

INTRODUCTION

Sanford Health's emergency access telehealth network, branded as Sanford One Connect Emergency, has its roots in a 2008 pilot project initiated at the critical access hospital (CAH) in Ortonville, MN. Since then, Sanford Health has phased One Connect Emergency into its network of integrated sites and strategically developed partnerships with independent facilities to bring unprecedented levels of care to a greater number of patient communities. Leveraging its own significant financial investments to create a solid infrastructure and secure federal and state funding, Sanford Health has grown Sanford One Connect Emergency in spite of barriers such as high equipment costs and site-specific health information technology (HIT) platforms.

During the initial high-growth years for telehealth services – particularly in the rural and frontier areas comprising the Sanford footprint – One Connect Emergency collaborated with a telemedicine consultant who guided the creation of a cost-effective implementation plan. Now, with a dedicated, on-staff Project Manager for the teleemergency program, a team of telehealth information technology (IT) specialists and a proven track record, Sanford One Connect Emergency has the internal expertise needed to proactively identify and address emerging health needs unique to this region's populations.

Purpose of the Proposed Project

The proposed project, Sanford One Connect Emergency and Telestroke Network, has **two overarching goals: (1) to increase access to patient-centered emergency and stroke care through telemedicine technology and (2) to improve quality of health care and patient outcomes** while effectively lowering the cost of care.

One Connect Emergency and Telestroke Network builds on the initial Sanford teleemergency foundation, expanding the network's reach while simultaneously enhancing the breadth of services offered to member sites. One Connect Emergency and Telestroke Network uses sophisticated real-time video links and cutting-edge telemedicine equipment to provide remote, around-the-clock access to emergency physicians and neurologists. **With this project, Sanford Health elevates the teleemergency standard – preserving emergency physician coverage 24/7 and reducing geographic disparities for communities without resident neurospecialists.** In fact, Sanford telehealth leaders targeted neurology services as a direct response to existing usage patterns and needs expressed by teleemergency network members. Neurological symptoms (16%) were second only to trauma (34%) as a specific chief complaint among Rural Spoke patients whose local providers access One Connect Emergency.

Because One Connect Emergency and Stroke Network springboards off an established network of committed Rural Spoke sites, Sanford Health is positioned to begin testing its telestroke program at a number of pilot hospitals within the first three to six months of the project period – even while adding new teleemergency sites at Rural Spokes in the same time frame. One Connect Emergency and Telestroke Network affords rural residents specialty care in trauma and neurology that is safe, effective, timely, efficient and equitable. Ultimately, rural residents will experience decreased mortality, morbidity and lost productivity from strokes, traumatic injuries, heart attacks and other emergency-related events.

One Connect Emergency and Telestroke Network offers emergency staff at Rural Spoke sites added resources to quickly assess and appropriately treat or stabilize patients, all the while

keeping local controls in place and respecting the direct-care relationship. Emergency department (ED) staff at a Rural Spoke site determine when to use their in-house technology to reach out-of-town consults, allowing a remote emergency physician to “enter” the rural ED through real-time, interactive audio and video. This limits the time that patients wait to receive definitive care when a Rural Spoke site’s physician or other provider is taking call off-site. Through the telemergency component, emergency-trained physicians are available immediately at either the Primary Hub site (Sanford University of South Dakota Medical Center, in Sioux Falls, SD) or a second Hub (Fargo Medical Center, in Fargo, ND). A new Sub-Hub site, proposed as part of this application, will be located within the Sanford Bismarck Medical Center, in Bismarck, ND. Together, these three lifeline sites provide a rapid response to tertiary care needs for hundreds of thousands of patients in communities throughout North Dakota, eastern South Dakota, western Minnesota and northwest Iowa. Each of the three hospitals serves as the headquarters for its respective Sanford Health Region – North, South, and West – and receives patients from independent facilities as well as from the Sanford Health Network of smaller medical centers, critical access hospitals (CAH), and specialty clinics.

The three-way connections enabled by the existing telemergency network even allow for a third site to be looped in as needed. This is particularly useful to preserve referral patterns and whenever possible, to keep patients closer to home. It’s not uncommon for staff at a CAH to engage the system and access a Hub site, then determine jointly with Hub consults that the patient’s health needs can be met at another, slightly larger Rural Spoke site. If patient transfer is needed, the transfer that requires the shortest distance is preferable – especially across a region where winter conditions often make travel itself a risk. Three-way interactivity gives ED staff at the receiving hospital advance notice to better prepare for the patient, and it enables specialists at the Hub to assist in stabilizing a critical patient prior to transport. This connectedness enhances the continuum of care for patients and gives ED staff at another Rural Spoke site or a tertiary Hub facility valuable moments to prepare secondary treatments or help mitigate patient risk during challenging circumstances. For example, neurologists at the new Sub-Hub site, in Bismarck, ND, will be able to invite additional neurology specialists from one of the Hubs to collaborate on particularly demanding or unique cases – and to serve in that same role themselves for colleagues at a Hub site.

Consulting specialists who are invited into a Rural Spoke facility do not make medical decisions for the originating-site provider or patients; instead, Sanford One Connect Emergency and Telestroke Network provides Rural Spokes with the opportunity to gather recommendations as part of the patient-care process. The originating-site provider has final say on decisions regarding patient care including, but not limited to, patient transport, tests/procedures performed, and medications ordered/given. Through telemedicine channels, this open, honest communication facilitates faster diagnosis for critically ill patients, particularly in instances of stroke or heart attack. Minutes can be the difference between brain or cardiac tissue saved, minimizing the risk of death or the severity of a lasting disability. In addition, telemergency physicians can function as another set of trained eyes during multi-victim vehicle crashes.

As part of the development of this proposal, Sanford Health evaluated the capacity of existing and new telehealth network sites to provide clinical services that focus on the high-priority areas of stroke and heart failure. In-facility equipment for Computed Tomography (CT) scans and

magnetic resonance imaging (MRI) were among the factors assessed, as were the ability to safely administer thrombolytic drug therapy via tissue plasminogen activator (tPA), the genetically engineered variant tenecteplase (TNKase), or another “clot-buster” drug. While Sanford Health protocols follow the delivery of intravenous alteplase as the only tPA drug currently approved for treating acute ischemic stroke, TNKase also was included in the survey criteria due to its application in cases of acute myocardial infarction (AMI). In the future, TNKase could prove to have further-reaching uses for certain stroke patients as well: According to a recent study published in the *New England Journal of Medicine*, an early randomized trial of TNKase demonstrated significantly better clinical outcomes than alteplase, when given to patients selected on the basis of CT perfusion imaging.¹

Funding and Legislative Preference

As the primary Applicant for One Connect Emergency and Telestroke Network, Sanford Health respectfully requests funding preference based on three Legislative Preferences.

First, as described above, One Connect Emergency and Telestroke Network elevates **Coordination** with other relevant federally funded projects in the areas, communities, and populations to be served through the grant. All members of the existing telehealth network came online with telemedicine equipment as a result of direct federal dollars or pass-through monies. A competitive award from the **Office of Rural Health Policy jump-started the 18 facilities** that composed the initial emergency access network, and **another 10 joined after receiving a Distance Learning and Telehealth (DLT)** grant from the U.S. Department of Agriculture. A single independently owned and operated site, Douglas County Memorial Hospital (Armour, SD), implemented telehealth services with a Medicare Rural Hospital Flexibility (Flex) program grant.

Second, One Connect Emergency and Telestroke Network promotes local **Connectivity** within geographic areas and communities served. By facilitating three-way collaboration among front-line CAH, larger Rural Spoke sites and Hub sites, One Connect Emergency and Telestroke Network empowers and supports decision-making at the local level. It fosters relationships among small, rural hospitals, encouraging staff at one site to learn the strengths of their colleagues at another, to gain experience by participating virtually in demanding cases, and to increasingly serve as advisors to another site when able to confidently do so. This three-dimensional connectivity allows certain Rural Spoke sites to at times function in the role of Sub-Hub, linking simultaneously with smaller Rural Spoke sites and Hub facilities to maximize local and area resources before moving a patient to a more regional tertiary hospital.

Third, One Connect Emergency and Telestroke Network demonstrates a sophisticated degree of **Integration**, incorporating health care information across sites. This occurs not only among Hub and Rural Spoke sites that are part of the Sanford Health Network – a commonly owned group of facilities – but also across independently owned sites. Many of the external partners in One Connect Emergency and Telestroke Network have access to Sanford Health’s electronic health record (EHR), an award-winning software solution from Epic that’s branded as Sanford One Chart. In fact, several One Connect Emergency and Telestroke Network members previously

¹Mark Parsons, M.D., Neil Spratt, M.D., Andrew Bivard, B.Sc., et al. A randomized Trial of Tenecteplase versus Alteplase for Acute Ischemic Stroke. *New England Journal of Medicine* 2012. 366:1099-1107. March 22, 2012

collaborated with Sanford Health to obtain funding to offset the costs of implementing One Chart, training staff, and migrating patient records to the EHR. Additionally, One Connect Emergency and Telestroke Network will continue Sanford One Connect's practice of working hand-in-hand with individual sites to conduct assessments of existing technology, recommending telehealth equipment and other components that create the greatest flexibility in communicating with Hub sites' own network architecture.

NEEDS ASSESSMENT

The target population for the project is individuals who receive health care in the four-state footprint of North Dakota, eastern South Dakota, western Minnesota, and northwest Iowa. One Connect Emergency and Telestroke Network counts 35 committed member sites as of the date of this application, with the potential to reach a conservative estimate of nearly 554,000 residents in 30 counties that are classified as wholly rural, or that claim rural census tracts. Of the 35 sites that compose this project, 32 are "pure" end-user sites included as Rural Spokes because they are located in rural or rural frontier areas. Furthermore, all but four Rural Spokes also are Critical Access Hospitals (CAH). To qualify as a CAH, a facility must maintain 25 or fewer beds and must be located in a rural area that is more than 35 miles away from another hospital.

Specialty Populations

Seconds count in any emergency event, but every spare moment is especially critical in episodes of heart attack and stroke – when muscle fibers and neural connections deteriorate at an almost incomprehensible rate. Elderly individuals are at an exponentially higher risk for these emergency conditions, and less likely to be able to travel to meet medical needs. It's predicted that South Dakota's population will grow 13% between 2000 and 2020.² In that same time period, it is estimated that the population 65 and over will grow 49%.³ A similar trend is seen in the other Rural Spoke communities in the One Connect Emergency and Telestroke Network's footprint.

About 87% of all strokes are ischemic – occurring when blood clots block blood vessels to the brain – though whether ischemic or hemorrhagic, stroke is a leading cause of serious long-term disability.⁴ Unfortunately, increasingly elderly rural populations such as those in the Sanford One Connect Emergency service area are particularly at risk for stroke and its causal factors of high blood pressure and atrial fibrillation (AF). This is even more sobering given that nearly three-quarters of all strokes nationwide occur in people age 65 and older. In fact, while stroke can occur at any age, a person's odds of having a stroke more than double each decade after age 55.⁵

Early action is vital. Patients who arrive in an Emergency Department (ED) within three hours of their first symptoms tend to be healthier three months after stroke than those whose care was

² U.S. Department of Health and Human Resources, Health Resources and Services Administration, Bureau of Health Professions, *Health Workforce Profiles Highlights South Dakota*, <http://bhpr.hrsa.gov/healthworkforce/reports/statesummaries/southdakota.htm>.

³ *Id.*

⁴ Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, et al. [Heart disease and stroke statistics—2012 update: a report from the American Heart Association](#). *Circulation*. 2012;125(1):e2–220.

⁵ The Internet Stroke Center. Stroke Statistics, abstracted from studies taken from the U.S. Centers for Disease Control and Prevention. Accessed Jan. 30, 2013. <http://www.strokecenter.org/patients/about-stroke/stroke-statistics/>

delayed.⁶ The abilities of tPA to halt or even begin turning back stroke’s damaging effects is determined in large part by timing. Patients who receive the drug within three to four-and-a-half hours of stroke onset may have reduced mortality rates and improved long-term speech and motor function. Because of these benefits, certified Primary Stroke Centers nationwide regard a 20-percent tPA treatment rate among all stroke patients as best practice.

The footprint also is home to a significant American Indian (AI) population, with Rural spoke sites in counties immediately adjacent to American Indian reservations (Winner and Burke, SD) and located on reservation land (Mahnomon, MN). While American Indians represent a small percentage of the US population, larger percentages are found in North Dakota (6%) and South Dakota (10%)⁷. Low socioeconomic status and concentrated poverty conditions are common across rural and tribal communities in these two states. Five of the top 15 poorest counties in the United States are located on South Dakota American Indian reservations.⁸

Relevant Barriers to Care Access in the Service Area

Rural and underserved communities and residents have above average need for emergency care but limited access to immediate, 24-hour care. Current research on emergency care indicates that high-quality care is critical in the early hours of an emergency event. Rural hospitals, though, are not often staffed with 24-hour physician coverage. In some hospitals, coverage is provided only by nursing staff and midlevel providers. Additionally, emergency trained physicians and neurology specialists are located in urban centers, while rural physicians commonly are trained in family medicine and have less experience with high-risk, low-volume events.

The CAH and other small facilities committed to Sanford One Connect Emergency and Stroke Network exist in counties that are federally designated as Health Professional Shortage Areas (HPSA) and Medically Underserved Areas (MUA). Existing and future network members are located in 17 single-county HPSA, 29 single-county Mental Health HPSA, 15 single-county Dental Health HPSA, and 23 single-county MUA. A complete listing of designations and partial designations by site county is included in **Attachment 4: Network Identification Information**.

Specific to stroke diagnosis, the National Institute of Health Stroke Scale (NIHSS) is a 15-item assessment whose proper use can objectively evaluate a patient’s impairment and degree of acute cerebral infarction. But physicians or other care providers in rural communities within the One Connect Emergency and Stroke Network might perform the assessment once or twice every six months overall. Incremental assessments for the same patient might be handled by a different primary care physician each time – making it difficult to track improvement through stroke rehabilitation programs or detect signs that point to a worsening condition. In these cases, even slight deviations in a patient’s response time or movement patterns can change the diagnosis and entire direction for treatment and management plan.

⁶The ATLANTIS, ECASS, and NINDS rt-PA Study Group Investigators. Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS rt-PA stroke trials. *Lancet*. 2004;363:768–74.

⁷DeVoe JF, Darling-Churchill KE. Status and Trends in the Education of American Indians and Alaska Natives: 2008 (NCES 2008-084): National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education [updated 2008]. Available from: <http://nces.ed.gov/pubs2008/2008084.pdf>.

⁸U.S. Department of Commerce BoEA, Regional Economic Accounts. 250 lowest per capita personal incomes of the 3111 counties in the United States, 2008 2008. Available from: <http://www.bea.gov/regional/reis/pcpilow.cfm>.

Currently, neurology specialists at the two Hub sites, Sanford USD Medical Center and Sanford Fargo Medical Center, take call by phone. They function as part of the Stroke Team that includes neurologists, radiologists and pharmacists (among others). These neurologists advise physicians or nurses at rural sites, sometimes talking on-site care providers step-by-step through the NIHSS. Neurology consults thus are at a serious disadvantage – asked to make near-instantaneous, life-altering decisions without being able to directly observe the patient’s behavior and ability to comprehend or follow instructions. Specialists depend heavily on these exams, in addition to results from neuroimaging and laboratory studies. It’s difficult to overstate the benefits of having neurologists in the virtual Emergency Department (ED) alongside other telemedicine consults. Realizing the incredible potential within the Sanford Health footprint, physician leaders, clinic and department managers, and telehealth directors began assessing the telestroke readiness of existing One Connect Emergency sites and potential new members for this project.

Telestroke Capability and Need for Services

American Stroke Association guidelines state best care for patients experiencing acute stroke is to receive tPA as quickly as possible and then be triaged to the nearest Primary Stroke Center for close observation, further testing, neurointervention procedures and – if necessary – neurosurgery. Therefore, to qualify as telestroke-ready, Rural Spokes must baseline criteria: The facility must have CT scanner equipment, access to radiology specialists to interpret those results, on-site tPA, and staff who are trained and confident in administering the medication. Even when a Rural Spoke site passes those tests, though, there are limitations. The clot-busting tPA drug must be administered during the first three to four-and-a-half hours of symptom onset, or the window of opportunity will be missed. As a result of these capacity- and medically related factors, the actual rate of tPA treatment at non-Primary Stroke Centers is estimated at no more than 2 percent – far less than the 20-percent guideline noted above.

Sanford One Connect Emergency and Telestroke Network brings Rural Spokes the technology and professional supports needed to expand tPA capabilities. In fact, data reveal that telestroke technology increases the number of patients receiving tPA therapy by approximately tenfold over previous levels.⁹ Clinical outcomes also are promising. One study posted a “door-to-needle” time for telestroke sites that was consistent with the same measure at many Primary Stroke Centers.¹⁰

| Stroke Patients Admitted Directly to ICU Sanford USD Medical Center | | | |
|--------------------------------------------------------------------------------|----------------------|------------------------------------|----------|
| <i>Month</i> | <i>Direct Admits</i> | <i>All Stroke and TIA Patients</i> | <i>%</i> |
| August 2012 | 10 | 39 | 26% |
| September 2012 | 12 | 41 | 29% |
| October 2012 | 11 | 48 | 23% |
| November 2012 | 12 | 32 | 38% |
| December 2012 | 9 | 28 | 32% |

The results are particularly encouraging for the Rural Spoke sites committed to this project. Many already are members of referral networks that transfer critical emergency patients and stroke victims to one of the telemedicine Hubs. With this proposal, 19 of the 21 surrounding

⁹Audebert H et al (2006). Comparison of Tissue Plasminogen Activator Administration Management between Tele-stroke Network Hospitals and Academic Stroke Centers. *Stroke*, 37, 1822.

¹⁰Schwamm LH and Rosenthal ES, et al (2004). Virtual Tele-stroke Support for the Emergency Department Evaluation of Acute Stroke. *Academy of Emergency Medicine* (11), 1193-1197.

hospitals that make up the Sanford USD Medical Center (SUSDMC) Stroke Network will gain telestroke services, based on site-specific readiness for the program. So will one non-Stroke Network affiliate who has worked with physicians and stroke program coordinators for the past three years. The picture is much the same at the Secondary Hub, where all seven hospitals that call in to Sanford Fargo Medical Center’s “One Call Physician Referral” phone line now will have the option to work toward a telestroke program. The table **Stroke Patients Admitted Directly to ICU** presents a quick look at how the stroke network and referral lines contribute to overall caseload of stroke patients.

In addition to patients who are stabilized with tPA before being transferred to a Hub site’s Emergency Department, the telehealth network’s three Primary Stroke Centers also receive admissions from surrounding hospital’s Emergency Departments directly to the ICU. These patients bypass the tertiary care center’s own ED, making it more challenging to capture complete information on the stroke activity that moves through these Hub sites. Sanford USD Medical Center in started tracking these cases in August 2012, as illustrated in the table **Sanford Stroke Referral Networks - 2012**.

Need for OAT Support

Sanford Health brings considerable institutional supports and a tested network structure to this project. The three-year budget makes exceptionally efficient use of dollars – efficiencies made possible by the institutional capacity brought to bear by Sanford Health and its affiliated Sanford Health Network. In an effort to keep it as budget-neutral as possible for members to participate, Sanford Health requires no matching or other cost-sharing requirement for members to participate, making it as budget-neutral as possible for sites to enhance the services they offer in their communities. Without OAT funding in the amount respectfully requested, however, potential Rural Spoke site members cannot afford to purchase the telemedicine equipment needed. The components, their installation and initial maintenance costs will come solely from grant funds.

| Sanford Stroke Referral Networks – 2012* | | | | |
|-------------------------------------------------|-------------------------------------|----|--------------------------------|----|
| | <i>Hub Site Sioux Falls, SD</i> | | <i>Hub Site Fargo, ND^</i> | |
| All Stroke Activity | 388 | | 546 | |
| TIA | 85 | | 71 | |
| Hemorrhagic | 55 | | 60 | |
| Ischemic | 248 | | 415 | |
| | tPA at Spokes | 8 | tPA at Spokes | 11 |
| | tPA at Hubs | 20 | tPA at Hubs | 29 |

^Fargo statistics are for a partial year, Jan. 1-Nov. 30, 2012

At the time of this application’s submission, Sanford Health does not assess a monthly or any other subscription fee to sites for access to the teleemergency network or its specialty consults. Furthermore, Sanford Health has not identified a date by which such fees will be charged. Therefore, contractual agreements in place with existing network members or intended as part of this project specify no service fees. Therefore, OAT funding is needed to support in full the Project Director who manages and monitors the network’s day-to-day activities, travels to Rural Spokes for on-site training in the use of telemedicine equipment, educates end-user staff on protocols developed by the network’s Governance Board, issues Quality Improvement reports, and works hand-in-hand with Sanford’s own IT technicians to spot-check installations and test connections.

This project represents a significant value-added piece for existing and new members alike. Sanford Health believes strongly in helping Rural Spokes be better equipped to assess patients, treat critical injuries and chronic disease episodes, and make ever-more-informed decisions. Patients and families benefit – and so, indirectly do telehealth network Hub sites whose personnel can be looped in sooner, more often, and with greater knowledge to assist whenever (and wherever, through virtual means) needed.

Relationship to Healthy People 2020 Objectives

One Connect Emergency and Telestroke Network supports objectives identified within several key categories of Healthy People 2020. All are connected by the goal of using health communication strategies and health information technology (HIT) to elevate care quality and improve patient outcomes. Specifically, One Connect Emergency and Telestroke Network is aligned with the following selected achievements¹¹ –

- Health Communication and HIT Objectives: Facilitate the meaningful use of HIT and exchange of health information among health care professionals; Enable quick and informed action to health risks and health emergencies
- Heart Disease and Stroke Objectives: Reduce coronary heart disease deaths (HDS-2) and reduce stroke deaths (HDS-3); Increase the proportion of adults aged 20 or older who are aware of the symptoms and aware how to respond to a heart attack or stroke (HDS-16 and HDS-17); Increase the proportion of eligible patients with heart attacks who receive timely, artery-opening therapy as specified by current guidelines
- Occupational Safety and Health Objectives: Reduce deaths from work-related injuries in agriculture, forestry, fishing and hunting (OSH-1.5)
- Injury and Violence Prevention Objectives: Increase the proportion of the land mass of the continental United States with access to trauma care (IVP-8.2); Reduce motor vehicle crash-related deaths per 100,000 population and per 100 million vehicle miles traveled (IVP-13.2); Reduce nonfatal motor vehicle crash-related injuries (IVP-14)

METHODOLOGY

The overarching vision of the One Connect Emergency and Telestroke project is to decrease mortality, morbidity and lost productivity from strokes, traumatic injuries and other emergency related events among rural residents through immediate access to emergency-trained and certified physicians and neurologists. The Network will achieve this vision through attainment of two goals and corresponding objectives: (1) increase access to patient-centered emergency and stroke care through telemedicine technology and (2) improve quality of health care and patient outcomes while effectively lowering the cost of care. Through historical program data and end-user patient volumes for emergency and stroke, conservative estimates of telestroke usage are expected to be once per month in Year 1, growing to one to two times per month in Year 2 and Year 3. Teleemergency use is expected grow rather quickly, with expected monthly volumes in Year 1 to equal once per day, expanding to twice or more times per day in Year 2 and Year 3 – or about 3-5 hours per day. **These numbers correspond directly to properly staffing the hub, and so will be rigorously reviewed and updated regularly.**

¹¹Healthy People 2020. Topics & Objectives Index. Accessed Jan. 4, 2013. <http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx>

Goal 1: Increase access to patient-centered emergency and stroke care through telemedicine technology

Objective 1.1: Strengthen One Connect’s core network infrastructure to create an even more effective healthcare resource management model through telemedicine technology.

The first objective of the consortium will be to develop the infrastructure for delivering telemergency and telestroke care, including administrative, hardware and operational aspects.

Activity 1.1.a Engage Governance Board and renew structure with incoming members: Upon Federal notice of grant award, the Applicant will assemble the Governance Board after reviewing and adjusting existing the existing governance structure. The Governance Board will include equal representation from each region, medical specialty and Spoke and Hub users. The Project Director will report directly to this Board and will act independently of all network partners. This is further illustrated in the organizational chart placed in **Attachment 8**. The Bovernance Board will meet monthly in Year 1 of the project and quarterly in Year 2 and Year 3 by teleconference to discuss achievement of project goals and objectives, review outcome data, identify challenges, discuss solutions and make decisions on project direction.

Activity 1.1.b Develop One Connect Emergency and Telestroke Network operational format: Project leaders will review the original project proposal and immediately work to adjust the telemergency model to meet infrastructure and operational needs of an integrated telestroke network. This will include review of the existing telemergency program as well as working with legal and telehealth experts in developing the policies, procedures, and operations of the new telestroke program. Using team members experienced with care delivery needs, telehealth equipment functionality and legal requirements, the Governance Board will develop a set of policies and procedures that will provide the basis for a high quality network. Within the first six months, the Board will develop the operational model for the telestroke program. Integrating telestroke into the existing telemergency network will be the Board’s key focus in Year 1.

Activity 1.1.c Develop telestroke policies, procedures, technical infrastructure and overall operations: Within the first six months, the Governance Board will have developed a comprehensive set of policies and procedures to guide the expansion of telestroke. The team will work collaboratively on developing the policies using Models/Best Practices to guide their efforts. The completed policies will be regularly reviewed and revised as necessary.

Objective 1.2: Implement telemergency at Rural Spoke sites.

Objective 1.2 provides the tools and training for tapping into telemergency resources. Each Spoke site will be wired to connect to an emergency certified physician and neurologist at the Hub site. The equipment includes access to the electronic health record (EHR) so physicians can easily access patient demographic and diagnostic information and make an informed treatment decision. Two new telemergency sites will be equipped within the first three to six months of the program, joining an existing telemergency network of 29 Rural Spoke sites and two Hubs. Two more sites are committed to join the network in Year 2. The Governance Board will use relevant criteria to guide selection of a third Spoke site in Year 2, as well as three Spokes in Year 3.

Objective 1.3: Implement telestroke services at Rural Spoke sites.

Objective 1.3 builds largely off an existing telemergency network infrastructure.

Activity 1.3.a Finalize and order Hub site mobile technology solutions/supplies: Within the first six months, the Governance Board will make final decisions on the mobile technology

solutions/supplies necessary to connect consulting neurologists to the telemergency Hub and Spoke site model. Initial plans are to provide both mobile and office-based solutions for neurologists. This will allow flexibility for the on-call neurologists and allow them to take part in a telemedicine consult from virtually anywhere.

Activity 1.3.b Integrate and test telestroke Hub technology for interoperability with telemergency Hub: IT staff will ensure that selected mobile technology solutions/supplies work with existing telemergency infrastructure.

Activities 1.2.c through 1.2.e provide the tools and training for tapping into telestroke resources. Each Spoke site will be wired to connect to emergency certified physicians and neurologists at Hub sites. The equipment includes access to the electronic health record (EHR) so physicians can easily access patient demographic and diagnostic information and make an informed treatment decision. Six sites will pilot using telestroke services in Year 1. By the end of Year 3, every telemergency-equipped site also will be capable of receiving telestroke services.

Relationship to Need: Goal 1 will allow rural communities to overcome geographic and workforce obstacles by providing emergency and stroke patients with immediate access to emergency-trained/certified physicians and neurologists. By developing a high quality, high efficiency system for providing remote care, the telemedicine network will ensure access to a telemergency and telestroke video system for all applicable patient encounters in rural EDs.

Goal 2: Improve quality of health care and patient outcomes while effectively lowering the cost of care.

Building a sustainable network that continues to grow will ensure that telemergency and telestroke service remains available for rural residents in the spoke site communities and is expanded to serve additional rural residents in new communities.

Objective 2.1: Formalize formative and summative evaluation structure to assist in program growth and sustainability.

Within the project's first three months, the Program Director, with guidance from the Board, will develop and implement a system for tracking and collecting evaluative measures, including a consult log and survey process.

Activity 2.1.a Review specific state and national emergency and stroke care nationally accepted quality performance measures/standards: The Project Director will research and compile acceptable quality indicators at both the state and national level. This includes consultation with the State Office of Rural Health at the state level. At the national level, project leaders will consult with the HRSA Office of Rural Health Policy, American Telemedicine Association (ATA) and American College of Emergency Physicians (ACEP).

Activity 2.1.b Review existing quality indicator data available at each network partner site: Upon completion of Activity 1, the Project Director will work with appropriate staff at each network member site to identify national and state quality indicator data readily available. When it is deemed necessary for a site to collect additional data, the Project Director will work with the site to determine the best approach to gathering such data.

Activity 2.1.c Develop/adjust patient and provider perception surveys and assessments: Patient and provider follow-up surveys will be administered following discharge. Specifically, project leaders will identify and implement standardized assessment and survey tools that are

aligned with best practices in published literature. Additionally, a telemergency log will be created for use by frontline staff. Once each quarter, the project Director will review the telemergency log and interview frontline staff to determine the level of compliance with established policies and procedures. If Rural Spoke or Hub staff identify concerns with the policies and procedures, the Project Director will take these issues before the Governance Board for review and action. This ensures that no dangerous work-arounds or service gaps develop, and that staff are satisfied with the functioning of the network.

Objective 2.2: Build the business case for telemergency and telestroke, evaluating clinical quality, satisfaction and financial indicators.

In order to ensure that telemergency meets expectations of clinic quality and satisfaction and is financially viable, the Governance Board will rigorously evaluate the project. Successful results will also ensure program sustainability.

Activity 2.2.a *Develop processes for tracking and collecting evaluation data:* The Project Director will work with appropriate staff at network member sites to track appropriate data. The **Clinical Services and Performance Measure Evaluation** section further details this process.

Activity 2.2.b *Provide ongoing detailed analysis of data to governance board to assist with informed decision making:* Prior to Governance Board meetings, the Project Director will analyze and interpret quality and survey data for presentation to the Board.

Objective 2.3: Align project design with relevant national best practices. National best practices will be studied prior to program design. The Governance Board will align with best practices when applicable.

Activity 2.3.a *Align project with best practices and other successful projects.*

Activity 2.3.b *Align project with the Healthy People 2020 Initiative:* The goals of Healthy People 2020 will be integrated into project design and operation when medically appropriate.

Activity 2.3.c *Use program evaluation and national best practices to continuously monitor and improve program design:* Program evaluation and national best practices will be continuously presented to project leaders to aid in further program development.

Objective 2.4: Disseminate to all stakeholders, project learnings and outcomes relating to changes in system processes and culture.

Activity 2.4.a *Summative Reporting:* The Project Director will prepare in the fourth quarter of every project year a summative report. This report will be used to disseminate information to appropriate audiences.

Activity 2.4.b *Disseminate project outcomes to internal and external audiences:* Project Director will identify and target appropriate internal stakeholders and professional organizations (telemedicine and rural health organizations) disseminate project outcomes. This includes professional journals and conferences. Additionally, the Project Director will facilitate viable communications tactics such as earned media (press releases and interviews) in local, regional and national publications to disseminate project.

Relationship to Need: Goal 2 will help meet long-term health needs of populations served in the Rural Spoke communities. As the Network continues to grow, access to additional specialty physicians such as cardiologists will be sustainable, providing even greater care and health outcomes for rural residents.

Clinical Services and Performance Measures

Clinical services and measures for Sanford One Connect Emergency are well-established, as are the baselines and data collection sources for these measures. During the first three months of the project, the Project Director will meet often with physician leaders from the neurology departments at both Hub sites to solidify the framework of the new telestroke component. This includes refining the list of clinical services and recommending a final list of baseline measures to the Governance Board.

Project staff will use a mixed-methods approach, utilizing quantitative tactics such as longitudinal data collection/analysis, as well as reliable, robust qualitative approaches such as interviews and surveys of staff, clients, and others. Project staff will continue to follow the One Connect Emergency plan developed through application and adaptation of a logic model. The plan is designed to achieve the following:

- Document Processes – Observe, measure and evaluate the implementation process for the purpose of quality improvement and an accurate portrayal of the reality of implementation as compared to the original intentions.
- Obtain baseline measures of important outcomes – Determine the current state of outpatient and emergency care at each new Rural Spoke site prior to implementation of the One Connect Emergency and Telestroke Network in terms of the defined outcomes. Outcomes will focus on the clinic measures of patient care, conformance with treatment guidelines, patient and provider perceptions, and revenues generated for Rural Spokes.
- Determine project impact on important outcomes – Measure and evaluate these outcomes of interest with respect to baseline in order to report the impact of the project on patients, providers, and the community.

Data will come from a variety of sources including business records, meeting notes and project staff reports. To record information about each telemedicine encounter, a usage log will be maintained at each Rural Spoke site that identifies the patient involved, the consulting emergency physician or other care provider at the Spoke, the date and time of the beginning and end of the encounter, and any technical difficulties that occurred. Clinical data will be obtained in compliance with HIPAA requirements through billing records, financial accounting systems and the electronic health record (EHR) – all of which track outpatient and ED encounters. Perceptions of providers will be obtained through personal interviews. Patients or their families will be asked to complete a brief survey of their experience with the encounter. The following table illustrates types of measurements, methods, and frequency of collection that will be conducted throughout the duration of the project. Please note that this list is not exhaustive, and will be further developed by the Governance Board, Project Director, and neurology physician leaders during the first six months of the project.

| Clinical Services and Performance Measures – Sanford One Connect Emergency and Telestroke Network | | |
|--------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------|
| Measure | Methods/Sources | Frequency of collection |
| Outcome Measures | | |
| Mortality within 60 days | Hospital discharge summaries | Every six months |
| Hospital LOS | Hospital billing records | Every six months |
| Hospital Discharge status | Hospital discharge summaries | Every six months |

| | | |
|--------------------------------------------|-----------------------------------------------------------------------------|------------------|
| Subsequent ED visits within 60 days | Hospital billing records | Every six months |
| Subsequent hospitalizations within 60 days | Hospital billing records | Every six months |
| ED provider perceptions | PD interviews ED physicians or other primary providers at Rural Spoke sites | Annually |
| Local nurse perceptions | Project Director interviews nurses at Rural Spokes | Annually |
| Patient/family perceptions | Patient/family Survey | At encounter |
| Hospital Revenue | Hospital accounting system | Every six months |

| Clinical Services and Processes | | |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Average elapsed time from referral to beginning of evaluation | Length of time from the request for referral to the beginning of the telemergency consultation as recorded in the log. | Quarterly through Y3 Q3 |
| N of outpatient telemergency consults and unique patients | Number of encounters listed in the telemedicine log for each facility and the number of unique patients listed for those encounters | Baseline: 1 year prior to telemergency, then Quarterly through Y3 Q3 |
| Total N of emergency patients transferred to another facility. | Billing records data – transfer data. Number of patients with a diagnosis of stroke transferred to another hospital | Baseline: 1 year prior to telemergency, then Quarterly through Y3 Q3 |
| N of outpatient telestroke consults and unique patients | Number of encounters listed in the telemedicine log for each facility and the number of unique patients listed for those encounters | Baseline: 1 year prior to telestroke, then Quarterly through Y3 Q3 |
| N of patients transferred to another facility after telemergency evaluation | Number of transfer recommendations resulting from telemergency consultations as recorded in the log | Quarterly through Y3 Q3 |
| N of suspected stroke patients given the NIHSS assessment tool | Number of NIHSS assessments listed in the telemedicine log for each facility and the number of unique patients listed for those encounters, checked against the electronic health record (EHR) | Baseline: 1 year prior to telestroke, then Quarterly through Y3 Q3 |
| N of patients receiving CT scans for suspected stroke activity at Rural Spoke site | Number of neurological CT scans listed in the telemedicine log for each facility and the number of unique patients listed for those CT scans, checked against the electronic health record (EHR) | Baseline: 1 year prior to telestroke, then Quarterly through Y3 Q3 |
| N of stroke patients receiving tPA at Rural Spoke site | Number of tPA drug administrations listed in the telemedicine log for each facility and the number of unique patients listed for those encounters, checked against the electronic health record (EHR) | Baseline: 1 year prior to telestroke, then Quarterly through Y3 Q3 |
| Time elapsed between onset of stroke symptoms and administration of tPA | Physician documented time of stroke onset listed in the telemedicine log checked against the administration of tPA drug as recorded electronic health record (EHR). | Baseline: 1 year prior to telestroke, then Quarterly through Y3 Q3 |
| Time elapsed between arrival at Rural Spoke site ED and administration of tPA | Documented arrival time in Emergency Department recorded against the administration of tPA drug as recorded electronic health record (EHR). | Baseline: 1 year prior to telestroke, then Quarterly through Y3 Q3 |
| N of patients transferred to another facility after telestroke evaluation | Number of transfer recommendations resulting from telestroke consultations as recorded in the log | Quarterly through Y3 Q3 |
| Durations of telemedicine encounters | Length of time between the beginning and termination of the telemedicine consult as recorded in the log. | Quarterly through Y3 Q3 |
| Operational Processes | | |
| System acquisition | Date of systems that are purchased from project accounting records | Collected when purchased |

| | | |
|-----------------------------------------------------|--------------------------------------------------|-----------------------------------------|
| Date systems installed and operational | Project records | Collected once, at time of installation |
| N of staff trained | Project records of training | Collected at time of initial training |
| Number and types of technical problems encountered. | Telemedicine log entries for technical problems. | Quarterly through Y3 Q3 |

Eligibility of Patients to be Enrolled in the Project

Sanford One Connect Emergency and Telestroke Network will be part of the standard care options available to patients at Rural Spoke sites, just as the telemergency component is now at existing sites. Physicians, advanced practice nurses and other care team staff decide when to access the network. Whenever practical, they also consider the patient’s wishes before engaging the telehealth network – just as any provider talks with her or his patient before bringing a colleague into the physical space of the exam room. Emergency physicians and specialists at hub sites will be licensed in every state in which they provide telemedicine consults. They also will be fully credentialed, with privileges to treat patients at the individual Rural Spoke sites. These remote care providers function almost as adjunct faculty and staff members. They are held to the same professional standards as the direct-contact care team at the originating hospital.

Selection and Relevance of Equipment

In 2009 Sanford Health, through the FCC’s Rural Healthcare Pilot Program and Universal Service program, increased the circuit capacity (bandwidth) to Sanford Health Network rural sites, ensuring the bandwidth infrastructure so that streaming of video will not impact other telecommunication applications – such as electronic medical records and teleradiography – riding on the circuit. This level of capacity allows for 720pHD video conferencing for telemedicine needs. To ensure HD quality, sites need a bandwidth of at least 512kbps. All sites in the proposed project have capacity to deliver video at this bandwidth. For sites not yet identified in Year 2 and Year 3 of this grant, the same bandwidth will be the minimal criteria necessary in order to participate. Specifically, every Rural Spoke site’s emergency room is outfitted with a Polycom HDX two-way interactive video and audio system with capability to immediately connect to the Hub site. Staff at the Spoke site activate the system by pushing a button on the wall. Once Hub site physicians enter a video call, they can hear the patient’s heart and lung sounds, monitor blood pressure and even hear a fetal heartbeat through an integrated electronic stethoscope. Additionally, Spoke site staff can manipulate an integrated general exam camera to provide the consulting physician additional close-up detail of wounds, airways and other throat structures, and the appearance or reactivity of a patient’s eyes to light and other stimuli.

The Sanford video network is designed so that regional locations have the most flexibility and interoperability with other health networks. The network allows any Sanford site to connect to any other Sanford location in an ad-hoc fashion. Outside network connections are addressed in a several different ways. Sanford’s global initiatives demand interoperability with any/all outside organizations, which enables several different connection methods and ensures Sanford’s ability to meet needs today and into the future.

Telehealth services at Sanford are fully documented within the existing electronic health record (EHR), an Epic software platform branded as Sanford One Chart. The fully integrated inpatient

and ambulatory EHR gives providers full access to all medical records pertaining to each patient, including telehealth visits throughout the Sanford system. Implementation of the EHR is well underway, with more than 120 clinics and nearly 30 hospitals currently live with Sanford One Chart. Records within the EHR are also fully available to other Epic organizations through the use of Care Everywhere, a tool designed to share confidential medical records over the internet via encrypted connections upon authorization by the patient, thus the patient's physician/primary clinician is integrated into the care process. This transition of records is fully HIPAA compliant.

Tools specifically created for use in the documentation of telehealth visits include standardized note templates and flowsheet documentation created. These templates were created with the input of Hub physicians who provide telehealth services and Rural Spoke providers who request consultative services.

WORK PLAN

In order to ensure program success, key staff will adhere to the project work plan. After initial network infrastructure setup, project leaders will be charged with timely completion of all activities. These include enlarging the existing telemergency service area and expanding the breadth of services under telemergency to include telestroke. The Project Director will follow a streamline implementation process that includes conducting medical staff meetings, facilitating the ordering and installation of telemergency equipment, ensuring that staff take part in necessary telemergency and telestroke training. Additionally, the Project Director working with IT staff and other key staff will determine the appropriate mobile solutions and infrastructure for the newly formed telestroke program. Additional activities include project evaluation and dissemination of information to targeted audiences. A more detailed description of the work to be done, including timelines, can be found in **Attachment 3**.

RESOLUTION OF CHALLENGES

Each Hub site for the One Connect Emergency and Telestroke Network has a dedicated Stroke Program Coordinator. Among their many duties, these licensed RNs abstract data for Quality Improvement (QI) reports on stroke codes, consistently evaluating clear indicator measures. A wealth of information comes from these reports, but one of the largest barriers remains the analysis of health outcomes across multiple hospital system. Without complete origination-site data, the telemedicine network will be unable to fully realize either impact or opportunity. Hub sites and all Rural Spokes owned or leased by the Sanford enterprise integrate the electronic health record (EHR) through Sanford One Chart. This platform also is available to Managed facilities, though they are individually operated within communities and these sites' financials are separate from Sanford's own. While records within the EHR already are fully available to other Epic-software organizations through the use of Care Everywhere, Sanford IT and business decision support personnel continue to find creative solutions to bridging the gap as greater numbers of independent Rural Spokes join the telemedicine network.

Evaluation

Stroke Program staff at Sanford Fargo Medical Center, the Secondary Hub, give extra supports to building and evaluating the timeline for stroke patients transferred in from small facilities. The Critical Access Hospital Stroke Code "Purple Sheet" is part medical document and part quality report. Stroke Program and Rural Spoke personnel use the document as a quality-control

stopwatch. It starts with the patient's Last Time Known Well, sets a goal of 15 minutes between arrival in a Spoke ED and activation of One Call telenetwork, and defines a "door to needle time" of 60 minutes for tPA administration.

All telemergency encounters are tracked using tools specifically created for use in the documentation of telehealth visits. These include standardized note templates and flowsheet documentation in the EHR. Data is readily available to project leaders at any time. Information collected in this manner is supplemented with clinical measure data as needed through Sanford's clinical informatics team.

System Sustainability

Project leaders have worked to create a sustainable network that continues to grow and will ensure that telemergency and telestroke service remains available for rural residents in the end-user communities. Additionally, the Network will endeavor to create a sound platform capable of hosting additional sites and services, including the addition of more specialty care such as cardiology, pediatrics, and psychiatry. In addition to absorbing ongoing costs such as staffing and equipment, a large part of the sustainability will depend on achieving positive outcomes. This includes quality of care, quality of the process, patient outcomes, utilization, satisfaction, financial impact and capacity. The project partners fully support the goal of providing access to patient-centered emergency and stroke care through telemedicine technology; thus demonstrating that the telemergency and telestroke has clinical impact and is financially sustainable will ensure that project activities and program will continue past the grant period. In addition to keeping ongoing costs low and demonstrating positive outcomes, the program will bill for consultative services and track savings to Rural Spoke hospitals.

Integrating Administrative/Clinical Systems and Deploying Technology

Currently, major public and private payors provide reimbursement for telestroke consults to Health Professional Shortage Areas (HPSA) or non-metropolitan statistical areas. However, emergency services cannot be sustained through reimbursements alone. The network will consider charging a monthly service fee for ongoing telemergency and telestroke services. Any fee would be intended to cover Hub site salaries and operational overhead. Tracking Rural Spoke site savings also is an important function to maintain the support of end-user facilities and staff. Because there may be ongoing costs related to equipment maintenance, staff training and community education, it is important to demonstrate both care quality and financial impacts. It has been documented that many patients entering rural emergency rooms are unnecessarily transferred to a tertiary care hospital for further diagnostic evaluation and treatment. Telemergency will allow the tertiary physician to assist in the diagnosis up front, meaning a greater number of patients with lesser critical needs can remain in their local facility, under watchful observation instead of being prematurely transferred. This provides financial benefits both to the patient (and their family) who avoids a costly transfer and to the Rural Spoke site that is able to keep bill for services.

Understanding the complexity and size potential of this program, careful planning has gone into the selection of equipment and infrastructure needs. Equipment was selected against numerous criteria including, cost, longevity, ease of use, compliancy with HIPPA and other relevant

Federal regulations, and interoperability with other systems. Using this information, numerous vendors and brands were compared side by side to ensure the most cost-effective solutions were identified. This process helps protect exponential growth of the system as a whole, with minimal technical, regulatory and financial hitches in the future.

EVALUATION AND TECHNICAL SUPPORT CAPACITY

Sanford One Connect Emergency has the experience necessary to carry out the activities proposed with the expansion to additional Rural Spoke sites and creation of a telestroke component. The existing network counts 31 members, including two Hubs and 29 Rural Spoke sites. Of the Rural Spokes, 10 are currently live and 19 will come online between now and the end of 2013. A snapshot of One Connect Emergency appears in the table below.

Sanford One Connect Emergency Network Members*

| Facility Name | Community | Date Site Began Providing Telemergency | Number of consults by specialty, Jan. 1 – Dec. 31, 2012 |
|------------------------------------------|-----------------------|----------------------------------------|---------------------------------------------------------|
| Community Memorial Hospital | Burke, SD | September 1, 2011 | 5 |
| Douglas County Memorial Hospital | Armour, SD | Goes live by 5/31/2013 | – |
| Mahnomen Health Center | Mahnomen, MN | Goes live by 2/28/2013 | – |
| Orange City Area Health System | Orange City, IA | Goes live by 10/31/2013 | – |
| Ortonville Area Health Services | Ortonville, MN | April 30, 2011 | 2 |
| Perham Health | Perham, MN | Goes live by 2/28/2013 | – |
| Pioneer Memorial Hospital | Viborg, SD | September 15, 2011 | 14 |
| Sanford Aberdeen Medical Center | Aberdeen, SD | June 30, 2012 | 1 |
| Sanford Bagley Medical Center | Bagley, MN | Goes live by 6/30/2013 | – |
| Sanford Bemidji Medical Center | Bemidji, MN | Goes live by 6/30/2013 | – |
| Sanford Canby Medical Center | Canby, MN | Goes live by 7/31/2013 | – |
| Sanford Canton-Inwood Medical Center | Canton, SD | September 15, 2011 | 14 |
| Sanford Chamberlain Medical Center | Chamberlain, SD | July 31, 2012 | 0 |
| Sanford Clear Lake Medical Center | Clear Lake, SD | Goes live by 4/30/2013 | – |
| Sanford Fargo Medical Center | Fargo, ND | Goes live Feb. 15, 2013 | n/a (Hub site) |
| Sanford Hillsboro Medical Center | Hillsboro, MN | Goes live by 2/28/2013 | – |
| Sanford Jackson Medical Center | Jackson, MN | Goes live by 6/30/2013 | – |
| Sanford Luverne Medical Center | Luverne, MN | Goes live by 7/31/2013 | – |
| Sanford Mayville Medical Center | Mayville, ND | Goes live by 4/30/2013 | – |
| Sanford Rock Rapids Medical Center | Rock Rapids, IA | Goes live by 7/31/2013 | – |
| Sanford Sheldon Medical Center | Sheldon, IA | Goes live by 7/31/2013 | – |
| Sanford Thief River Falls Medical Center | Thief River Falls, MN | Goes live by 6/30/2013 | – |
| Sanford Tracy Medical Center | Tracy, MN | December 1, 2011 | 13 |
| Sanford Worthington Medical Center | Worthington, MN | April 30, 2011 | 21 |
| Sanford USD Medical Center | Sioux Falls, SD | April 30, 2011 | n/a (Hub site) |
| Sanford Vermillion Medical Center | Vermillion, SD | May 31, 2011 | 30 |
| Sanford Webster Medical Center | Webster, SD | Goes live by 4/30/2013 | – |
| Sanford Westbrook Medical Center | Westbrook, MN | December 1, 2011 | 2 |
| Sanford Wheaton Medical Center | Wheaton, MN | Goes live by 2/28/2013 | – |
| Windom Area Hospital | Windom, MN | Goes live by 10/31/2013 | – |
| Winner Regional Healthcare Center | Winner, SD | Goes live by 4/30/2013 | – |

*As of February 7, 2013

Network Experience and Knowledge

Both existing Hub sites within Sanford One Connect Emergency – as well as the proposed Sub-Hub – are verified as Level II Emergency Trauma Centers (American College of Surgeons Committee on Trauma) and hold advanced certification as a Primary Stroke Center (The Joint Commission). The primary site for this application, Sanford USD Medical Center (SUSDMC), also is the region’s first and only hospital verified as a Level II Pediatric Trauma Center. Several key personnel are based at the Primary Hub/performance site in Sioux Falls, SD, and serve on the One Connect Emergency and Stroke Network Governance Board. Among them is Dr. Beth Lapka, MD, Medical Director for SUSDMC’s Emergency Department, known as Trauma 5, and its Intensive Air Flight Program. Another is Dr. Jitendra Sharma, MD, the only interventional neurologist in South Dakota. Dr. Sharma completed two fellowships at Case Western Reserve University and is certified in both neurology and vascular neurology by the American Board of Psychiatry and Neurology. His surgical expertise allows him to manually retrieve clots in the brain as long as eight hours after the onset of symptoms, and to lead aneurysm evaluation and endovascular management – also known as aneurysm coiling. At the Secondary Hub site, Dr. Kevin Faber will serve as a physician champion. Dr. Faber completed his residency and fellowship at the University of Iowa. He is certified in neurology and sleep medicine by the American Board of Psychiatry and Neurology. Dr. Faber serves as Medical Director for the Primary Stroke Center at Sanford Fargo Medical Center in Fargo, ND.

In addition to strong physician support, strong backing from institutional leaders is a necessity for program growth and sustainment. Telehealth at Sanford Health has been operational for a number of years. However, in the past two years, the program became one of the organization’s primary strategic initiatives. This refocused energy has given structure and support for the program. Institutional support has provided the necessary staff to streamline and run the administrative, technical and clinical aspects of all telemedicine efforts at Sanford Health.

Lessons Learned in Implementing and Sustaining the Network

The overall user experience is vital to program success. End-user provider and nursing surveys allow project leaders to monitor user satisfaction and engage with rural providers when necessary. Over the past year, rural provider satisfaction has been stable and positive, with 85% of respondents strongly agreeing or agreeing that interactive video consult was of benefit to patient care. Even more telling, 57% of respondents disagreed or strongly disagreed that the consult could have been performed as well by telephone. Focusing on the needs of providers and usability of the system has lent itself to steady growth rates in use at a number of existing sites. It has become apparent that putting emphasis on process improvement – rather than focusing on end results – is a key to overall growth and success. Instances in the past year at a number of sites prove out this theory. After utilization rates of less than one telemedicine encounter per month, attention to individual needs at each facility has resulted in steady utilization at these sites, some now using the service five or more times a month. In Year 1 of the teleemergency program, the service was used a total of 28 times. In Year 2 this number grew to 74 encounters, with nearly the same number of sites using the program. Additionally, the number of avoided and downgraded transfers due to use of teleemergency has begun to steady, with nearly **1 out of every 10 telemedicine consults resulting in an avoided or downgraded transfer**. Project leaders expect that this attention to detail at the site level will continue to lift usage rates. As

more sites access telehealth services, this important lesson will be addressed during implementation and on an ongoing basis throughout the program.

Protocols

A protocol framework has been developed for clinical telemedicine services in the neurology specialty and is closely tied to in-house protocols at the two Hubs sites/Primary Stroke Centers. These will be refined during Year 1 of the Sanford One Connect Emergency and Telestroke Network. While the scope of work in this grant is focused on developing the clinical protocols for neurology, the same set of key staff will simultaneously be working toward adding other specialties that have a natural fit with Emergency medicine – among them, cardiology, psychiatry and pediatrics. In addition to work done in urgent-care settings, the full range of Sanford One Connect telehealth program offerings includes access to more than 70 clinical telemedicine specialties in all – many of which have their own, customized protocols.

Additional Program Support

Additional program support to implement the Network has come from Federal, state and foundation funding sources. Eighteen sites were part of an Office of Rural Health Policy (ORHP) Network Development grant. This grant runs from May 1, 2011, through April 30 2014, and provides \$180,000 per year. In 2012, 10 network sites were included in a USDA Distance Learning and Telemedicine (DLT) grant to receive telemergency equipment. This is a three-year grant (2012-2014) awarded in the amount of \$465,000. Additionally, Douglas County Memorial Hospital in Armour, SD, recently was awarded a Flex program grant in the amount of \$9,500. This Rural Spoke site will direct the Flex dollars toward purchase of telemergency equipment, with the Spoke site itself contributing the same amount.

Skill of Network Member Sites and Network Organization to Implement the Project

One Connect Emergency and Telestroke Network members represent a true cross-section of the health systems that serve the four-state footprint, including independently owned hospitals and facilities with varying roles and relationships within the Sanford enterprise. These roles include sites Owned or Leased by Sanford Health, whose site-specific operations roll up into a single financial and leadership structure; and sites that are either Managed by Sanford Health, Associate members of the Sanford Health Network, or entirely Independent.

Network Development and Governance

A Governance Board comprising both experienced and new members of Sanford One Connect Emergency is committed to provide guidance for project design and revisions, determining and adjusting clinical measures and baseline data to be evaluated, as well as ongoing quality improvement. Governance Board members are as follows –

- Dr. Kevin Faber, MD: Neurologist, Sanford Fargo Medical Center, Fargo, ND
- Joe Adams, Director: Sanford Clinic Neurology, Sioux Falls, SD
- Kathy Altena, RN, Director of Patient Services, Sanford Health Network (SHN):
Representing the integrated system of community-based hospitals and clinics that are owned or leased as part of the Sanford enterprise
- Richard Ash, CEO, Ortonville Area Health Services: Representing a Rural Spoke site from an independently owned and operated system of care in Minnesota
- Susan Berry, Director, Sanford Telehealth Services

- Jim Frank, CEO, Community Memorial Hospital: Representing a Rural Spoke site from an independently owned and operated hospital in South Dakota
- Dr. Beth Lapka, MD: Medical Director for Trauma 5 Emergency Department, Sanford USD Medical Center, Sioux Falls, SD
- Dmitri Melius: Project Direct, One Connect Emergency and Stroke Network, and Project Manager for Sanford One Connect Emergency, Sioux Falls, SD
- Dr. Jitendra Sharma, MD: Interventional neurologist, Sanford USD Medical Center, Sioux Falls, SD
- Jesse Tischer, Vice President, Sanford Health Network: Representing SHN leadership with responsibility for hospitals and clinics in Minnesota
- Tim Tracy, CEO, Sanford Vermillion Medical Center: Representing a South Dakota Rural Spoke site from within SHN
- Dan Van Roekel: IT Manager, Sanford Telehealth Services, Sioux Falls, SD

Round-the-clock physician staffing of the One Connect Emergency and Telestroke Network is achieved through existing capacity at the Hub sites in Sioux Falls, SD, and Fargo, ND. This proposal also finds efficiencies in the teams of neurologists who already take call 24/7, and who are eager to be able to see and hear patients during administration of the NIHSS and other evaluative tools. Sanford Health is committed to maintaining the level of highly skilled personnel, technological infrastructure, and overall institutional capacity needed to provide reliable, sustainable critical interventions via a telemedicine program.

Community/Clinician Involvement for Ongoing Development

The Project Director and Sanford IT staff make an early, on-site visit to each new Rural Spoke site and coordinate this visit with installation of telemedicine equipment by Sanford’s vendor. Throughout the project period for the proposed activities, Spoke sites also have the reassurance of the vendor’s own service agreement – included in the fees budgeted by Sanford Health as the Applicant. During the IT visit, One Connect telemergency staff learn each hospital’s unique workflow pattern and work with hospital staff to adapt placement and configuration of the system components to best fit their expected use. This helps the Project Director tailor the later, workshop-style training sessions at the site. It also informs a separate visit from the Project Director and the Hub site’s Emergency Department Medical Director, who discusses protocol issues such as managing heart or stroke codes through telemergency, using verbal bedside clinical noting, and enacting procedures for transfers of advanced care patients. As a member of the telemedicine network’s Governance Board, the Medical Director teaches and listens not only as a trained emergency physician, but also as a decision-maker who can take member hospitals’ concerns or ideas back for larger discussions.

Emergency physicians take in-house call over concentrated bursts of time and participate in telemedicine directly from within the One Connect “nerve center” in each Hub’s Emergency Department. In contrast, neurologists rotate through an extended call schedule, responding to stroke codes and other consult requests over the space of a week or more. Physician leaders from the neurology departments at the telehealth network’s two Hub sites were actively involved in creating the framework for the new telestroke program – and advised which technologies would give them the optimal tools needed during remote consultations. As a result, Sanford One

Connect Emergency and Telestroke Network preserves current on-call scheduling and workflow practices.

Clinician Acceptance and Support

Each resident neurologist on staff at the Hub sites will be assigned a mobile tablet device with an accompanying data plan sufficient to support real-time, interactive video and audio clinical experiences. This maintains current on-call scheduling and workflow, ensuring that neurologists will be available for telestroke activities whether they take call from home, a medical center, or another location. In addition, a Web cam will be installed on the desktop computer within each neurologist's office at the hospital or clinic. Neurologists who are on campus when a Rural Spoke or other Hub site requests a consult will be to access the interactive connection via a Web portal and provide clinical services through larger-screen, superb-resolution imaging solutions. Of course, neurologists on campus also have the option of joining their emergency physician colleagues in person, in the ED "nerve center".

Dissemination

Project information will be disseminated in a number of ways. Internally, information will be shared regularly through physician meetings, department staff meetings, grand rounds and other meetings as needed, to inform staff of updates or provide additional training. Dissemination of information to external audiences will be through professional journals and conference participation at the regional and national level. Additionally, the Project Director will facilitate viable communications tactics such as earned media (press releases and interviews) in local, regional and national publications to ensure information is shared with the general public. One Connect projects will remain closely tied to Sanford Health marketing strategy.

ORGANIZATIONAL INFORMATION

Sanford Health's mission is "Dedicated to the work of health and healing", and the integrated system's vision is to improve the human condition through exception care, innovation and discovery. Enterprise-wide values of courage, passion, resolve, advancement and family guide every effort and patient interaction. Sanford Health approaches emergency care as an organized team effort – whether delivered in a patient's room or via telemedicine. The entire hospital and medical staff are involved in development of a comprehensive emergency service. Sanford One Connect Emergency and Telestroke Network is grounded in the same foundation as are all components within the Sanford One Connect telehealth initiative. The network is designed to provide the greatest benefit to multiple user groups, primarily through its commitment to supporting –

- patients and families, by offering increased access to care, reducing travel expenses/time away from work, and experience fewer unnecessary transfers;
- individual communities, by keeping healthcare dollars local and strengthening the rural healthcare presence;
- practitioners, by improving patient care coordination, enhancing professional relationships and reducing travel time for specialty physicians;
- and facilities, by offering additional services and maximizing local site revenue.

Integrating neurology care into the telemergency access networks means new Rural Spokes and patient communities now will have greater access to neurologists and neurosurgeons who offer consultation, evaluation, and surgical treatment to correct, treat and manage injuries to and chronic disease states of the brain.

Project Organization, Staffing and Management

An Organizational Chart for Sanford One Connect Emergency and Telestroke Network appears as **Attachment 8**. The project's Staffing Plan for Year 1 is as follows:

Dmitri Melius, Project Director: 1.0 FTE – Melius is responsible for the day-to-day programmatic and fiscal direction of the network. He will facilitate communication on all project activities between OAT program officials and the project's Governance Board. In addition, Melius performs on-site training for new network members, ongoing programmatic monitoring to assure the project is accomplishing objectives identified in the program plan, and reviews financial expenditures. Melius works with medical staff to conduct formative assessments, prepare required reports and evaluate the project. Additionally, Melius will participate in annual OAT grantee meetings in the Washington, D.C. area.

Dan Van Roekel, Information Technology Manager: 0.05 FTE – Van Roekel will direct his Telehealth IT team in performing technology audits and implementation, particularly as related to the new telestroke program. He will be the primary contact for One Connect Emergency and Stroke Network's vendor and will provide project guidance on highly technical matters. Following installation of telehealth units at each new Rural Spoke or Sub-Hub site, Van Roekel or another member of his team will join Project Manager Melius on a site visit to follow up with in-facility IT staff and troubleshoot issues as needed.

Dr. Beth Lapka, MD (Emergency Department Medical Director): 0.05 FTE – Dr. Lapka will serve as the physician leader for telemergency care, advising the seamless integration of telestroke services into the existing telemergency framework. As Medical Director for the Trauma 5 Emergency Department (ED) at Sanford USD Medical Center in Sioux Falls, SD, Dr. Lapka has extensive knowledge of ED operations and workflow and first-person experience with One Connect Emergency's receipt of calls from surrounding communities. Dr. Lapka will join Project Director Melius on a site visit to each new Rural Spoke, meeting with on-site physicians and other care team members. She will serve on the Governance Board for the duration of the project period.

Dr. Jitendra Sharma, MD (Interventional Neurologist): 0.04 FTE – Dr. Sharma will share Co-Lead duties on refining the clinical services, protocols, clinical measures and performance outcomes for the telestroke component during planning and testing of pilot sites in Year 1. Dr. Sharma is based at the Primary Hub site, Sanford USD Medical Center in Sioux Falls, SD. Dr. Sharma also brings to the project knowledge of the referral patterns and Rural Spoke site needs throughout the Sioux Falls (South) Region of Sanford Health's integrated system. Dr. Sharma will serve on the One Connect Emergency and Stroke Network Governance Board for the duration of the project period.

Dr. Kevin Faber, MD (Neurologist): 0.04 FTE – Dr. Faber will share Co-Lead duties on refining the clinical services, protocols, clinical measures and performance outcomes for the telestroke component during planning and testing of pilot sites in Year 1. Dr. Faber is based at the Secondary Hub site, Sanford Fargo Medical Center in Fargo, ND. Dr. Faber is knowledgeable in the referral patterns and Rural Spoke site needs throughout the Fargo (North)

Region of Sanford Health's integrated system. Dr. Faber will serve on the One Connect Emergency and Stroke Network Governance Board for the duration of the project period.

Joe Adams, Sanford Neurology Clinic Director: 0.04 FTE – Adams directs Sanford Clinic Neurology, based at Sanford USD Medical Center in Sioux Falls, SD. Adams' clinic manages workflow and call schedules for the neurology team at the Primary Hub site for One Connect Emergency and Stroke Network. He will assist during the planning and testing of pilot sites in Year 1 and will serve on the Governance Board for the duration of the project period.

Summary of Network Member Sites and Network Organization Activities

During Year 1 of the project, four sites within the One Connect Emergency and Telestroke will be supported with Federal dollars. They are as follows:

Sanford USD Medical Center (SUSDMC), Sioux Falls, SD. As the Primary Hub for this telehealth network, the site is the flagship hospital of the Sanford Health South Region. SUSDMC is the home base for Sanford Telehealth Services as a whole, providing strategic guidance, day-to-day operational management across the system, IT resources, and on-site training for Emergency Department (ED) and other personnel at end-user facilities.

Sanford Fargo Medical Center (SFMC), Fargo, ND. The network's Secondary Hub, the site is the home hospital for the Sanford Health North Region.

Kittson Memorial Hospital, Hallock, MN. A new Rural Spoke site, this 15-bed CAH also operates an on-site nursing home and Rural Health Clinic. Kittson Memorial is in a frontier county designated with HPSA, Mental Health HPSA, Dental Health HPSA and MUA status.

Northwood Deaconess Health Center, Northwood, ND. A new Rural Spoke site, this 12-bed CAH is certified as a Level V Trauma Center and also operates an on-site nursing home. This community of approximately 1,000 lies in a Rural Census Tract of Grand Forks County, and is designated with both HPSA and MUA status. Two ambulances help meet this demand.

Applicant Resources

The Applicant, Sanford Health, owns and operates both Hub sites proposed to receive Federal funding during Year 1 of this project. The annual financial statements for SUSDMC and SFMC are consolidated together with those of other Sanford enterprise facilities. A signed Letter of Agreement from SFMC appears with others in **Attachment 5**, reaffirming the site's commitment to its ongoing telemergency services and stating its intent to launch a telestroke program. Because SUSDMC and SFMC are wholly part of the Sanford enterprise, the Sanford One Connect system is their premier source of telehealth services.

As part of its commitment to around-the-clock trauma care and expansion of telemedicine frontiers, Sanford Health leadership has made the operational decision to staff Hub site Emergency Departments at levels that provide ample capacity for the additional consults and transfers generated as a result of this project. Rural Spoke sites benefit from the Hubs' 24/7 availability of board-certified and board-eligible emergency physicians. Each neurology call team member at the Hub sites will have his or her own dedicated mobile tablet to provide telestroke consults, as well as an in-office connection into the One Connect Emergency and Telstroke Network. Administrative offices will manage the licensing and privileging of their respective emergency physicians and neurologists in the states and network hospitals in which they will practice telemedicine. Each Hub site has a dedicated RN Stroke Program Coordinator.

Financial and Strategic Relationships Among Members

The two new Rural Spokes named above are Managed by Sanford Health. Neither facility's financial statements are consolidated with Sanford Health. As Managed sites within the Sanford Health Network (SHN) of hospitals, clinics and other care settings, Northwood Deaconess Health Center and Murray County Medical Center are offered access to SHN preferred vendor group purchasing rates, the One Chart platform to integrate with the Hub sites' own electronic health record (EHR), and other benefits. Operational decisions at these and other sites are made solely by their respective leaders and/or board members. The Letters of Agreement (see **Attachment 5**) from Northwood Deaconess and Murray County sites each attest to their intent to form a consortium agreement with Sanford Health for the purposes of this proposal, and to enter a service contract with Sanford Health to launch their respective telemergency programs through the One Connect Emergency and Telestroke Network. As discussed earlier, there is no charge at present for this subscription service, and Sanford Health has not identified an effective date for any such fee.

Northwood Deaconess Health Center and Murray County Medical Center will be Subcontractors of Sanford Health for this project, as Subrecipients of federal dollars awarded to Sanford Health. A full accounting of Object Class Category expenditures at these two Subcontractor sites is included in a supplementary table within **Attachment 2: Detailed Budget Information** [See Table 3: Detail of Aggregate Figures for Subcontractor Network Member Sites to Receive Funding During the Budget Period (9/1/2013-8/31/2014)].

Sanford One Connect Emergency and Telestroke Network is managed by a team of experienced professionals and guided by an involved Governance Board. Board members are named in **Current Experience, Skills and Knowledge** subsection above. They include representatives from both Hub sites (physician leaders and telestroke champions among them), Sanford Health Network leadership in both North and South Regions and Rural Spoke sites. All One Connect Emergency and Telestroke Network members understand relationship between strong governance and the sustainability of network services. The Project Director reports regularly to this Board and acts independently of all network partners. This is further illustrated in the organizational chart (see **Attachment 8**). Throughout the duration of the project period, the Governance Board will meet in person and via teleconference to share telemedicine care and workflow experiences, discuss achievement of project goals and objectives, review outcome data, identify challenges, discuss solutions, and make decisions on project direction.

Additional program support to implement the Network has come from Federal, state and foundation funding sources. As noted in the **Funding and Legislative Preference** section, this funding includes grants from the Office of Rural Health Policy, the U.S. Department of Agriculture, and the Flex program. The communities and families served by these projects have benefited significantly from innovative public-private partnerships, and Sanford Health is well-positioned to build on those successes with this proposal.