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## • November 2008 FEATURE ARTICLES •

### Telemedicine/Telehealth : Case History

## Reach Out and Save Someone

**Georgia neurologists develop a Web-based ASP that eliminates the geographic penalty typically associated with rural stroke patients.**

*By David Hess, M.D.*

Every 45 seconds, someone in the U.S. suffers a stroke. An estimated 700,000 cases of stroke in this country each year have elevated this condition to the third leading cause of death and the leading cause of long-term disability.

In 1996, the FDA approved the first treatment for acute ischemic strokes: tissue plasminogen activator (tPA), a thrombolytic treatment that must be delivered within three hours of the onset of stroke.

Studies have shown that the sooner a stroke patient is treated after the onset of symptoms, the better their chances of recovery and prevention of long-term disability. However, since the drug's approval more than 10 years ago, an industry average shows that only 2 to 4 percent of stroke patients actually receive this disability-preventing treatment, mostly because that crucial 3-hour window has expired by the time the patient finally reaches the neurologist.

Deep in the heart of the U.S. stroke belt, which is highly concentrated in the Southeast, our team of neurologists at the Medical College of Georgia (MCG) sought a solution to the frustrating problem of insufficient stroke care in our region. MCG is a major academic health center and health sciences research university based in Augusta, Ga. As such, I am fortunate to work with some of the nation's top neurologists. But although such skilled caregivers are concentrated in Augusta, the rural hospitals within mere hours of MCG are not as fortunate. Many do not employ even one neurologist to evaluate stroke patients; and although emergency department (ED) physicians at these hospitals can administer stroke tests, a neurologist ideally should diagnose the patient and prescribe lifesaving tPA.

### **Dedicated Links or Web-based?**

Georgia hospitals already had tried several methods to remedy this problem, but they continued to fall short nevertheless. For instance, some stroke patients were rushed from rural hospitals via ambulance or helicopter to MCG for evaluation by a neurologist. But because "time is brain," transportation delays before treatment reduced the number of potential candidates for tPA, and



increased the likelihood of disability in those who were treated. Other times, physicians made treatment recommendations via the telephone; however, "tPA by telephone" prevented the consulting physician from directly examining the patient or reviewing the CT scan. Instead, the risk of a misdiagnosis actually increased.

For years, hospitals in North America and Europe have sought a new approach to expedite stroke care. Therefore, we at MCG looked at some telestroke systems that were already being employed. We noticed that these networks generally fit into two

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categories: they involved either a dedicated ISDN connection between the rural ED and the larger stroke center, or they transmitted the consultation across the Internet. We saw several advantages of using a direct link between the two hospitals, including a high speed, high quality, two-way audio-visual connection. On the other hand, these systems had their own disadvantages, such as a high price tag for example.

The biggest disadvantage of a direct connection, in our opinion, was that this type of system required a stroke specialist to travel to a dedicated site (usually at the stroke center or hospital) to perform the consultation. As it is, hospitals have a tough time getting neurologists to take the call when it comes to treating stroke patients in their own EDs. When those caregivers must drive to the hospital even more frequently to treat rural stroke patients via a teleconference, it gets even tougher to get them onboard.

### **Hub and Spokes**

We envisioned a Web-based system that would allow a stroke specialist to perform a consultation from any location with Internet access – home, office, or even a hotel in another country – eliminating the time delays that result from the consultant having to travel to a specific place. This design not only facilitates consultant flexibility, but it also decreases stroke onset-to-treatment times (OTT). If a consultation were completely Web-based, neurologists would be able to take a call at any time, from any place. We believed the convenience of such a system would encourage greater participation among specialists.

In 2001, our team of neurologists began creating a time-saving telemedicine solution that would enable us to evaluate patients in nine rural Georgia EDs. What transpired was the Remote Evaluation of Acute isChemic stroke (REACH Call), a complete, secure Web-based service powered by integrated audio-visual communication capabilities and decision support tools. REACH needed only a standard PC with a Web cam and broadband Internet connection to connect a specialist with a rural ED. We deployed the system in 2003 in a "hub and spoke" configuration, where MCG served as a hub hospital that provided physician-consulting services to spoke hospitals. All consultants have telestroke privileges at all nine participating hospitals.

The spoke hospitals use a workstation on wheels (WOW) from Flo Healthcare to communicate with a physician at the hub hospital. Spoke hospital ED staff can use the Web browser running on a laptop integrated into the WOW to register a patient and to request a consult with a remote physician. A toll-free call to the MCG Emergency Communication Center contacts the stroke specialist on call. The stroke consultant then logs onto the REACH Web site via any workstation with broadband Internet access and performs the consult. In the rural hospital, the ED physician points the high-resolution video camera attached to the WOW toward the patients so that the stroke specialist at MCG may interview and examine the patient over real-time video.

The consulting neurologist performs an NIHSS score, reviews the CT scans transmitted via DICOM from the rural hospital, and communicates with local ED staff with a graphical interface. The consultant can speak with the emergency physician, patient and family, as well as review vital signs and laboratory values, visually assess the patient's neurologic status and review the CT scan. Finally, a recommendation to treat or not treat with tPA is given. In addition, the ED staff is provided with a consult that can be printed out with recommendations for further care.

### **Shortening OTT**

Today, spoke hospitals in Georgia that are connected to MCG include Cobb Memorial Hospital, Elbert County Hospital, Emanuel County Hospital, Jefferson County Hospital, Jenkins County Hospital, McDuffie Regional Hospital, Morgan Memorial Hospital, Washington Regional Medical Center, Wills Memorial Hospital, and Tift County Regional Medical Center.

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Since installation, more than 600 consults have resulted in more than 125 patients receiving tPA in some of the shortest OTTs in the world. The group of hospitals has reduced OTT to 128 minutes, on average, from 146 minutes. We examined OTT among our telestroke patients and compared the results with the experience of our own ED, and with other community and academic experiences. The mean OTT using the system was 127.6 minutes, with half of the patients treated within 120 minutes of symptom onset and 22 percent within 90 minutes. During the same period of time, 26 patients were administered i.v. tPA in the MCG ED. In this setting, MCG achieved a mean OTT time of 146 minutes, with 35 percent of treatments within two hours and 19 percent within 90 minutes of onset.

### **Expanding REACH**

The system is now installed in more than 60 hospitals throughout California, Florida, Georgia, South Carolina, Tennessee, New York and Wyoming. New York, the second state to embrace the telestroke consult concept, sought the system after implementing a statewide telemedicine initiative. For instance, Buffalo, N.Y.-based Kaleida Health's Millard Fillmore Gates Circle Hospital serves 10 spoke hospitals: Olean General Hospital, Niagara Falls Memorial Medical Center, TLC Network, Medina Memorial Medical Center, Wyoming County Medical Center, United Memorial Medical Center, Brooks Memorial Hospital, Jones Memorial Hospital, Bertrand Chafee Hospital and WCA Hospital. According to Hollis Mahaney, an RN and physician liaison at Kaleida Health, the hospital saw 400 to 600 stroke patients in 2004, compared with 1,700 in 2007. Mahaney believes that the increase is due to educating rural hospitals about how the new system works and what they can do with it.

We at MCG originally designed the network to increase the availability of tPA to acute ischemic stroke patients residing in the rural communities that surround our institution. We expect other states, as well as other countries, to begin deploying the system this summer. By connecting stroke patients with neurologists more quickly, we hope to increase the percentage of stroke patients who receive tPA, the only drug that reduces disability.

**For more information  
on WOW solutions  
from Flo Healthcare**

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