine (2022) and the United Nations Educational, Scientific and Cultural Organization [UNESCO] (2016) provide toolkits for healthcare industry leaders to consider when designing and implementing digital health services. The implementation of Virginia's broadband plan must include a strategy to improve digital literacy, particularly for underserved populations.

Like most problems, the digital divide has many root causes (Rittel & Weber, 1973). Incremental policy changes have primarily addressed the first level of the divide, access.

Solutions focus on private/public partnerships and grant funding to improve access. These policy initiatives are narrow in their approach to overcome access as they do not ensure equitable access. As Laswell famously stated, public policy focuses on "who gets what when" (Laswell, 1950). The time has come to consider access to high speed broadband a common good and as such synergy between Federal and State level solutions are needed (Birkland, 2011). Thus, ensuring everyone "gets" *high speed* broadband access. In order to further secure digital equity's place on the policy agenda, Virginia's constituents need a heightened awareness to drive constituency control.

Future broadband policy reccomendations: Broadband as a Common Good

The concept of the common good philosophical roots date back to the socratic ancient Greek philosphers Ariostle and Plato; both argued that the normative concept of a common good would contribute to a righteous society as individuals sought to contribute to the collective goals of their society (Aristotle & McKeon, 1941; Plato, 1968). Sociologist, Amitiai Etzioni, later defined the common good as,

> (alternatively called "the public interest" or "public goods") denotes those goods that serve all members of a given community and its institutions, and, as such, includes both goods that serve no identifiable particular group, as well as those that serve members of generations not yet born. (Gibbons, 2014, Common Good, para. One)

Public policy aimed at improving access to broadband supports the concept that the internet serves as a common good to advance society.

Historically, the problem of the digital divide focused purely on access to the internet. The 1990's ushered in a heightened digital awareness culturally with a governmental response that attempted to improve access with interbranch actions supporting free market principles.

Federal acts such as, the 1996 Telecommunications Act, aimed to improve access by creating a de-regulated, pro-competitive market for the growth of telecommunications. The intention of the 1996 Telecommunications Act was to improve digital access yet, following its passage NTIA published a series of reports highlighting the digital divide*: Falling Through the Net: A Survey of the 'Have Nots' in Rural and Urban America* (1995); *Falling Through the Net II: New Data on the Digital Divide* (1998) and *Falling Through the Net: Defining the Digital Divide* (1999). Collectively the reports demonstrated a persistent disparity in internet access in the U.S. primarily among socioeconomically disadvantaged groups with those living in either rural or central urban areas reporting the least access (NTIA, 1998). Executive and congressional actions improved access to the networked society for some but not for all.

During the first three years of the Trump Administration, multiple legislative initiatives aimed at further improving digital access. Congress passed the Consolidated Appropriations Act of 2018 that created the Rural eConnectivity Pilot Program, also known as the ReConnect Program (United States Department of Agriculture [USDA], 2018). The ReConnect Program designated 600 million in Federal funds for loans and/or grants to support private industry in the development of broadband infrastructure in rural communities (USDA, 2018). The following year, the Leading Infrastructure for Tomorrow's America Act (LIFT Act), the Broadband Deployment Accuracy and Technological Availability (DATA) Act and Digital Equity Act were all introduced with bi-partisan support. The LIFT Act (H.R. 2741) provided 45 billion dollars in funding for broadband infrastructure while the DATA Act required the Federal Communications Commission (FCC) to update its process for mapping internet availability/capability throughout the U.S. (House Committee on Energy and Commerce, 2019; U.S. Senate Committee on Commerce, Science & Transportation, 2020). The Digital Equity Act required that NTIA

distribute grant fudding to support digital inclusion. Federal initiatives to address the digital divide have been in place for over thirty years, yet the rural-urban internet access divide persists.

Prior to the pandemic, the narrative of internet access as a problem was misleading. Numbers were used to define and shape the problem (Stone, 2012). Data reported that 99% of Americans had internet access, but these numbers only presented part of the story (NTIA, 2014). While the gap in access to broadband may have been closing, the access to high speed broadband widened among certain populations (Hilbert, 2016). Some groups had improved access, yet, those in lower socioeconomic groups and/or rural communities continued to lack access to high speed broadband (Hilbert, 2016; Lai & Widmar, 2020). A false sense of digital equity was created by shaping the discussion using numbers.

Like many problems, the problem of the digital divide is unlikely to be solved but rather be serially resolved; each policy initiative slaying on head of the multi headed hydra (Rittel & Weber, 1973). Policy analysts must inform the debate by speaking the truth; like most societal problems, digital inequity is rooted in structural classism and racism (Wildavsky, 1979). These wicked problems require serial solutions rooted in bipartisan support.

Political ideology tempers the discussion of the internet as a common good. Liberal commentaries align digital inequity with all forms of social inequity and call for revolutionary change while conservative commentaries argue that inequity is natural phenomena resulting from a free market (Birkland, 2011; Hacker & Mason, 2003). The government is increasingly polarized and as such, elected officials' voting patterns are unlikely to stray from party lines (Pfiffner, 2014; Arnold, 1990; Bernstein, 1989). Constituency control is strongest on issues that personally impact constituents, yet in the case of broadband access, gerrymandering has quieted the voice of underrepresented groups, including rural dwellers and the poor (Cayton, 2017;

Pfiffner, 2014). Those of low socioeconomic status are socially constructed as dependents with weak power (Schneider & Ingram, 1993). To overcome the power differential and advance the issue of high-speed broadband access as a common good, unofficial actors' voices will be important to sway conservative voting. Virginia's plan includes the two largest unofficial actors. Grassroots involvement should not be overlooked. Constituents voices are more likely to be represented by grassroots efforts that include small businesses.

Summary of Policy Recommendations

The implementation of Waiver 1135 in Virginia enabled telehealth use by making payment parity possible (reimbursing telehealth services at the same rate as face to face visits). Clinician uptake of telehealth increased in 2020 and Virginian clinicians plan on continuing its use, particularly to deliver behavioral health services. Continuation of telehealth services could serve as a mechanism to improve access to care in HPSAs. The VSWTHP implementation strategy should continue the payment models that Waiver 1135 prompted. The implementation strategy should also address other factors to improve telehealth infrastructure which includes a prepared workforce. The implementation of VSWTHP cannot occur in a vacuum. Consideration for Virginia's broadband plan in designing the implementation strategy of VSWTHP is imperative. Overcoming multiple levels of the digital divide will promote the sustainability of VSWTHP.

Table 8

Summary of Policy Recommendations

Policy Recommendations	**BMHSU Contextual Characteristic**
Outcomes of Study: VA Statewide Telehealth Plan	
To address core strategy #5, continue payment parity instituted by Waiver 1135	Enabling (telehealth payment policy)

To address core strategy #3, state & commercial insurance abandon face to face requirement for HPSAs	Enabling (telehealth payment policy)
To address core strategy #1, mandate participation in interstate licensure compacts	Pre-disposing (telehealth workflows)
To address core strategy #6, Department of Health Professions provide training for telehealth documentation	Pre-disposing (telehealth workflows)
Consideration of Extraneous Variable: Virginia Broadband Plan	
Cyclic process to evaluate benchmark speeds to align with usage	Enabling (broadband access policy)
Conduct cost analysis for consumers of broadband services to ensure affordable access	Enabling (broadband access policy)
Incorporate plan to improve clinician and patient digital literacy	Pre-disposing (telehealth workflows)
Public awareness campaign to engage voters	Enabling (broadband access policy)

Limitations

This study was designed to examine correlation between variables as opposed to causation. The general limitation of correlation is the inability to predict outcomes; meaning that while an association between variables may contribute to outcomes, causation cannot be determined. This analysis determined relationships between variables but was unable to determine which variables had the greatest influence on telehealth utilization. Confounding variables in this study include the COVID 19 pandemic, which corresponds to the implementation of Waiver 1135 in Virginia. While private insurance and Medicaid adopted payment policies that aligned with Waiver 1135, their implementation was not simultaneous. In the case of commercial insurance, not all payers complied with the entirety of allowances set forth by Waiver 1135. Commericial insurers may have only partially adopted payment policies set forth by Waiver 1135 and this study could not control for individual intepretations of such.

Virginia mandated shelter in place orders with varying uptake by geographic regions during 2020 which may have influenced individual locales telehealth needs. Individual healthcare clincians characteristics, such as skills/training in telehealth use, cannot be controlled for in this analysis. Therefore, changes in telehealth utilization between January 2019 and December 2020 cannot be attributed to the impact of Waiver 1135 alone. Future research examining a longer time span may be able to isolate the effects of the Waiver versus confounding variable effects.

Generalizability to telehealth utilization in other states may be limited in that Virginia's health policy landscape has unique attributes that may impact telehealth utilization. Virginia's board regulations requires that certain nurse practitioners have a collaborative agreement with a physician to render care. As such, their claims may fall under the collaborating physician's healthcare clincians number.

Nationally, the limitations when using APCD data includes missing populations and the inability to compare across states (Carman, Dworsky, Heins, Schwam, Shelton & Whaley, 2021). Missing populations include the omission of certain insurance carriers from APCDs. The 2016 Supreme Court Gobeille decision precluded states from requiring reporting to APCDs by self-insured private employers and third-party administrators operating health plans regulated under the Employee Retirement Income Security Act of 1974 (ERISA). These plans cover over 60 percent of those with employer-sponsored insurance and are regulated by the Department of Labor. The Consolidated Appropriations Act, 2021 took one step to address this limitation through its No Surprises Act provisions. The Act required the Department of Labor to establish an Advisory Committee to produce a report with recommendations for a standardized reporting format for ERISA group health plans to voluntarily report to state APCDs and to offer guidance

to the states on the use of the standardized reporting format. Given these constraints, VHI estimates that approximately seventy-five percent of all claims are captured in Virginia's APCD.

Research Contribution

Andersen's Behavioral Model of Health Service Use (BMHSU) theory is classically used to examine factors that drive patients to access healthcare services. This study applied BMHSU to clinicians; the telehealth claim served as a proxy for clinician use while simultaneously acting as an indicator of patient use. Andersen's model is well suited for examining large datasets; aggregated data reflects population level trends which then inform policy agendas. This study's innovation application of the theoretical model to clinician use of telehealth as a healthcare service modality provides insight into the impact of contextual factors on clinicians ability to uptake of services.

This study contributes to the growing body of literature examining healthcare utilization during a global pandemic. Pre-pandemic payment parity was often cited as a barrier to telehealth use by clinicians. By specifying Waiver 1135, this study provides insight into the impact of payment parity on telehealth utilization by clinicians. Future research should examine a longer time interval post-Waiver 1135 to better understand its impact on clinician uptake of telehealth services. Isolating for the effects of the Waiver alone are challenging; time series research could provide further insight.

The 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act, prompted health systems to use electronic health records in a meaningful way; the intention was to reduce errors and improve bidirectional communication in health care (HHS, 2017). The adoption of electronic health records over the next decade created large sets of data. These big datasets yield aggregated

data that can inform population health strategies. All payer claims data was designed for administrative purposes making it cumbersome for researchers to use (Konrad, Zhang, Bjarndóttir & Proaño, 2019). As such, much of healthcare research continues to rely on examination of single systems. This study contributes to the body of evidence by providing a macrosystem evaluation of telehealth utilization using all payer claims data. While limitations exist for this approach, a macrosystem level data drives population health strategies.

Conclusion

Society was not adequately prepared for the abrupt change to healthcare access that was triggered by the events of 2020. The disruption of healthcare services created by the pandemic exacerbated existing healthcare disparities. Clinicians and consumers of healthcare experienced an increased need to use telehealth services as a mechanism to comply with shelter in place mandates and preserve personal protective equipment while attempting to maintain access to care. Policymakers responded to needs in real time by creating waivers to make telehealth a feasible option during unprecedented pandemic. The pandemic created a natural phenomenon for researchers to study by using theoretical frameworks to guide analysis of real time scenarios. Exploration the impact of policy changes necessitated by the pandemic are necessary to inform the next iteration of policymaking.

This study's descriptive examination of Virginia's telehealth utilization pre and post implementation of Waiver 1135 applied Andersen's Behavioral Model of Health Service Use (BMHSU) theory to clinicians uptake of telehealth services. Trends in telehealth use suggest that payment parity alone is insufficient to support telehealth as viable solution to healthcare access disparities in Virginia. While payment parity created by Waiver 1135 may have increased overall utilization of telehealth services, other contextual characteristics seemed to offset increased need.

Rural Virginians did not experience telehealth services in the same way as their metropolitan counterparts. Existing disparities, such as health healthcare clincians shortages, seemed to influence rural Virginians telehealth experience post Waiver 1135. Policy makers must address other mutable contextual characteristics including telehealth infrastructure and access to broadband in order to make telehealth a sustainable, feasible option.

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Appendices

Appendix A: Literature Search Strategy

A review of the telehealth research was conducted using the following search terms in PubMed ((("Coronavirus Infections"[MeSH Terms] OR "Disease Outbreaks"[MeSH Terms] OR "Disease Outbreak"[Title/Abstract] OR "Disease Outbreaks"[Title/Abstract] OR "Pandemic"[Title/Abstract] OR ("pandemic s"[All Fields] OR "pandemically"[All Fields] OR "pandemicity"[All Fields] OR "pandemics"[MeSH Terms] OR "pandemics"[All Fields] OR "Pandemic"[All Fields]) OR "Epidemic"[Title/Abstract] OR "Epidemics"[Title/Abstract] OR "Coronavirus"[Title/Abstract] OR "corona virus"[Title/Abstract] OR "corona viruses"[Title/Abstract] OR "coronaviruses"[Title/Abstract] OR "covid"[Title/Abstract] OR "covid 19"[Title/Abstract] OR "SARS COV 2"[Title/Abstract] OR ("Middle East Respiratory Syndrome Coronavirus"[MeSH Terms] OR "MERS Virus"[Title/Abstract] OR "MERS Viruses"[Title/Abstract] OR "MERS CoV"[Title/Abstract] OR "Middle East respiratory syndrome related coronavirus"[Title/Abstract] OR "MERS Virus"[Title/Abstract] OR "MERS Viruses"[Title/Abstract]) OR "middle east respiratory syndrome"[Title/Abstract] OR "Coronavirus"[Title/Abstract] OR "Severe Acute Respiratory Syndrome Coronavirus 2"[Title/Abstract] OR "2019 ncov"[Title/Abstract] OR "ncov 2019"[Title/Abstract]) AND ("Telemedicine"[MeSH Terms] OR "Telemedicine"[Title/Abstract] OR "Telehealth"[Title/Abstract] OR "eHealth"[Title/Abstract] OR "mHealth"[Title/Abstract] OR "Telerehabilitation"[Title/Abstract] OR "Teleradiology"[Title/Abstract] OR "Telerehabilitation"[Title/Abstract])) AND (("Physicians"[Mesh] OR Physician OR Physicians OR Doctor OR Doctors OR Healthcare clincians OR Healthcare clincianss) OR ("Nurse

Practitioners"[Mesh] OR Nurse Practitioner OR Nurse Practitioners OR Clinician OR Clinicians)).

The timeframe used was 2020-2022 and was limited to full text availability and English language. This search strategy resulted in 4,152 articles. The primary inclusion criterion was that the article focused on the clinician/system experience as opposed to the patient experience. The remaining inclusion criteria were as follows: published between 2020-2022, English language, and focused on an adult population. Randomized control trials, quasi-experimental studies, pilot studies and observational studies were included. No studies were eliminated due to risk for bias. Risk for bias was examined by the reviewer by evaluating the rigor of each study with regards to study design.

Appendix B: APCD Data Dictionary

Category	Field Name	Field Description
Dates	Admit Date	The date of the facility admission. If this date is NULL, the row does not represent a facility admission or the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Admit Day of Week	The day of the week of the facility admission. If this date is NULL, the row does not represent a facility admission or the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Admit Month of Year	The month of the year of the facility admission. If this date is NULL, the row does not represent a facility admission or the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Admit Quarter	The quarter of the facility admission. If this date is NULL, the row does not represent a facility admission or the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.

Dates	Admit Quarter of Year	The quarter of the year of the facility admission. If this date is NULL, the row does not represent a facility admission or the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Admit Year	The year of the facility admission. If this date is NULL, the row does not represent a facility admission or the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Admit Year and Month	The year and month of the facility admission. If this date is NULL, the row does not represent a facility admission or the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Discharge Date	The date that the patient left the facility. This date may be NULL for patients that have not been discharged yet.
Dates	Discharge Day of Week	The day of the week that the patient left the facility. This date may be NULL for patients that have not been discharged yet.
Dates	Discharge Month of Year	The month of the year that the patient left the facility. This date may be NULL for patients that have not been discharged yet.

Dates	Discharge Quarter	The quarter that the patient left the facility. This date may be NULL for patients that have not been discharged yet.
Dates	Discharge Quarter of Year	The quarter of the year that the patient left the facility. This date may be NULL for patients that have not been discharged yet.
Dates	Discharge Year	The year that the patient left the facility. This date may be NULL for patients that have not been discharged yet.
Dates	Discharge Year and Month	The year and the month that the patient left the facility. This date may be NULL for patients that have not been discharged yet.
Dates	Episode Date	The year and month of the maximum (latest) month associated with an episode of care.
Dates	Episode Max Month	The month of the maximum (latest) month associated with an episode of care.
Dates	Episode Max Month of Year	The month of year of the maximum (latest) month associated with an episode of care.
Dates	Episode Max Quarter	The quarter of the maximum (latest) month associated with an episode of care.
Dates	Episode Max Quarter of Year	The quarter of year of the maximum (latest) month associated with an episode of care.
Dates	Episode Max Year	The year of the maximum (latest) month associated with an episode of care.
Dates	Incurred Date	The date of service.

Dates	Incurred Day of Week	The day of the week spelled out (e.g., Monday, Tuesday, etc.) when a service was performed.
Dates	Incurred Month of Year	The month of the year spelled out (e.g., January, February, etc.) when a service was performed.
Dates	Incurred Quarter	The quarter (e.g., Q1 2014, Q2 2014, etc.) when a service was performed.
Dates	Incurred Quarter of Year	The quarter of the year (e.g., Q1, Q2, etc.) when a service was performed.
Dates	Incurred Year	The year (YYYY) when a service was performed.
Dates	Incurred Year and Month	The month and year (YYYYMM; e.g., 201101 is January 2011) when a service was performed.
Dates	Paid Date	The date that the claim line is considered paid by the plan for general ledger purposes. The presence of the paid date does not necessarily indicate that the claim has been paid, but rather that the claim has been processed and may have been denied. If this date is NULL, the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Paid Day of Week	The day of the week spelled out (e.g., Monday, Tuesday, etc.) when a claim was paid.
Dates	Paid Month of Year	The month of the year spelled out (e.g., January, February, etc.) when a claim was paid.

Dates	Paid Quarter	The quarter (e.g., Q1 2014, Q2 2014, etc.) when a claim was paid.
Dates	Paid Quarter of Year	The quarter of the year (e.g., Q1, Q2, etc.) when a claim was paid.
Dates	Paid Year	The year that the claim line is considered paid by the plan for general ledger purposes. The presence of the paid date does not necessarily indicate that the claim has been paid, but rather that the claim has been processed and may have been denied. If this date is NULL, the row represents an Incurred But Not Reported (IBNR) complete trends row and not an actual claim line item.
Dates	Paid Year and Month	The month and year (YYYYMM; e.g., 201101 is January 2011) when a claim was paid.
Diagnosis	10th ICD Diagnosis Code	A secondary diagnosis ICD code (10th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	10th ICD Diagnosis Desc	A written description for the 10th ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	10th ICD Rollup	A high level grouping of the 10th ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	2nd ICD Diagnosis Code	A secondary diagnosis ICD code (2nd) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	2nd ICD Diagnosis Desc	A written description for the 2nd ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	2nd ICD Rollup	A high level grouping of the 2nd ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	3rd ICD Diagnosis Code	A secondary diagnosis ICD code (3rd) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	3rd ICD Diagnosis Desc	A written description for the 3rd ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	3rd ICD Rollup	A high level grouping of the 3rd ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	4th ICD Diagnosis Code	A secondary diagnosis ICD code (4th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	4th ICD Diagnosis Desc	A written description for the 4th ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	4th ICD Rollup	A high level grouping of the 4th ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	5th ICD Diagnosis Code	A secondary diagnosis ICD code (5th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	5th ICD Diagnosis Desc	A written description for the 5th ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	5th ICD Rollup	A high level grouping of the 5th ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	6th ICD Diagnosis Code	A secondary diagnosis ICD code (6th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	6th ICD Diagnosis Desc	A written description for the 6th ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	6th ICD Rollup	A high level grouping of the 6th ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	7th ICD Diagnosis Code	A secondary diagnosis ICD code (7th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	7th ICD Diagnosis Desc	A written description for the 7th ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	7th ICD Rollup	A high level grouping of the 7th ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	8th ICD Diagnosis Code	A secondary diagnosis ICD code (8th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	8th ICD Diagnosis Desc	A written description for the 8th ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	8th ICD Rollup	A high level grouping of the 8th ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	9th ICD Diagnosis Code	A secondary diagnosis ICD code (9th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, 8489 = SPRAIN NOS, etc.).

Diagnosis	9th ICD Diagnosis Desc	A written description for the 9th ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	9th ICD Rollup	A high level grouping of the 9th ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).
Diagnosis	ICD CCS Level 1	Hierarchical view of the ICD Diagnosis Agency for Healthcare Research and Quality (AHRQ) Clinical Classification Software (CCS).
Diagnosis	ICD CCS Level 2	Hierarchical view of the ICD Diagnosis Agency for Healthcare Research and Quality (AHRQ) Clinical Classification Software (CCS).
Diagnosis	ICD CCS Level 3	Hierarchical view of the ICD Diagnosis Agency for Healthcare Research and Quality (AHRQ) Clinical Classification Software (CCS).

Diagnosis	Primary ICD Diagnosis Code	The main or principal diagnosis ICD code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 95909 = FACE & NECK INJURY, 78652 = PAINFUL RESPIRATION, or 8489 = SPRAIN NOS, etc.).
Diagnosis	Primary ICD Diagnosis Desc	A written description for the Primary ICD Diagnosis Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Diagnosis	Primary ICD Rollup	A high level grouping of the Primary ICD Diagnosis Code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., Intestinal infection, Bacterial infection; unspecified site, or Encephalitis (except that caused by tuberculosis or sexually transmitted disease), etc.).

Episodes of Care	MEG Body System	High level rollup of which body system the care is focused around during an episode of care.
Episodes of Care	MEG Episode Completion Flag	Flag indicating whether an episode of care is complete or not.
Episodes of Care	MEG Episode Number	Unique numeric identifier for an episode of care.
Episodes of Care	MEG Label	ID number and description used to identify and describe an episode of care.
Episodes of Care	MEG Outlier Flag	Flag indicating whether the episode is considered a high outlier.
Episodes of Care	MEG Rollup	ID number and description for the rollup label used to categorize an episode of care.
Episodes of Care	MEG Severity	Stratification indicating the severity level of an episode within each MEG category based on Truven's disease staging classification system.
Episodes of Care	MEG Type	Indicates whether the episode is chronic or acute.
Evidence Based Measures	EBM	A combination of metrics developed and maintained by organizations such as the National Quality Forum (NQF), the Agency for Healthcare Research and Quality (AHRQ), and the National Committee for Quality Assurance (NCQA).
Evidence Based Measures	EBM Category	A grouping of Evidence Based Measures into a broad classification (e.g., Cardiovascular Conditions, Diabetes, Prevention, etc.).

Evidence Based Measures	EBM Denominator	The number of times a member qualified to contribute to the eligible population for the Evidence Based Measure during the measurement period. For details on how the denominator is calculated for each measure, see the "MedInsight Evidence Based Measures" documentation.
Evidence Based Measures	EBM Numerator	The number of times a member met the measurement criteria for compliance in a measurement period. For details on how the numerator is calculated for each measure, see the "MedInsight Evidence Based Measures" documentation.
Evidence Based Measures	Total EBM Denominator	A summation of EBM Denominator, which represents the number of times a member qualified to contribute to the eligible population for the Evidence Based Measure during the measurement period. For details on how the denominator is calculated for each measure, see the "MedInsight Evidence Based Measures"

Evidence Based Measures	Total EBM Numerator	A summation of EBM Numerator, which represents the number of times a member met the measurement criteria for compliance in a measurement period. For details on how the numerator is calculated for each measure, see the "MedInsight Evidence Based Measures" documentation.
Evidence Based Measures	EBM Ending Month	Ending Month is the first day of the last month and year for the measurement period. The measure period varies by measurement but is usually one year. The Ending Month can be used as a common frame of reference for all the measures, aligned against a common time period.
Evidence Based Measures	Total EBM Rate	The ratio of patients in the Total EBM Numerator compared to the Total EBM Denominator. The numerator represents the number of times a member met the measurement criteria for compliance in a measurement period. The denominator represents the number of times a member qualified to contribute to the eligible population for the Evidence Based Measure during the measurement period. For details on how the numerator is calculated for each measure, see the "MedInsight Evidence Based Measures" documentation.

Insurance Coverage Information	Insurance Type	Insurance type as coded by the data suppliers on the enrollment files (e.g., 15 - Indemnity insurance, SP - Supplemental Policy, etc.).
Insurance Coverage Information	Medical and RX Eligibility	Indicates members who are eligible for both medical and pharmacy benefits as reported on the enrollment files submitted by the data suppliers (Y/N).
Prescription Drug	RX Fill Source	Prescription Fill Source indicates whether drug dispensed at pharmacy or by mail. R = Retail, M = Mail, Blank = unknown.
Prescription Drug	Prescription Dispensed as Written	Prescription dispensed as written (DAW) flag that indicates if the physician has or has not authorized a substitution for the prescribed drug. "Y" indicates the drug is to be dispensed as written; "N" indicates a substitution is permissible.
Prescription Drug	Strength	Strength is the amount of the drug or potency of the drug, usually per dose (e.g., 10 MG, 200 MG/5ML, or 1500 UNIT).
Patient Information	Subscriber Key	Subscriber key is a MedInsight generated number that represents the subscriber in a health insurance plan. The subscriber is the person who has purchased (or who's employer has purchased) the health insurance plan. A subscriber can have zero, one or more associated members.

Insurance Coverage Information	Effective Date	Effective Date is the first day that the membership was active.
Insurance Coverage Information	Termination Date	Termination Date is the last day that the membership was active.
Insurance Coverage Information	Parent Payer Code	A unique identifier generated by Milliman and assigned to each data supplier organization. In some cases, more than one subsidiary or division of a company may be submitting data for the Virginia APCD. Each division submitting data is assigned its own payer code and payer codes relating to the same organization are mapped to a single Parent Payer Code.
Insurance Coverage Information	Payer LOB	Indicates the type of payer (i.e., COMERCIAL, MEDICARE, MEDICAID, or OTHER).

Insurance Coverage Information	Payer Type	A classification for the payer as one of the following: PPO…Commercial Preferred Healthcare clincians Organization POS...Commercial Point of Service HMO...Commercial Health Maintenance Organization MDE...Medicaid Dual Eligible Health Maintenance Organization MD...Medicaid Disabled Health Maintenance Organization MLI...Medicaid Low Income Health Maintenance Organization MRB...Medicaid Restricted Benefit Health Maintenance Organization MR...Medicare Advantage Health Maintenance Organization MP...Medicare Advantage Preferred Healthcare clincians Organization MC...Medicare Cost SN1...Special Needs Plan - Chronic Condition SN2…Special Needs Plan - Institutionalized SN3…Special Needs Plan - Dual Eligible CHP…Child Health Insurance Program
Insurance Coverage Information	Primary Insurance Flag	Indicates whether or not a carrier associated with a claim was the primary payer (Y/N).
Metrics	Admits	The number of people admitted; Populated for Inpatient Facility claims only.

Metrics	Allowed Amount	A proxy allowed amount based on the average allowed amounts across all data submitters and not representative of allowed amounts reported by any one data submitter.
Metrics	Coinsurance	A proxy allowed amount based on the average coinsurance amounts across all data submitters and not representative of allowed amounts reported by any one data submitter.
Metrics	Cost Sharing	The average total of coinsurance, copayment, and deductible collected.
Metrics	Member Paid	The amount of non-premium member payments (coinsurance + copayment + deductible).
Metrics	Paid Amount	A proxy paid amount based on the average paid amounts across all data submitters and not representative of paid amounts reported by any one data submitter.
Metrics	Prepaid Amount	A proxy allowed amount based on the average prepaid amounts across all data submitters and not representative of allowed amounts reported by any one data submitter.
Metrics	RVUs	The Relative Value Unit (RVU) calculated based on the service line.
Metrics	RX Paid	The average proxy amount paid per prescription.
Metrics	Total Admits	A summation of the number of people admitted; Populated for Inpatient Facility claims only.

Metrics	Total Allowed	A summation of the proxy allowed amount based on the average allowed amounts across all data submitters and not representative of allowed amounts reported by any one data submitter.
Metrics	Total Cost Sharing	A summation of the average total of coinsurance, copayment, and deductible collected.
Metrics	Total Member Paid	A summation of the amount of non-premium member payments (coinsurance + copayment + deductible).
Metrics	Total Paid	A summation of the proxy paid amount based on the average paid amounts across all data submitters and not representative of paid amounts reported by any one data submitter.
Metrics	Total RVUs	A summation of Relative Value Units (RVUs) calculated based on the service line.
Metrics	Total RX Days Supply	A summation of the number of days that a drug will last if taken at the prescribed dose.
Metrics	Total RX Paid	A summation of the average proxy amount paid per prescription.

Metrics	Total Utilization	A summation of the count of the number of distinct services, differing according to the type of service. For hospital inpatient services, it represents the number of days spent in the facility. For hospital outpatient services, it represents the number of unique events at the outpatient facility. For professional and/or ancillary services, it represent either the number of visits (office visits, physician exams, chiropractic visits, etc.) or the number of procedures performed for non-visit professional services. For pharmacy services, it represents the number of prescriptions.
Metrics	Utilization	A count of the number of distinct services, differing according to the type of service. For hospital inpatient services, it represents the number of days spent in the facility. For hospital outpatient services, it represents the number of unique events at the outpatient facility. For professional and/or ancillary services, it represent either the number of visits (office visits, physician exams, chiropractic visits, etc.) or the number of procedures performed for non-visit professional services. For pharmacy services, it

		represents the number of prescriptions.
Other Claim Elements	Admit Source	A written explanation designating the origin of an admitted patient (e.g., Emergency, Urgent, Elective, etc.).
Other Claim Elements	Admit Type	A numeric value and written explanation designating the nature of a hospital admission (e.g., Emergency, Urgent, Elective, etc.).
Other Claim Elements	Bill Type Class	Indicates the setting of care billed on an outpatient claim line (e.g., Ambulatory Surgery Center, Residential Facility, etc.).
Other Claim Elements	Bill Type Description	A written description corresponding to the Uniform Bill (UB) form that encodes facility type (e.g., Hospital, Home Health, etc.) and bill classification (e.g., Inpatient, Outpatient, etc.).
Other Claim Elements	Bill Type ID	The code on the Uniform Bill (UB) form that encodes facility type (e.g., Hospital, Home Health, etc.) and bill classification (e.g., Inpatient, Outpatient, etc.).
Other Claim Elements	Claim ID	A unique numerical ID for each claim.
Other Claim Elements	Claim Status	Determines if a claim is Paid, Denied, Encounter, or Reversed.
Other Claim Elements	Discharge Hour	Hour in military time at which the patient was discharged (for inpatient claims).

Other Claim Elements	Discharge Status	The description corresponding to the two-character discharge status code that represents the disposition of the patient upon leaving the facility. If the patient died, this event may be indicated here (e.g., Home – Self Care, SNF, Died, etc.).
Other Claim Elements	Discharge Status Code	A two-character code that represents the disposition of the patient upon leaving the facility. If the patient died, this event may be indicated here (e.g., 01 = Home – Self Care, 03 = SNF, 20 = Died, etc.).
Other Claim Elements	Facility Type	Indicates the type of facility where a service was performed (e.g., Clinic, Hospital, Skilled Nursing, etc.).
Other Claim Elements	Place of Service	Indicates the setting of care billed on a professional claim line, corresponding to the industry standard place of service code (e.g., Office, Home, Urgent Care Facility, etc.).
Patient Information	ACO Rating Area	The CMS designated Accountable Care Organization Rating Areas for Virginia.
Patient Information	Adult Flag	Indicates whether the member age on the date of service is greater than or equal to 18 (Y) or less than 18 (N).
Patient Information	Member Age Band DOS	Member age on the date of service grouped into age ranges (bands).
Patient Information	Member Age DOS	Member age on the date of service.

Patient Information	Member Age Band ENROLL	Member age on the member's most recent enrollment record grouped into age ranges (bands).
Patient Information	Member Age ENROLL	Member age on the member's most recent enrollment record.
Patient Information	CCHG Grouping	Chronic Condition Hierarchical Group (CCHG). Categorizes each member into either Chronic Condition, Healthy, or No CCHG Grouping. The CCHG organizes medical utilization and costs in a clinically relevant manner by assigning patients to unique categories using a hierarchy that groups similar patients in the same group based on how doctors make treatment decisions.
Patient Information	CCHG Label	Chronic Condition Hierarchical Group (CCHG). Organizes medical utilization and costs in a clinically relevant manner by assigning patients to unique categories using a hierarchy that groups similar patients in the same group based on how doctors make treatment decisions (e.g., Major Psychoses, COPD, Healthy Male (41-64), etc.).
Patient Information	Member Gender	Member gender (e.g., M, F, or U).
Patient Information	Health Planning District	Virginia Health Planning District mapped from zip codes.

Patient Information	Health Planning Region	Virginia Health Planning Region mapped from zip codes.
Patient Information	Hispanic Indicator	Member ethnicity (e.g. 01 - Y, 02 - N, or 03 - UNK).
Patient Information	Member County ENROLL	Member county derived from the member's most recent enrollment record.
Patient Information	Member MSA ENROLL	Metropolitan Statistical Area (MSA) . A 5-character code specifying where the member resides as defined by the Office of Management and Budget.
Patient Information	Member Race	Member race (e.g. 1 - AMERICAN INDIAN/ALASKA NATIVE; 2 - ASIAN; 3 - BLACK/AFRICAN AMERICAN; 4 - NATIVE HAWAIIAN/OTHER PACIFIC ISLANDER; 5 - WHITE; 9 - OTHER; 6 - UNKNOWN/NOT SPECIFIED; 0 - UNKNOWN/NOT SPECIFIED; UNKNOWN - UNKNOWN/NOT SPECIFIED).
Patient Information	Member State ENROLL	Member state of residence (e.g., Virginia - VA).
Patient Information	Member Zip Code DOS	The member's 5-digit zip code on the date of service.
Patient Information	Person Key	Unique value assigned to identify each unique individual within the data warehouse across all payers.
Patient Information	Relation Type	Indicates a member's relationship to the subscriber (e.g., SUBSCRIBER, SPOUSE, or DEPENDENT).
Patient Information	Member County DOS	Member county derived from the member's zip code on the date of service.

Patient Information	Member Zip Code ENROLL	The member's 5-digit zip code derived from the member's most recent enrollment record.
Prescription Drug	Brand Status	Indicates if the drug is available as a generic, multiple source brand (MSB), single source brand (SSB), or over the counter (OTC).
Prescription Drug	Dosage Form	The medium through which the drug is delivered (e.g., FOAM, GEL, TABS, etc.).
Prescription Drug	Drug Code	The drug's National Drug Code (NDC), a unique numeric identifier assigned by the US Food and Drug Administration (e.g., 00006011731, 00025152531, 00300304619, etc.).
Prescription Drug	Drug Name	The name of the drug associated with the National Drug Code (NDC), a unique numeric identifier assigned by the US Food and Drug Administration (e.g., SINGULAIR, CELEBREX, PREVACID, etc.).
Prescription Drug	GPI	The numeric Medi-Span Generic Product Indicator of the drug.
Prescription Drug	GPI Generic Name	The drug name corresponding to the Medi-Span Generic Product Indicator (e.g., "Alprostadil Powder", "Phenazopyridine HCl Tab 100 MG", etc.).
Prescription Drug	Manufacturer	The name of the company that manufactured the drug listed on the claim (e.g., GLAXO SMITH KLINE,

		SCHERING, WYETH, etc.).
Prescription Drug	NDC	A combination of the drug's National Drug Code (NDC), the unique numeric identifier assigned by the US Food and Drug Administration, and the associated drug name (e.g., 00006011731 - SINGULAIR, 00025152531 - CELEBREX, 00300304619 - PREVACID, etc.).
Prescription Drug	OTC	Over the counter indicator for the drug. Values include: O- OVER-THE-COUNTER (SINGLE SOURCE) P- OVER-THE-COUNTER (MULTIPLE SOURCE) R- PRESCRIPTION DRUG (SINGLE SOURCE) S- PRESCRIPTION DRUG (MULTIPLE SOURCE)
Prescription Drug	Primary Substitution Brand Status	Indicates if the substitute drug is available as a generic, multiple source brand (MSB), single source brand (SSB), or over the counter (OTC).
Prescription Drug	Primary Substitution Drug Name	The name of the substitute drug.
Prescription Drug	Primary Substitution Flag	Indicates whether a drug allows for substitution (e.g., No Substitution, Not Rx, or Valid Substitution).

Prescription Drug	Primary Substitution Manufacturer	The company that manufactures the substitute drug (e.g., GLAXO SMITH KLINE, SCHERING, WYETH, etc.).
Prescription Drug	Primary Substitution Type	Determines substitution drug class (e.g., Drug Bioequivalence, Generic Bioequivalence, No Substitution, etc.).
Prescription Drug	RX Days Supply	The number of days that a drug will last if taken at the prescribed dose.
Prescription Drug	Strength	The amount of the drug or potency of the drug, usually per dose (e.g., 10 MG, 200 MG/5ML, 1500 UNIT, etc.).
Prescription Drug	Therapeutic Class 2	The second level rollup of the therapeutic class in Medi-Span's Generic Product Identifier (e.g., Insulin, Metabolic Modifiers, etc.).
Prescription Drug	Therapeutic Class 3	The third and lowest level rollup of the therapeutic class in Medi-Span's Generic Product Identifier (e.g., Human Insulin, Bisphosphonates, etc.).
Prescription Drug	Therapeutic Class 1	The first and highest level rollup of the therapeutic class in Medi-Span's Generic Product Identifier (e.g., Ulcer Drugs, Penicillin, Thyroid Agents, etc.).
Healthcare clincians Information	Billing Healthcare clincians County	The county of the healthcare clincians who was reimbursed for the claim.
Healthcare clincians Information	Billing Healthcare clincians Name	The name of the healthcare clincians who was reimbursed for the claim.

Healthcare clincians Information	Billing Healthcare clincians NPI	The National Healthcare clincians Identifier (NPI) number of the healthcare clincians who was reimbursed for the claim.
Healthcare clincians Information	Billing Healthcare clincians Specialty	The description associated with the CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians who was reimbursed for the claim.
Healthcare clincians Information	Billing Healthcare clincians State	The state of the healthcare clincians who was reimbursed for the claim.
Healthcare clincians Information	Billing Healthcare clincians Taxonomy	The CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians who was reimbursed for the claim.
Healthcare clincians Information	Billing Healthcare clincians TIN	The Tax ID Number (TIN) of the healthcare clincians who was reimbursed for the claim.
Healthcare clincians Information	Billing Healthcare clincians ZIP	The zip code of the healthcare clincians who was reimbursed for the claim.
Healthcare clincians Information	Episode Managing Healthcare clincians County	The county of the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.
Healthcare clincians Information	Episode Managing Healthcare clincians Name	The name of the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.

Healthcare clincians Information	Episode Managing Healthcare clincians NPI	The National Healthcare clincians Identifier (NPI) of the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.
Healthcare clincians Information	Episode Managing Healthcare clincians Specialty	The description associated with the CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.
Healthcare clincians Information	Episode Managing Healthcare clincians State	The state of the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.
Healthcare clincians Information	Episode Managing Healthcare clincians Taxonomy	The CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.
Healthcare clincians Information	Episode Managing Healthcare clincians TIN	The Tax ID Number (TIN) of the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.
Healthcare clincians Information	Episode Managing Healthcare clincians ZIP	The zip code of the healthcare clincians with the highest number of outpatient E&M visits during the course of the episode.

Healthcare clincians Information	Episode Primary Healthcare clincians County	The county of the healthcare clincians accounting for the greatest resource use during the episode.
Healthcare clincians Information	Episode Primary Healthcare clincians Name	The name of the healthcare clincians accounting for the greatest resource use during the episode.
Healthcare clincians Information	Episode Primary Healthcare clincians NPI	The National Healthcare clincians Identifier (NPI) of the healthcare clincians accounting for the greatest resource use during the episode.
Healthcare clincians Information	Episode Primary Healthcare clincians Specialty	The description associated with the CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians accounting for the greatest resource use during the episode.
Healthcare clincians Information	Episode Primary Healthcare clincians State	The state of the healthcare clincians accounting for the greatest resource use during the episode.
Healthcare clincians Information	Episode Primary Healthcare clincians Taxonomy	The CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians accounting for the greatest resource use during the episode.
Healthcare clincians Information	Episode Primary Healthcare clincians TIN	The Tax ID Number (TIN) of the healthcare clincians accounting for the greatest resource use during the episode.
Healthcare clincians Information	Episode Primary Healthcare clincians ZIP	The zip code of the healthcare clincians accounting for the greatest resource use during the episode.

Healthcare clincians Information	PCP Attrib Healthcare clincians County	The county of the healthcare clincians accounting for the member's most primary care visits over a rolling 24-month period.
Healthcare clincians Information	PCP Attrib Healthcare clincians Name	The name of the healthcare clincians accounting for the member's most primary care visits over a rolling 24-month period.
Healthcare clincians Information	PCP Attrib Healthcare clincians NPI	The National Healthcare clincians Identifier (NPI) of the healthcare clincians accounting for the member's most primary care visits over a rolling 24-month period.
Healthcare clincians Information	PCP Attrib Healthcare clincians Specialty	The description associated with the CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians accounting for the member's most primary care visits over a rolling 24-month period.
Healthcare clincians Information	PCP Attrib Healthcare clincians State	The state of the healthcare clincians accounting for the member's most primary care visits over a rolling 24-month period.
Healthcare clincians Information	PCP Attrib Healthcare clincians Taxonomy Code	The CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians accounting for the member's most primary care visits over a rolling 24-month period.
Healthcare clincians Information	PCP Attrib Healthcare clincians TIN	The Tax ID Number (TIN) of the healthcare clincians accounting for the member's most primary

		care visits over a rolling 24-month period.
Healthcare clincians Information	PCP Attrib Healthcare clincians ZIP	The zip code of the healthcare clincians accounting for the member's most primary care visits over a rolling 24-month period.
Healthcare clincians Information	Service Healthcare clincians County	The county of the healthcare clincians who performed the service on the claim.
Healthcare clincians Information	Service Healthcare clincians Name	The name of the healthcare clincians who performed the service on the claim.
Healthcare clincians Information	Service Healthcare clincians NPI	The National Healthcare clincians Identifier (NPI) number of the healthcare clincians who performed the service on the claim.
Healthcare clincians Information	Service Healthcare clincians Specialty	The description associated with the CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians who performed the service on the claim.
Healthcare clincians Information	Service Healthcare clincians State	The state of the healthcare clincians who performed the service on the claim.
Healthcare clincians Information	Service Healthcare clincians Taxonomy	The CMS-defined Specialty Coding System value used to identify the specialized area of care for the healthcare clincians who performed the service on the claim.
Healthcare clincians Information	Service Healthcare clincians TIN	The Tax ID Number (TIN) of the healthcare clincians who performed the service on the claim.

Healthcare clincians Information	Service Healthcare clincians ZIP	The zip code of the healthcare clincians who performed the service on the claim.
Risk Adjustment	Medical Member Months	Indicates whether or not the member was enrolled during the month for medical benefits (0 = NO, 1 = YES). These units can be summed to get the number of member months for a population.
Risk Adjustment	RX Member Months	Indicates if the member was enrolled during the month for pharmacy membership (0 = NO, 1 = YES). These units can be summed to get the number of member months for a population.
Risk Adjustment	Total MARA Concurrent ER Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing the past 12 month resource use for emergency room encounters.
Risk Adjustment	Total MARA Concurrent IP Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing the past 12 month resource use for inpatient hospital services.
Risk Adjustment	Total MARA Concurrent OP Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing the past 12 month resource use for outpatient hospital services.

Risk Adjustment	Total MARA Concurrent OTH Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing the past 12 month resource use for ancillary services such as durable medical equipment, home care services, ambulances and medical supplies.
Risk Adjustment	Total MARA Concurrent Physician Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing the past 12 month resource use for physician and other (such as home health or chiropractor) services.
Risk Adjustment	Total MARA Concurrent Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing the past 12 month resource use for medical and pharmacy.
Risk Adjustment	Total MARA Concurrent RX Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing the past 12 month resource use for pharmacy.
Risk Adjustment	Total MARA Prospective ER Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing expected future 12 month resource use for emergency room encounters.
Risk Adjustment	Total MARA Prospective IP Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing expected future 12 month resource use for inpatient hospital services.

Risk Adjustment	Total MARA Prospective OP Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing expected future 12 month resource use for outpatient hospital services.
Risk Adjustment	Total MARA Prospective OTH Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing expected future 12 month resource use for ancillary services such as durable medical equipment, home care services, ambulances and medical supplies.
Risk Adjustment	Total MARA Prospective Physician Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing expected future 12 month resource use for physician and other (such as home health or chiropractor) services.
Risk Adjustment	Total MARA Prospective Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing expected future 12 month resource use for medical and pharmacy.
Risk Adjustment	Total MARA Prospective RX Risk	A summation of the Milliman Advanced Risk Adjuster (MARA) risk score representing expected future 12 month resource use for pharmacy.

Risk Adjustment	Total Medical Member Months	A summation of the field "Medical Member Months", which indicates whether or not the member was enrolled during the month for medical benefits (0 = NO, 1 = YES). The summation represents the number of member months for a population.
Risk Adjustment	Total RX Member Months	A summation of the field "RX Member Months", which indicates whether or not the member was enrolled during the month for pharmacy membership (0 = NO, 1 = YES). The summation represents the number of member months for a population.
Service Identifiers	10th ICD Procedure Code	A secondary surgery/procedure ICD code (10th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).

Service Identifiers	2nd ICD Procedure Code	A secondary surgery/procedure ICD code (2nd) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	2nd ICD Procedure Desc	A written description for the 2nd ICD Procedure Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	3rd ICD Procedure Code	A secondary surgery/procedure ICD code (3rd) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN

		ENRICHMENT NEC, etc.).
Service Identifiers	3rd ICD Procedure Desc	A written description for the 3rd ICD Procedure Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	4th ICD Procedure Code	A secondary surgery/procedure ICD code (4th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	4th ICD Procedure Desc	A written description for the 4th ICD Procedure Code (e.g., FACE & NECK INJURY,

		PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	5th ICD Procedure Code	A secondary surgery/procedure ICD code (5th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	5th ICD Procedure Desc	A written description for the 5th ICD Procedure Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	6th ICD Procedure Code	A secondary surgery/procedure ICD code (6th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 =

		SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	6th ICD Procedure Desc	A written description for the 6th ICD Procedure Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	7th ICD Procedure Code	A secondary surgery/procedure ICD code (7th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	7th ICD Procedure Desc	A written description for the 7th ICD Procedure Code (e.g., FACE & NECK INJURY,

		PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	8th ICD Procedure Code	A secondary surgery/procedure ICD code (8th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	8th ICD Procedure Desc	A written description for the 8th ICD Procedure Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	9th ICD Procedure Code	A secondary surgery/procedure ICD code (9th) associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 =

		SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	9th ICD Procedure Desc	A written description for the 9th ICD Procedure Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).
Service Identifiers	CPT Mod 1 Code	The first (1st) modifier code associated with the procedure code.
Service Identifiers	CPT Mod 1 Desc	The description corresponding to the first (1st) modifier code associated with the procedure code.
Service Identifiers	CPT Mod 2 Code	The second (2nd) modifier code associated with the procedure code.
Service Identifiers	CPT Mod 2 Desc	The description corresponding to the second (2nd) modifier code associated with the procedure code.
Service Identifiers	DRG Code	The CMS Diagnostic Related Group (DRG) code that classifies inpatient hospital services into one of approximately 750 groups.

Service Identifiers	DRG Desc	The description associated with the CMS Diagnostic Related Group (DRG) code that classifies inpatient hospital services into one of approximately 750 groups (e.g., FEVER, PSYCHOSES, NORMAL NEWBORN, etc.).
Service Identifiers	DRG Type	Classifies a DRG code as either All Patient (AP), Center for Medicare (CMS), All Patient Refined (APR), or Medicare Severity (MS). (Note - APR DRGs are not available within the MedInsight platform.)
Service Identifiers	HCG Detail	The third and lowest level of the Milliman Health Cost Guideline (HCG) service grouping system. The Detail grouping assigns all services into one of 107 categories (e.g., O12 = HOP Surgery, P14 = PHY Outpatient Surgery, I11 = HIP Medical, etc.).
Service Identifiers	HCG Line	The second level of the Milliman Health Cost Guideline (HCG) service grouping system. The Line grouping assigns all services into one of 61 categories (e.g., I11 = Medical, O11 = Emergency Room, P21 = Maternity, etc.).
Service Identifiers	HCG Setting	The first and highest level of the Milliman Health Cost Guideline (HCG) service grouping system. The Setting grouping assigns all services into one of five categories (e.g., 1-Inpatient, 2- Outpatient,

		3-Professional, 4-Prescription Drug, or 5-Ancillary).
Service Identifiers	MDC Code	The numeric code corresponding to the Major Diagnostic Category.
Service Identifiers	MDC Desc	The written description corresponding to the Major Diagnostic Category code.
Service Identifiers	Primary ICD Procedure Code	The main or principal surgery/procedure ICD code associated with the service. ICD is the International Statistical Classification of Diseases and Related Health Problems that classifies diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease (e.g., 0331 = SPINAL TAP, 9921 = INJECT ANTIBIOTIC, 9396 = OXYGEN ENRICHMENT NEC, etc.).
Service Identifiers	Primary ICD Procedure Desc	A written description for the Primary ICD Procedure Code (e.g., FACE & NECK INJURY, PAINFUL RESPIRATION, SPRAIN NOS, etc.).

Service Identifiers	Procedure Code	The American Medical Association's Current Procedural Terminology (CPT) code or the Healthcare Common Procedure Coding System (HCPCS) code associated with a service (e.g., 90471 = IMMUNIZATION ADMIN, 80061 = LIPID PANEL, 74170 = CT ABDOMEN W/O & W/DYE, etc.).
Service Identifiers	Procedure Family 1	First and highest level categorization of procedures.
Service Identifiers	Procedure Family 2	Second level categorization of procedures.
Service Identifiers	Procedure Family 3	Third and lowest level categorization of procedures.
Service Identifiers	Procedure Name	The description corresponding to the American Medical Association's Current Procedural Terminology (CPT) code or the Healthcare Common Procedure Coding System (HCPCS) code associated with a service (e.g., IMMUNIZATION ADMIN, LIPID PANEL, CT ABDOMEN W/O & W/DYE, etc.).
Service Identifiers	Revenue Code	A is a rollup of hospital services as billed by the facility where the service took place (e.g., 0201 = INTENSIVE CARE-SURGICAL, 0280 = ONCOLOGY-GENERAL CLASSIFICATION, 0512 = CLINIC-DENTAL CENTER, etc.).

Appendix C: Data Recoding

Unduplicated Patients – Create variable using patient MIP

0=duplicate
1=primary case

Unduplicated Service Healthcare clincians – use service healthcare clincians NPI
0=duplicate
1=primary case

Place of Service Recode

1=Home (12-Home)
2=Office (11-Office)
3=Other Facility (19, 20, 22, 23, 24, 52, 53, 55, 99)
4=Other Not Specified (02-Telehealth & all else)

Zip Code-RUCA Classification Revised using OMB criteria

1 Metropolitan area core: primary flow within an urbanized area (UA)
2 Metropolitan area high commuting: primary flow 30% or more to a UA
3 Metropolitan area low commuting: primary flow 10% to 30% to a UA
4 Micropolitan area core: primary flow within an urban cluster of 10,000 to 49,999 (large UC)
5 Micropolitan high commuting: primary flow 30% or more to a large UC
6 Micropolitan low commuting: primary flow 10% to 30% to a large UC
7 Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)
8 Small town high commuting: primary flow 30% or more to a small UC
9 Small town low commuting: primary flow 10% to 30% to a small UC
10 Rural areas: primary flow to a tract outside a UA or UC
99 Not coded: Census tract has zero population and no rural-urban identifier information

Service Healthcare clincians State Category– Recode of Service Healthcare clincians State

1=Virginia
2=Border State (DC, MD, KY, NC, TN, WV)
3=Non-Border State
4=Unknown

Service Healthcare clincians Discipline – Recode of Service Healthcare clincians Specialty

1=Medicine
2= Nursing
3=PA
4=Social Work
5=Clinical Psychologist
6=PT
7=Facility

8=Other
9=Unknown

Service Healthcare clincians Location – Recode of

1=Facility Based
2=Clinic/Office
3=Unknown

Service Healthcare clincians Specialty Category

1=Psych, Neuropsych, Addiction
2=Other Specialty
3=Internal Medicine, family Practice, General care
4=Unable to Determine

Insurance Type

1=Medicaid (MC)
2= Medicare (MO, MA, HN, 12)
3= Commercial (PR, HM, PS, 15, C1, 13)

Appendix D: Quarterly Tables 2019 & 2020

Quarterly Table 2019

	Incurred Quarter									
	Q1 2019		Q2 2019		Q3 2019		Q4 2019		2019	
Insurance Type	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Medicaid (MA)	189482	40.33%	208662	43.37%	240491	44.96%	239217	44.75%	877852	43.45%
Medicare (MC)	151637	32.28%	156450	32.52%	147231	27.53%	147117	27.52%	602435	29.82%
Commercial (CO)	128699	27.39%	116015	24.11%	147147	27.51%	148268	27.73%	540129	26.73%
Service Place										
Home	64852	13.80%	68998	14.34%	69717	13.03%	70423	13.17%	273990	13.56%
Office	121580	25.88%	118941	24.72%	137888	25.78%	140140	26.21%	518549	25.67%
Other Facility	113631	24.19%	118245	24.58%	127583	23.85%	130594	24.43%	490053	24.26%
Other Not Specified	169755	36.13%	174943	36.36%	199681	37.33%	193445	36.18%	737824	36.52%
Healthcare clincians Specialty										
Internal Medicine, Family Practice, General Care	17185	3.75%	15887	3.39%	18911	3.63%	19843	3.81%	71826	3.65%
Other Specialty	370421	80.93%	378745	80.72%	421839	80.87%	417824	80.27%	1588829	80.69%
Psych, Neuropsych, Addiction	70078	15.31%	74552	15.89%	80868	15.50%	82857	15.92%	308355	15.66%
Healthcare clincians Role										
Clinical Psychologist	11218	2.45%	12595	2.68%	13213	2.53%	14108	2.71%	51134	2.60%
Facility	181109	39.57%	189056	40.29%	212713	40.78%	213255	40.97%	796133	40.43%
Medicine	242853	53.06%	242949	51.78%	268849	51.54%	265991	51.10%	1020642	51.84%
Nursing	13505	2.95%	14949	3.19%	16935	3.25%	17144	3.29%	62533	3.18%
Other	202	0.04%	203	0.04%	292	0.06%	237	0.05%	934	0.05%
Physician Assistant	3624	0.79%	3712	0.79%	3928	0.75%	4024	0.77%	15288	0.78%
Social Work	5173	1.13%	5720	1.22%	5688	1.09%	5765	1.11%	22346	1.13%
Healthcare clincians State										
Border State	50403	10.80%	53941	11.28%	55882	10.50%	54916	10.32%	215142	10.71%
Non-Border State	33304	7.14%	35523	7.43%	38911	7.31%	37985	7.14%	145723	7.25%
Virginia	383058	82.07%	388787	81.29%	437353	82.19%	439222	82.54%	1648420	82.04%
Patient Geographic Location										
Metropolitan	300213	64.42%	303006	63.54%	342015	64.24%	341127	64.28%	1286361	64.12%
Rural	165842	35.58%	173856	36.46%	190428	35.76%	189599	35.72%	719725	35.88%

Quarterly Table 2020

	Incurred Quarter									
	Q1 2020		Q2 2020		Q3 2020		Q4 2020		2020	
Insurance Type	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Medicaid (MA)	755559	30.04%	600075	33.40%	616136	30.86%	539341	29.29%	2511111	30.81%
Medicare(MC)	1047741	41.66%	737908	41.07%	912977	45.72%	838743	45.55%	3537369	43.40%
Commercial (CO)	711888	28.30%	458555	25.52%	467657	23.42%	463291	25.16%	2101391	25.78%
Service Place										
Home	573809	22.81%	416962	23.21%	516368	25.86%	484012	26.29%	1991151	24.43%
Office	610115	24.26%	390435	21.73%	426226	21.35%	406906	22.10%	1833682	22.50%
Other Facility	617546	24.55%	441483	24.57%	470014	23.54%	435442	23.65%	1964485	24.10%
Other Not Specified	713718	28.38%	547658	30.48%	584162	29.26%	515015	27.97%	2360553	28.96%
Healthcare clincians Specialty										
Internal Medicine, Family Practice, General Care	136472	5.58%	89888	5.14%	98524	5.06%	93670	5.22%	418554	5.27%
Other Specialty	2167661	88.61%	1524883	87.13%	1737929	89.17%	1599901	89.10%	7030374	88.53%
Psych, Neuropsych, Addiction	142153	5.81%	135358	7.73%	112529	5.77%	102141	5.69%	492181	6.20%
Healthcare clincians Role										
Clinical Psychologist	40036	1.64%	42318	2.42%	39804	2.04%	39350	2.19%	161508	2.03%
Facility	783163	32.01%	561297	32.07%	635768	32.62%	552154	30.75%	2532382	31.89%
Medicine	1509133	61.69%	1053617	60.20%	1175378	60.31%	1105668	61.57%	4843796	61.00%
Nursing	68223	2.79%	53108	3.03%	57604	2.96%	59053	3.29%	237988	3.00%
Other	933	0.04%	761	0.04%	697	0.04%	670	0.04%	3061	0.04%
Physician Assistant	27046	1.11%	19977	1.14%	22253	1.14%	22227	1.24%	91503	1.15%
Social Work	17752	0.73%	19051	1.09%	17478	0.90%	16590	0.92%	70871	0.89%
Healthcare clincians State										
Border State	287109	11.49%	204478	11.44%	244542	12.32%	227649	12.43%	963778	11.90%
Non-Border State	185911	7.44%	118744	6.65%	136695	6.89%	127965	6.99%	569315	7.03%
Virginia	2026069	81.07%	1463627	81.91%	1603840	80.79%	1475271	80.58%	6568807	81.08%
Patient Geographic Location										
Metropolitan	2146052	86.34%	1507482	84.79%	1700314	85.44%	1575378	85.95%	6929226	85.69%
Rural	339572	13.66%	270484	15.21%	289850	14.56%	257614	14.05%	1157520	14.31%

VITA

Dr. Shelly Smith earned a Bachelor of Science in Nursing from the University of Virginia where she also earned a Doctorate in Nursing Practice. She earned a Master of Science from Virginia Commonwealth University (VCU) with a concentration as Adult Primary Care Nurse Practitioner. Dr. Smith is a Clinical Associate Professor at Virginia Commonwealth School of Nursing where she also serves as the Program Director for Graduate Practice Programs. In addition, she serves as the Translational Research Fellow in Residence at VCU's Wilder School of Government and Public Affairs. Dr. Smith's clinical practice focuses on improving outcomes for high need, high-cost adults by addressing social determinants of health through an interprofessional transitional care model. Her recent publications include, "Political Framing: A Strategy for Policy Analysis," and "Achieving health equity: Examining telehealth in response to a pandemic," both published in *The Journal for Nurse Practitioners*. A practice and policy scholar, Dr. Smith is a Fellow of the American Academy of Nursing as well as and a distinguished policy fellow of the National Academies of Practice of Nursing. Dr. Smith was the 2021 recipient of the American Academy of Nurse Practitioner's Nurse Practitioner State Excellence Award.