

Research Report

Use of Telehealth at NHSC Grantee Sites

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Telehealthⁱ has long been viewed as an important pathway for increasing access to care for underserved populations, while providing high quality care at low cost.^{1,2} The spread of telehealth in the United States, however, has been hampered by a range of reimbursement, equipment costs, and licensure barriers. In this study we examine the extent to which telehealth is being used in settings that are among the locations most in need: the National Health Service Corps (NHSC) approved sites. We also explore geographic variation in telehealth use across the country, and the association of state-level policies and Federal funding levels for telehealth to the use of telehealth by NHSC-approved sites by state.

Telehealth can take many forms and a growing body of evidence shows it can be an effective way of providing high quality care.^{3,4,5} Health services requiring minimal physical interaction, such as radiology through “store and forward” methods, or psychiatry through real-time communications platforms are particularly suited to telehealth applications and constitute a significant portion of existing telehealth-based care.⁶ Telehealth is also effective for helping patients manage chronic diseases, with comparable, or sometimes even improved, outcomes to in-person visits.⁷ Furthermore, telehealth, including monitoring and care from an at-home setting, can potentially lead to significant cost savings in avoided hospitalizations due to effective long term care of chronic conditions.⁸

Despite the potential benefits, use of telehealth is far from ubiquitous in sites located in underserved communities. A study of telehealth usage in sites participating in HRSA’s Telehealth Network Grant Program actually showed a decline in telemedicine encounters between 2007 and 2010. In a study

ⁱ Telehealth is the delivery of health-related services and information via telecommunications technologies, and is often used to encompass a broader range of health care beyond direct clinical services. This information exchange may use either synchronous interactive, real time technology or use asynchronous technology.

conducted by the George Washington University in 2010, 39 percent of Federally Qualified Health Centers (FQHCs)ⁱⁱ reported they offered telehealth services in 2010, although half (52%) planned to offer telehealth in the next two years.⁹ That promise may be taking effect; a 2015 survey of FQHCs in New York State found usage close to 50%.¹⁰ A recent New England Journal of Medicine article posits on a hopeful note that telehealth may have reached a “tipping point” where it will move beyond the early adopters to the majority. They point to the two million Department of Veterans Affairs’ telehealth visits in 2014 and data from Kaiser Permanente of Northern California that predicted more telehealth visits in 2016 than in-person visits.¹¹

Barriers to telehealth implementation vary, but the most frequently identified by FQHCs are equipment cost and reimbursement challenges.^{12,13} Although payment for telehealth services through Medicare reform has been improving since the beginning of the 2000s,¹⁴ Medicare currently only reimburses telehealth services for patients receiving care in a Health Professional Shortage Areas (HPSAs) or a county outside a Metropolitan Statistical Area (MSA) and does not reimburse for store and forward services.¹⁵ Analysis of Medicare data in 2013 showed only a handful of providers (369) billed for telehealth services more than ten times.¹⁶ Another report shows that from 2009 to 2013, “of nearly 100 million primary care claims over that period, only about 6,500 were for telemedicine services (about 0.0065%)”.¹⁷ Both findings support the idea that payment policy likely plays an important role in usage of telehealth services

States and private payers have varying policies regarding telehealth reimbursement. All but two states (Connecticut and Rhode Island) offer some type of Medicaid coverage for telehealth services, but state parity of reimbursement between telehealth and face to face visits can differ between states due to

ⁱⁱ The GW Readiness for Meaningful Use of HIT and PCMH Recognition was issued to all Section 330 grantees, otherwise known as Federally Qualified Health Centers (FQHCs). FQHCs include Community Health Centers, Migrant Health Centers, Health Care for the Homeless, Public Housing Primary Care.

restrictions on covered services, practitioners, and practice locations.¹⁸ The American Telemedicine Association (ATA) grades states on their telehealth payment policies. They gave 22 states top grades for private parity, noting that these states have no provider, technology, or patient setting restrictions. Eight states and the District of Columbia received the top score for Medicaid coverage. Seven states received failing grades.¹⁹

An additional barrier for implementation is the regulatory environment, particularly the state to state variance in licensure and legal requirements which are becoming increasingly restrictive in some states. Again, according to ATA, only six states improved their telehealth regulatory policies since 2014, while eleven states and the District of Columbia actually increased barriers by adopting language that has different standards for telehealth visits than in-person visits, requiring informed consent and/or limiting the types of modalities.²⁰

The Affordable Care Act (ACA) of 2010 contained a series of provisions directing the new Center for Medicare and Medicaid Innovation (CMMI) to fund and evaluate telehealth pilot projects.²¹

Furthermore, HRSA has provided multiple funding mechanisms to support increased use of telehealth in rural and underserved communities. The Office for the Advancement of Telehealth (OAT) administers the following grant programs: (a) Telehealth Network Grant Program; (b) Telehealth Resource Center Grant Program; and (c) Licensure Portability Grant Program. Funding for these programs has grown from \$11 million in 2012 to almost \$15 million in 2016.²²

To begin to understand the extent to which the spread of telehealth has included primary care settings in HPSAs, this study explores whether and to what extent NHSC-approved sites, which are by definition located in HPSAs, are utilizing telehealth. Specifically, we ask the following:

- To what extent and how are NHSC-approved sites using telehealth services?

- Does NHSC-approved sites' use of telehealth and telemedicine services vary across geographical regions or states?
- Is the intensity and/or length of Federal telehealth funding in a state associated with the use of telehealth services?
- Are state telehealth policies associated with the use of telehealth services?

Methods

Building on an annual survey administered by HRSA to all NHSC participants, several additional questions specific to telehealth use were asked of NHSC participants who were currently fulfilling their service obligations. The voluntary survey was administered by HRSA in the summer of 2015, with a reported response rate of 26 percent.

The survey asked if telehealth was used at their site, as well as if they personally used telehealth services. Those who indicated telehealth was used at the site were asked whether specific types of telehealth services were provided, including behavioral health visits, oral health visits, and intensive care unit (ICU) visits. They were also asked whether telehealth was provided at the originating practice site (i.e. where the patient is located), distance sites (i.e. where the clinician providing services is located), or both. Those who indicated that telehealth was offered at their site but that they did not personally use telehealth were asked an open-ended question about why.

HRSA provided us with a dataset of individual responses from 3,744 NHSC participants, of which 2,418 (65%) were currently fulfilling their service obligations, and answered the question about whether telehealth is used at their site. Responses included providers in 46 states, plus the District of Columbia

and Puerto Rico. We analyzed the data at the national and regional level, using regional definitions employed by HRSA's Office of Regional Operations.ⁱⁱⁱ

We tested whether the regional usage of telehealth was significantly different using chi-square tests. Probability values <0.05 were considered statistically significant.

We also examined the relationship between state regulations and payment policies and adoption of telehealth services using state rankings provided in two 2016 ATA reports: one focused on coverage and reimbursement and the other on physician practice standards and licensure. The ATA accords each state a grade (A is the highest score, and F the lowest) on each of the individual policies and regulations, along with an overall coverage and reimbursement score, and an overall practice standards and licensure score.

Specifically, the Coverage and Reimbursement report rates each state on their current telehealth policies for both private and Medicaid-specific payment and coverage policies.²³ They examine whether private insurers are required to cover telemedicine visits and whether payment is the same as in-person visits (aka "parity laws"). They also look at whether Medicaid covers visits provided in the home or school setting, whether they include behavioral health or rehabilitation services, or whether there are any distance restrictions as a condition of payment. Finally, they assess whether the reimbursement is restricted to specific provider types.

Their Physician Practice Standards and Licensure rates each state on physician practice standards. This includes requirements for an in-person visit in addition to a telemedicine visit; requirements for a

ⁱⁱⁱ Region 1 = CT, ME, MA, NH, RI, VT; Region 2 = NJ, NY, PR, VI; Region 3 = DE, DC, MD, PA, VA, WV, Region 4 = AL, GA, FL, KY, MS, NC, SC, TN; Region 5 = IL, IN, MI, MN, OH, WI; Region 6 = AR, LA, NM, OK, TX, Region 7 = IA, MO, NE, KS; Region 8 = CO, MT, ND, SD, UT, WY; Region 9 = AZ, CA, HI, NV, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Republic of the Marshall Islands, Republic of Palau; and Region 10 = AK, ID, OR, WA.

telepresenter or provider to be on the premises during a telemedicine encounter; requirements for informed consent before a telemedicine encounter; and restrictions on care provided across state lines.²⁴

In order to explore whether respondents located in states with the most favorable telehealth policies (i.e., those with A rankings) were more likely to be providing telehealth services than respondents practicing in states with lower rankings, we grouped respondents by their state rankings on select individual indicators, as well as on the two summary scores. Indicators were excluded if there was little variation across states (e.g. only 1 state got the highest score for Medicaid Eligible Technologies) or only applied to a subset of states (e.g. only 37 states offer coverage of rehabilitation services – telehealth or otherwise). We also elected not to present individual indicators for practice standards and licensure given the lack of relationship between the overall score and telehealth usage (as will be discussed below) in addition to limited variation in some of the individual metrics.

We then examined whether providers located in states with higher levels of HRSA telehealth funding were more likely to provide telehealth services. We calculated the total grant dollars provided to each state during the years 2010-2015 for two grant programs sponsored by the Federal Office of Rural Health: the Telehealth Network Grant Program and the Telehealth Resource Center Grant Program. For each state, we also calculated the number of years the state had received funding to explore whether respondents in states with longer funding periods, or with higher numbers of funded sites, were more likely to use telehealth at their site.

Finally, we examined the relationship between funding and state policies by dividing the states into four quadrants based on whether the state received above median HRSA funding or below and whether the state received a high ATA rating on their overall Coverage and Reimbursement policies or not (A or B versus C or F).

Findings

As shown in Table 1, we find that 35.6 percent (861) of respondents reported telehealth is used at their practice site. Of those who indicated telehealth is used at their site, 46.8 percent use telehealth only as an origination site (i.e., where the patient is located) and 37.7 percent use telehealth as both an origination site and as a distant site (i.e., where the clinician is located). Telehealth is used as a distant site only by 15.5 percent of respondents. A little over half of the respondents at sites that use telehealth (54.7%) indicated that behavioral health was provided through telehealth at their practice site, while only 4.9 percent indicated oral health was provided through telehealth, and 1.3 percent indicated ICU care was provided through telehealth.

We also find that although a site may use telehealth, only 24.5 percent (214) of the respondents reported they personally use some form of telehealth services. Those who did not were asked why. Only 395 respondents answered the open ended-question. The most common answer was that it was not available to them, with some specifying that telehealth services were limited to particular types of patient care at their site, such as psychiatry only or medication management only, which they did not provide. The next most common theme was that there was “no need.” Three respondents listed National Health Service Corps rules as the reason.

Table 1. Site Telehealth Usage by Type

	#	%
Telehealth is used at practice site	861	35.6%
• telehealth used only as an origination site	403	46.8%
• telehealth used only as a distant site	133	15.5%
• telehealth used as both an origination site and as a distant site	325	37.7%
Type of telehealth used at site		
• behavioral health	471	54.7%
• oral health	42	4.9%
• ICU care	11	1.3%
Personally use telehealth	214	24.5%

Total number of survey respondents that answered telehealth questions	2,418
Note: origination site = where the patient is located distant site = where the clinician is located	

We find important regional variation in the use of telehealth services, the types of telehealth services provided, and in the location of services. Use of telehealth services varies from a low of 24.4 percent in Region 2 (NJ, NY, PR, VI) and a high of 48.0 percent in Region 6 (AR, LA, NM, OK, TX) (see Table 2). More detailed regional results on the other survey questions are reported in Appendix A.

Table 2. Telehealth Usage Rate by Region

Region	Use telehealth		Total
	#	%	#
Region 1	33	25.8%	128
Region 2	44	24.4%	180
Region 3	62	36.7%	169
Region 4	125	32.6%	384
Region 5	124	32.2%	385
Region 6	121	48.0%	252
Region 7	82	38.0%	216
Region 8	86	45.3%	190
Region 9	123	42.6%	289
Region 10	61	27.1%	225
Total	861	35.6%	2,418
Pearson chi2(9) = 57.1107 Pr = 0.000			

State Policies and Use of Telehealth

NHSC respondents located in states with the most favorable telehealth coverage and reimbursement policies (i.e., those that received an overall “A rating”), were the most likely to offer telehealth services, compared to states with a B or less (50.8% versus 33.4% respectively). When looking at specific telehealth policies, we find that the exceptions are (1) those with an A rating for Medicaid policies that require a telepresenter be present, and (2) states with an A rating for their Overall Physician Practice Standard and License Score. See Table 3.

Table 3. Telehealth Usage by ATA Rating of Telehealth Policies

Telehealth Coverage and Reimbursement Measures	A Rating	B or lower Rating	# of States rated A	# of States Rated B or less
	% use telehealth	% use telehealth	N	N
Parity Private Insurance	40.0%	32.0%	22	26
Parity Medicaid	39.2%	34.7%	9	39
Medicaid: Patient Setting Restrictions	37.7%	33.2%	25	23
Medicaid: Eligible Provider Restrictions	41.7%	33.7%	17	31
Medicaid: Telepresenter Required on Premises	34.7%	36.5%	30	18
Medicaid: Physician-Provided Telemedicine Services	40.4%	34.4%	12	36
Medicaid: Distance or Geography Restrictions	35.8%	29.6%	8	40
Medicaid Informed Consent Required	36.7%	34.0%	23	25
State Employee Health Plan Parity	41.7%	30.9%	20	28
Medicaid: Mental/behavioral Health Services Restrictions*	29.2%	18.2%	12	36
Overall “Coverage and Reimbursement” Score	50.8%	33.4%	9	39
Overall “Physician Practice Standards and Licensure” Score	33.9%	36.3%	20	28

* For the mental/behavioral health services indicator, the usage rate of telehealth for behavioral health was compared instead of overall use of telehealth.

- **Parity Private Insurance:** Measures whether private insurers cover the telemedicine-provided services comparable to that of in-person.
- **Medicaid Parity:** Measures the components of state policies that under Medicaid plans enable or impede parity for telemedicine-provided services.
- **Patient Setting:** Measures the components of state policies that broaden or restrict the location of the patients at the time of telemedicine-provided services.
- **Medicaid Distance or Geography Restriction:** Measured components of state Medicaid policies that apply distance or geography restrictions for conditions of coverage and payment when telemedicine is performed.
- **Medicaid Informed Consent:** Measured components of state Medicaid and medical licensing board policies based on requirements for written, verbal or unspecified methods of informed consent before a telemedicine encounter.
- **Eligible Providers:** Measures the components of state policies that broaden or restrict the allowance for types of distant site providers to perform the telemedicine encounter.
- **Physician-Provided Services:** Measured components of state Medicaid policies that broaden or restrict a physician’s ability to use telemedicine for conditions of coverage and payment.
- **State Employee Health Plan Laws:** Measures state policies that enable or impede parity for telemedicine-provided services under state employee health plans.

- **Mental/behavioral Health Services:** Measures components of state Medicaid policies that broaden or restrict telehealth coverage for mental and behavioral health or the types of providers allowed to perform the encounter.
- **Telepresenter:** Measures whether the state Medicaid and medical licensing board policies have requirements for a telepresenter or health care provider to be on the premises during a telemedicine encounter.

HRSA Grant Funding and Use of Telehealth

As expected, we find that NHSC grantee respondents in states with no telehealth funding were less likely to participate in telehealth (29.6%), compared to those with funding (36.9%). However, we do not find a relationship between the amount of grant dollars a state received and telehealth use. Oddly, respondents in states that ranked in the lowest quartile of telehealth grant funding actually had the highest telehealth participation rate (43.4%). Those in the second quartile had the lowest participation rate (28.1%) which is slightly lower than those in states with no funding. We also find that that the number of years of funding did not appear to be associated with telehealth use. See Tables 4 and 5.

Table 4. Telehealth Usage Rate by Number of Sites with Grants during 2010~2015

Total Amount of grant during 2010~2015	Telehealth Usage Rate	# of states in each category
4th Quartile(\$2,245,825 to \$4,729,007)	42.4%	8
3rd Quartile (\$1,494,486 to \$2,245,825)	34.7%	8
2nd Quartile (\$752,680 to \$1,494,486.5)	28.1%	8
1st Quartile (\$325,000 to \$752,680)	43.4%	8
No funding	29.6%	15

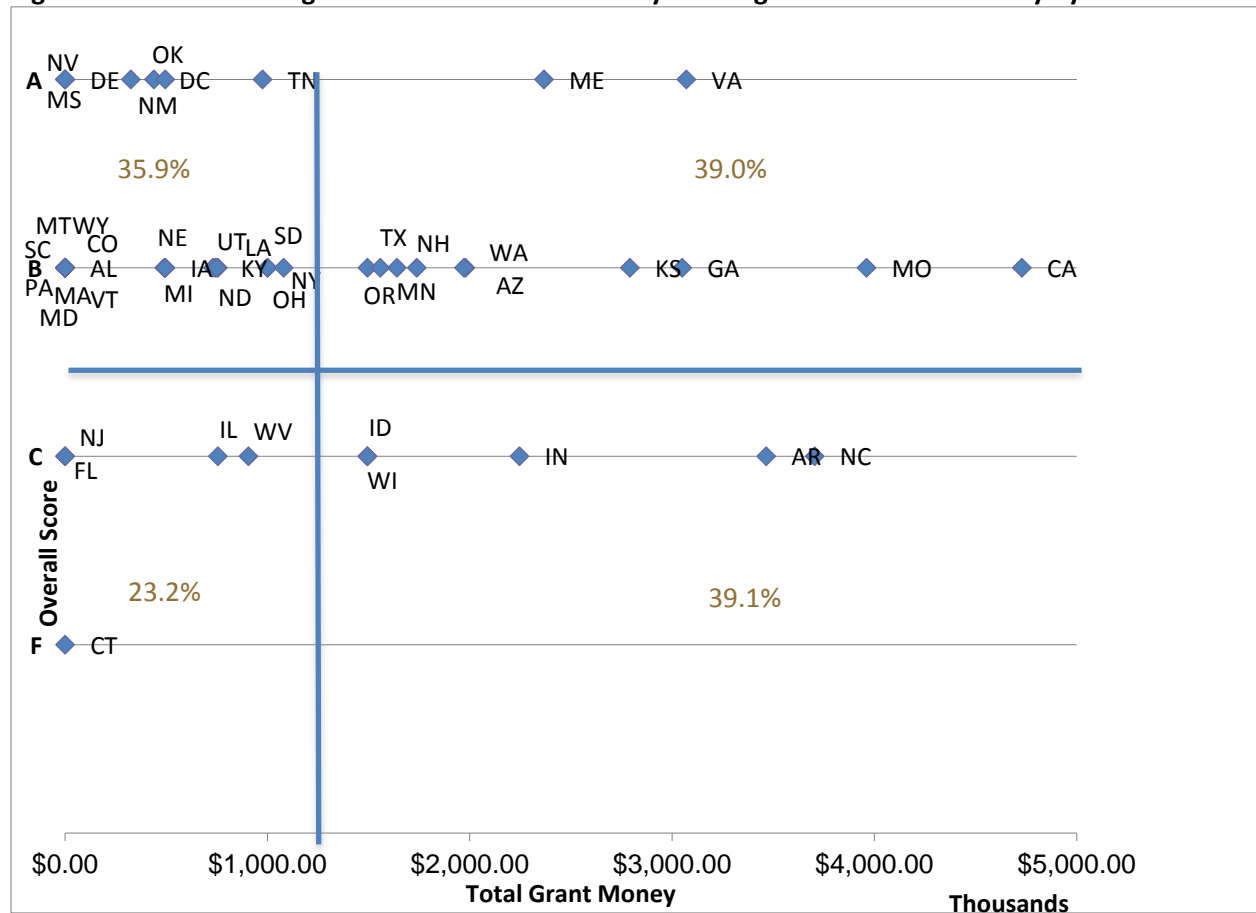
Table 5. Telehealth Usage Rate by Number of Grant Years, 2010-2015

Number of Grant Years	Telehealth Usage Rate	# of states in each category
5~6 years	39.1%	15
4~3 years	30.2%	11
2~1 year	42.0%	7
0 year	29.6%	14

Combined Influence of State Policy and Funding

To examine the combined influence of telehealth coverage and reimbursement policies and telehealth grant funding on telehealth participation, we plotted each state on a grid with the X-axis representing the amount of telehealth grant funds received by the state between 2010 and 2015 and the y-axis representing the state's overall ATA rating. The chart was divided into four quadrants with states in the upper right quadrant having above the median grant funding and an A or B rating for their telehealth policies (n=12). Those in the bottom right quadrant have above median grant funding but a C or F rating on their telehealth policies (n=5). Those in the bottom left quadrant have below median or no grant funds and an A or B rating on policies (n=5). Those in the top left quadrant have below median or no grant funds and A or B rating on policies (n=26). We then calculated the telehealth participation rate for each quadrant of the chart. Respondents in the two right hand quadrants (i.e., with above median grant funds) have nearly identical participation rates regardless of state policies (39.0% and 39.1%). Respondents in the states with favorable state policies but less grant funding (upper left) had a 35.9% telehealth participation rate. The respondents in the states with below median or no funding and C or F ratings of their telehealth policies (lower left) had the lowest participation rate (23.2%). See Figure 1.

Figure 1: Overall Coverage and Reimbursement Policy Ranking vs. Total Grant Money by State



Limitations

The generalizability of this study to all NHSC-approved sites is limited by the low response rate to the survey. We also were unable to obtain data on response rates at the state level, making our findings extremely tenuous. It is also possible that some NHSC-approved sites have multiple responses. Several zip codes in the survey have more than one response and may have come from respondents fulfilling their service obligations at the same NHSC-approved site.

Policy Implications

Findings from the study point to variation in the use of telehealth services across regions, but overall a potentially lower than expected rate of telehealth usage among sites with NHSC providers and among the providers. In particular, it is alarming that the 2010 study of FQHC telehealth use found a slightly

higher prevalence (38%) than we find in 2015 (35.6%).²⁵ While the low response rate to HRSA's survey requires us to be cautious in our interpretation, there are several issues that may be at play.

The first was suggested in the open-ended survey questions. NHSC-approved sites and clinicians are faced with a set of restrictions regarding telehealth that include the following: 1) both the originating and distance site must be located in a HPSA, 2) if the sites are in different states, the NHSC clinician must be licensed in each state, and 3) an NHSC clinician's telehealth encounters cannot be more than 25% of their patient care hours.²⁶ These restrictions may make it less likely for NHSC-approved sites to use telehealth.

In addition, NHSC-approved sites are not limited to FQHCs. They include, for example, private practice, rural health clinics, and critical access hospitals.²⁷ These settings differ from FQHCs, have fewer resources, and therefore may be less able to invest in equipment costs and to have the necessary relationships to launch a telehealth program.

Lastly, it is possible that there has been a decline in telehealth use even in FQHCs. Barriers clearly exist; only nine states have an overall A rating from the ATA on their coverage and reimbursement policies.²⁸ Furthermore, since 2014, 11 states and the District of Columbia have adopted more restrictive policies requiring informed consent or limiting telehealth modalities leading to lower ATA ratings while only 6 have improved their policies.

Our preliminary analysis also suggests that state policies around coverage and reimbursement for telehealth services may be leading to greater use of telehealth. Many of these policies specifically relate to Medicaid recipients, who make up a large proportion of patients served at CHCs and other locations where NHSC providers are likely to practice. This includes paying comparable rates for Medicaid services (parity), removing restrictions on who can provide services, allowing them to occur in the home or

school setting, allowing coverage of behavioral health or rehabilitation services, and removing distance restrictions as a condition of payment. Parity is an important incentive for providers to use telehealth services and states could soon see a major changes, as the Medicare Telehealth Parity Act is being considered by Congress.²⁹

Similarly, the data suggest a positive relationship between telehealth grant funds and increased use of telehealth services. Of course the data do not allow us to examine the question of whether the HRSA grant funding caused the increase in telehealth use. Indeed, HRSA may have purposefully targeted states with the lowest use of telehealth, and while they may still use at a lesser level than other states, rates may have increased as a result of the funding.

It was surprising not to find a strong a relationship between telehealth usage and state policies focused on physician practice standards and licensure. This includes things like whether a telepresenter needs to be present, and restrictions on patient care and provider consultations by out-of-state physicians. Again, we are cautious in our interpretation, given the study limitations, but it may suggest that much of current telehealth is occurring within states, and telehealth across states is yet to advance.

Perhaps the most actionable finding for HRSA is that states with the lowest grant funds and the most restrictive coverage and reimbursement policies have the lowest telehealth usage rates. These may provide an opportunity for HRSA to target funding to sites in those states. It could also provide an interesting natural experiment in which, with the appropriate control group, it may be possible to observe the effects of increased funding on not just telehealth adoption, but telehealth policy reforms as well.

As HRSA improves its data collection efforts, we anticipate that there will be future opportunities to refine this line of inquiry. The use of surveys requires a more robust response rate and must include

response rates by states. Ideally, a unique identifier could be provided to facilitate linkages with other data sources like the Uniform Data System. Further, using the same questions that were used in a 2010/2011 “Readiness for Meaningful Use and HIT and Patient Centered Medical Home Recognition Survey” would also make it possible to do a longitudinal analysis.

Multivariate regression models could then be used to explore what factors are affecting telehealth usage. The findings could provide compelling evidence that improvements in state policies or increased grant funding leads to greater adoption of telehealth services. That information could help galvanize states to revise their telehealth policies and/or HRSA to increase their grant funding, and thereby, hopefully, improve access to care for our most vulnerable populations. If indeed, as the New England Journal of Medicine study suggests, we are at a tipping point in terms of telehealth usage, it is even more critical that we understand how HRSA can be most effective at helping ensure that NHSC providers do not fall behind.

APPENDIX A - Telehealth by Region

When analyzing telehealth usage by region we used regional definitions employed by HRSA’s Office of Regional Operations. The regions are as follows:

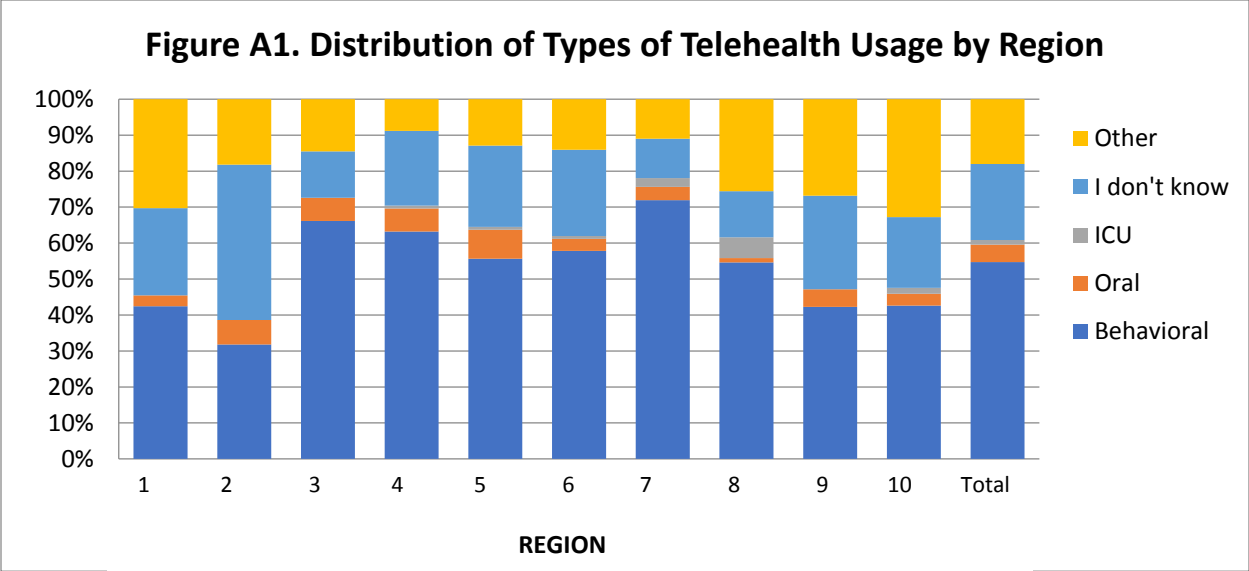
Region	States
1	CT, ME, MA, NH, RI, VT
2	NJ, NY, PR, VI
3	DE, DC, MD, PA, VA, WV
4	AL, GA, FL, KY, MS, NC, SC, TN
5	IL, IN, MI, MN, OH, WI
6	AR, LA, NM, OK, TX
7	IA, MO, NE, KS
8	CO, MT, ND, SD, UT, WY
9	AZ, CA, HI, NV, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Republic of the Marshall Islands, Republic of Palau
10	AK, ID, OR, WA

As previously shown in Table 1, we find a statistically significant difference in the degree to which sites use telehealth across regions ($p=0.000$). We also find a statistically significant difference in reports of telehealth types across regions ($p=0.000$). Sites in region 7 were more likely (72%) than any other region to use telehealth for behavioral health. Sites in region 5 reported the highest rate of oral (8.1%) among all regions. Region 8 reported significantly higher rates of telehealth usage for ICU (5.8%) especially compared to sites 1, 2, 3, and 9 where almost no sites use telehealth for ICU. See Table A1 and Figure A1.

Table A1. Type of Telehealth Offered by Region

Region	Behavioral Health		Oral Health		e-ICU		I don't know		Other		Total #
	#	%	#	%	#	%	#	%	#	%	
1	14	42.4%	1	3.0%	0	0.0%	8	24.2%	10	30.3%	33
2	14	31.8%	3	6.8%	0	0.0%	19	43.2%	8	18.2%	44
3	41	66.1%	4	6.5%	0	0.0%	8	12.9%	9	14.5%	62
4	79	63.2%	8	6.4%	1	0.8%	26	20.8%	11	8.8%	125
5	69	55.6%	10	8.1%	1	0.8%	28	22.6%	16	12.9%	124
6	70	57.9%	4	3.3%	1	0.8%	29	24.0%	17	14.0%	121
7	59	72.0%	3	3.7%	2	2.4%	9	11.0%	9	11.0%	82
8	47	54.7%	1	1.2%	5	5.8%	11	12.8%	22	25.6%	86
9	52	42.3%	6	4.9%	0	0.0%	32	26.0%	33	26.8%	123
10	26	42.6%	2	3.3%	1	1.6%	12	19.7%	20	32.8%	61
Total	471	54.7%	42	4.9%	11	1.3%	182	21.1%	155	18.0%	861

Pearson $\chi^2(36) = 95.2515$ Pr = 0.000



Clinical Sites Using Telehealth

We find a statistically significant difference among regions’ use of telehealth at original and distant sites ($p=0.011$). Region 6 was more likely (61.2%) than any other regions to adopt telehealth in the original site, whereas Region 5 had the highest adoption rate (23.4%) in distant sites. Sites in Region 10 were most likely (45.9%) to adopt telehealth in both sites. The sites that had the lowest telehealth adoption rate in the original site, distant site, and both, respectively, were region 1 (33.3%), region 6 (8.3%), and region 6 (30.6%). See Table A3.

Table A3. Telehealth Use by Site and Region

Region	Origination site		Distant site		Both		Total #
	#	%	#	%	#	%	
1. Boston	11	33.3%	7	21.2%	15	45.5%	33
2. New York	19	43.2%	8	18.2%	17	38.6%	44
3. Philadelphia	32	51.6%	7	11.3%	23	37.1%	62
4. Atlanta	47	37.6%	21	16.8%	57	45.6%	125
5. Chicago	55	44.4%	29	23.4%	40	32.3%	124
6. Dallas	74	61.2%	10	8.3%	37	30.6%	121
7. Kansas City	32	39.0%	13	15.9%	37	45.1%	82
8. Denver	40	46.5%	15	17.4%	31	36.0%	86
9. San Francisco	69	56.1%	14	11.4%	40	32.5%	123
10. Seattle	24	39.3%	9	14.8%	28	45.9%	61
Total	403	46.8%	133	15.4%	325	37.7%	861
Pearson $\chi^2(18) = 34.3712$ Pr = 0.011							

¹ First B. (2015, July 23). Telemedicine: A Solution to Address the Problems of Cost, Access, and Quality. [Web log comment]. Retrieved from <http://healthaffairs.org/blog/2015/07/23/telemedicine-a-solution-to-address-the-problems-of-cost-access-and-quality/>

² Health Resources and Services Administration. (nd). *What is Telehealth?* Retrieved from <http://www.hrsa.gov/healthit/toolbox/RuralHealthIToolbox/Telehealth/whatistelehealth.html>

³ Neubeck L, Redfern J, Fernandez R, et al. (2009). Telehealth interventions for the secondary prevention of coronary heart disease: a systematic review. *Eur J Cardiovasc Prev Rehabil*, 16(3): 281-289.

⁴ Dellifrairie JL, Dansky KH. (2008). Home-based telehealth: a review and meta-analysis. *J Telemed Telecare*, 14(2): 62-66.

⁵ Vella M, Broman K, Tarpley J, et al. (2015). Postoperative Telehealth Visits: Assessment of Quality and Preferences of Veterans. *AMA Surg*, 150(12): 1197-1199. Retrieved from <http://archsurg.jamanetwork.com/article.aspx?articleid=2442534>

⁶ Kvedar J, Coye M, Everett W. (2014). Care With Telemedicine And Telehealth Connected Health: A Review Of Technologies And Strategies To Improve Patient. *Health Affairs*, 33(2): 194-199.

⁷ Baker L, Johnson S, Macaulay D, et al. (2011). Integrated Telehealth And Care Management Program For Medicare Beneficiaries With Chronic Disease Linked To Savings. *Health Aff*, 30(9): 1689-1697.

⁸ IOM (Institute of Medicine). (2012). The role of telehealth in an evolving health care environment: Workshop summary. Washington, DC: The National Academies Press. Retrieved from <http://www.nap.edu/read/13466/chapter/1#ii>

⁹ Cunningham M, Lara A, Shin P. (2011). Results from the 2010-11 Readiness for Meaningful Use of HIT and Patient Centered Medical Home Recognition Survey (policy research brief no. 27). Washington, DC: George Washington University. Retrieved from http://hsrc.himmelfarb.gwu.edu/cgi/viewcontent.cgi?article=1031&context=sphhs_policy_ggrchn

¹⁰ Martiniano R, Moore J. (2015). An Exploratory Study of the Use of Telehealth Services by Federally Qualified Health Centers and Hospitals in New York State. Rensselaer, NY: Center for Health Workforce Studies, School of Public Health, SUNY Albany. Retrieved from <http://www.chwsny.org/our-work/reports-briefs/r-2015-14/>

¹¹ Dorsey E, Topol E. (2016). State of Telehealth. *N Engl J Med*, 375:154-161.

¹² Cunningham M, Lara A, Shin P. (2011). Results from the 2010-11 Readiness for Meaningful Use of HIT and Patient Centered Medical Home Recognition Survey (policy research brief no. 27). Washington, DC: George Washington University. Retrieved from http://hsrc.himmelfarb.gwu.edu/cgi/viewcontent.cgi?article=1031&context=sphhs_policy_ggrchn

¹³ Martiniano R, Moore J. (2015). An Exploratory Study of the Use of Telehealth Services by Federally Qualified Health Centers and Hospitals in New York State. Rensselaer, NY: Center for Health Workforce Studies, School of Public Health, SUNY Albany. Retrieved from <http://www.chwsny.org/our-work/reports-briefs/r-2015-14/>

¹⁴ Gilman M, Stensland J. (2013). Telehealth and Medicare: Payments Policy, Current Use, and Prospects for Growth. *Medicare and Medicaid Research Review*, 3(4): 2.

-
- ¹⁵ Health Resources and Services Administration. (nd). *What are the reimbursement issues for telehealth?* Retrieved from <http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/Telehealth/whatarethereimbursement.html>
- ¹⁶ Gilman, Matlin and Jeff Stensland. "Telehealth and Medicare: Payments Policy, Current Use, and Prospects for Growth" *Medicare and Medicaid Research Review* 3 (4): 8-13.
- ¹⁷ Wilson F, Trout K, Rampa S, Stimpson J. (nd). *An Examination of Private Payer Reimbursements to Primary Care Providers for Healthcare Services Using Telehealth, United States 2009–2013* (issue brief). Retrieved from <http://www.healthcostinstitute.org/files/HCCI-Issue-Brief-Examination-of-Private-Payer-Reimbursements.pdf>
- ¹⁸ Thomas L, Capistrant G. (2016). *State Telemedicine Gaps Analysis: Coverage and Reimbursement*. Washington, DC: American Telemedicine Association. Retrieved from http://www.americantelemed.org/docs/default-source/policy/2016_50-state-telehealth-gaps-analysis--coverage-and-reimbursement.pdf?sfvrsn=2
- ¹⁹ Thomas L, Capistrant G. (2016). *State Telemedicine Gaps Analysis: Coverage and Reimbursement*. Washington, DC: American Telemedicine Association. Retrieved from http://www.americantelemed.org/docs/default-source/policy/2016_50-state-telehealth-gaps-analysis--coverage-and-reimbursement.pdf?sfvrsn=2
- ²⁰ Thomas L, Capistrant G. (2016). *State Telemedicine Gaps and Analysis: Physician Practice Standards and Licensure*. Washington, DC: American Telemedicine Association. Retrieved from http://www.americantelemed.org/docs/default-source/policy/2016_50-state-telehealth-gaps-analysis-md-physician-practices-licensure.pdf?sfvrsn=2
- ²¹ American Telemedicine Association. (2010). *Telemedicine in the Patient Protection and Affordable Care Act (2010)*. Retrieved from <http://www.americantelemed.org/docs/default-source/policy/telehealth-provisions-within-the-patient-protection-and-affordable-care-act.pdf>
- ²² Department of Health and Human Services, Health Resources and Services Administration. (2016). *Justification of Estimates for Appropriations Committees*. Retrieved from <http://www.hrsa.gov/about/budget/budgetjustification2016.pdf>
- ²³ Thomas L, Capistrant G. (2016). *State Telemedicine Gaps Analysis: Coverage and Reimbursement*. Washington, DC: American Telemedicine Association. Retrieved from http://www.americantelemed.org/docs/default-source/policy/2016_50-state-telehealth-gaps-analysis--coverage-and-reimbursement.pdf?sfvrsn=2
- ²⁴ Thomas L, Capistrant G. (2016). *State Telemedicine Gaps and Analysis: Physician Practice Standards and Licensure*. Washington, DC: American Telemedicine Association. Retrieved from http://www.americantelemed.org/docs/default-source/policy/2016_50-state-telehealth-gaps-analysis-md-physician-practices-licensure.pdf?sfvrsn=2
- ²⁵ Cunningham M, Lara A, Shin P. (2011). *Results from the 2010-11 Readiness for Meaningful Use of HIT and Patient Centered Medical Home Recognition Survey* (policy research brief no. 27). Washington, DC: George Washington University. Retrieved from http://hsrc.himmelfarb.gwu.edu/cgi/viewcontent.cgi?article=1031&context=sphhs_policy_ggrchn
- ²⁶ U.S. Health and Human Services, National Health Service Corps. (2015). *National Health Service Corps Loan Repayment Program: Fiscal Year 2016 Continuation Contract Application & Program Guidance*. Retrieved from <http://www.nhsc.hrsa.gov/downloads/lrpcontinuation.pdf>

²⁷ U.S. Health and Human Services, National Health Service Corps. (2011). *What You Need to Know: Health Professional Shortage Areas (HPSAs) and Your Practice Site*. Retrieved from <https://nhsc.hrsa.gov/downloads/howitworks.pdf>.

²⁸ Thomas L, Capistrant G. (2016). *State Telemedicine Gaps Analysis: Coverage and Reimbursement*. Washington, DC: American Telemedicine Association. Retrieved from http://www.americantelemed.org/docs/default-source/policy/2016_50-state-telehealth-gaps-analysis--coverage-and-reimbursement.pdf?sfvrsn=

²⁹ Yang T, (2016, August 15). *Health Policy Brief: Telehealth Parity Laws*. Retrieved from http://www.healthaffairs.org/healthpolicybriefs/brief.php?brief_id=162