

# Teleneurology Report Card: Proof of Concept

Teleneurology may be viewed as a “physician extender” not for an individual practitioner, but for the entire specialty, according to one teleneurologist.

By Mitchell J. Rubin, MD

In 2005 I was given the task of providing stroke coverage for a four hospital system in New Jersey. One of these hospitals was a JCAHO certified primary stroke center, but the others had inadequate neurology manpower to provide 24/7/365 stroke coverage. The solution was teleneurology. The four hospital system contracted with a fledgling company, Brain Saving Technologies, now Specialists on Call, Inc. (SOC) and the service launched in April 2006. I was at first a teleneurology client but soon became a working teleneurologist and then a Medical Director for Specialists on Call.

Teleneurology has allowed me to transform my practice to that of an “Emergency Neurologist.” I now provide emergency neurology consultations to patients on a national level. The service has expanded from “stroke codes” to encompass all neurological emergencies. Cerebrovascular disease represents 70 percent of our consults with encephalopathies and seizures being the next most common. While technology plays an important role, our offering is first and foremost a neurology practice, providing emergency and on call coverage to hospitals who otherwise lack the necessary neurology manpower. Technology alone will not solve the problem.

Forty-five neurologists are employed by SOC, working four-, eight-, or 12-hour overlapping shifts with two to three neurologists on call per shift. Each physician is licensed in each state and credentialed at all covered hospitals. Academic and community neurologists are employed, all following strict ASA guidelines for ischemic and hemorrhagic stroke. A 15 minute response time is guaranteed and a web based EMR is employed. Consults are delivered to the requesting ED within 15 minutes of consult completion. Video consults are bidirectional audio and visual. A full NIHSS is performed with the assistance of only the ED nurse. tPA decisions are accompanied by a detailed discussion of risks and benefits presented to the patient and family by the consulting teleneurologist. In the event of tPA administration, the teleneurologist calculates the dose and stays on video until the bolus is administered and is available for 24 hours to handle any complications.

The dramatic growth of our teleneurology practice underscores the acceptance of the service by hospitals and ED physicians. From 720 consults in 2006 the growth has been exponential with 11,137 consults in 2010, including 620 tPA administrations. From a starting point of eight hospitals, we now

cover over 120 hospitals in 12 states and plan to add an additional eight states in 2011. In a poster presentation at the 2011 International Stroke Conference, we demonstrated that 12 percent of the US population was within 30 minutes driving distance from one of our teleneurology hospitals. Patient acceptance has been remarkable as well. Over 92 percent of patients considered the telemedicine consultation to be a positive experience, with 82 percent indicating that they believed that the teleneurology consult had a positive impact on their care.

Our teleneurology practice has matured to the extent that I believe we can answer a number of proof of concept questions:

- 1.) Is the teleneurology examination accurate and reproducible?
- 2.) Can tPA be given safely by telemedicine?
- 3.) Will teleneurology be accepted by patients, hospitals and ED physicians?
- 4.) Will teleneurology increase tPA utilization?
- 5.) Will teleneurology reduce door to needle times?
- 6.) Will teleneurology reduce length of stay?
- 7.) Will teleneurology increase tertiary referrals for endovascular treatment and clinical trials?
- 8.) Will teleneurology reduce the likelihood of tPA related malpractice lawsuits?

A number of studies have shown the video exam to be reliable and reproducible. Total NIHSS scores obtained by bedside and remote methods are strongly correlated.<sup>1</sup> When bedside versus remote administration of tPA were compared, functional outcomes, symptomatic ICH rates, and door to needle times were similar in both groups.<sup>2</sup> Long-term outcomes were similar, as well. Good functional outcomes were identical in both groups and comparable to results from randomized trials.<sup>3</sup> The video exam is superior to telephone alone, with a diagnostic accuracy of 98 percent by video compared to 82 percent

Table 1. Cumulative Neuro Consults

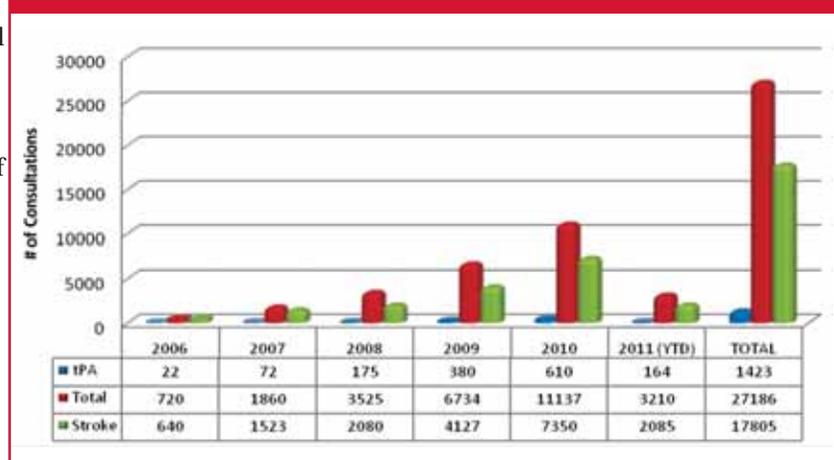


Table 2. Total tPA Cases

2007	12 cases
2008	26 cases
2009	61 cases

Table 3. Total ED Stroke Volume

Prior to SOC	387
After SOC	460

by telephone.<sup>4</sup>

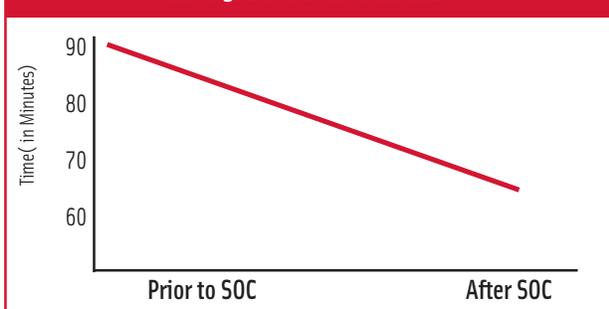
In addition, SOC has been able to show an increase in tPA utilization. As an example, a five hospital system in Texas noted an increase in tPA utilization of over 500 percent following implementation of the SOC teleneurology service. The same hospital saw an increase of 18 percent in overall ED stroke patient volume.

A Florida health system noted a decrease in length of stay (LOS) for stroke from 4.1 to 3.7 days. The decreased LOS was based on the prompt ordering of diagnostic testing and the early institution of secondary stroke prevention measures. The same Florida hospital realized a marked improvement in door to needle times, dropping from 89 to 71 minutes, a reduction of 20 percent. Our teleneurology network also supports a number of hub and spoke models where the hub represents a comprehensive

**Table 4. Average Length of Stay (Stroke Patients)**

Prior to SOC		4.1 days
After SOC		3.7 days

**Table 5. Door to Needle Time**



stroke center with the spokes being primary stroke centers. At one of our hub hospitals two-thirds of all transfers and two-thirds of IA stroke interventions originate at spoke hospitals. Published reports reflect the same two-thirds number for clinical trial enrollment.<sup>6</sup>

The presence of a teleneurologist available within 15 minutes should also lower the malpractice risk for community ED physicians. In 88 percent of all tPA related malpractice suits, plaintiff injury was claimed to have resulted from the failure to treat with IV tPA. ER physicians were the most common physician defendants. According to published legal reviews, “the typical characteristic of a stroke/tPA lawsuit is a patient suing an emergency physician who has failed to make or delayed a stroke diagnosis, with the patient not receiving tPA.”<sup>7</sup> Teleneurology mitigates this risk.

While we at SOC have seen the overwhelming benefits our teleneurology service brings to patients and hospitals, much to my surprise, fellow neurologists have been the most vocal impediment to implementation. Sometimes this is due to the potential loss of on call stipends. Others express concern that hospitals will view the teleneurologist as a replacement for the bedside neurologist, although it is very clear to those of us who practice teleneurology that we will never replace a bedside neurologist. Among the things we can’t do well

remotely are: check reflexes, feel muscle tone, perform a detailed sensory exam, do a fundus exam, examine for a stiff neck; the list goes on. Teleneurology is excellent for neurological emergencies, less so for routine consults.

I believe that teleneurology should be viewed as a “physician extender,” not for an individual practitioner, but for the entire specialty. Teleneurology relieves on-call burden, prevents disruption of office hours by emergency calls, and provides rapid response to neurological emergencies in places and situations where access would not otherwise exist. I have seen the benefits of teleneurology first hand, to my practice, my neurosurgeons’ practices, hospital EDs around the country, and most importantly, the patients we serve. ■

*Mitchell J. Rubin, MD has been practicing Neurology in New Jersey since completing his training at Columbia University in 1985 where he served as chief resident. He is currently Medical Director of the Neurology Center at Capital Health in Trenton, NJ. Since 2005 he has worked with Specialists On Call to develop a Teleneurology network which now services 17 states and over 120 hospitals nationwide. He currently serves as Medical Director of the Neurology practice for SOC. Dr. Rubin has served on NJ Governor Corzine’s Commission on Rationalizing Health Care Recourses and currently serves on the NJ State Stroke Data Advisory Group.*

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