

**The PTAC Preliminary Review Team’s Questions on  
ACCESS Telemedicine: An Alternative Healthcare Delivery Model for  
Rural Cerebral Emergencies Physician-Focused Payment Model**

**May 8, 2019**

**Outcomes and Estimated Cost Savings**

1. *The Preliminary Review Team (PRT) would like to know how you measured QALYs in Figure 3 (copied below). Please provide as exact of a description as possible as well as a clear indication of the source (e.g., the ACCESS Health Care Innovation Award study).*

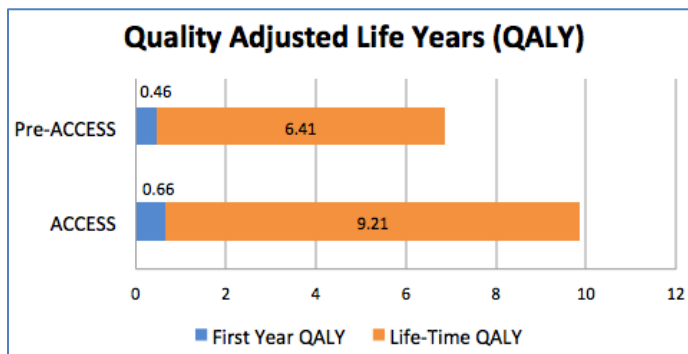


Figure 3. Quality adjusted life years for Pre-ACCESS and ACCESS patients at rural hospitals.

QALYs values were based on health state (modified Rankin Scale mR0-mR6) of the patient post stroke event and taken from the literature. The corresponding QALY for the health state was multiplied by years spent in that health state. Figure 3 shows the average patient for ACCESS and Pre-ACCESS.

QALYs.						
	QALY <sup>1</sup>	Range <sup>1</sup>	Years of remaining life <sup>3</sup>	Range <sup>3</sup>	If tPA <sup>3</sup>	If no tPA <sup>3</sup>
mR0	0.85	0.80-1.00	15	13-17	0.18 (0.13-0.23)	0.11 (0.06-0.16)
mR1	0.8	0.75-0.95	11.7	8.4-14.9	0.24 (0.19-0.29)	0.16 (0.11-0.21)
mR2	0.65	0.68-0.90	8.4	7.6-9.3	0.07 (0.02-0.12)	0.12 (0.07-0.17)
mR3	0.5	0.45-0.65	6	5.2-6.8	0.13 (0.08-0.18)	0.14 (0.09-0.19)
mR4	0.35	0.10-0.40	3.7	2.9-4.6	0.13 (0.08-0.18)	0.20 (0.15-0.25)
mR5	0.2	0.00-0.32	2.5	1.4-3.5	0.06 (0.01-0.11)	0.07 (0.02-0.12)
mR6	0	0.00-0.00		0-0	0.18 (0.13-0.23)	0.21 (0.16-0.26)

2. *What is the source of the numbers in Table 7 and how were the numbers derived? In particular, how do the cost saving results presented in Table 7 relate to the costs savings estimates for ACCESS published in Whetten et al. 2018, if at all?*

<b>Table 7. Cost Savings Breakdown</b>	<b>First Year</b>	<b>Lifetime</b>
Average Cost Savings Per Patient	\$13,617	\$35,761
From Transportation	\$11,757	\$21,197 <sup>a</sup>
From Improved Health	\$1,860 <sup>b</sup>	\$14,564 <sup>b</sup>

**a** Cost savings when all health cost set to zero, **b** Cost savings when transport costs set to zero.

The numbers from table 7 came from a paper that is under review at CMS called “First-year and lifetime cost-effectiveness of a neuro-emergent telemedicine consultation program in the treatment of acute ischemic stroke”. We have attached the paper for your review (see addendum 1). The Whetten et al. 2018 publication was an event analysis that looked at immediate cost-savings from treatment via ACCESS telemedicine including healthcare utilization post cerebral event (i.e. rehabilitation, post event ER visits, re-hospitalizations, long-term care, and caregiver costs). The 2018 publication didn’t consider the full range of costs. Our more recent analysis looked at the wider range of cost and benefits that come from improved health (decreased ER visits, decreased long-term care, etc., see Table 1 below). Using these criteria, Table 7 above shows the results of the analysis that accounts for all healthcare utilization for both the First Year and Lifetime.

**Table 1**

<b>Avoided per 100 Consultations</b>	
ICU LOS	21 days
IRF stays	1.15
SNF Stays	1.25
Outpatient Rehab	0.83
ED vists	3
Rehospitalizations	1.25

3. *What is the observed and assumed repeated probability of repeated cerebral events?*

- a. *Is it correct to presume the lifetime transportation cost savings are so much larger than the first year savings because typical patients have more than one cerebral event?*

Yes, over half of the patients will likely experience a second cerebral event over their lifetime. ACCESS is assumed to have no effect on secondary cerebral events via the initial treatment of the first cerebral event.

- i. (Demaerschalk, Bart M., et al. "Cost utility of hub-and-spoke tele stroke networks from societal perspective." *The American journal of managed care* 19.12 (2013): 976-985.; Burn, John, et al. "Long-term risk of recurrent stroke after a first-ever stroke. The Oxfordshire Community Stroke Project." *Stroke* 25.2 (1994): 333-337.)

- b. *Were your estimates based on a nationally representative database or patients who used the UNM system?*

Our estimates were based on findings from the ACCESS telemedicine project and where there were gaps in our data or the data was unclear, parameters were estimated using current peer-reviewed literature.

- i. Chambers MG, Koch P, Hutton J. Development of a decision-analytic model of stroke care in the United States and Europe. *Value Health*. 2002; 5(2):82-97.
- ii. Quinn TJ, Dawson J, Walters MR, Lees KR. Exploring the reliability of the modified Rankin scale. *Stroke* 2009; 40:762–766. 16. The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. Tissue plasminogen activator for acute ischemic stroke. *N Engl J Med* 1995;333: 1581–1587.
- iii. Schwab S, Vatankehah B, Kukla C, et al. Long-term outcome after thrombolysis in tele medical stroke care. *Neurology* 2007; 69:898 –903.
- iv. Earnshaw SR, Jackson D, Farkouh R, Schwamm L. Costeffectiveness of patient selection using penumbral-based MRI for intravenous thrombolysis. *Stroke* 2009; 40:1710– 1720.
- v. Brown DL, Boden-Albala B, Langa KM, et al. Projected costs of ischemic stroke in the United States. *Neurology* 2006; 67:1390 –1395.
- vi. Silbergleit R, Scott PA, Lowell MJ. Cost-effectiveness of helicopter transport of stroke patients for thrombolysis. *Acad Emerg Med* 2003; 10:966 –972.
- vii. Russo CA, Andrews RM. Hospital stays for stroke and other cerebrovascular diseases. In: *Healthcare Cost and Utilization Project*. Rockville, MD: Agency for Healthcare Research and Quality; 2008.
- viii. Deutsch A, Granger CV, Heinemann AW, et al. Poststroke rehabilitation: outcomes and reimbursement of inpatient rehabilitation facilities and subacute rehabilitation programs. *Stroke* 2006; 37:1477–1482. Hickenbottom SL, Fendrick AM, Kutcher JS, Kabeto MU, Katz SJ, Langa KM. A national study of the quantity and cost of informal caregiving for the elderly with stroke. *Neurology* 2002; 58:1754 –1759.)

4. *Page 19 indicates that “cost is evaluated using the Total Cost of Care Population-based PMPM Index.” Which costs are included in the calculation? Can you provide a citation?*

**First-year costs.** Patient care costs were obtained from published literature and included initial hospitalization costs, tPA and transfer costs, post-acute stroke care costs (including rehabilitation and nursing home costs), ICU length of stay, re-hospitalizations, other ER

visits, and daily caregiver costs<sup>1-3</sup>. Rehabilitation costs (both inpatient and others) were one-time costs assumed to occur after each episode of stroke.

**Long-term costs.** Long-term costs included those that occurred after the initial 90-day period. These costs included annual medical cost and daily caregiver costs that vary by health state<sup>3</sup>. These costs we obtained from the literature and publicly available data sets. Annual medical costs consist of additional hospitalizations, outpatient physician visits, medical equipment, and other costs that would be covered by a third-party payer<sup>2</sup>. Nursing home costs and caregiver costs were incurred as long as patients were alive. Long-term costs differ only by health state not by treatment type. All cost inputs were inflated to 2015 US dollars using the medical care services component of the Consumer Price Index. Costs represent patient averages and actual reimbursements paid by payers.

Costs	Costs (range)
Scan	\$2,000 (\$1,700-\$3,250) <sup>1</sup>
Transfer	\$5,125 (\$4,600-\$12,700) <sup>3</sup>
tPA	\$3,152 (\$2,364 - \$3,940) <sup>2</sup>
Mild Stroke	\$15,400 (\$11,550-\$19,250) <sup>1</sup>
Severe Stroke	\$30,327 (\$22,520-\$37,533) <sup>1</sup>
Inpatient Rehabilitation	\$21,688 (\$16,266-\$27,110) <sup>1</sup>
ER visit	\$400 (\$300-\$500) <sup>1</sup>
Rehospitalization	\$10,322 (\$7,741-\$12,902) <sup>1</sup>
Long-term Care	\$77,745 (\$58,308-\$97,181) <sup>1</sup>
Caregiver	\$23 (\$17.25-\$28.75) <sup>1</sup>
Other Rehabilitations	\$10,941 (\$8,205-\$13,676) <sup>1</sup>

- i. Brown DL, Boden-Albala B, Langa KM, et al. Projected costs of ischemic stroke in the United States. *Neurology* 2006; 67:1390 –1395.
- ii. Earnshaw SR, Jackson D, Farkouh R, Schwamm L. Costeffectiveness of patient selection using penumbral-based MRI for intravenous thrombolysis. *Stroke* 2009;40:1710– 1720.
- iii. Demaerschalk, Bart M, et al. Cost Utility of Hub-and-Spoke Tele stroke Networks from Societal Perspective. *The American journal of managed care* 19.12 (2013): 976-85. Print.

## Payment Model

1. *The PRT is seeking clarity on certain aspects of the payment methodology. As we understand the payment model, the idea is for CMS to pay the spoke hospital for the telemedicine bundle at the “fair market value,” (listed as \$850 for a neurologist consult, and \$1,200 for a neurosurgeon consult), and for the spoke hospital to pay remote*

*neurology or neurosurgery consultant and the telemedicine technology provider per episode (page 8).*

The payment from the remote hospital (spoke) is to the ACCESS telemedicine program that provides payment for the physician consultant, the technology support and call center, the nursing and physician education support and the exchange of quality, financial and feasibility data that is central to this program's documented success. Specialized staff both clinical and programmatic are essential as part of the bundled concept in a value-based model. The bundle concept incorporates all the elements necessary for altering the prior behavior of emergency room physicians, and hospitalists, especially in the rural communities from simply transferring most patients with neuro emergent diagnoses, to feeling more confident after the consult to discharge or admit the patient into the local hospital. Through the data gathered during the last four years, patients who were likely to have been transferred pre-ACCESS were now discharged with follow-up or were admitted to the local hospital or transferred to an appropriate higher-level care facility.

*a. Why not have ACCESS bill CMS directly, and thereby simplify the rural hospitals' functions even more?*

1. The purpose of the ACCESS telemedicine program is responding to a request from a physician at the remote hospital who wants help with the care of their patient when time is of the essence, or as we say when "time is brain". The patient remains the responsibility of the remote emergency treating physician and hospitalist if admitted. The ER physician initiates the consult process and has ultimate control of the patient's care plan and the billings of the episode of care required for their patient from emergency room to final disposition.
  
2. The development by Medicaid of a single charge code exclusive of normal emergency room billing has simplified this process for hospitals. The goal of our Medicaid, and now Medicare, efforts have been to develop an appropriate shared savings relationship with rural hospitals, physicians, and payers to decrease the financial exposure of all parties. The positive impact to rural hospitals has been demonstrated to be many-fold, including increased patient and family satisfaction, improved clinical outcomes, and increased recognition by community that they can obtain specialized health care locally. Health care insurer organizations and patients also benefit from significant gains with the minimization of emergent travel expenses and avoidance of transfers to more costly and out-of-network providers that support higher levels of care.

3. Through our four-year grant experience, the current concept of having hospitals bill insurance companies for a defined bundled payment is acceptable to rural hospitals. These facilities are extremely familiar with submitting claims and have already established relationships with multiple payers.

*b. Can you please provide more detail on the data and assumptions used in determining the amounts of \$850 per neurology consult and \$1200 per neurosurgical consult?*

It is difficult to arrive at a fair market value (FMV) for our ACCESS program because alternative services have an additional number of charges beyond the base professional consultation fee. The base consultative fee is normally all that is compared for a FMV without inclusion of a technical use fee per consult, subscription charges, monthly cart/technology rental fees, and on call charge for availability of a consultant. Because the initial focus of ACCESS was on low volume, financially at-risk rural hospitals, ACCESS decided from the beginning that it should charge a single bundled fee for a consultation with no additional “hidden” charges regardless of whether you used the program once or one hundred times per month. Originally, the technology was provided by the CMS grant, but following the grant there is a single \$8,000 for acquisition of the image capture system in the remote ER with a minimum (\$500) yearly maintenance fee. Competitive programs charge either a far higher price of acquisition (\$20 to \$50 thousand for telemedicine equipment purchase and/or a high monthly or yearly lease payment). Because many of our New Mexico hospitals may require a neuro emergent consultation only a few times per month, a program that only charges a fee per consultation is well within the financial reach of even the smallest hospital. Additionally, regardless of how much or little each hospital utilizes consultation services, the program still provides education and training to new ER physicians, clinical staff and c-suite members on our service.

The neurology FMV was based upon an inquiry to a third-party health care appraiser. Determination of FMV for ACCESS was challenging because current tele-neurology services do not provide the bundle of services that ACCESS includes within their bundled services that have proven to be extremely successful. The appraiser developed several methods of assessing FMV, including amortization of the up-front implementation costs into the consultation fee to enhance affordability for low volume facilities. The ACCESS program provides additional services which we have demonstrated are central to altering the behavior of local physicians to be more willing to keep patients in remote hospitals if recommended by a consulting neurologist or neurosurgeon. Based on the findings in a paper written by our Community Engagement group at UNM (see Addendum 2), “Rural Hospitals as Anchor Institutions: Using Telemedicine to Promote Organizational Community Capacity in Rural New

Mexico” the research showed “Both internal and external stakeholders identified the value of ACCESS, with successes at multiple levels of impact. Hospital administrators and providers perceived that ACCESS strengthened both the organizational capacity and the performance of rural hospitals. ACCESS was perceived as contributing to increases in financial, human, and informational resources; as well as encouraging a shift in the belief that rural hospitals could become a strengthened locus of care, with improved quality of services, increased innovation, and decreased patient costs”.

The educational program includes involvement of in-house physicians (hospitalists) that ultimately assume responsibility of admitted patients. Prior to the ACCESS program, even if the emergency room physician was comfortable admitting a stroke or neuro trauma patient, the hospitalists would most often refuse to accept responsibility for the admitted patient due to their lack of knowledge of how to care for patients with these types of disorders. After an intense education program at each hospital we observed a change in emergency room and hospitalist physician behavior, displaying significantly more confidence in their patient care management skills resulting in a major reduction of unnecessary transfers and thus a higher incidence of local admissions.

The neurosurgical FMV was even more difficult to arrive at due to a paucity of comparable services in the United States, despite exhaustive research to find similar models. The FMV was derived from published AAMC median salaries, and a calculation to determine a reasonable amount for what a one-hour of consultation was worth. Because of a national shortage of neurosurgeons and the need to have them available 24/7 to support the program, an additional incentive of \$100 per day was added for being on call. The payment of \$400/consult plus \$100/per day for on call accessibility has been able to support availability of neurosurgeons to date.

Higher volume facilities have determined that ACCESS consultation fees, while slightly higher than the net per consult cost of some commercial alternatives, carries a significant return on investment (ROI) due to the impact of retaining patients that were previously transferred. Additionally, hospitals that had a tele-neurology service available to them prior to ACCESS did not utilize that existing service, primarily due to high ER physician provider turnover and lack of a dedicated targeted training and on-going education program.

ACCESS also had a positive effect on rural hospital recruitment and retention of hospital physicians and staff with 1/3 of rural ER physicians responding that the ability to obtain consultations for patients with neurological disorders has been a significant reason for their desire to work in rural hospitals (ACCESS survey of rural ER physicians involved in ACCESS program).

- c. *Page 15 indicates that “the payment received from the consult is divided among the physician and NXMS for providing the technology hardware and services.” What are the amounts received by the two groups, and what is the rationale or basis for the split?*

The payment to consulting neurologists is \$250/consult which is a standard rate of compensation in our region. For neurosurgeons the consult payment is \$400. In the case of UNM faculty, these amounts go to the departments to compensate for the use of their faculty during standard working hours. If after hours, weekends, holidays, etc., the departments pass the consultation payment along to the faculty member for their time. For those physicians that are contracted through NMXS, they receive their payments through NMXS.

The technical charge is currently \$175/consult. It is important to understand that the “technical” charge includes a substantial IT infrastructure as well as the 24/7 Net Medical call center. The Net Medical call center is the entity that contacts an appropriate physician for the diagnoses upon receiving a request for consultation. The request for consultation comes on a web-based entry form that provides initial diagnosis by the emergency room physician and a specific request for either neurologist or neurosurgeon to respond. Because of a severe shortage of both neurologists and neurosurgeons in NM, many of the consulting providers are remote. Net Medical technology must “identify and find,” sometimes very quickly depending on the acuity of the emergency, appropriate consultants willing to perform consultations, regardless of their physical location. Because many consulting providers may be remote, NMXS also coordinates hospital credentialing and New Mexico licensure for specialists. NMXS technology involves a cloud-based telemedicine system that enables use of consultants outside of UNM, and provides rapid transfer of essential imaging for integration into the consultation when time is of the essence. NMXS technology also tracks consultations and distributes payment to outside physicians.

The remaining funds are essential to support the educational program that includes two senior nurse educators. These educators go to each hospital creating relationships and sharing 8+ hours of hands-on education. The nurses maintain communication with the hospital staff and assess the rate of turn-over of physician and nursing staffs, a strategic process that informs when to return to each hospital to reestablish a high level of knowledge about neuro-emergent disorders, and in turn be more “comfortable” keeping more patients under their care at the rural hospital.

To maintain the program there is also the need for a financial tracking of services rendered and payments received from hospitals. A record of each consult, recommendations and actions taken, is maintained for accountability of services provided and to provide documentation of outcomes of consultation. It is vital that these outcomes are assessed to validate the continued cost benefits to the system. As the program is expanded to other regions this documentation of



outcomes, and demonstration of a change of behavior toward retaining more patients at rural hospitals must be continually assessed. A feed-back mechanism will be necessary between ACCESS programs, hospitals and insurance companies to validate continued significant clinical and financial benefit of the bundled payment model that is the foundation of this program.

- d. *Is the bundle intended to replace existing telemedicine billing or supplement it? Appendix A indicates that for billing within New Mexico Medicaid, the telemedicine charge will still be allowed.*

The intent of the bundled payment methodology is to replace the existing telemedicine billing guidelines which do not provide sufficient funding to cover all the components of the bundle, especially the added costs of running an on-demand time-sensitive service versus a scheduled service (such as a clinic). It is essential to recall that while prior reports of the impact of telemedicine have shown an increased use of appropriate medication and triage, they have not shown cost savings. ACCESS has demonstrated cost savings to the health care system by altering the behavior of local physicians beyond making a neuro consultant available in the emergency setting.

2. *New Mexico is one of the states that expanded Medicaid under the Affordable Care Act. Appendix A indicates that the Medicaid ACCESS Program that was approved in January 2019 uses the same rates (\$850 and \$1200) to pay the spoke hospital.*

- a. *What documentation did the Medicaid program require in approving the rates?*

New Mexico Medicaid took information from the ACCESS program, but did their own actuarial assessment of the price for the ACCESS consultations and additional services provided. They integrated all the elements of the bundle and came to the rates that they published.

- b. *Appendix A says, "If the patient has Medicare rather than Medicaid as their primary payer, then Medicare rules for billing and coverage will apply." Does this stipulation mean that dually eligible beneficiaries will generally not be eligible for the Medicaid ACCESS Program, but that Medicaid enrollees not in Medicare will be covered for the service?*

All patients for whom a hospital requests an ACCESS consult will receive the same level of consultation and service irrespective of payer. The statement that "Medicare rules for billing and coverage will apply" is applicable if Medicare does not adopt the ACCESS program and payment model, and hospitals would proceed to bill Medicare as per standard Medicare guidelines. Dual eligible

patients have Medicare as primary coverage and so hospitals would not be able to bill Medicaid for ACCESS consultations as per the January 3, 2019 directive.

*Appendix A also indicates that the ACCESS Program will cover both Medicaid fee-for-service and the Centennial Care managed care program. Has your program discussed or established provisions for use of the program with any Medicare Advantage plans*

Yes, over the last year we have worked with Molina and more recently with Blue Cross Blue Shield of New Mexico for use of the ACCESS Program for Medicaid FFS and Medicare Advantage beneficiaries. BCBS has our PFP submission and are working on helping us establish provisions for the patients who have Medicare Advantage plans. Once we have an outline, we will work with the other MCOs who carry the Advantage plans to finalize the provisions.

3. *What criteria would qualify a hospital as an ACCESS spoke facility? Would all hospitals be eligible? Or would participation be limited to hospitals in rural areas (as defined by some criterion), hospitals in medically underserved areas, or critical access hospitals?*

When the ACCESS program was offered to CMS the vision was to meet the unmet need of access to neuro-emergent providers in rural, underserved areas and critical access hospitals. As the program proceeded and we began to better understand the need for neurology specialists and neurosurgeons that existed in all hospitals in New Mexico. We learned that even the largest cities in New Mexico lack 24/7 neuro specialist's coverage. After a year of full operation, a request was made to CMS CMMI HCIA-2 program administration to allow ACCESS to establish services in non-RUCA designated hospitals and this was granted. Even in communities that have a neurologist or neurosurgeon, the ACCESS program has provided the ability to fill in coverage gaps when a single neurologist may not be available, especially to respond emergently to an acute stroke consultation that needs "hands on" assessment within 20-30 minutes of ER presentation. Consistent with the physician focused payment model concept, we are extending the ability for community neurologists and neurosurgeons to become a telemedicine consulting physician in their own communities in order to increase their ability to serve the needs of their community, create an opportunity for added income, and supply the means to practice in a small community that needs their services.

Because the ACCESS model is a value-based initiative, the question of replicability of the ACCESS model is important. We believe that the model can be replicated because what defines the qualification/eligibility of a facility is *'the elements of the physician services it receives and provides to patients.'* We suggest that the following elements of the physician service are essential based on the ACCESS experience:

- Provides emergent telemedicine consultation service(s)

- Provides technical training
- Provides clinical education program with CMEs to increase understanding and confidence of ED and hospitalist providers and their staffs on patient management to help them manage patients locally where that is reasonable and feasible.
- Demonstrates a quality program with metrics, target projections, hospital reporting, at a minimum to include:
  - Consultation numbers
  - tPA rates
  - Education - #s, training cycles
  - Incident reporting, and tracking
  - Local hospital changes of behavior
  - Surveillance for spoke hospital turn-over
- Charges by the consult in a bundled invoice to the requesting facility

**Care Delivery Model**

4. *Do you have any data for the distribution of cases currently handled by ACCESS for the conditions listed in Table 2?*

The data upon which the tables are based are from the 3293 primary consultations conducted through the HCIA-2 program running from May 2015 through the end of May 2018.

The program extended the widely employed stroke-only model to include any neuro-emergent presentations at the local ER physician’s discretion. The acceptance of ACCESS by ER physicians has been in part due to the availability of consultations on such a diversity of neurological and neurosurgical disorders. Our intent is to continue the breadth of consultations due to the clear need for guidance beyond “stroke”.

The following tables present lists and frequencies of the standard diagnoses and the “Other Diagnosis” category. If there were more than one Diagnosis for a case, the apparent most acute was used. Only cases where none of the standard items in the first table were selected are included in the “Other Diagnosis” tables.

<b>Final Primary Diagnosis</b>	<b>Frequency</b>	<b>% of Consults</b>
Altered Mental Status	330	10.02%

Aneurysm	3	0.09%
Arteriovenous Malformation	0	0.00%
Ataxia	20	0.61%
Bells Palsy	55	1.67%
Brain Tumor	65	1.97%
Cavernoma	2	0.06%
Conversion Disorder	39	1.18%
Dizziness	157	4.77%
Intracerebral Hemorrhage	49	1.49%
Ischemic Stroke	850	25.81%
Meningitis/Encephalitis	11	0.33%
Migraine	202	6.13%
Seizures	498	15.12%
Spine Injury	75	2.28%
Subarachnoid Hemorrhage	35	1.06%
Subdural Hematoma	43	1.31%
TIA	364	11.05%
Traumatic Brain Injury	61	1.85%
Other Neurological Diagnoses	319	9.69%
Non-neurological Diagnosis	115	3.49%
<b>Total consultations</b>	<b>3293</b>	<b>100.00%</b>

<b>Other Neurological Primary Diagnoses</b>	<b>Frequency</b>	<b>% of Consults</b>
Amaurosis Fugax	1	0.31%
Amnesia	2	0.63%
Arteritis	2	0.63%
Astasia-abasia	1	0.31%
Ataxic Syndrome	1	0.31%
Basilar Artery Syndrome	1	0.31%
Brachial Plexitis	1	0.31%
Brachial Plexus Neuropraxia	1	0.31%
Brain Lesion	1	0.31%
Brainstem Lesion	1	0.31%
Cervical Spine Pathology	1	0.31%
Cervical cord lesion	1	0.31%
Cervical Disk Disease	1	0.31%
Cervical Myelopathy	1	0.31%
Cervical Sprain	1	0.31%
Chronic Stroke	1	0.31%

Coma	2	0.63%
Compression Fracture	1	0.31%
Concussion	1	0.31%
Confusion	1	0.31%
Cysticercosis	2	0.63%
Degenerative Spine Disease	1	0.31%
Delirium	7	2.19%
Dementia	5	1.57%
Demyelinating Disease	3	0.94%
Disk Herniation	2	0.63%
Disk infection	2	0.63%
Encephalopathy	33	10.34%
Essential Tremors	1	0.31%
Guillain-Barre Syndrome	10	3.13%
Hallucinations	1	0.31%
Headache	11	3.45%
Hemiballismus Movement disorder	2	0.63%
Hemifacial Pain	1	0.31%
Hemorrhagic Conversion	1	0.31%
Horner's Syndrome	1	0.31%
Hperreflexia	1	0.31%
Huntington's Disease	1	0.31%
Hydrocephalus	7	2.19%
Hypertensive Encephalopathy	20	6.27%
Hypodense Lesions	1	0.31%
Meningitis	1	0.31%
Mood Disorder	1	0.31%
Movement Disorder	1	0.31%
Multiple Sclerosis	28	8.78%
Myelopathy	2	0.63%
Myoclonic movement	2	0.63%
Nerve Palsy	14	4.39%
Nerve Root Compression	1	0.31%
Neuralgia	4	1.25%
Neurapraxia	1	0.31%
Neuritis	3	0.94%
Neuropathy	12	3.76%
Neuropathy, Diabetic	1	0.31%
Numbness	20	6.27%
Paralysis	3	0.94%
Paraparesis	2	0.63%

Paresthesia	1	0.31%
Parkinson's Disease	4	1.25%
Parsonage Turner Syndrome	3	0.94%
Post Concussive Syndrome	3	0.94%
Previous Stroke	2	0.63%
Pseudotumor Cerebri	1	0.31%
Psychogenic Movement Disorder	1	0.31%
Psychomotor retardation	1	0.31%
Quadriparesis	1	0.31%
Radiculopathy	13	4.08%
Ramsay-Hunt Syndrome	1	0.31%
Sinus Thrombosis	3	0.94%
Skull fracture	1	0.31%
Spinal Infection	1	0.31%
Spinal Stenosis	6	1.88%
Spinal Tumor	1	0.31%
Spine Lesion	1	0.31%
Subdural Hygroma	1	0.31%
Syncope	2	0.63%
Thoracic Cord Myelopathy	1	0.31%
Todd's Paralysis	2	0.63%
Transient Global Amnesia	24	7.52%
Tremor	4	1.25%
Trigeminal Neuralgia	7	2.19%
Vertebrobasilar Insufficiency	1	0.31%
VP Shunt	1	0.31%
<b>Total</b>	<b>319</b>	<b>100%</b>

In addition to these, there were a relatively small number of non-neurological diagnoses, such as UTI, resulting from conditions with symptoms mimicking stroke or other neurological conditions.

5. *The PRT would like to understand how the model would be extended in situations beyond UNMHSC. The current model appears to rely on connection to a neurologist or neurosurgeon at the University of New Mexico Hospital (e.g., as described in the example on page 20).*

Neurology coverage is shared between UNM, external independent physicians, and a for-profit telemedicine physician group. Coverage is assessed by the Net Medical operator for availability. Most neurology coverage is by physicians that are scheduled to

be on call or have the capacity to break from clinic responsibilities during the day and as available for night and weekend coverage.

Because the availability of specialist consultants varies greatly within and between states, a means of increasing the pool of qualified neurologists and neurosurgeons is critical to making tele-neuro emergent services available on a larger scale. Critical to providing emergent consultations with providers outside our own institution has been a cloud-based consultative system that provides equally rapid and high-quality transfer of live video and images from anywhere internet connectivity can be established. The ability to access the system with a portable computer makes it far more acceptable to consulting physicians to make themselves available to provide consultations. To date this connectivity has been provided by NMXS.

A barrier to enlarging this or other subspecialty telemedicine programs is the difficulty associated with obtaining state licensure and institutional credentialing for each consulting physician. While we have been able to accomplish these tasks with a great investment in administrative staff, a national registry for telemedicine consultants is needed to expand telemedicine nationally. In addition, a national initiative to making credentialing of telemedicine providers in individual hospitals more standardized is also needed if programs such as ACCESS are to expand nationally.

**List of ACCESS Telemedicine credentialed consulting physicians that have performed consultations, by discipline**

<b>Discipline</b>	<b>Affiliation</b>
<b>Neurology</b>	
Alicia Bennett M.D.	NMXS
Branko Huisa MD	NMXS - formerly UNM
Byron Roderick Spencer, Jr. MD	NMXS
Christopher Fanale MD	NMXS
Ira Chang MD	NMXS
Jason Chang MD	NMXS
Jeffrey C. Wagner MD	NMXS
Neeraj Dubey MD, FAAN	NMXS
REBECCA MILHOLLAND MD	NMXS
Russell Bartt MD	NMXS
Todd Dettmer MD	NMXS
Vishnumurthy Shushrutha Hedna MD	NMXS - formerly UNM
Huy Tran MD	UNM
Tobias Kulik MD	UNM

<b>Neurosurgery</b>	
Howard Yonas MD	UNM
Jeremy J. Lewis MD	UNM
Muhammad Chohan MD	UNM
Suguna Pappu MD	UNM - formerly UNM

- a. *Is this neurosurgeon typically working in a clinic or emergency department? Page 21 indicates that NMXS also has contracts with specialists; how are these specialists typically employed?*

The neurosurgical coverage is currently by UNM neurosurgeons with a primary and a back-up person in case primary is not available (in operating room). NMXS will be contracting with other neurosurgeons to provide adequate coverage of the growing program, UNM physicians are employed by UNM with monies for consultations being distributed to each department and then to the consulting physician as described in the response to Payment Model section 3c. Non-UNM faculty are contracted through NMXS and integrate the workload with their own practices, either absorbing consultations within their normal clinical practice or, as with one group in Denver Colorado, they schedule one or more on-call neurologists for telemedicine consultations.

- b. *Page 9 of the proposal says: “The ACCESS program itself handles credentialing of the expert clinical neurologists through partnership with NXMS and their independent physicians.” The NXMS website also indicates they provide support for credentialing. Does your model envision that all participating rural hospitals would have a pre-determined relationship with neurosurgeons/neurologists or with a telemedicine platform?*

Because the ACCESS models employ specialists from a variety of business entities, i.e. academic health center, independent contractors, and a for-profit out-of-state group, credentialing needs to be a collaborative effort depending where the physician is based.

Individual credentialing of physicians with all ACCESS spoke hospitals that do not accept proxy credentialing is initiated by NMXS. NMXS works directly with their physicians, the hospitals and UNM Hospitals for required information and signatures while the ACCESS program provides support to NMXS for credentialing of UNM physicians. The UNM Credentialing Department oversees the hospitals who accept credentialing by Proxy. Due to the lack of universal credentialing and licensing processes for telemedicine providers the credentialing process accounts for a fair amount of support time and resources required.



Ideally, all providers are credentialed at each hospital so that there are many options for coverage, and the ability to provide a 24 x 365 service. This is a tedious process, especially at small hospitals that do not have an efficient mechanism for credentialing telemedicine providers. Many of the delays (months) in getting the hospitals live is their lack of an appropriate person to handle the number of physicians from our program. Unfortunately, the alternative is not to have reliable coverage when an immediate need arises.

- c. *To what extent do you expect the spoke hospitals to rely on specialists affiliated with the telemedicine platform (in this case, NMXS)?*

Unlike many other academic, non-profit or for-profit telemedicine programs we did not set up ACCESS to bring patients into the UNM Hospital or Health Care System as a line of business, but rather to provide specialists where there are none. One goal is to avoid expensive transfer costs when there is not necessarily an indication for the patient to be transferred. Unless the local ER physician determines their patient can get the best care and the UNM Hospital has availability, hospitals retain their existing transfer relationships. A non-interference policy with a rural hospital's transfer pattern was important to ensuring the rural physicians had control of their patients. This concept is a vital component to achieve buy-in of the ACCESS program instead of transferring the patients out of their hospital.

The ACCESS telemedicine program fills a need when there is not a specialist in the spoke hospitals. We may be the only neurological specialists available or we can supplement any local neurologists or neurosurgeons so they can have time off, attend medical conferences and obtain continuing medical education. The emergency room physician initiates the consult and makes the final decision regarding their patient, so there is no competition with our consultants for patients.

The job of the NXMS coordinating operator is to make available the correct specialist in a timely manner for each consultation. We do not provide a consult from a specific physician, but rather provide consultation based only on discipline and availability. Expectations are set with the spoke hospitals that when they call, the specialist answering may or may not be a UNM faculty member, but is an appropriately certified, licensed, credentialed and competent specialist in their field. This allows us to provide our service 24/7/ 365, which would be impossible to accomplish without the contracted physicians.

6. *Since initiation of the program, have any patients been transported due to lack of availability of a consult? If so, how often does this happen and under what*

*circumstances? How prompt access or review is ensured, and is it ensured for all cases and at all times?*

There have been 3 cases in the past 300 neurosurgical consultations when a patient was transferred before a neurosurgical consultation could be obtained emergently. In these cases, the life-threatening nature of the patient injuries made it clear that transfer was the correct action and that there was nothing a telemedicine neurosurgical consultation would add to the decision to move the patient to a tertiary care center. A delay of even a few minutes which is needed commonly to obtain a neurosurgical consultation is part of such a system where the neurosurgeon and or the back-up surgeon are not immediately available. ER physicians have learned that all cases do not require a tele neurosurgical consultation which was their early hospital administrative directive. A computer record of the time of consultation being created vs answered is part of the permanent record of all consultations. For emergent neurology (stroke) cases our average response time is within 20 minutes. We also provide requesting urgency options other than "stat" for less acute patients which the emergency room physician can select. This would be appropriate for help in guiding the management of a possible spine injury that may have already been in the ER for many hours. We have enough providers in the system so that if one provider is not available there are others that, as a rule, have been able to cover clinical needs in a timely manner.

As with all other quality issues surfaced in the program, we have an incident reporting process, and all submissions are subjected to a quality review which includes a root cause analysis and mitigation/resolution/closeout procedure.

- 7. How is it determined whether a consultation with a neurologist versus a neurosurgeon is needed? Are certain criteria specified? To what extent is the use of a neurosurgeon versus a neurologist based on provider availability?*

The need for a neurologist vs neurosurgeon consultant is made by the emergency room physician. The NMXS operator is also aware of the diagnoses and will inquire of the consulting hospital if the requested doctor is not appropriate for the diagnosis. A consultation for a neurosurgical (trauma) is consistently responded to by neurosurgery. Some cases such as an intra cerebral hemorrhage could be consulted by either service, however the choice of the consultant specialty is not due to lack of availability of an appropriate provider.

Guidelines as to what presentations should be routed to a particular specialty are provided to physicians and clinical staff in both the training on telemedicine system usage, as well as the neuroscience workshop education provided by the program.

The decision to request a consultation with a neurologist or neurosurgeon is left to the ER physician who has made an initial assessment of the patient's problem that brought them to their emergency room. While a few consultations appear to be on the basis of an ER physician not having the time to properly assess their patient, most consultations

are based upon a thoughtful assessment by the local physician who is seeking consultation and frequently feedback on their decision process. Without feedback by a specialist they often do not feel adequately trained to decide upon optimum management, resulting in their need to transfer the patient.

8. *Are the benefits listed at the top of page 12 measured in a publication or report, or are these hypothesized benefits? Specifically, this section lists “fewer ED visits, re-hospitalizations, stays in inpatient rehab, skilled nursing facilities, and shorter ICU length of stays” as benefits.*

We do not have statistical results of changes of behavior in these categories from our ACCESS data base. We obtained ResDAC data through our grant and continue working with our Research Honest Broker through our IRB to analyze the data. At this point, the described benefits are hypothesized, but based on realistic expectations of benefit gained by most appropriate and timely diagnoses and management guidance.

9. *Please describe in more detail the measures of clinical quality that are tracked by ACCESS. In particular, does UNMHSC have data on morbidity and mortality for patients who are not transferred and remain in the rural hospital?*

ACCESS clinical staff randomly review 100% of stroke cases and 1/3 of all other consultations for quality of reporting and reasonableness of patient care recommendations. We follow what cases were completed as recommended and we access discharge records to assess disposition. Approximately 80% of recommendations are to stay at local hospital and approximately 72% do stay at local hospital or are discharged from the ER. The 7% that are recommended to stay are transferred primarily because remote hospital does not have inpatient staff to attend to the admission. There is a group of about 5% that stay at the local hospital that have terminal disorders for which transfer would not have been beneficial for the patient or their families. Six cases fell into this category where a remote ER physician wanted to transfer due to the dire prognosis and their not feeling comfortable presenting that diagnosis with the family. Our telemedicine doctor has played that role, aborting transfer by providing the needed clarity of prognosis by an expert in the local emergency, avoiding unnecessary transfer.

We have information on transfer after recommendation to admit locally. There have been 5 delayed transfers due to deterioration from an injury not evaluated in the ER or where a local hospitalist did not feel comfortable managing the patient. We know of no mortality of a patient due to neurological deterioration in the rural hospital that was not expected on admission. When there was any concern about severity of injury and adequacy of a rural hospital to care for a patient, transfer is recommended. ACCESS also maintains records of types of ICU beds, technology available in each hospital and adequacy of staffing at each hospital. Transfer is recommended if the consulting

neurologist/neurosurgeon does not believe a hospital has the appropriate care availability to provided needed management.

While it is not a quality measure the program allows a re-consultation within 24 hours as part the cost of a consultation. This opportunity for re-consultation allows for a re-examination of the care recommended with the hospitalist that usually has to assume the management of a patient after admitted from the ER. (The follow up consultation is also an important component for the third-party appraiser that conducted the FMV analysis.)

## **Other**

*10. Page 15 indicates that you will be “working with Medicare and the AMA to obtain a bundled payment avenue.” Please describe the interactions you have had with the Medicare program other than submission of this proposal to PTAC.*

During the CMMI HCIA2 cooperative agreement period of four years, based on the fact that we had to create a payment model for the patients who were not covered by the grant, and adhering to EMTAL regulations, we had to immediately incorporate a payment model. This allowed us approximately four years of developing, implementing and measuring how the bundled payment is the key to sustainability of this crucial delivery model.

As part of our cooperative agreement we were assigned great technical resources from Health Insight’s Michael Silver, and Lewin Group’s Tim Prince along with their teams remotely & in person to discuss, re-evaluate, reverse engineer, etc., to ensure this was the most appropriate payment model for our clients. Mike Silver, came to the University and hosted a two-day workshop with Health Insights (QIO for New Mexico) to work with us on answering questions and developing a road map and relevant data for adoption by government and commercial payers as they realize the value to patients and the healthcare system.

We worked in collaboration with other CMMI awardees in payment model sessions for 4 years.

ACCESS staff attended CMS and private company workshops on developing Payment Models.

We met with MCO representatives (specifically BCBS of NM and Molina of NM) on integration of the bundled payment into their business and,

Worked with the NM Medicaid Office for two years to develop, get approval and finally rollout in January 2019 an approved bundled payment for our consults.

Early in the grant we contacted the American Medical Association to research whether we could develop new CPT code(s) for neuro-emergent telemedicine consults to secure adequate reimbursement. Working with one of the local MCO’s, based on their experience with audits in neurosciences consults, they recommended we follow our

other routes to get adequate reimbursement (Medicaid, Medicare, MCO's) and then if we need to pursue new CPT codes we can begin the applications in the next year or so.

11. *Page 16 indicates that "the availability of this program has also been used as a recruiting tool as a quality of life benefit." The PRT would appreciate some clarification of this point. Do you mean recruiting neurologists or neurosurgeons to UNMHSC, or to participate in providing consultations for NMXS?*

Approximately 1/3 of rural ER doctors have said that ACCESS has been a moderate or major reason that they wish to remain in rural hospital. Some rural hospital administrators have related that having ACCESS has been a recruiting tool for their hospitals in that ER doctors would have a support structure caring for neurological disorders.

In addition, for facilities that have sufficient population to justify having practitioners in neurology or neurosurgery, they may only be able to justify or afford one or two individuals. This is insufficient to provide 24/7/365 coverage without impacting the physician's personal time and quality of life. With the ACCESS program as backup for these doctors, they are able to take weekends, sick time, or vacation, while having coverage for emergent cases.

The continuing education credits obtained by the rural physicians and nurses have also proven beneficial for these providers who often have difficulty meeting continuing education requirements.

12. *Do you have an estimate of the extent to which the newly enacted Medicaid coverage will or can be used for dual Medicare/Medicaid enrollees?*

At this time, it is our understanding that the newly enacted Medicaid coverage can only be used for straight Medicaid or Centennial 2.0 Managed Medicaid beneficiaries. Dual eligible enrollees have Medicare as primary coverage and thus fall under Medicare billing guidelines.

13. *Figure 2 is a bit confusing, possibly because the pre-ACCESS and ACCESS percentages sum to 100 in all categories. Are the categories in this table mutually exclusive? Can you provide this information in a flow diagram or decision tree that shows the pathways followed by patients after presentation at the spoke hospital ED under pre-ACCESS versus ACCESS?*

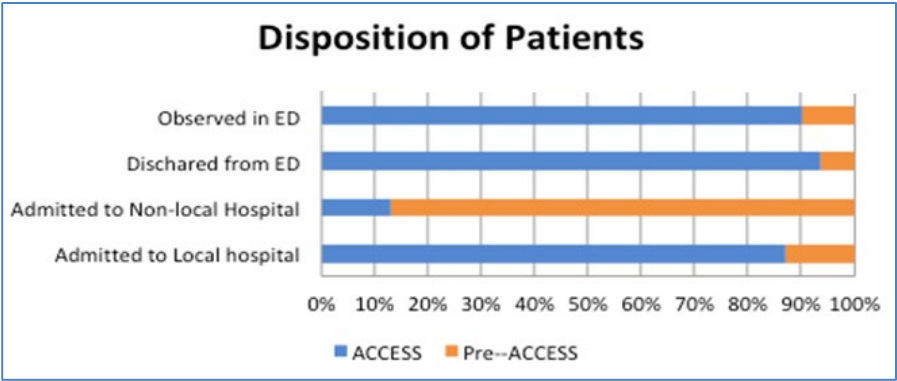
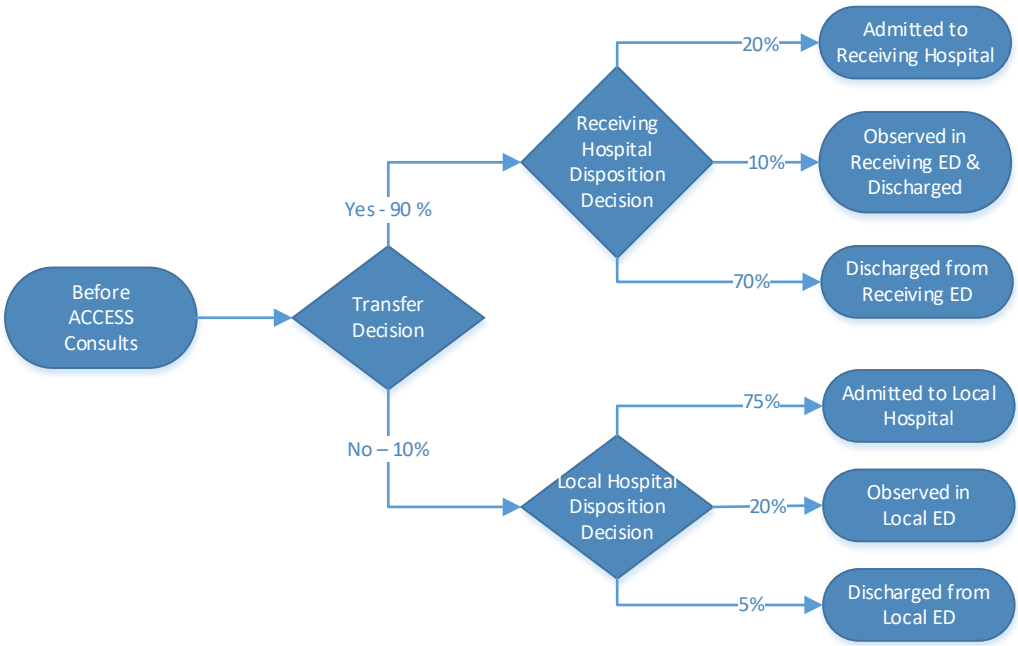
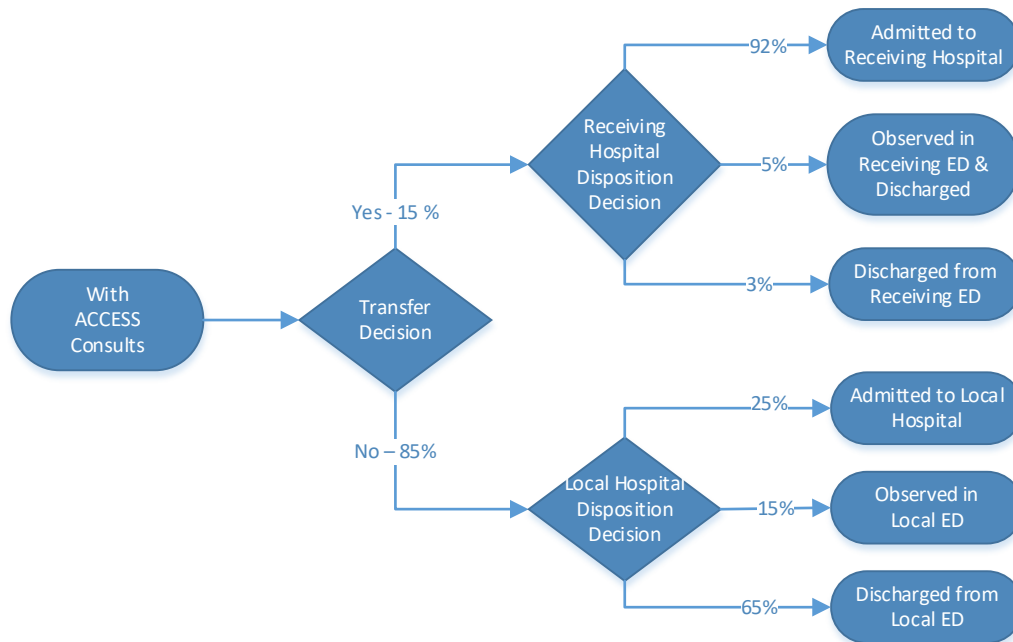


Figure 2. Disposition of patients are rural hospitals Pre-ACCESS and once ACCESS was implemented.



This figure shows the decision tree of a rural/underserved hospital’s transfer patterns prior to the implementation of ACCESS into their hospital. You can see that prior to ACCESS 90% of the patients who presented at the emergency room with a neurological ailment were transferred. Of those 90% that were transferred, 20% were admitted to the receiving hospital, 10% were observed in the receiving hospital ER and then discharged and 70% were immediately discharged from the receiving hospital. Only 10% were admitted to the local hospital or discharged from the local emergency room.



This figure shows the decision tree of rural/underserved hospital’s transfer patterns after the implementation of ACCESS into their hospital. You can see that after implementing ACCESS there is a substantial increase of patients retained in their community. Only 15% of the patients who presented at the emergency room with a neurological ailment were transferred. Of those 15% that were transferred, 92% were admitted to the receiving hospital, 5% were observed in the receiving hospital ER and then discharged and 3% were immediately discharged from the receiving hospital. The 85% of the patients that were not transferred, 25% were admitted to the local hospital 15% were observed in the local ED and then discharged and 65% were discharged from the local emergency room.

The change in local ED transfer behavior with access to neuro-emergent consultations has substantial downstream effects such as: large reduction in cost of transport which in NM is primarily by helicopter; increased and earlier local administration of tPA resulting in better outcomes and lower cost of post-acute care; lower family expenditures due to travel chasing a transferred patient; increased revenue for the local hospital due to increase of retained patients; etc.

14. PTAC is using the title provided in the cover letter, which includes the word “cerebral.” The cover letter notes that you “aim to expand this model to other specialties” beyond cerebral emergencies, though the focus of the proposal is clearly on cerebral emergencies. Are you currently expanding or considering expanding the model into other clinical areas relevant for Medicare? If so, can you briefly describe the state of development of those models?

The program’s initial focus was on neuro-emergent cases as it was proposed and executed through the CMS CMMI HCIA-2 grant supporting development of a model that

could be duplicated at other locations and scaled both in terms of covered spoke hospitals and disciplines. Due to the needs for specialty care in New Mexico we have implemented tele critical care with one rural hospital and are currently working to implement emergent cardiology within the framework of our current model. We are in the process of securing internal agreements with the cardiologists, and the infrastructure to start telemedicine consults. After completing the internal agreements with UNM and NMXS, we will begin contracting the eight hospitals who have shown interest in having these services. Our plans anticipate having our first hospital live with cardiology and performing consultation in or about August 2019.

Other disciplines that are also majorly underserved in New Mexico are emergent pediatrics, neonatology, and maternal fetal medicine, all of which we have discussed providing services using the ACCESS model and infrastructure. There are a number of other disciplines with emergent components that can and should be providing such consultations. The only limitations are the interest and willingness of the departments to spend the time and effort, as well as the funding to support the expansion of infrastructure and additional personnel needed.

The UNM Emergent pediatrics department has been providing telemedicine services under the name of Child Ready. Although they are currently grant funded, we saw benefit in having them use the same telemedicine hardware as ACCESS for future sustainability. This allows the hospitals who have both ACCESS and Child Ready the use of one cart for both specialties with their grant close to an end, we are discussing their expanded use of our IT and business infrastructure to continue the necessary services they have been providing.

Looking forwards:

Staged growth is a requisite for bringing on new hospitals and new specialties to the ACCESS program. We do a “needs and resource assessment, data and financial analysis” and work closely with the hospitals to determine if this is an appropriate service at their hospital. We make sure the local hospital employees are trained and have opportunities to obtain CME. The credentialing of specialists at each hospital can take up to six months so fast implementation is not capable nor desired based on our quality goals.

As ACCESS expands in the State of New Mexico, (added another hospital in March), there is continuous data collection and analysis to make sure there are enough specialist resources to keep up with the increase of monthly consultations. When adding other specialties, we will follow the same criteria we use now.

Our plans to expand outside New Mexico would begin regionally with states with communities that have many of the attributes and needs our hospitals have. We are currently working on adding Indian Health Service Hospitals and see a possible expansion through their system on a national scale.



## **First-year and lifetime cost-effectiveness of a neuro-emergent telemedicine consultation program in the treatment of acute ischemic stroke.**

**Objective:** Evaluate from the cost-utility of a Neuro-Emergent telemedicine consultation program in the management of acute ischemic stroke.

**Methods:** A Markov model was developed for both first year and lifetime horizons. Costs were gathered using a societal perspective and include initial and recurrent stroke treatments, consultations, patient transports, rehabilitation, long-term care, and caregiver costs. Effectiveness was measured by quality-adjusted life years (QALYs). Incremental cost-effectiveness ratios (ICERs) were calculated using QALYs gained combined with costs incurred. Costs and QALYs were discounted at 3% annually in the lifetime horizon model. Model inputs were taken from findings from the ACCESS program for emergency room patients in rural New Mexico from May 2015 to February 2017 and existing literature. One-way and Monte Carlo sensitivity analyses were also conducted.

**Results:** Compared with no network, patients treated in a Teleneurology network had a cost savings of \$13,617 for the first-year horizon and \$22,696 in the lifetime horizon. Incremental QALYs increased from 0.2 for the first year to 2.8 over a lifetime. All 10,000 Monte Carlo simulations for both first year and lifetime horizons yielded ICERs <\$50,000/QALY, a ratio commonly considered acceptable in the United States. With cost savings ranging from \$4,960 to \$146,000 and QALYs gained from .013 to 3.56.

**Conclusion:** A Neuro-Emergent Telemedicine Consultation Program demonstrates significant savings and improved quality of life. Unlike other telemedicine programs, ACCESS has shown to be cost-effective in both the first year and lifetime horizons. Teleneurology can help reduce the large geographic disparities in acute stroke care. Implications for Policy or Practice: The large cost savings of Teleneurology suggests that MCOs should diligently seek to include urgent Teleneurology consultation as a covered benefit. Currently, there is no uniform reimbursement and this acts as a significant barrier to adoption of Teleneurology.

**Intro:**

Stroke is one of the most significant health problems in the United States. Approximately 780,000 strokes occur each year and of these, 600,000 are first attacks (AHA 2008). Stroke is the fifth leading cause of death and the leading cause of serious long-term disability. In 2004, stroke accounted for approximately 1 of every 16 deaths.<sup>1</sup> Among all strokes, 87% are ischemic, 10% are intracerebral hemorrhage, and 3% are subarachnoid hemorrhage (AHA 2008). Stroke imposes a significant economic burden on our healthcare system, with acute ischemic stroke accounting for the bulk of costs. Total direct and indirect cost resulting from stroke has been reported to be more than \$65 billion a year (AHA 2008). Direct cost encompasses all expenditures from hospitalization, nursing homes, physicians and other healthcare professionals, drugs and other medical durables, and home healthcare, whereas indirect cost accounts for lost productivity due to morbidity or mortality. Stroke can be ranked among the most expensive chronic diseases such as cancer (\$219.2 billion), diabetes (\$174 billion), and depression (\$83.1 billion). Patient outcomes can be improved and costs reduced for ischemic stroke if the patient can receive proper treatment and diagnose by a stroke specialist.

However, rural communities do not have the same accommodations as urban communities. Rural America faces many of the same issues as developing countries. There is a general lack of access to health professionals. As such stroke risk factors are more prevalent, while stroke specialists and treatment options are less available (Eberhardt 2004, Pearson 1998). The administration of tissue plasminogen activator (tPA) for ischemic stroke patients can greatly reduce the risk of disability from stroke, yet if given incorrectly tPA can cause the patient to bleed into the brain, causing severe disability or death (Hacke 2008). The candidacy of a patient must be determined by a stroke specialist with experience and proper training. Further, tPA has only been shown to be an effective treatment for ischemic stroke if given in the first 3–4.5 hours after symptom onset (Adams 2007, Del Zoppo 2009). Only 2%–4% of ischemic stroke patients receive this treatment, with the lowest percentage in rural areas (Kleindorfer 2009, Switzer 2009). Thus, few patients get this essential treatment because of limited access to stroke professionals and community isolation. Patients that present with Acute ischemic stroke (AIS) at a rural hospital ER are transferred to another hospital with a stroke specialist. Due to the increase in travel time, fewer than 2% of patients receive tPA within this 3-hour window (Barber 2001). The transferring of these patients leads to lost revenue for the rural hospitals, increased time for diagnosis and treatment, higher costs for the patients, and a significant inconvenience for families that want to accompany their relative. Small rural hospitals do not have the resources needed to have a

## ADDENDUM 1

neurologist on call. A Teleneurology program that lets rural doctors consult with a stroke neurologist on arrival to the rural hospital, potentially improving patient outcomes and allows remote hospitals keep more patients. Teleneurology is a 2-way audiovisual technology that links remote emergency department physicians and their patients to stroke specialists. The increased cost of a Teleneurology program along with health-related issues must be considered in the choice of whether to adopt a program or not. Hospitals need to be willing to use and MCO's reimburse telemedicine consultations for neuro-emergent care for the program to be sustainable. The purpose of this study is to assess the clinical and economic outcomes of a statewide, Teleneurology program in New Mexico. There have been other studies published that look at this problem theoretically, and how to set up a potential Teleneurology program. (Frey 2005, Keplinger 2014, Pervez 2010, Saler 2011, Stradling 2009) However this study is the first based on a current ongoing Teleneurology program (ACCESS) which incorporates a strong educational component, to address patient transport, and how the program affects the administration of tPA.

### **ACCESS Program**

Through Access to Critical Cerebral Emergency Support Services (ACCESS), UNMH and its partners leveraged community-based coalitions to reduce the cost of neuroemergent services and improve outcomes for patients with neuro-emergent disorders. ACCESS built and expanded existing partnerships to provide critical state-of-the-art telehealth services to potentially all NM providers and their patients. The program partnered initially with 12 regional hospitals to provide optimum triage and care for these patients. These 12 hospitals also provided 6 months of patient data prior to their first consultation with ACCESS, for base line trends.

ACCESS focused on improving the health of geographically, clinically, and socioeconomically diverse populations by providing comprehensive care that extended beyond the clinical service delivery setting. ACCESS integrated an educational component via traveling educators and a telehealth educational program. Through the education component, emergency room and hospitalists at each hospital received training from a stroke specialist to help them better utilize ACCESS and become more comfortable with keeping patients.

With ACCESS, the participating ERs have a telehealth platform that includes rapid radiograph image transfer and two-way audiovisual capacity, as well as report generating capacity. This enables consulting neuro specialists to review imaging and talk with/examine the patient and generate a report. This platform is used at the bedside to examine and assess patients, increases the confidence and decision-making capacity of local and tertiary care physicians, and increases family members' confidence that decisions for their loved ones were optimal.

Net Medical Express Solutions (NMXS) has developed this telehealth technology to facilitate comprehensive consultation services to hospitals at a minimal upfront and maintenance cost to the hospitals. Instead, the hospitals pay a per consultation fee to a specialist for assessment

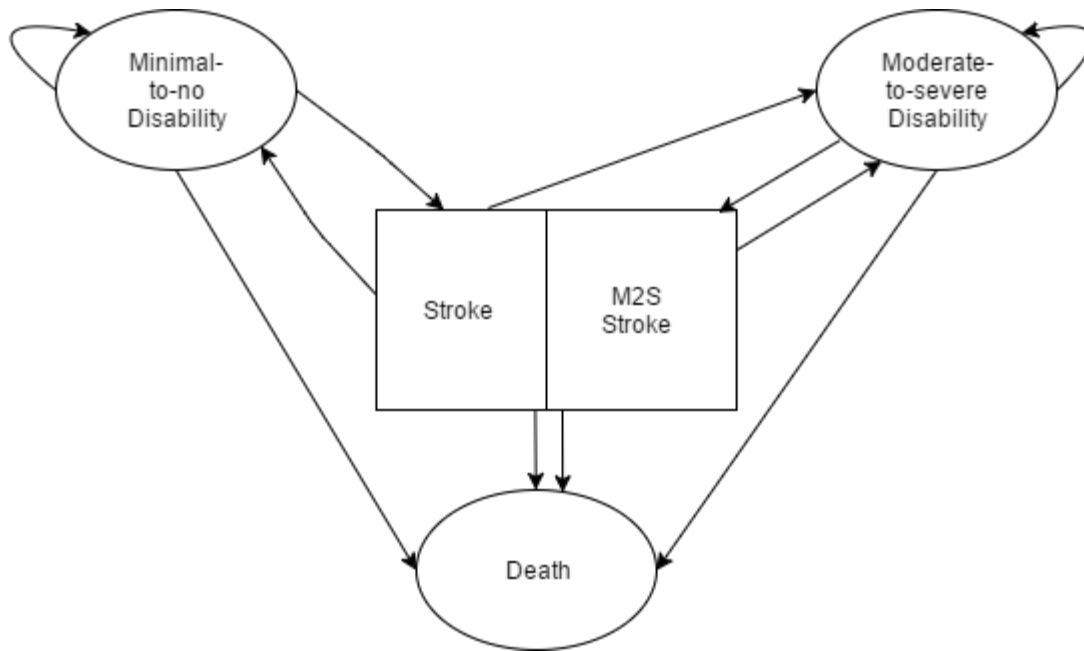
and plan-of-care decision-making. In the current program for rural stroke care, 12 hospitals pay \$850 per consult; \$200 goes to NMXS to cover overhead, maintenance, support, and profit; \$250 pays the consulting neurologist the other \$350 pays for the administrative staff including the educational and administrative staffs that also monitor a quality program with quality outcomes which are reported quarterly to consulting hospitals.

ACCESS enables healthcare professionals (HCPs) to treat most patients with neurological and non-operative neurosurgical disorders locally, instead of transporting the vast majority to tertiary facilities. Patients who necessitated tertiary-level intervention were stabilized and optimized for transport.. Patients who did not require tertiary-level emergent care were triaged to remain at rural hospitals and referred to appropriate clinics for follow-up care.

Further, most commercial telemedicine programs have charged a monthly subscription fee along with a technical maintenance and per consultations fees. These costs are beyond the ability of low volume rural hospitals to support. ACCESS, instead, uses a pricing model that works on a per consultation fee only so that if no consults were submitted there was no charge and the relatively low charge per consult built into ACCESS has been within the financial capacity of even the smallest rural hospitals.

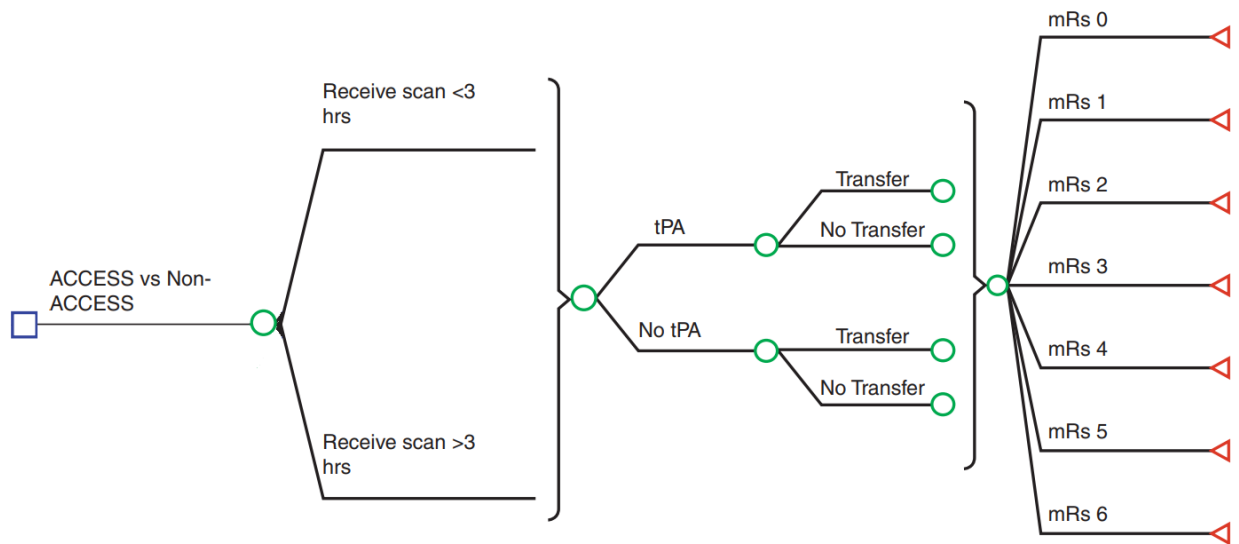
## **Methods**

**Overview.** We constructed a Markov model for a Neuro-Emergent telemedicine consultation program to determine the cost-effectiveness of a Teleneurology hospital compared to a non- Teleneurology hospital. “Access” or Teleneurology refers to a hospital that has telemedicine capabilities. While “Control” or Non-Teleneurology refers to a hospital in which telemedicine capabilities are not available. Rural “Control” hospital physicians must then make decisions concerning the care of patients presenting with stroke symptoms without a consultation from a stroke expert. The model is evaluated for both the first year after stroke incident and lifetime horizons.



**Figure 1 Model**

**Model structure.** The model as seen in Figure 1 has 3 health states defined by the modified Rankin Scale (mRS)(Chambers 2002): (1) minimal to no disability (mRS 0-2); (2) moderate-to-severe disability (mRS 3-5); and (3) death (mRS 6). The model also has a stroke tunnel state (figure 2) to account for initial and recurrent strokes. Patients enter the model in the stroke tunnel state by presenting with AIS symptoms in a rural emergency room (ER). In the tunnel state, each patient is given a probability of receiving a CT and MRI scan within 3-hours. This allows a stroke expert to determine the capability of receiving tPA. It is then determined whether the patient will be transfer to another hospital or not. The patients initial mRS is then determined and they are placed in one of the 3 health states based on the expected distribution of initial stroke severity (Quinn 2009). At the start of each cycle (1 year) the patient can either stay in their current state, worsen, or have another stroke. Outcomes and costs are compared between hospitals with ACCESS to those without. Outcomes from the model included costs (total cost being the sum of the hospital, transfer, and caregiver costs) and quality-adjusted life years (QALYs). Patient data and network characteristics come from the ACCESS data. This data is taken from 12 rural New Mexico hospitals and covers over 2,000 unique patients with a mean age of 61.



**Figure 2 stroke tunnel state**

The following assumptions were made in the model estimation:

- Patients could only transition from a less severe to a more severe health state or remain in the same health state at each cycle.
- Difference in treatments only occurs during ER encounters for AIS, not after discharge from acute care.
- Recurrent stroke rate did not differ by treatment type.

**Input parameters.** The model was populated with results from the ACCESS project. Where the data was lacking or unclear, parameters were estimated using current peer-reviewed literature. These parameters are defined in the tables below and explained here by category.

**Event probabilities.** We estimated the probabilities of receiving a CT and/or MRI scan within a 3-hour window, of receiving tPA, and of being transferred to another hospital for both in and out of network. These estimates are based on the ACCESS project findings. The probabilities of health outcome based on whether a patient receives tPA or not was obtained from existing literature (Schwab 2007, NINDS 1995).

**Table 1-A Stroke transitions.**

Stroke transitions	Teleneurology (range)	Non-teleneurology (range)
Scan <3 h	0.22 (0.16–0.27)	0.02 (0.01–0.03)
Scan >3 h	0.78 (0.60–0.98)	0.98 (0.91–0.99)
Transfer/tPA	0.23 (0.17–0.29)	0.90 (0.80–0.99)
No transfer/tPA	0.77 (0.59–0.97)	0.10 (0.08–0.13)
Transfer/no tPA	0.05 (0.04–0.06)	0.85 (0.76–0.91)
No transfer/no tPA	0.95 (0.88–0.99)	0.15 (0.12–0.19)
Scan <3 h/tPA	0.84 (0.78–0.92)	0.44 (0.37–0.51)
Scan <3 h/no tPA	0.16 (0.13–0.20)	0.66 (0.54–0.78)
Scan >3 h/tPA	0.00 (0.00–0.00)	0.00 (0.00–0.00)
Scan >3 h/no tPA	1.00 (1.00–1.00)	1.00 (1.00–1.00)

**Table 1-B Health State Transitions**

Health Transitions	Minimal to no disability	Moderate to severe disability
Same Health state	0.9066(0.8159-0.9519)	0.8445(0.7501-0.8917)
Second Stroke	0.0686(0.0514-0.0857)	0.0686(0.0514-0.0857)

**First-year costs.** Patient care costs were obtained from published literature and included Teleneurology consultation fee, initial hospitalization costs, tPA and transfer costs, post-acute stroke care costs (including rehabilitation and nursing home costs), ICU length of stay, rehospitalizations, other ER visits, and daily caregiver costs (Earnshaw 2009, Brown 2006, Silbergleit 2003, Russo 2008, Deutsch 2006, Hickenbottom 2002). Rehabilitation costs (both inpatient and others) were one-time costs assumed to occur after each episode of stroke.

**Table 2. Costs**

	Costs(range)
Cost of Scan	\$2,000 (\$1,700-\$3,250)
Cost of Transfer	\$5,125 (\$4,600-\$12,700)
Cost of Mild Stroke	\$15,400 (\$11,550-\$19,250)
Cost of Severe Stroke	\$30,327 (\$22,520-\$37,533)
Cost of Consultation	\$850
Cost of Inpatient Rehabilitation	\$21,688 (\$16,266-\$27,110)
Cost of ER visit	\$400 (\$300-\$500)
Cost of Rehospitalization	\$10,322 (\$7,741-\$12,902)
Cost of Long-term Care	\$77,745 (\$58,308-\$97,181)
Cost of Caregiver	\$23 (\$17.25-\$28.75)
Cost of Other Rehabilitations	\$10,941 (\$8,205-\$13,676)

**Long-term costs.** Long-term costs included those that occurred after the initial 90-day period. These costs included annual medical cost and daily caregiver costs that vary by health state (Lee et al 2007). These costs were obtained from the literature and publicly available data sets. Annual medical costs consist of additional hospitalizations, outpatient physician visits, medical equipment, and other costs that would be covered by a third-party payer (Hickenbottom et al 2002). Nursing home costs and caregiver costs were incurred as long as patients were alive. Long-term costs differ only by health state not by AIS treatment type. All cost inputs were inflated to 2015 US dollars using the medical care services component of the Consumer Price Index.

**Discharge probabilities.** Caregiver time and probabilities of being discharged to home, a rehabilitation facility, or long-term care were obtained from the literature (Chambers et al 2002, Fagan et al 1998, Silva et al 2012, Schlegel et al 2003) and varied based on health state.

**Table 3.** Resource utilization for post-acute stroke care

Inpatient rehabilitation	Percent(range)
Patients with moderate to severe disability	0.49(0.41-0.57)
Patients with minimal to no disability	0.00
Other rehabilitation	Percent(range)
Patients with moderate to severe disability	0.33(0.26-0.40)
Patients with minimal to no disability	1.00
Long-term care	Percent(range)
Patients with moderate to severe disability	0.60(0.47-0.73)
Patients with minimal to no disability	0.05(0.04-0.07)
Caregiver time Hours/week	Hr/week(range)
Patients with moderate to severe disability	18.6(13.95-23.25)
Patients with minimal to no disability	8.6(6.45-10.75)
ICU LOS	Avg. days(range)
Patients with moderate to severe disability	24(18-30)
Patients with minimal to no disability	3(2.25-3.75)
ED Visits	Avg.(range)
Patients with moderate to severe disability	4(3-5)
Patients with minimal to no disability	1(.8-1.12)
Rehospitalization	Avg.(range)
Patients with moderate to severe disability	2(1.5-2.5)
Patients with minimal to no disability	0.75(0.56-0.94)



**Table 4.** QALYs.

	QALY	Range	Years of remaining life	Range	If tPA	If no tPA
mR0	0.85	0.80–1.00	15	13–17	0.18 (0.13–0.23)	0.11 (0.06–0.16)
mR1	0.80	0.75–0.95	11.7	8.4–14.9	0.24 (0.19–0.29)	0.16 (0.11–0.21)
mR2	0.65	0.68–0.90	8.4	7.6–9.3	0.07 (0.02–0.12)	0.12 (0.07–0.17)
mR3	0.50	0.45–0.65	6	5.2–6.8	0.13 (0.08–0.18)	0.14 (0.09–0.19)
mR4	0.35	0.10–0.40	3.7	2.9–4.6	0.13 (0.08–0.18)	0.20 (0.15–0.25)
mR5	0.20	0.00–0.32	2.5	1.4–3.5	0.06 (0.01–0.11)	0.07 (0.02–0.12)
mR6	0	0.00–0.00	0	0–0	0.18 (0.13–0.23)	0.21 (0.16–0.26)

**Utility Inputs.** Utility values for minimal to no disability and moderate to severe disability were obtained from the literature (Gage et al 1998, Earnshaw et al 2006, Samsa et al 1999). Death was assumed to have a utility of 0.

**Outcomes.** Model outputs included total incremental costs, incremental effectiveness, and incremental cost-effectiveness ratios (ICERs) for both first year and lifetime. Total incremental costs were summed across all cycles. Incremental effectiveness was measured as the utility of the health state multiplied by years spent in that health state. All outcomes were discounted at 3% per year.

**Sensitivity analyst.** A Tornado sensitivity analyze was performed to determine whether the results were sensitive to certain parameters in the model, by varying inputs (-/+ 25%) at a time while holding other inputs constant. A probabilistic sensitivity analysis was also performed using a Monte Carlo simulation. In the Monte Carlo, all parameters varied at once rather than one at a time. The ranges for the changes for each variable were taken from existing literature, variables, where variance could not be found, were varied by +/- 25%.

## Results

**Table 5.** Results

First Year	Teleneurology	Non-Teleneurology	Difference	ICER
Total Costs	\$28,458 <sup>a</sup>	\$42,075 <sup>a</sup>	-\$13,617 <sup>b</sup>	-68,085
QALY`s	0.63 <sup>c</sup>	0.43 <sup>c</sup>	0.20 <sup>d</sup>	Dominate <sup>e</sup>
Lifetime	Teleneurology	Non-Teleneurology	Difference	ICER
Total Costs	\$562,941 <sup>a</sup>	\$585,637 <sup>a</sup>	-\$22,696 <sup>b</sup>	-8,106
QALY`s	4.43 <sup>c</sup>	7.23 <sup>c</sup>	2.8 <sup>d</sup>	Dominate <sup>e</sup>

ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year. **a** Average cost per patient, **b** Average cost savings per patient, **c** Average QALY per patient, **d** Average QALY gained per patient, **e** ACCESS is cost savings with higher QALY meaning it is the dominate option.

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Table 5 presents the results for both the first year and lifetime horizons. In both time horizons, Teleneurology hospital was both cost savings and more effective and was, therefore, a dominant strategy compared with a non-Teleneurology hospital. Specifically, the Teleneurology hospital has an incremental cost savings of \$13,617 for the first year and \$22,696 over the life of the patient. The incremental effectiveness measured in QALYs was .20 per patient for the first year and 2.8 for the lifetime horizon.

Table 6. Cost Savings Breakdown	First Year	Lifetime
Average Cost Savings Per Patient	\$13,617	\$22,696
From Transportation	\$11,757 <sup>a</sup>	\$13,453 <sup>a</sup>
From Improved Health	\$1,860 <sup>b</sup>	\$9,243 <sup>b</sup>

**a** Cost savings when all health cost set to zero, **b** Cost savings when transport costs set to zero.

**Sensitivity Analysis.** Figure 3 and 4 present the results of the one-way sensitivity analyses in the form of a tornado diagrams. A Teleneurology program was the dominant strategy in all scenarios for both time horizons. Meaning that the program is both cost savings and more effective. The first year horizon is most affected by the cost of severe stroke outcome and cost of rehabilitation. While in the lifetime horizon the largest factors are the addition medical costs of life after a severe stroke and caregiver’s time costs. When transportation or health care costs are set to zero we still find that Teleneurology is the dominate strategy (Table 6).

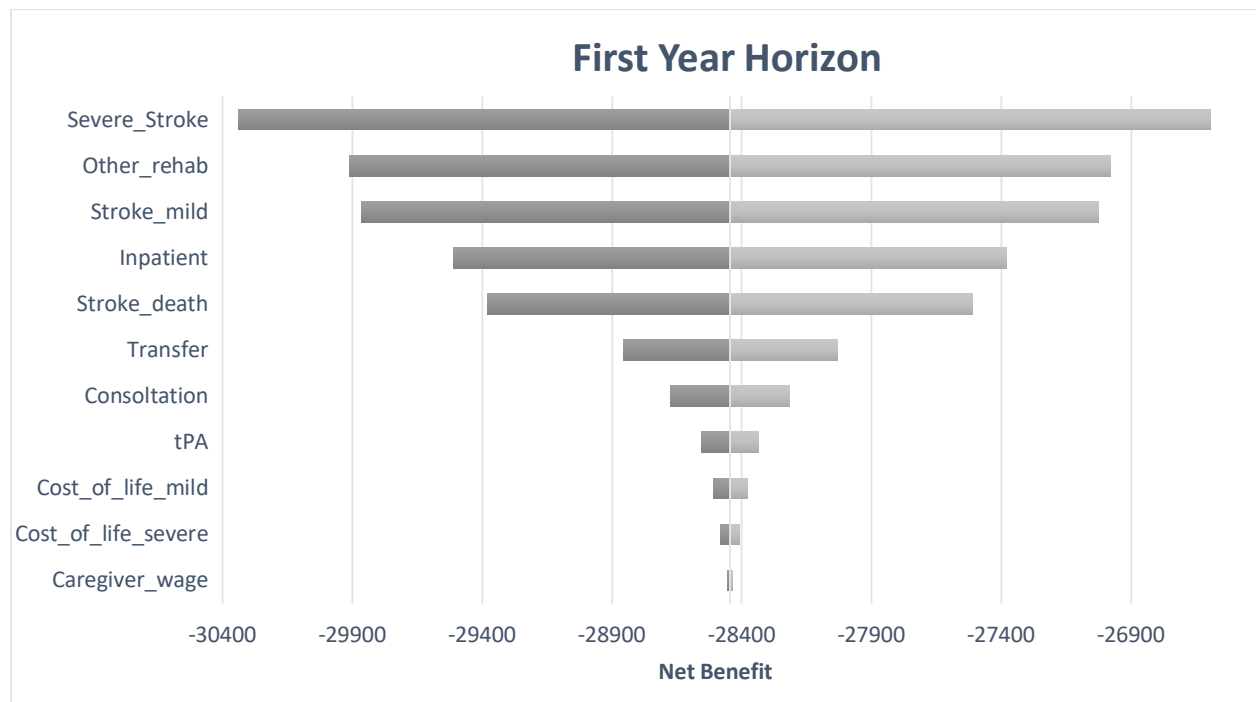


Figure 3

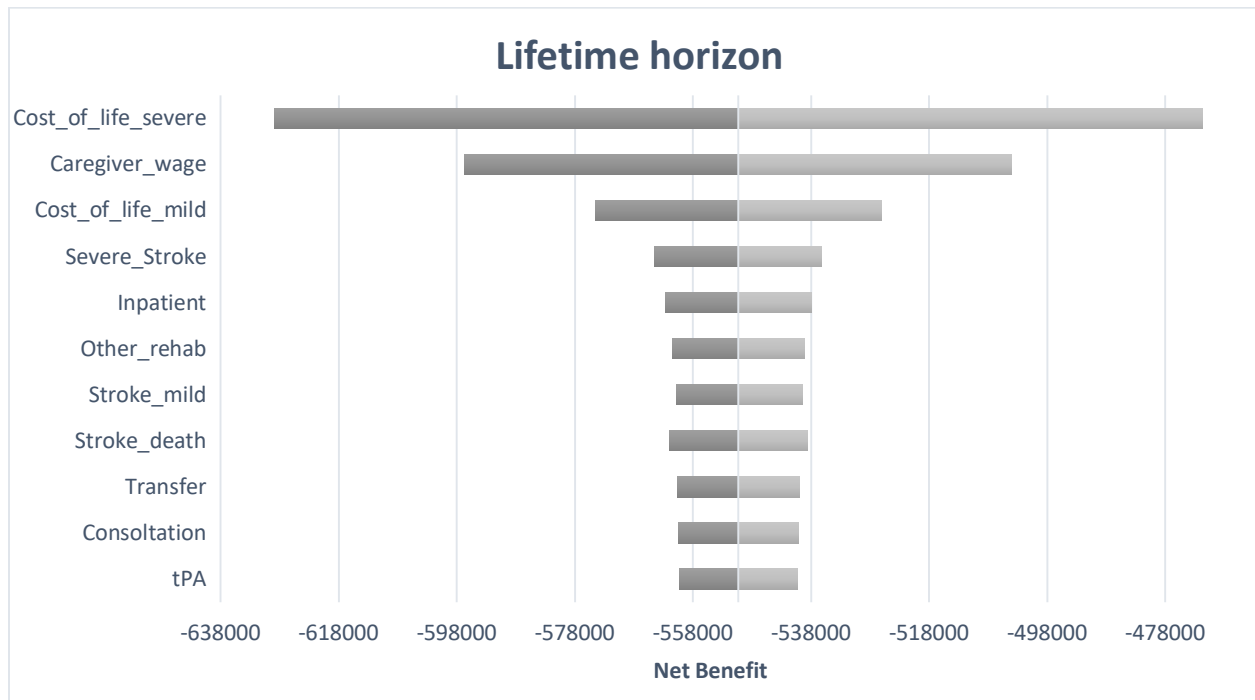


Figure 4

## Discussion

This study has shown that a Teleneurology hospital is the dominant strategy in comparison to a non-Teleneurology hospital for both time horizons. There was a cost savings per patient of \$13,617 for the first year and \$22,696 for the lifetime. While the increase in QALYs was 0.20 for the first year and 2.8 for the lifetime. The majority of patient savings for the first year comes from the reduction in unnecessary transportation. When looking at the lifetime horizon the large cost savings are due in part to this reduction in unnecessary transport but also because of the improved quality of life from increased tPA use. This increase in quality of life results in less need for rehabilitation and other hospital interventions.

The use of tPA in qualified patients is the most beneficial treatment for acute ischemic stroke (Adams et al 2007). However, because of the risk of a cerebral hemorrhaging only a stroke specialist should determine if a patient is a good tPA candidate (Leira et al. 2008). The shortage of stroke specialists in rural areas is a substantial barrier preventing more widespread tPA use. Teleneurology lowers this barrier by allowing stroke consultations to such areas, in effect, increasing the expertise, and therefore quality, of stroke care at rural hospitals.

The large cost savings of Teleneurology suggests that insurance plans should diligently seek to include urgent Teleneurology consultation as a covered benefit. Currently, there is no

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uniform reimbursement and this acts as a significant barrier to adoption of Teleneurology. We hope to in the future address the effects of Teleneurology on other types of strokes like hemorrhagic, mimics, and TIAs. While different types of stroke are also time sensitive they are not as common, and as such the literature on them is limited.

Other Teleneurology studies revealed similar results, with the exception that they did not show the large cost savings that we have. The Cost Effectiveness Analyst (CEA) of a similar program in Arizona showed a hub-spoke Teleneurology network could lead to a short-term cost increase but long-term gains from the improvement in health outcomes and follow-up care (Demaerschalk 2013). Another study followed a similar Arizona network and showed an ICER of \$108,363 per QALY with a first-year horizon and \$2449 per QALY with the lifetime horizon (Nelson 2011). A Denmark study showed that as more time passed the program became more efficient. The Danish determined an ICER of \$50,100 per QALY after a year and became dominate after 30 years. (Elhers 2008). While all these studies showed that Teleneurology is cost effective, none of them were cost savings. Our study is different in this regard because of the reduction in the cost of the technology and the type of Teleneurology network that we study. The ACCESS program did not require rural hospitals to pay for costly technology and maintenance fees. ACCESS only has a per consultation fee.

While this article takes the next step in our understating of Teleneurology there are some limitations. We are limited by the current state of the literature and available data. We relied on experts' opinions for data not reported in the literature or could not be found from our results. Conservative assumptions were made under uncertainties. For example, the study assumed no differences in subsequent care and outcomes following the initial hospitalizations. However, if a patient receives treatment in a Teleneurology program, they may also receive better quality of subsequent care (Schwamm 2009) which could affect their final outcomes. These assumptions lead to increased reliability with limited and imperfect data. Also, our analysts used current national averages for costs and outcomes when in reality these vary from area to area. While the sensitive analyst could address part of this concern, it can't address the full range of possible program aspects. There are other types of consultations like telephone-only. These kinds of consultations have not been able to significantly determine if a patient is tPA eligible (Frey et al 2005, Meyer et al 2008). Future research can compare these other types of consultations vs Teleneurology. Lastly, it was assumed that diagnosis had the same accuracy for both those in and outside of the program. While not addressed in this paper there is a clear finding that rural physicians with access to a consultation have a higher accuracy of diagnosis (Demaerschalk et al 2012).

**Conclusion**

Teleneurology is cost effective for increasing access to stroke specialists for rural communities. This increase in access results in large cost savings in both short-term (\$13,617 first year) and long-term (\$22,696 lifetime). There is also an increase in QALYs for both short-term (0.20 first year) and long-term (2.8 lifetime). Teleneurology can help reduce the large geographic disparities in acute stroke care.

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## **Rural Hospitals as Anchor Institutions: Using Telemedicine to Promote Organizational and Community Capacity in Rural New Mexico**

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**Abstract**

**Purpose:** Access to Critical Cerebral Emergency Support Services (ACCESS) offers an alternative telemedicine, anchor-institution model designed to strengthen rural hospital capacity to offer timely stroke and neurological treatment and to reduce the unnecessary transport of patients for neurological and neurosurgical care by keeping patient care in local communities.

In this paper, we present a multilevel conceptual model that redirects the hub to the rural setting.

**Methods:** The research team conducted qualitative interviews and focus groups with internal and external stakeholders from 2016-2018 to test the validity of the conceptual model. Forty-one semi-structured interviews and 1 focus group were conducted to assess perceptions of stakeholders both before (n=25) and after (n=16) implementation of ACCESS. All interviews were recorded, transcribed, with all identifying information removed. The research team coded the transcripts in AtlasTI and analyzed them for themes

**Findings:** Both internal and external stakeholders identified the value of ACCESS, with successes at multiple levels of impact. Hospital administrators and providers perceived that ACCESS strengthened both the organizational capacity and the performance of rural hospitals. ACCESS was perceived as contributing to increases in financial, human, and informational resources; as well as encouraging a shift in the belief that rural hospitals could become a strengthened locus of care, with improved quality of services, increased innovation, and decreased patient costs.

**Conclusions:** Qualitative interviews and focus groups show ACCESS has contributed to perceptions of a stronger community of practice, increased rural hospital utilization, and the development of rural hospitals as anchor institutions with the potential to influence long-term community outcomes.

**Key Words:** Rural Health Care, Anchor institutions, telemedicine

Stroke telemedicine is an effective strategy to increase access to health care and improve neurological health outcomes. Traditional models have facilitated improved outcomes via a “hub and spoke” structure where a tertiary care center would provide vital emergency guidance, often including transfer of the patient to the tertiary care center. While higher levels of care may be warranted at times, unnecessary transfers can take local community resources from rural settings and redirect them to well-resourced, urban hubs. Access to Critical Cerebral Emergency Support Services (ACCESS) offers an alternative telemedicine, anchor-institution model designed to strengthen rural hospital capacity to offer timely stroke and neurological treatment and to reduce the unnecessary transport of patients for neurological and neurosurgical care by keeping patient care in local communities. In this paper, we present a multilevel conceptual model that redirects the hub to the rural setting. Using qualitative interviews and focus groups with internal and external stakeholders from 2016-2018, we highlight the key features of this supportive approach, showing how ACCESS has contributed to perceptions of a stronger community of practice, increased rural hospital utilization, and the development of rural hospitals as anchor institutions with the potential to influence long-term community outcomes.

### **Rural Hospitals as Anchor Institutions**

Hospitals are the center of rural health care systems. They not only provide health care, but serve as the locus for health care personnel, bring in outside dollars to the community through third-party payers, stimulate local purchasing, and help attract other industries to rural areas.<sup>1</sup> Growing evidence indicates rural hospitals have measurable positive economic outcomes beyond their primary objective of providing health care, including wage and job growth in health care and non-health care settings.<sup>1-2</sup> The strong, positive spillover effect that hospitals have on

non–health care employment suggests that hospitals are an important institution for job creation, community development, as well as greater access to health care.

A growing literature posits that anchor institutions, such as universities and hospitals, healthcare facilities, cultural institutions, school systems, and municipal governments, have significant economic, social, and cultural impacts in their surrounding communities.<sup>3</sup>

Proponents argue it is difficult to strengthen fragile local economies or reduce widening social disparities without leveraging stable institutions, especially amidst a decline in government resources. The concept of “anchors” as agents of community and economic development means stable institutions not only promote economic development, but are sources of innovation for cultural life and new ideas that drive further economic and social development.<sup>4</sup> Numerous examples exist of how universities and hospitals have implemented an anchor strategy to improve local conditions, with a strong emphasis on the social determinants of health.<sup>5-7</sup> For example, many urban hospitals are using multilevel, upstream approaches such as workforce training, creating living wage jobs, increasing community safety and access to affordable healthy food, building advocacy capacity of community-based organizations, and engaging in private-public sector collaborations.

Core values underlying this concept include: first, a commitment to a pragmatic interdependence of institutional and community resources and to multidisciplinary and multi-sector coalitions<sup>8</sup>; second, to create bi-directional learning, moving beyond top-down flows of information, so that community stakeholders contribute to the collective expertise to build organizational and community capacity<sup>9</sup>; and third, to be firmly rooted in localities, which supports anchor institutions’ economic self-interest within communities which are healthy, stable and safe.<sup>9-11</sup>

While growing evidence illustrates the role anchor institutions play in urban environments, less is known about their impact in rural areas.<sup>12</sup> ACCESS sought to adapt this urban-based model by facilitating an emerging network of rural, anchor hospitals throughout the state. Given that the University of New Mexico (UNM) is the only Trauma 1 hospital located in the state, ACCESS sought to use university resources and expertise to bolster the organizational capacity of rural hospitals to provide neuro-emergency care in the context of extreme inequities in access to health care and poverty. Using a hospital-to-hospital approach, ACCESS offered an innovation in the application of anchor institutions to meet the contextual conditions facing rural health care. The goal of ACCESS was to create a new level of care capacity within rural hospitals, making them the anchor of care delivery, and extending into the community.

### **Rural Conditions and Rural Hospital Closures**

Despite the promise of hospitals as anchor institutions, rural U.S. towns face significant challenges such as high poverty, poor educational outcomes, and high social isolation. These realities stem from increasing migration to urban centers, inequities in public expenditures compared to cities, and disinvestment in rural economies, leading to a rapidly increasing rate of rural hospital closures. In 2013-2014, the number of rural, short-term acute hospital closures was more than twice the number of closures in 2011-2012.<sup>13</sup>

In New Mexico, poverty, low education and unemployment are also significant factors contributing to rural health disparities. Based on 2017 American Community Survey data, the poverty rate in rural New Mexico is 23.3%, compared with 16.4% in rural counties nationwide. Similarly, the unemployment rate in rural New Mexico is 6.7% compared to 4.7% nationwide. New Mexico rural counties also lag behind rural counties nationwide in educational attainment,

as 18.7 % of the rural population has not completed high school, compared to 14.9 % in rural counties nationwide.<sup>14</sup>

The two main drivers associated with closures are hospital factors of low occupancy rates, aging facilities, fewer services and retention and recruitment difficulties; as well as market forces of high proportions of Medicaid and racial/ethnic minority patients, industry competition, and distance to competitors.<sup>13</sup> There is substantial evidence that hospital closures decrease health care access, placing older, poorer populations at risk for negative health outcomes; as well as reducing per capita community income by at least 4 percent and increasing unemployment rates by 1.6 percent.<sup>1</sup>

### **The ACCESS Program**

Given these realities, the ACCESS team used their clinical expertise in neuro-emergent disorders as a first step in developing multi-level interventions to not only improve patient quality of care in rural areas, but also to co-create strategies with diverse rural hospitals designed to improve their capacities. The long-term goal of ACCESS was to support rural hospitals to expand their scope of care beyond neuro-emergent issues and expand their mission with more local community engagement, in essence becoming a stable and, “remaining-open” local anchor institution.

ACCESS started in 2015 with the goal of reaching 20 rural hospitals across New Mexico by 2017. UNM staff spent considerable initial effort establishing legal agreements and provider licensing and credentialing, installing essential technology, training local providers, and building surveillance and research infrastructure. Four hospitals added a community engagement component with a UNM staff person dedicated to working with community coalitions to adopt a community educational agenda related to prevention of neurological injuries. Roll out took

longer than expected, as many of the local hospitals owned by out-of-state entities needed approval from corporate headquarters. Despite these setbacks, the project recruited 14 hospitals to participate in the network.

### **ACCESS Conceptual Model**

As Figure 1 demonstrates, the idea behind ACCESS was to enable rural hospitals, with UNM support, to better support community/local clinical services (ie., emergency medical services, transportation, outpatient clinics, and supportive services) and to engage with local community leaders and policy makers to improve neuro-emergency care to rural communities. The research team hypothesized that this enhanced quality of services and shift in culture would change the rural hospital environment.

[Insert Figure 1 Here}

#### *UNM Support to Build Rural Hospital Infrastructure:*

In practice, the ACCESS program facilitated the acquisition of and training to use low-cost neuro-technology to facilitate real-time, point-of-service assessment of patients in rural community hospital emergency departments by a neurologist or neurosurgeon. In real time, with patients and their families, rural doctors consulted with a UNM specialist to assess the patient's condition and jointly develop a treatment plan. In most cases, patients received immediate treatment and remained in their local hospital and community for follow-up care.

Second, UNM ACCESS providers offered technological and clinical education support. Working in tandem with ACCESS-funded telehealth coordinators (THC) placed in each rural hospital, UNM nurse educators traveled to each hospital to provide continuous, state-of-the-art training in telehealth practices. They co-created surveillance systems of quality measures, program utilization, staff turnover, billing, and discharge data to measure the impact of ACCESS

and the sustainability of the program in each community. ACCESS also engaged local community and allied health care providers to create sustainable systems for patients to stay in their communities for care. Finally, UNM engaged insurance companies and state-level policy makers to advocate for reimbursement of neuro-emergency consultations in order to improve sustainability within rural hospitals.

*Shifting Hospital Organizational Culture:*

One of ACCESS's major innovations, in building local anchor institutions, was to stimulate a shift in organizational culture, so that patient care, provider training, hospital services, and community services became part of a wrap-around, collective strategy.

*Patient Outcomes:* The ACCESS model intended that increased access to specialty services in local communities and decreased transportation costs and time for patients and family members would increase patient health outcomes and patient family satisfaction.

*Provider Outcomes:*

The model posited that additional provider support and access to more comprehensive patient care would enhance recruitment, retention, and job satisfaction for rural hospital providers.

*Community Outcomes:*

Finally, the conceptual model posited that decreased patient transport costs and increased quality of care would lead to patients seeking care locally, including primary health care. The improved impression of quality and specialty of care would increase community trust and improve the overall reputation of the hospital, enabling greater financial stability. The supportive change of national (CMS), state (MCOs), and local policy would also improve care available to



patients locally. Hospitals which also engaged community prevention activities could not achieve additional outcomes.

## **Methods**

The research team conducted qualitative interviews and focus groups with internal and external stakeholders from spring of 2016 through summer of 2018 to test the validity of the conceptual model. Forty-one semi-structured interviews and 1 focus group were conducted to assess perceptions of stakeholders both before (n=25) and after (n=16) implementation of ACCESS. Interviews included questions regarding participant experiences, perceptions, and satisfaction with ACCESS, and barriers or facilitators to ACCESS implementation. Post-implementation interviews also included questions regarding perceptions of organizational change facilitated by the ACCESS program, and reflections on the ACCESS conceptual model. The community interviews included additional questions on community activities undertaken and perception of impact at the community level. All interviews were recorded, transcribed, with all identifying information removed. The research team coded the transcripts in AtlasTI and analyzed them for themes. (IRB UNM 15-012)

## **Results**

Both internal and external stakeholders identified the value of ACCESS, with successes at multiple levels of impact. For hospital organizational changes shown in Table 1, hospital administrators and providers perceived that ACCESS strengthened both the organizational capacity and the performance of rural hospitals. ACCESS was perceived as contributing to increases in financial, human, and informational resources; as well as encouraging a shift in the belief that rural hospitals could become a strengthened locus of care, with improved quality of services, increased innovation, and decreased patient costs.

[Insert Table 1 Here]

While patient health outcomes are more fully reported elsewhere (cite), local delivery of Tpa increased from less than 2% of patients that presented with ischemic stroke symptomatology to 20%, which was a major improvement in health care delivery in rural New Mexico. For patient outcomes, this paper focuses on patients' access to local quality care and perceptions of satisfaction with their local hospital as part of results in Community Outcomes.

*Provider Outcomes:*

Interviewees reported that the ACCESS program attained success with provider outcomes from local hospitals. Providers at ACCESS hospitals reported feeling more supported and having improved confidence in the care they were providing to patients.

*Telemedicine has helped and improved care. It helps doctors feel like there is some backing and it reinforces us. Even though telemedicine has limited capacity, it is helping.*  
ED Physician (Pre: Alta Vista)

The ACCESS program provided training to physicians and nurses regarding assessment and treatment options for neuro-emergent patients. Participants reported that this increased their support and confidence, which contributed to clinical decisions to not transfer patients to tertiary care facilities.

*I have noticed that we have kept a few that we probably would have transferred, and I've also noticed that our tPA has been increasing with the usage. It would expire every time we bought some because the providers were a little hesitant to give it. So we are giving more with the consultation – with that consult from the neurologist that says, "Yes, give it. I see the image, and I see the patient. I would give it if I was there, and I think you should, too." And so our providers feel a little bit more comfortable ordering for us to give it.* THC (post-Guadalupe)

Participants reported that providers also improved their clinical skills with support from the ACCESS program. Many participants, particularly nurses, described developing deeper

understanding from in-patient consultations with specialists, and from clinical education and ACCESS annual conferences focused on tele-stroke neuro-emergent care.

*We're able now to confidently give the patients the tenecteplase or the alteplase as needed, whereas before the doctors were reluctant to give it to them because they didn't feel that they had expertise to determine the use. So that's been a huge benefit to the patients. So I believe that the outcomes, the final outcomes, for the patients have been very, very positive.* Chief Executive Officer (CEO)/Administrator (post-Guadalupe)

### **Community Outcomes**

Community outcomes were related to enhanced perceptions and trust related to receiving quality care from the local hospital. Internal and external providers explained how ACCESS reduced patient burden of transportation and associated costs, and supported patient outcomes by using local, in-hospital and rehabilitation services. Yet ACCESS also provided more than enhanced quality of local medical care. The emphasis on community and patient education created a deeper connection to patients so they were seen as part of the larger community for which the hospital is responsible. The general perspective was well expressed by a hospital administrator: *“Overall, very positive about the program. I think it has spurred innovation on our part. I know it's been a benefit for our community.”* (Post: Nor-Lea). Table 2 summarizes four themes that emerged from the analysis.

[Insert Table 2 Here]

As Table 2 suggests, one of the key perceived benefits was that ACCESS acknowledged the poor, economic conditions facing rural residents and could alleviate family costs associated with long-distant travel for low-income residents. ACCESS also increased efforts to implement meaningful community outreach and education and therefore increasing community trust.

*Community Engagement Sites:*

In addition to improving patient access to enhanced local care and becoming a valued resource within the community, community engagement activities were initiated in four sites with local Health Councils to extend community engagement outside of hospital walls. For these sites, ACCESS became an inspiration for additional prevention activities.

As one example, the Lea County Health Council had members from both local community hospitals. Nor-Lea Hospital, a public hospital, was an early adopter while Lea Regional Medical Center, a private hospital and part of a national chain, added ACCESS later.

Staff from both hospitals were key members of the Health Council and were able to make the bridge between hospital and community concerns. One area of connection was fall prevention for the older adults.

*I really think that this might be way outside of the box thinking but I think educating our children in our local schools, because when mom or dad are not around, who is taking care of kid? It is usually grandparents and so I think we need to educate our children on the importance of when something doesn't seem right, you need to call for help and the way to do that is 911....When grandma falls and she can't get up on her own, call for help because there is a reason that grandma fell and it could be a stroke and it could be a neuro issue.. So, I think maybe going down the road and educating our children...because sometimes they are going to be the only one in the house with a grandparent. Administrator (Pre: Lea)*

During implementation of ACCESS, Nor-Lea hospital chose to partner with a local program and began to provide education in senior centers, which extended into direct community service.

*We partnered with Senior Stand and Strong, 'cause when we look at our trauma program, we look at the mechanism of injury, and what we found that it was falls for elderly. So, what can we do to help prevent those falls? We went to the community – there are lots of community programs that they have, and we go out to the community centers, we talk to the seniors. We figure out ways that – for one of them, we even put a ramp in their home, because in order for them to get to go into their home. Administrator (Post: Nor-Lea)*

During the pre-interviews, several members expressed an interest with ACCESS taking neurological concerns into schools and school children.

*I would like to see the change in the school system. I would like to see that the school system be aware of what it is that we can offer through ACCESS. -PCC Focus Group Member (Pre: Lea)*

At post-interview, the Health Council members told of creating a bike giveaway program, including helmets to prevent head injuries.

*For Christmas, we partnered with a few people in the community, and we gave away bikes to all the first graders. ...And so, we provided the education to those kids, when you're riding, you need to always make sure you're safe, you wanna make sure you're protecting your head. So, we went out to the schools, and we fitted each one of them a helmet for them. Administrator (Post: Nor-Lea)*

Finally, while state policy change can take longer than changes within hospital practice and health care systems, progress was seen in addressing state health insurance reimbursement for telemedicine services:

*The other thing I would add to that is the policy outcomes. Part of the reason we didn't get into telemedicine before, is because nobody was reimbursing for it. Now, laws have been changed, and we're getting reimbursed for some of this now. UNM obviously had a big impact on that. Administrator (Post: Nor-Lea)*

## **Discussion**

Across rural New Mexico, ACCESS has gained a reputation for promoting rural hospitals as anchor institutions, which has the possibility of countering the trend toward rural hospital closures. As seen by the interviews, a culture shift emerged in participating hospitals, enabling them to maintain care of the neuro-emergent patient in the community instead of transporting them to tertiary care facilities. Access to external specialists in real-time facilitated an increase in confidence for local emergency medicine providers to care for patients within their hospital. In particular, CEOs and chief nursing officers (CNOs) expressed that 80% of their patients do not require transport if they have specialty back up. In addition to provider confidence, the data demonstrated an increase in patient confidence and satisfaction with the ACCESS program at

their local hospital, even going so far as expecting family members with other conditions to receive the same treatment and stay in their community. This finding is especially critical because of the low-income status of many of the patients within these rural communities. Within the community, hospitals began to be viewed as providing wrap-around services, a core rural anchor institution strategy.

The analysis presents a complementary view of anchor institutions in rural settings. By investing in their cultural, technology, and human resource infrastructure, the hospital develops the foundation to center health care for rural settings. This is particularly true for providers who received direct access to specialty consultations, as well as clinical training at the local level, avoiding the need to leave for continuing medical or nursing education. The goal was to increase retention of emergency medicine and intensive care hospitalists at the local level through providing support to local providers.

Within the community-engaged hospitals, working with local external providers and health councils, ACCESS extended their work into community development activities, also paralleling the anchor institution literature on institutional-community coalitions. Activities included patient education, media outreach, and additional collaborations related to rehabilitation, education, and preventive services in school and community settings.

Despite these early successes, ACCESS has faced institutional challenges and rural realities that are important to consider for the development of rural hospitals as anchor institutions. During early implementation, there were major technologic and logistical challenges. Interviewees reported early extensive wait times for service, because of weak internet services. The private hospitals, linked to national chains were able to leverage national

resources to improve their internet to overcome this limitation, whereas public hospitals were slower because they did not have the resources.

During early implementation, patients and families also did not recognize the ability to receive effective care at their local emergency rooms. Patients were often hesitant to consent to the ACCESS consultation and the treatment recommendations from the specialist via the consultation. Participants also reported that the lack of awareness regarding the ACCESS program and the need for additional referral resources in the community were barriers to further implementation of the program. CEOs also reported on turnover of ACCESS-trained staff which created difficulties for smooth implementation of the ACCESS program, as those individuals familiar with how the program were replaced by staff who did not understand how to use the equipment and facilitate consultations.

Despite these challenges, CEOs and CNOs expressed hope that services, such as ACCESS, would successfully enhance hospital infrastructure and capacity to support their patients and providers, as well as increase their wrap-around responsibility to the community. Evidence for this shift is supported in their desire for ACCESS to expand to a range of other services, so that hospitals could increase their capacity, for example, to local hospitalists caring for patients in intensive care units.

## **Conclusion**

While the anchor institution literature has supported broader community development as a core strategy, ACCESS has shown the benefit of starting from concrete services, such as access to specialty consultations and trainings that can slowly build out capacity of the hospitals to adopt larger cultural institutional changes. The potential to influence patients and therefore rural communities can be seen in the following quote from a hospital administrator (Post Nor-Lea).

“The one thing that I think, we need to continue this program, because if you think about it, rural health is just as important as anywhere else....because in a lot of places, this is the only way we're gonna be able to provide that kind of care, because it is expensive, and we have to think about how do we do the best work for patients, and at the same time, get the best patient care outcomes. I hope we can find a way to continue this program, and for them to find a way to get the funding for it.”



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**Table 1: Organizational Capacity Change among Rural Hospitals**

<b>Improving the Organizational Capacity of Rural Hospitals</b>	
<b>Fiscal and Workforce Gains</b>	<p>The more tools you put in the hands of rural providers, the less likely the situation will turn into one that ends up with an expensive transfer and also other expenses related to remote hospitalization. And that costs not just the patient and their family, but the whole system a lot more. Physician (Post: Nor-Lea)</p> <p>Its amazing, it's the right thing to do at the end of the day. ACCESS meets the scope of its intent to support rural hospital capacity which in turn meets the needs of the community for us. They offered good infrastructure for staff, particularly nursing staff, to held do some of the QA stuff and get that part done as it's progressed. CEO (Post: Lea)</p>
<b>Improved Informational Resources</b>	<p>UNM led the team at the time to help us educate our physicians, and we have seen a decrease in the number of patients that had to be transferred out of the facility, and an increase in the number of patients that have actually stayed in the facility to be cared for here appropriately. So, I think it's had the impact that we wanted it to have. It's been a value to us and our community. Social Worker (Pre: Guadalupe)</p>
<b>Changes in Organizational Culture: Belief that Rural Hospital is Locus of Care</b>	<p>Now the local hospitalist knows that, hey, this consultant has evaluated patient A and is also available for re-evaluation, or someone from their team is available to contact, should there be a complication or – it gives them a lifeline to say, "Okay, we can accept the patient here, because now we have an avenue to deal with any difficulties that may occur." Makes a big difference. They're much more risk-tolerant if they have a means to handle that risk. Physician (Post: Nor-Lea)</p>
<b>Perceived Rural Hospital Outcomes</b>	
<b>Improvements in Rural Quality of Care</b>	<p>Getting the neurologist or the neurosurgeon to have a telemedicine consult quickly has been a benefit to the patients...we've been able to administer to stroke victims tPA, which is the clot busting drug, many, many times that has been just a terrific benefit to our community and to our patients and to the region that we service, wherein prior to that we were not administering tPA at all, and nobody in the region was. And so it's helped us to bring a whole new course of treatment to patients suffering from stroke. Administrator (Post, Rehoboth)</p> <p>I think there's better continuity of care as a result of ACCESS. Because the problem is if patients go elsewhere, we lose track of them because we don't have really a direct link with the patient record..., Now we keep in contact with that patient and do our follow-up. We have a neurologist here...so that makes a difference, too. Now, keep patients in the local system. Administrator (Post, Nor-Lea)</p>
<b>Innovations in Rural Care</b>	<p>I think for what I've seen--especially reviewing the data with the critical care committees and stroke committees, outcomes are positive....And those are the things we thrive on. We've also reached out even further than the hospital to our local EMS. Because that's what stroke accreditation and ACCESS are all about building that community of first responders. Now our first responders are learning even how to triage from the field and we prepare the ER and get our telemedicine gear...Chief Nursing Officer (Post, Lea)</p> <p>When I look at this model, and I think back over the last several years, we had really no experience with telemedicine, none. UNM helped us in a cost-efficient way to enter into that fray. Now are testing technology to actually be the location where the physician is doing telemedicine out in other areas...It's opened up opportunities for us. It's part of our strategic plan now to see if we can expand telemedicine opportunities, look at clinics that we can bring in. Administrator (Post, Nor-Lea)</p>
<b>Decreased Costs in Rural Care</b>	<p>I feel for our patients it's been the stay in the community and the transportation costs. You know, we're in a very low socio-economic area with a lot of Medicaid and non-insurance. And, that, like I said, to be sent somewhere even for a night could financially devastate somebody if they didn't have good insurance, and even if they did. You know, if their income was limited. THC (Post, Nor Lea)</p>

**Table 2: Perceived Community Outcomes**

Community Benefits	External and Internal Community Members
<p><b>Reductions in Financial Hardship</b></p>	<p>I think it will help specially with the travel and being able to keep out clients or any of the clients here in the area but still being able to meet with the doctor by videoconferencing. I see a good impact on that because a lot of our people here have hard ways of getting transportation. Public Health Nurse Manager (Pre: Alta Vista)</p>
	<p>We definitely have a need for neurology and I think it is really tough for impoverished communities and they have a hard time getting to even these appointments, so I think having that access would be really good. External Provider (Pre: Guadalupe)</p>
	<p>I mean we've been able to rule out patients that don't need to be transferred, and that's really important because we're 120 miles from Albuquerque, so it's been very, very beneficial to rule out unnecessary transfers. CEO (Post: Guadalupe)</p>
<p><b>Increased Patient Satisfaction</b></p>	<p>I've had a patient that we did the teleneuro on, and they came back with another family member, not for a stroke or anything. It was completely different systems. But they asked the same thing, "Well can we do a video thing like we did for me?" I said, "Unfortunately we don't have it for this," so we ended up transferring them, but yeah, so they had a positive experience with it, so I'm sure if they remembered and asked about it, that they'd tell their friends and other members of the community, too. RN (Post NorLea)</p> <p>Staying in the community for care is satisfying to many people, for sure. I think it helps the reputation or perception of the hospital. Emergency Medical Director (Post NorLea)</p>
<p><b>Increased Education and Outreach</b></p>	<p>It is important to educate the public. The people in [Name of NM City], when I came here in [year] till now, these people are very good. They all want what is best for their family. They will work, they will do anything the doctor or therapist recommends to better their family. Education is ideal. Counselor/Therapist (Pre: Guadalupe)</p>
	<p>So, we've had tons of fliers and things for patients in the ER and ran a few articles in the paper and whatnot... THC (Post: NorLea)</p>
	<p>I know like they have talked in the town on the radio station on Fridays and that might be a good way to get it out on the public if a lot of people have not heard about it because a lot of people here listen to the local radio station. School counselor (Pre: Guadalupe)</p>
<p><b>Increased Community Trust in Rural Hospitals</b></p>	<p>I think it's a wonderful project. I think whenever you can keep people at home, close to their community, I think there is that home where family is being able to come and visit, that whole holistic approach that it's not just medicine, it's the caregivers getting to be there by the side for support, encouragement, teaching for after hospital care when you can keep that within their communities, I think the rehab is obviously a lot better cause now I think if you are at UNM and you spend a week there and family can't get down there and so one person goes down there, I guess probably the person that can afford to go down there and they are bombarded with all this post discharge information and how much do they actually retain? It's probably very little so if you can have the whole family there, that's the culture in these small North Eastern areas is grandma goes to the hospital, everybody goes to see grandma, I mean everybody goes. She is the matriarch of the family and it's like almost too many people but that's what drives that culture. So, I think that you can have family members being there present where they can get education and ask questions, I think that whole recovery is improved. External Director of Nursing (Pre: Alta Vista)</p>

**UNMHSC ACCESS Telemedicine**

**Second Set of Questions for UNMHSC Regarding Payment Issues from the PTAC PRT**

**7/29/2019**

The PRT appreciated the details provided in UNMHSC’s May 8<sup>th</sup> response to PRT questions. Based on UNMHSC’s responses to Payment Model Questions 1b and 1c (summarized in Table 1, next page), the PRT developed several additional questions.

In asking these questions, the PRT acknowledges an advisory opinion by the Office of the Inspector General<sup>1</sup> on the payment of a per diem fee for on-call coverage as well as broader discussion in the literature about the valuation of call coverage.<sup>2</sup> The Medicare Physician Fee Schedule, however, pays based on CPT Service provided, not based on the type of physician providing a service. Table 2 shows 2019 payments for distant provider services that are made regardless of physician training.

Could you please provide more information on the payment values and justifications associated with these services? Specifically, it would be helpful to understand the following points:

**\*\*Other than a “fair market value” argument, is there any justification for a different price for a neurologist (\$250) versus a neurosurgeon (\$400)?**

Is there any reason (aside from algebra) that the residual payment amount is higher for the neurosurgical consult (Table 1, bottom line of \$425 for neurologist and \$625 for neurosurgeon)?

Response:

Please see the attached table for pricing support for the variance in pricing for a telemedicine consult by a neurologist versus a neurosurgeon.

<b>Neurosurgeon (\$400)</b>	<b>Neurologist (\$250)</b>
<b>Scope:</b> Neurological Surgery is a discipline of medicine and the surgical specialty that provides the operative and non-operative management (i.e.; prevention, diagnosis, evaluation, treatment, critical care, and rehabilitation) of disorders of the central, peripheral, and autonomic nervous systems,	<b>Scope:</b> Neurology is medical specialty dealing with the inborn, developmental and acquired, acute and chronic diseases of the central and peripheral nervous system and skeletal muscle at all ages. Neurology covers their diagnosis, the understanding of underlying mechanisms and management.

<sup>1</sup> <https://oig.hhs.gov/fraud/docs/advisoryopinions/2012/AdvOpn12-15.pdf>

<sup>2</sup> <https://academic.oup.com/neurosurgery/article/80/4S/S23/3077270>



<p>including their supporting structures and vascular supply. Evaluation and treatment of pathological processes which modify functions or activity of the nervous system and the management of pain is also under the purview of the Neurosurgeon. By training and experience, neurosurgeons are expected to perform difficult procedures that involve the nervous system as it interacts with the integumentary and musculoskeletal systems, skull, spinal column and spinal cord. They treat congenital and acquired anomalies; extracranial vascular disease; neurotrauma, tumors, intracranial and intraspinal infections; pain, movement, affective and seizure disorders.</p>	<p>Neurology is a constantly evolving field parallel to the development of the neurosciences and overlaps with numerous other medical specialties, in particular neurosurgery, psychiatry, clinical genetics, pediatrics, rehabilitation, internal medicine and Public health.</p>
<p><b>Education and Training:</b> 4 years medical school, residency 7 years, 1-2 years fellowship. 102 accredited neurosurgical residency programs training nearly 1,200 residents, 160 graduates completing residency annually.</p>	<p><b>Education and Training:</b> 4 years medical school, 4 years residency and 1 year fellowship. 127 residency programs</p>
<p><b>Compensation</b> – (Salary.com, 2019) average annual salary is \$598,208 (range \$450, 341 - \$756,978). *Average salary for all specialties is \$329,000 (Medscape Physician Compensation Report 2018).</p>	<p><b>Competition</b> – (Salary.com, 2019) average annual salary is \$251,750, range between \$220,000 and \$295,000 *Average salary for all specialties is \$329,000 (Medscape Physician Compensation Report 2018).</p>
<p><b>Supply and Demand:</b> small specialty constituting only 0.5% of all physicians. (2012) Approximately, 3,689 practicing board certified neurosurgeons serving a population of more than 311 million people.</p>	<p><b>Supply and Demand:</b> estimated supply, 2013 – physicians 16, 100, projected demand 2025 – 18,600. Projected deficit: - 820.</p>
<p><b>On Call:</b> neurosurgery typically provide on call for all neurosurgery admissions, spine, stroke and trauma.</p>	<p><b>On Call:</b> neurology typically provides on-call for all general neurology admissions and stroke.</p>
<p><b>Shortage in rural areas:</b> 1 neurosurgeon per 100,000 people.</p>	<p><b>Shortage in rural areas:</b> 1.78 neurologists per 100,000 people (Wyoming) compared to 11.02 neurologists per 100,000 in Washington, DC.</p>

The current Medicare payment model is insufficient to provide adequate coverage for stroke neurologists, general neurologists and neurosurgeons in rural New Mexico. The ACCESS program showed that the prior model was associated with less than optimal clinical outcomes such as the rare use of stroke thrombolytic therapy despite proven benefit. The care was also expensive with a near universal patient transfer pattern to a higher level of care when experience with ACCESS demonstrated that 80% did not require transfer. The ACCESS proposed bundled payment model is higher than currently supported by Medicare but the improved stated outcomes in care and cost support the increase in payment.

The concept of a bundled payment, embedding clinical and community education and program quality surveillance, are uniquely affordable by rural hospitals that have fewer patients that require



neuro emergent care. Standard commercial telemedicine programs charge a significant fee for monthly technical support, physician availability charges, and a charge per consult. This partly explains why telemedicine services for neuro emergent disorders has not been present in rural hospitals. Our bundled payment model has proven effective in rural communities with less frequent need for consultation and with the minimal maintenance expense with only a charge per consult.

The proposal to bring virtual neurosurgical care to rural communities is unique and the financial investment for sustaining such an effort is modest compared to the proven benefits to patients, rural hospitals and communities.

**How is the payment of \$100 per day for on-call neurosurgeon support handled? Is this payment made out of the residual?**

The on-call fee of \$100 comes out of the residual. The added on-call fee compensates the limited number of neurosurgeons available (1-2) who are required to be on-call 24/7. This is compared to a pool of neurologist (20) that are available to cover neurology consults.

**Otherwise, how are the residual amounts allocated? We understand from your response that this residual payment covers the educational program that includes two senior nurse educators (e.g., 8+ hours of hands-on education at each hospital) and financial tracking of services rendered and payments received from hospitals, but we would appreciate more details.**

Residual monies for neurology and neurosurgery consults support the reduced infrastructure resulting with the termination of the CMS contract. There is a greater need for educational programs, quality oversight and financial management as the programs expands in clinical depth (new interventions, i.e. thrombectomy), scope (potential to add new specialties) and range (additional new hospitals). It is projected that with a sustained growth in contracted hospitals and increase in consultation numbers that there will be a corresponding increase in revenue that may result in an improved financial position depending upon the increase of expenses associated with programmatic growth.

The success of the ACCESS program requires significant administrative and clinical educational and quality support which in the past has been shared by the Department of Neurosurgery from where the ACCESS contract was managed. As the program moves to an independent status outside the Department of Neurosurgery and into the UNM Medical Group, the program will need to be totally self-sustaining through monies obtained via consultation charges. The support structure based on future projections work out to the positions which makes up the largest portion coming out of our residual amount:

1.0 FTE - Sr. Program Manager

1.0 FTE - Program Manager

.20 FTE – Chief Medical Officers

1.0 FTE - Clinical Nurse Educator/Quality



.80 FTE - Clinical Nurse Educator – Vacant

1.0 FTE -Administrative Coordinator

**For a total FTE equivalent of 5.0 employees**

**Percentage (%) Breakdown of Expenses from Consultation Residuals**

On call pay for Neurosurgeon	4.7%
Salary and Fringe Benefits of Administrative, IT and Clinical RN Staff	77.2%
Chief Medical Officers for Neurology and Neurosurgery	4.0%
Malpractice coverage, legal, IT security, contracting, space expenses, OH	11.1%
Travel/Conference	2.0%
Supplies, educational and administrative	<u>1.0%</u>
	100%

Can you provide more detail on the estimated market values of the various services that comprise the \$175/consult technical charge?

7X24 call center and technical support, radiology transfer and viewing, web based consult record capture database system, physician credentialing support to hospitals,

- 1) 24/7 Call Center - 150,000 per year
- 2) Enterprise Software License - \$7,500 per month =\$90,000 /yr.
- 3) Malpractice Insurance = \$25,000 per year
- 4) Unix Software Dev/Ops (3 programmers) = \$15,000 per month 180,000 per yr.
- 5) Amazon Server Maintenance = \$1,600 =19,200
- 6) HIPAA, Security Services, Hi-tech Compliance = \$1,000 =12,000 /yr.
- 7) Administrative Charges including Supervisors = 3,000 per month 36,000 /yr.
- 8) Credentialing Charges = 1,000 per month 12,000 /yr.

Total cost = \$524,200

Total Cases = 3000 per year (average)

Avg Cost per case = \$174.73





<b>Table 1 (Based on UNMHSC 5/8/19)</b>	<b>Provider Type:</b>	<b>Neurologist</b>	<b>Neurosurgeon</b>
Total Charge per Consult (= sum of components below)		\$850	\$1,200
Payment to Consulting Physician:		\$250	\$400
Technical Charge		\$175	\$175
Residual payment left with hospital/program receiving the full payment (\$850 or \$1,200)		\$425	\$625

<b>Table 2:</b>	<b>HCPSC Code</b>	<b>Medicare Physician Fee Schedule CY2019</b>			
		<b>NM Payment Amount</b>		<b>US Payment Amount</b>	
		<b>Non Facility</b>	<b>Facility</b>	<b>Non Facility</b>	<b>Facility</b>
<b>Medicare Distant Provider Services</b>					
Telehealth consultation, emergency department or initial inpatient, typically 30 minutes communicating with the patient via telehealth	G0425	NA	\$100.38	NA	\$101.27
Telehealth consultation, emergency department or initial inpatient, typically 50 minutes communicating with the patient via telehealth	G0426	NA	\$136.23	NA	\$137.67
Telehealth consultation, emergency department or initial inpatient, typically 70 minutes or more communicating with the patient via telehealth	G0427	NA	\$202.13	NA	\$204.35
Telehealth Consultation, Critical Care, initial, physicians typically spend 60 minutes communicating with the patient and providers via telehealth	G0508	NA	\$211.10	NA	\$212.64

HCPSC: Healthcare Common Procedure Coding System; NA: Not applicable.

Facility and non-facility payments: Under the PFS, the payment rate differs by site of service. The facility (e.g., outpatient department, hospital) can usually bill separately for the cost it incurs while the provider bills under PFS and receives the facility-based rate. In non-facility settings (e.g., offices, homes), the provider is the only entity that bills and receives the non-facility rate

# UNM ACCESS Telemedicine Program

## Current Month and Cumulative Stats Thru July 2019

The following reports are collected statistics from the current indicated month, and cumulative statistics, either from inception of the program (May 2015), or following data collection for the CMMI HCIA-2 cooperative agreement (June 1, 2018). The time-periods are indicated in the title of the particular report.

**Table 1. July 2019 Program Quick Stats:**

Total contracted hospitals	21	
Live hospitals	19	
In implementation	2	
Time in production	4 Yr 3 Mo	
Total month's consults - Including F-U	256	
Total month's consults - Primary	253	98.8%
Consults - Neurosurgery - Including F-U	14	
Consults - Neurosurgery - Primary	14	5.5%
Consults - Neurology - Including F-U	242	
Consults - Neurology - Primary	239	94.5%
Average Primary Consults/Day	8.16	
Total Consults from Inception	6627	
Total Primary Consults from Inception	6535	
Primary Neurosurgery Consults from Inception	390	6.0%
Primary Neurology Consults from Inception	6145	94.0%

## UNM ACCESS Telemedicine Program Current Month and Cumulative Stats Thru July 2019

Table 2.

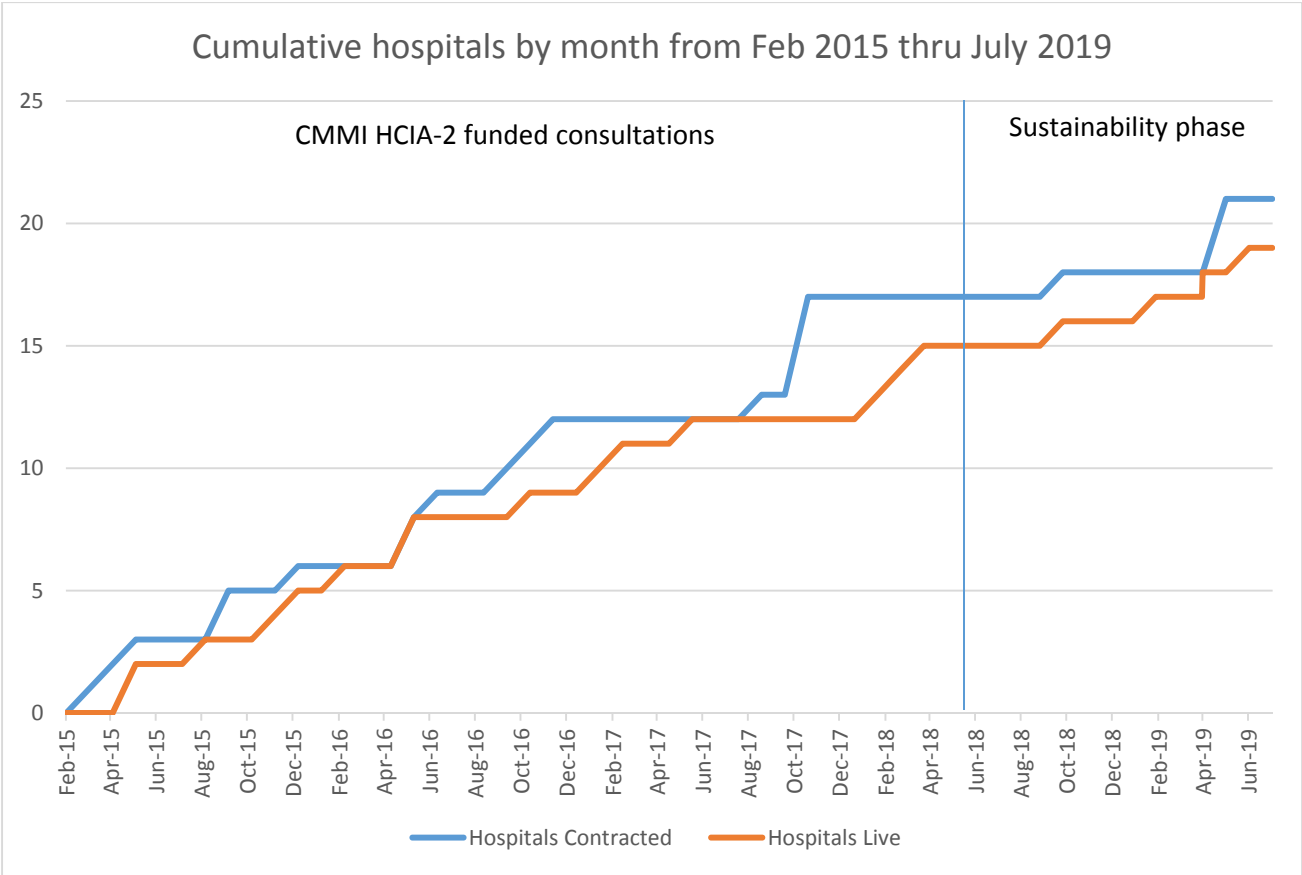
<b>Hospitals in production</b>	
1	Alta Vista Regional Hospital
2	Cibola General Hospital, Inc.
3	Eastern New Mexico Medical Center - CHS
4	Gerald Champion Regional Medical Center
5	Guadalupe County Hospital
6	Heart Hospital of New Mexico at Lovelace Medical Center
7	Holy Cross Hospital
8	Lea Regional Medical Center - CHS
9	Los Alamos Medical Center
10	Lovelace Medical Center
11	Lovelace Westside Hospital
12	Memorial Medical Center
13	Mimbres Memorial Hospital
14	Miners Colfax Medical Center
15	Nor-Lea Hospital District
16	Rehoboth McKinley Christian Hospital
17	Roosevelt General Hospital
18	San Juan Regional Medical Center
19	Union County General Hospital

<b>Hospitals in implementation</b>	
1	Lovelace Regional Hospital- Roswell
2	Lovelace Women's Hospital

# UNM ACCESS Telemedicine Program

## Current Month and Cumulative Stats Thru July 2019

Figure 1.



## UNM ACCESS Telemedicine Program

### Current Month and Cumulative Stats Thru July 2019

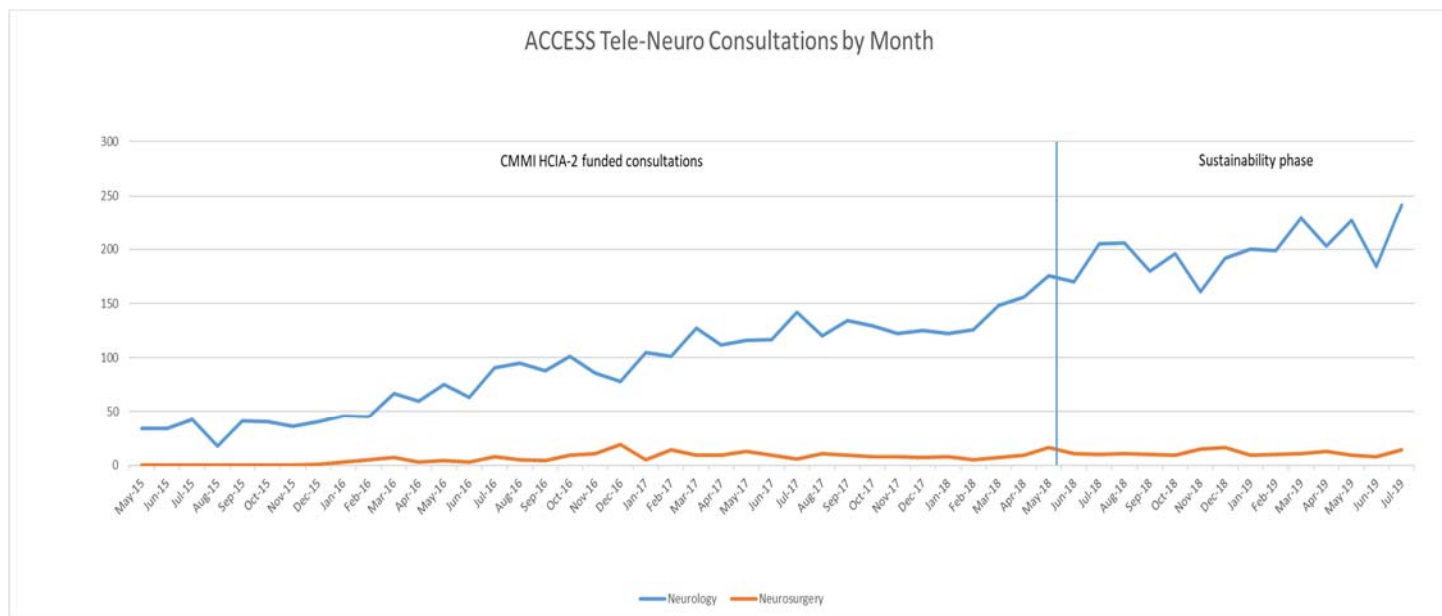
**Table 3. Cumulative primary consults by payor, (June 2018 thru July 2019)**

<b>Payer</b>	<b>Consults</b>	<b>%</b>
Aetna- Commercial	6	0.20%
Aetna- Medicare	1	0.03%
Blue Cross & Blue Shield- Commercial	229	7.78%
Blue Cross & Blue Shield- Medicaid - Managed Care	183	6.22%
Blue Cross & Blue Shield- Medicare Advantage	127	4.32%
Commercial Insurance (Unspecified)	8	0.27%
Eligible Uninsured	1	0.03%
Indian Health Service (IHS)	6	0.20%
Kaiser Healthcare- Medicare Advantage	2	0.07%
Kaiser Healthcare-Commercial	2	0.07%
Medicaid (Unspecified)	78	2.65%
Medicaid Fee for Service (FFS)	11	0.37%
Medicare	1297	44.07%
Molina Healthcare - Medicare Advantage	29	0.99%
Molina Healthcare- Commercial	11	0.37%
Molina Healthcare- Medicaid Managed Care	100	3.40%
Other (out of state)	67	2.28%
Person in Custody of Law Enforcement Agency (PICLEA)	11	0.37%
Presbyterian Healthcare -Commercial	50	1.70%
Presbyterian Healthcare - Medicare Advantage	16	0.54%
Presbyterian Healthcare -Medicaid Managed Care	208	7.07%
Privately Insured	29	0.99%
Self Pay	147	4.99%
TRICARE	55	1.87%
United Healthcare- Commercial	54	1.83%
United Healthcare Medicare Advantage	89	3.02%
United Healthcare-Medicaid Managed Care	7	0.24%
UNM Health -Commercial	1	0.03%
UNM Health- Medicaid Managed Care	1	0.03%
UNM Health- Medicare Advantage	1	0.03%
Veterans Administration (VA)	46	1.56%
Workman's Comp	2	0.07%
(blank)	68	2.31%
<b>Grand Total</b>	<b>2943</b>	<b>100.00%</b>

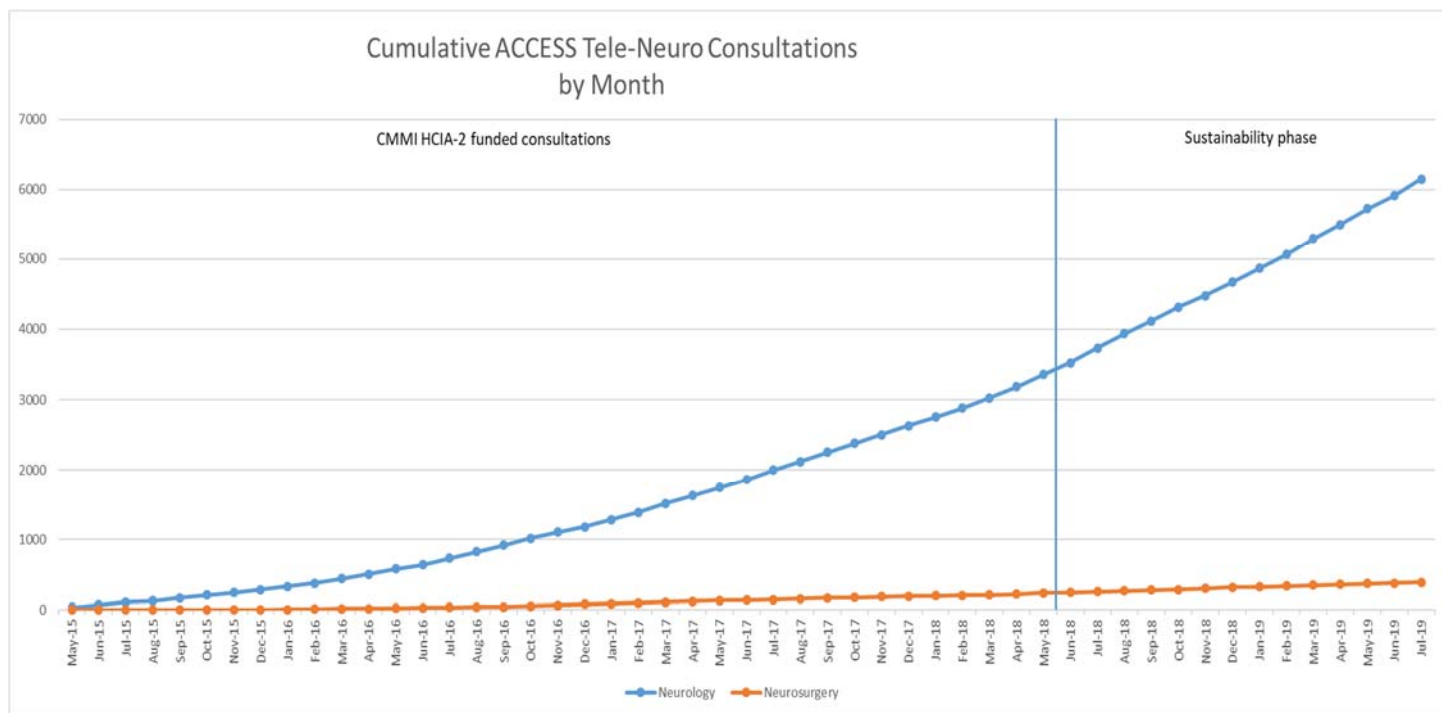
# UNM ACCESS Telemedicine Program

## Current Month and Cumulative Stats Thru July 2019

**Figure 2. Primary consultations by discipline by month, since inception (May 2015)**



**Figure 3. Cumulative primary consultations by discipline by month, since inception (May 2015)**



# UNM ACCESS Telemedicine Program

## Current Month and Cumulative Stats Thru July 2019

**Table 4. Estimated avoided insurance savings**

Assumptions for estimated avoided insurance savings

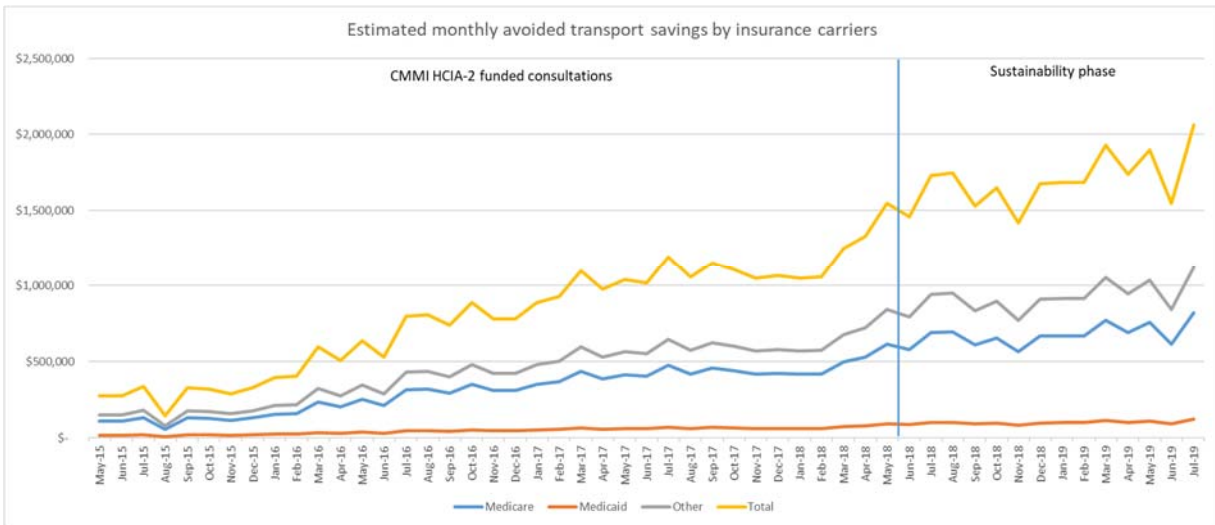
Insurance	% of consults (a)	Est Pmt/transport (b)
Medicare	53.40%	\$6,000
Medicaid	23.80%	\$2,000
Other	22.80%	\$19,194

(a) HCIA-2 ACCESS final report percentage of consults by payor

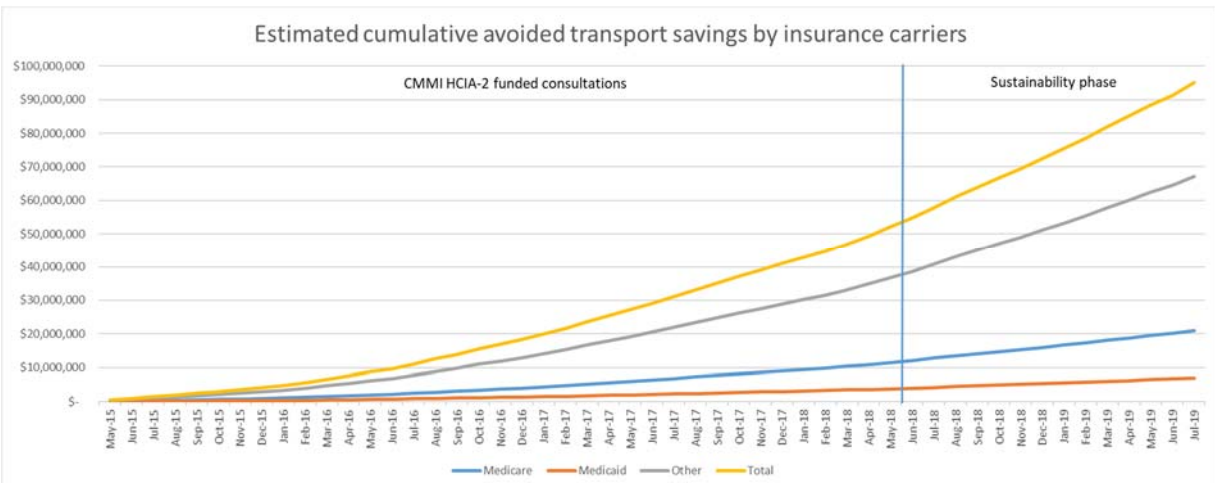
(b) conservative estimates of the per transport actual claims reimbursements from the New Mexico Office of the Superintendent of Insurance  
<https://www.cnn.com/2018/11/26/health/air-ambulance-high-price/index.html>

Estimated transport savings by month (assuming 70% of total consults were avoided transport, and all Other are commercial insurance – Estimated payment per transport from OSI 2015 numbers)

**Figure 4.**



**Figure 5.**



# UNM ACCESS Telemedicine Program

## Current Month and Cumulative Stats Thru July 2019

Table 5.

	During HCIA Grant	Post Grant
Revenue to Local Hospital	\$ 34,730,468.32	\$ 31,048,532.28
Cost avoidance from Air Transport	\$ 16,168,098.47	\$ 14,454,044.29
Total Cost avoidance to System	\$ 55,979,209.04	\$ 50,044,596.66

Figure 6.

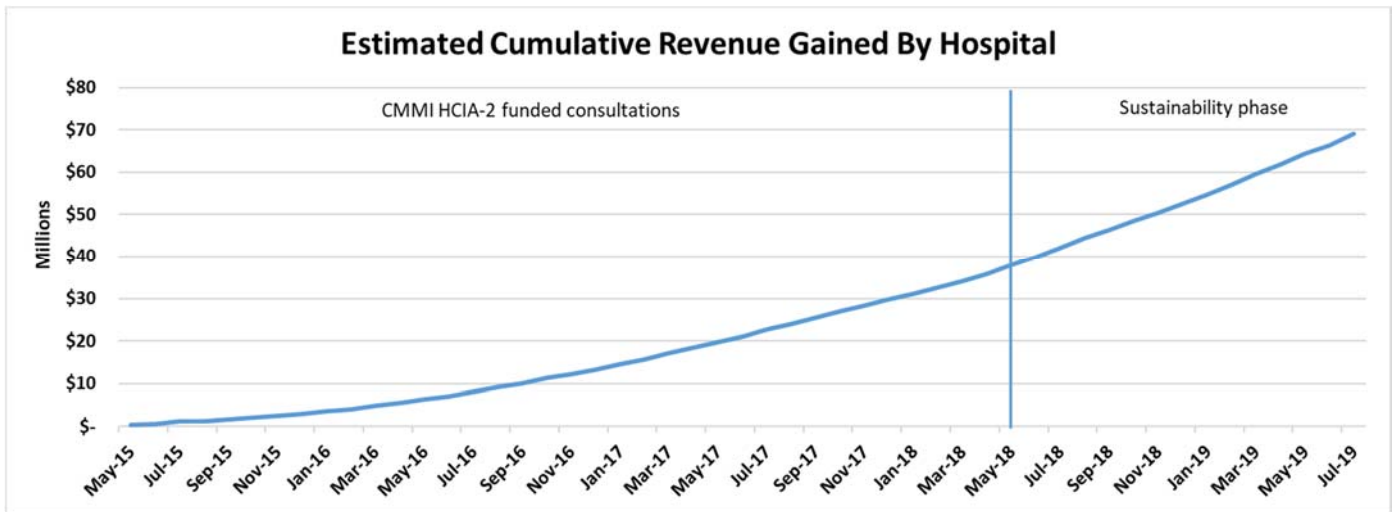
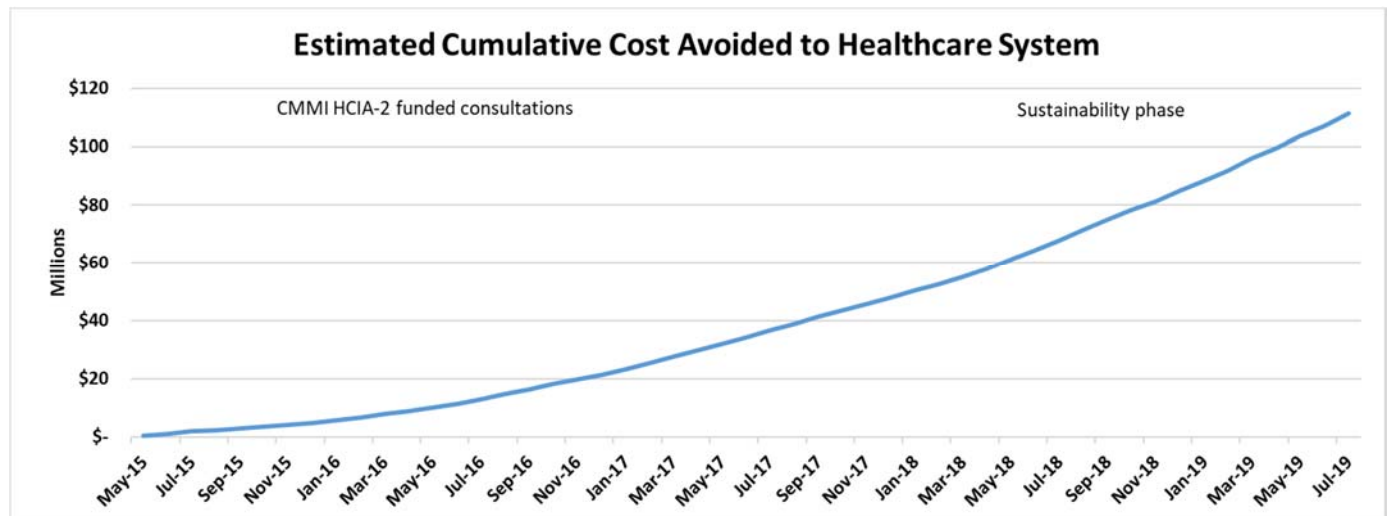


Figure 7.





## UNM ACCESS Telemedicine Program Current Month and Cumulative Stats Thru July 2019

Table 6. Current month primary consults by urgency, by discipline, by response time

Urgency by Discipline	Count of Cases	% of Case	Average of Minutes to Consult	Minimum Minutes to Consult	Maximum Minutes to Consult	StdDev of Minutes to Consult
<b>Neuro Consult</b>	<b>238</b>	<b>94.44%</b>	<b>25.0</b>	<b>4.0</b>	<b>177.0</b>	<b>24.5</b>
Stat <= 15 min	194	76.98%	24.4	4.0	177.0	22.6
Urgent < 60 min	42	16.67%	27.0	4.0	171.0	32.3
(blank)	2	0.79%	39.5	26.0	53.0	19.1
<b>Neurosurgical Consult</b>	<b>14</b>	<b>5.56%</b>	<b>58.6</b>	<b>10.0</b>	<b>256.0</b>	<b>68.0</b>
Stat <= 15 min	8	3.17%	30.6	10.0	115.0	34.6
Urgent < 60 min	4	1.59%	58.8	16.0	109.0	44.1
Routine 2 - 6 hr	2	0.79%	170.0	84.0	256.0	121.6
<b>Grand Total</b>	<b>252</b>	<b>100.00%</b>	<b>26.8</b>	<b>4.0</b>	<b>256.0</b>	<b>29.5</b>

Table 7. Cumulative activity post CMS funding by locations (end of ACCESS program in June 2018 thru July 2019)

Hospital	ED	ICU	Med Surg	Medical	Neuro	Grand Total
Alta Vista Regional Hospital	220	7	6			233
Cibola General Hospital, Inc.	45					45
Eastern New Mexico Medical Center - CHS	614	73		46		733
Gerald Champion Regional Medical Center	465	7				472
Guadalupe County Hospital	1					1
Lea Regional Medical Center - CHS	185	1	1			187
Los Alamos Medical Center	18	2	3			23
Lovelace Medical Center	351	27			23	401
Lovelace Westside Hospital	183	43				226
Memorial Medical Center	26					26
Mimbres Memorial Hospital	87					87
Miners Colfax Medical Center	18					18
Nor-Lea Hospital District	170		1			171
Rehoboth McKinley Christian Hospital	278	3	7			288
Union County General Hospital	5		1			6
<b>Grand Total</b>	<b>2666</b>	<b>163</b>	<b>19</b>	<b>46</b>	<b>23</b>	<b>2917</b>

## UNM ACCESS Telemedicine Program Current Month and Cumulative Stats Thru July 2019

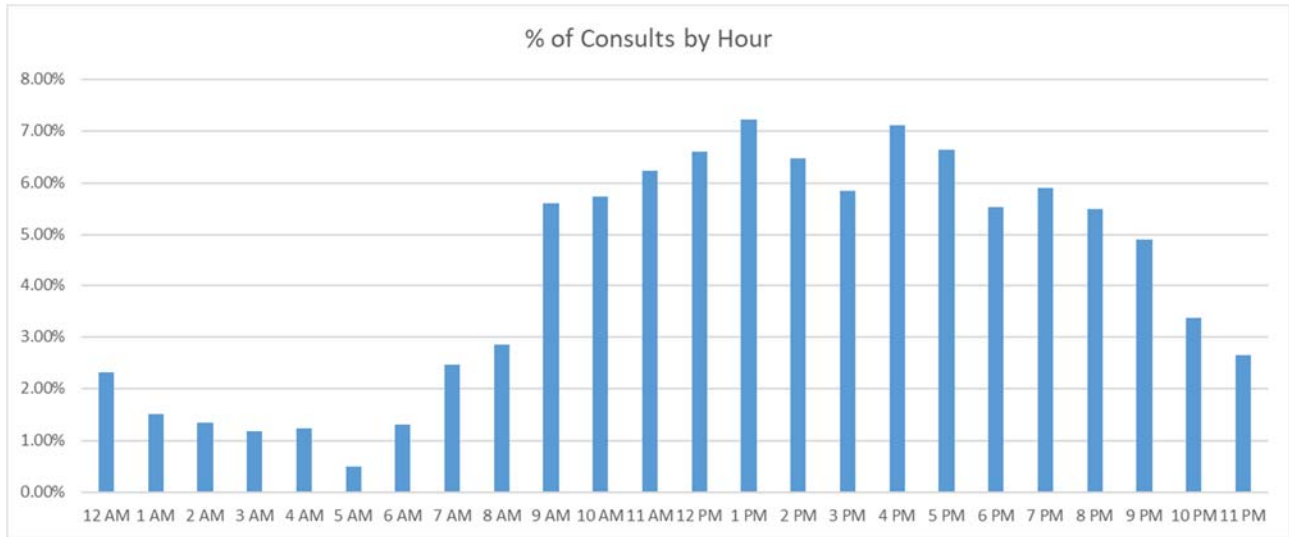
**Table 8. Recorded negative events during consultation due to technical failure of audio/visual communication**

Description	Cumulative two month case count	May	Jun
Audio/Speaker	0		
Audio/Speaker Dysfunction/interference;	0		
Audio/Speaker Dysfunction/interference;	0		
Audio/Speaker Dysfunction/interference; Video	0		
Audio/video time delay;	0		
Audio/video time delay; None;	0		
Disconnection;	0		
Disconnection; Audio/Speaker	1	1	
Disconnection; Audio/Speaker Dysfunction/interference;	0		
Disconnection; Audio/Speaker Dysfunction/interference;	0		
Disconnection; Audio/Speaker	0		
Disconnection; Audio/Speaker Dysfunction/interference; Video	0		
Disconnection; Video	0		
Disconnection; Video dysfunction/interference;	0		
None;	7	5	2
Video dysfunction/interference;	2		2
Video dysfunction/interference; (blank)	438	186	252
<b>Grand Total</b>	<b>448</b>	<b>192</b>	<b>256</b>
Issues	3	1	2
%	0.7%	0.52%	0.78%
Increase/(Decrease) from total		-0.15%	0.11%
Increase/(Decrease) from previous month			0.26%

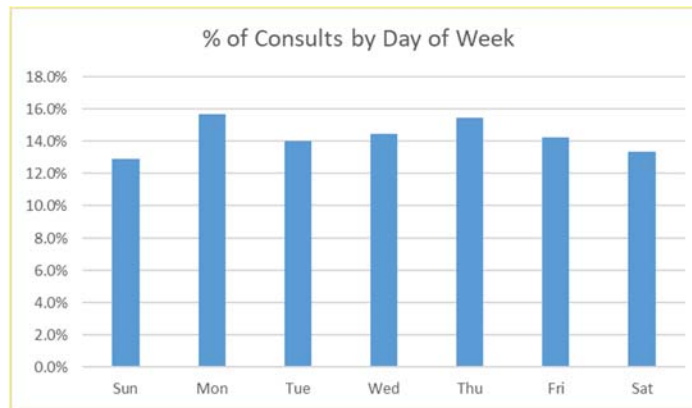
# UNM ACCESS Telemedicine Program

## Current Month and Cumulative Stats Thru July 2019

**Figure 8. Percent of total consult conducted by hour – June 2018 thru July 2019**



**Figure 9. Percent of total consult conducted by day of week – June 2018 thru July 2019**



## UNM ACCESS Telemedicine Program Current Month and Cumulative Stats Thru July 2019

**Table 9. Cumulative primary consults by hospital by transfer method, (June 2018 thru July 2019)**

Tx Hospital	Air		Ground		None		(blank)		Personally owned vehicle		Total	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Banner - University Medical Center Phoenix	1	0.71%		0.00%		0.00%		0.00%		0.00%	1	0.03%
Carlsbad Medical Center		0.00%	1	0.99%		0.00%	1	0.04%		0.00%	2	0.07%
Christus St Vincents Regional Medical Center		0.00%	8	7.92%		0.00%		0.00%	1	100.00%	9	0.31%
Covenant Children's Hospital - Lubbock	1	0.71%		0.00%		0.00%		0.00%		0.00%	1	0.03%
Covenant Medical Center - Lubbock	21	15.00%	15	14.85%	1	50.00%	1	0.04%		0.00%	38	1.29%
Del Sol Medical Center	7	5.00%	4	3.96%		0.00%	1	0.04%		0.00%	12	0.41%
Flagstaff Regional Medical Center	3	2.14%		0.00%		0.00%		0.00%		0.00%	3	0.10%
Heart Hospital of New Mexico at Lovelace Med Ctr	2	1.43%		0.00%		0.00%		0.00%		0.00%	2	0.07%
Hospitals of Providence - Memorial Campus	1	0.71%		0.00%		0.00%		0.00%		0.00%	1	0.03%
Hospitals of Providence - Sierra Campus	1	0.71%	3	2.97%		0.00%	1	0.04%		0.00%	5	0.17%
Las Palmas Medical Center	3	2.14%	1	0.99%		0.00%	1	0.04%		0.00%	5	0.17%
Lea Regional Medical Center		0.00%	1	0.99%		0.00%		0.00%		0.00%	1	0.03%
Lovelace Medical Center	11	7.86%	13	12.87%		0.00%	1	0.04%		0.00%	25	0.85%
Lovelace Regional Hospital - Roswell		0.00%	1	0.99%		0.00%		0.00%		0.00%	1	0.03%
Medical Center Hospital - Odessa	2	1.43%		0.00%		0.00%		0.00%		0.00%	2	0.07%
Memorial Medical Center - Las Cruces	1	0.71%	3	2.97%		0.00%		0.00%		0.00%	4	0.14%
Midland Memorial Hospital	1	0.71%		0.00%		0.00%		0.00%		0.00%	1	0.03%
Mountain View Regional Medical Center	3	2.14%	6	5.94%		0.00%		0.00%		0.00%	9	0.31%
Odessa Regional Medical Center	1	0.71%		0.00%		0.00%		0.00%		0.00%	1	0.03%
Parkview Medical Center - Pueblo, CO		0.00%	1	0.99%		0.00%		0.00%		0.00%	1	0.03%
Peak Behavioral Health Services		0.00%	1	0.99%		0.00%		0.00%		0.00%	1	0.03%
Presbyterian - Rust Medical Center	3	2.14%	2	1.98%		0.00%		0.00%		0.00%	5	0.17%
Presbyterian Hospital	7	5.00%	9	8.91%		0.00%	2	0.07%		0.00%	18	0.61%
Raymond G. Murphy VA Medical Center (ABQ)		0.00%	1	0.99%		0.00%		0.00%		0.00%	1	0.03%
Sierra Vista Hospital	4	2.86%	1	0.99%		0.00%		0.00%		0.00%	5	0.17%
University Medical Center - El Paso	7	5.00%	4	3.96%		0.00%	1	0.04%		0.00%	12	0.41%
University Medical Center - Lubbock	24	17.14%	7	6.93%		0.00%		0.00%		0.00%	31	1.05%
University of New Mexico Hospital	34	24.29%	18	17.82%	1	50.00%	1	0.04%		0.00%	54	1.83%
(blank)	2	1.43%	1	0.99%		0.00%	2689	99.63%		0.00%	2692	91.47%
<b>Grand Total</b>	<b>140</b>	<b>100.00%</b>	<b>101</b>	<b>100.00%</b>	<b>2</b>	<b>100.00%</b>	<b>2699</b>	<b>100.00%</b>	<b>1</b>	<b>100.00%</b>	<b>2943</b>	<b>100.00%</b>

**Table 10. Tx by in and out of state destination frequencies, (June 2018 thru July 2019)**

Tx Type	Sum of Cases	% of Total	% of Transports
Tx in state	131	4.45%	52.2%
Tx out of state	120	4.08%	47.8%
No Tx	2692	91.47%	
<b>Grand Total</b>	<b>2943</b>	<b>100.00%</b>	
<b>University of New Mexico Hospital</b>	<b>54</b>		
% of Total Primary Consults			2.0%
% of Total Tx			21.5%
% of In State Tx			41.2%

## UNM ACCESS Telemedicine Program Current Month and Cumulative Stats Thru July 2019

**Table 11. Cumulative primary consults by actual disposition, (from conclusion of ACCESS funded CMS program in June 2018 thru July 2019)**

Actual Disposition	Case Count	Percent
Admitted to local hospital, then subsequently transferred to another hospital;	9	0.3%
Admitted to local hospital, then subsequently transferred to another hospital; Transferred to a hospital other than UNMH;	1	0.0%
Admitted to local hospital;	1536	52.2%
Admitted to local hospital; Deceased;	8	0.3%
Admitted to local hospital; Transferred to a hospital other than UNMH;	1	0.0%
Deceased;	7	0.2%
Discharged;	818	27.8%
Kept for observation in the ED;	26	0.9%
Kept for observation in the ED; Admitted to local hospital;	55	1.9%
Left ED against medical advice;	36	1.2%
Transferred to a hospital other than UNMH;	189	6.4%
Transferred to University of New Mexico Hospital;	52	1.8%
(blank)	205	7.0%
<b>Grand Total</b>	<b>2943</b>	<b>100.0%</b>

**Table 12. Primary consults by reason for consult, by discipline – current month**

Reason for Consult entered by ER staff, by discipline	Count of Cases
<b>Neuro Consult</b>	<b>242</b>
ABNORMAL MRI RESULTS	1
acute tic	1
Altered Mental Status	21
Altered Mental Status Expressive Aphasia	1
Altered Mental Status syncopal episode at home	1
Altered Mental Status Twitching	1
AMS	7
AMS/left sided weakness, r/o TIA	1
AMS/Pupillary change, left arm shaking, confusion	1
AMS/unequal pupils left is a 5 and right is a 2	1
AT 3:15 PATIENT HAD A EPISODE THAT LASTED 5 MIN HER SPEECH BECAME SLURRED LT SIDE OF FACE DROOPING , HER LT HAND SHOOK. SYMPTOMS RESOLVED SPONTANEOUSLY	1
BEEN HAVING BAD HEADACHE WITH NAUSEA FEVER VOMITING, DID SOME TEST ON FOR PNEUMONIA TAKING ANTIBIOTICS TOLD TO COME TO ER FOR FURTHER TESTING.	1
bells palsy, left facial droop	1
Blurry vision	1
CANNOT SEE FROM LEFT EYE	1
Cerebral Infarction, unspecified - Ischemic	1
CHEST PAIN AND FEEL SOB, STATES SHE FEELS THAT SHE HAD DIFFICULTY SPEAKING, LAST TIME SHE NORMAL WAS LAST NIGHT	2
Difficulty speaking x4 days, hx previous MCA infarct	1
Dizziness	10
Dizziness Altered Mental Status	3
Dizziness Confusion	1

## UNM ACCESS Telemedicine Program Current Month and Cumulative Stats Thru July 2019

Dizziness GENERALIZED WEAKNESS "FEELS LIKE MY BRAIN IS NOT TALKING TO MY BODY"	1
Dizziness/blurred vision	1
Dizziness/drowsiness	1
Dizziness/Syncopal Episode	1
DOUBLE VISION	2
double vision since last night 1900	1
drooping, swelling to R eye	1
embolic stroke prognostication	1
Expressive aphasia	1
Face Numbness	1
facial droop	1
facial numbness	2
facial weakness	1
FAMILY CONCERNS FOR STROKE, REPORTS THAT SHE IS NOT SPEAKING NORMALLY, NOT FOLLOWING COMMANDS, HAVING HARD TIME WAKING UP, LAST KNOWN TIME, 900 ACUTE NEUROLOGICAL DEFICITS ARE PRESENT	1
GENERALIZED WEAKNESS	2
GENERALIZED WEAKNESS, FATIGUE	1
HEADACHE 1 WEEK, RIGHT SIDED DEFICIT, SLURRED SPEECH	1
Headache, blurred vision, confusion.	1
Headache, Right jaw pain	1
HEADACHES	1
Hx CVA, Parkinson's. Worsening weakness on left side and facial droop.	1
HX OF CVA 1 YEAR AGO, TODAY GENERALIZED WEAKNESS THAT STARTED 1 HOUR AGO	1
HX OF OLD STROKE, STARTED WITH HEADACHE ON THE RT SIDE THAT GOES DOWN RT SIDE, HAS RT SIDE DEFICITS AND SPEECH IMPAIRED	1
Ischemic Stroke	60
Ischemic Stroke acute neuro changes s/p thrombectomy	1
Ischemic Stroke Altered Mental Status	1
Ischemic Stroke Dizziness Migraine	1
Ischemic Stroke Left-sided facial droop	1
Ischemic Stroke Numbness to left side of face	1
Ischemic Stroke slurred speech; r/o stroke	1
Ischemic Stroke/Dizziness/headache	1
Ischemic Stroke/visual changes, CT findings	1
L sided numbness	1
LEFT ARM NUMBNESS	1
left arm numbness and heaviness	1
left arm weakness	1
Left facial droop	1
Left side weakness	1
left side weakness, facial droop	1
LEFT SIDED HEADACHE, LEFT SIDED WEAKNESS, HX STROKE	1
Left sided weakness	1
Left sided weakness and numbness	1
Left sided weakness, facial droop	1
LEFT SIDED WEAKNESS, UNABLE TO FOCUS	1
Migraine	8
MS	1
MS/Ischemic Stroke/AMS	1
None provided	2
NOT SPEAKING CLEARLY AND SPEECH WAS SLOW HAVING A HARD TIME THINKING, PT STOOD UP AND PASSED OUT AND VOMITING, WITH DOUBLE VISION	1

## UNM ACCESS Telemedicine Program

### Current Month and Cumulative Stats Thru July 2019

numbness	1
NUMBNESS AND WEAKNESS	1
NUMBNESS OF FACE AND JAW WEAKNESS	1
NUMBNESS OFF AND ON SINCE LAST NIGH ALSO STATES THAT HE FELLS THAT IT IS TRAVELING TO HIS LEFT SIDE OF FACE OF FACE, SMILE SYMMETRICAL	1
numbness to extremities	1
numbness to the left side	1
Pain, spasms to right shoulder. Neck pain, lower back pain.	1
Possible complex migraine	1
POSSIBLE STROKE	1
possible syphilis	1
PT NOT ABLE TO FOLLOW COMMANDS,UNABLE TO PROCESS THINGS, SPEECH IS GARBLED, UNABLE TO WALK INDEPENDENTLY, NOT ABLE TO WALL OR CONVERSE	1
pt was having issues communicating slurred speech drooling	1
R sided facial droop	1
right facial droop	1
right sided weakness	1
s/s of possible stroke	1
Seizure	15
Seizure Altered Mental Status	1
Seizure Altered Mental Status Hx Seizures; pt was found at a local gas station not knowing who or where he was	1
Seizure, AMS Bicycle accident 7/20/19. No helmet. Neg. CT head. Seizure. 3-4 episodes since of staring into space. Left arm tightness. Sent from IHS today after similar event. Right facial weakness, slight slurring to speech. NIH SS: 2.	1
Seizure/Dizziness	1
Shakey	1
SLURRED SPEECH	1
slurred speech, R sided facial droop, R sided weakness	1
STATES WAS IN HAGERMANAND HAD PASSED OUT, WIFE SAID HE HAD NO PULSE, URINATED ON SELF CALLED EMS AND BROUGHT BY POV TO ER	1
STROKE IN LEFT EXTERNAL CAPSULE PER DR. CARVER	1
Suspected new onset seizure with calcification to R parietal region. Remote hx of head trauma from abusive relationship. Has had headaches and L sided weakness for the past several months.	1
Symptoms of stroke/rule out	1
syncope and collapse	1
TIA	3
Tinnitus	1
TRANSIENT EPISODE OF MUSCLE RIGIDITY, BRIEF INABILITY TO AMBULATE	1
UNABLE TO SEE	1
Uneven smile, Trouble walking, and fast heart rate	1
UNSTABLE GAIT, VISION DISTURBANCE IN BOTH EYES	1
Vision changes/loss in left eye	1
Visual changes	1
WEAK IN LEGS THE LAST WEEK OR SO BEEN FALLING A LOT	1
weakness	3
WEAKNESS AND LEFT SIDE WEAKNESS	1
weakness, confusion	1
Weakness, unsteady gait, slurred speech	1
weakness/headache	1
WOKE UP CONFUSED,LIPS WERE SWELLING AND HAS A HARD TIME EXPRESSING WORDS,WIFE STATES THAT LT ARM WAS WEAK AND HE COULD NOT SWALLOW LIQUIDS NOW, NO FACIAL DROOPING , SEEM CONFUSED AND STILL HAS A HARD TIME EXPRESSING SELF	1
WORKING IN YARD 1 HR AGO, WIFE SAW HIM COLLAPSE, LOADED HIM IN THE CAR TO BRING HIM ,PT NON RESPONSIVE ONLY TO PAIN	1
<b>Neurosurgical Consult</b>	<b>14</b>
Brain Injury - Subdural Hematoma	4

## UNM ACCESS Telemedicine Program Current Month and Cumulative Stats Thru July 2019

Brain Injury - Subdural Hematoma/Large isodense left subdural with maximum width 2.7 cm. 1 cm midline L to R subfalcine shift, tiny, right frontal subdural hematoma. 3 mm in thickness. No acute hemorrhage. No mass demonstrated.	1
expressive aphasia	1
Ischemic Stroke S/P THROMBECTOMY WITH tPA with hemorrhagic conversion	1
Neck pain and headache	1
Neck/Back Pain	2
Spinal Cord Injuries Mech fall 7/15. No LOC. C/O Left headache, cervical pain. CT: Type 3, C2 dens fracture. NVI .	1
Stroke - Subarachnoid Hemorrhage	1
T11 Compression fracture	1
T11 verbal fracture	1
<b>Grand Total</b>	<b>256</b>

**Many diagnoses involve multiple symptomatologies. About 60% probably related to hemispheric or brain stem ischemia. 20% have symptoms referable to brain stem ischemia and 20% involve a primary diagnosis of altered mental status but with overlap with possible stroke, seizure. 5% have focal transient deficits but associated with migraine events.**

**Thus, a broad inclusion of symptomatology allows the initiation of the appropriate evaluation. Narrowing the diagnoses to only "stroke" would exclude many patients from evaluation who have ischemic brain related symptomatology.**