

## Telemedicine Leads to Better Stroke Treatment Decisions

*Technology enables doctors to make correct decisions for stroke patients at remote sites*

August 4, 2008

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Researchers at the University of California, San Diego Medical Center say that their first-of-its-kind study of a telemedicine program which transports stroke specialists via computer desktop or even laptop to the patient's bedside, using highly sophisticated video, audio and Internet technology, could have an immediate and profound impact on the treatment of stroke patients throughout the world.

Brett C. Meyer, M.D., principal investigator of the STRoKE DOC trial and Co-Director of the UC San Diego Medical Center Stroke Center, and colleagues investigated the use of a site-independent telemedicine system when used to provide remote consultation leading to treatment decisions about stroke patients. The study was designed to determine if the so-called "STRoKE DOC" technology enabled physicians to make good treatment decisions, and better decisions than telephone consultations, when evaluating stroke patients across distant sites.

The results of 222 patient cases showed that telemedicine evaluation led to better decision-making than telephone consultations in the care of those patients. The study, funded by the National Institutes of Health, will be published online August 2 in *Lancet Neurology*, ahead of print .

Rapid decision-making about treatment is critical in stroke patients, who can benefit greatly from appropriate treatment if it is administered within a narrow window of time. This can be hampered when patients are being evaluated in hospitals in rural or underserved areas without a dedicated stroke team, or located too far away from practitioners with such expertise to rapidly treat a stroke patient. One-third of the U.S. population lives in such a rural area.

STRoKE DOC (Stroke Team Remote Evaluation using a Digital Observation Camera) connects stroke experts located at a "hub" site to the patient at a remote but connected "spoke" site via the Internet. The audio/video teleconsultation system allows the stroke expert real-time visual and audio access to the patient, medical team and medical data at the remote site.

"We assumed that telemedicine was a good idea, but it hadn't been scientifically tested until now," said Meyer, who is also associate professor of neurosciences at the UCSD School of Medicine. "Using STRoKE DOC, our stroke team physicians were able to evaluate the patient and help make the correct decision about treatment over 98 percent of the time, compared to only 82 percent of the time when doing a telephone consultation to a remote site."

UC San Diego stroke team doctors can access the telemedicine system - pioneered at UCSD in collaboration with the California Institute for Telecommunications and Information Technology (Calit2), Qualcomm and BF-Technologies, Inc. - from any location with an Internet connection, enabling them to rapidly connect with an emergency medicine practitioner, the patient and perhaps their family members at the "spoke." A mobile camera server with an intravenous-pole design is placed at the foot of the patient's bed at the remote site.

Via this system, the stroke specialists can not only view physical signs of a possible stroke in order to assess the patient's condition, but can speak to the patient, family members, nurses and attending physicians, as well as directly review CT scan images of the patient's brain. Patients and their families can see, hear, and communicate directly with the stroke expert.

"When a person suffers a stroke, time is of the essence," Meyer explained, as treatment to reduce brain infarctions, known as rtPA (alteplase), must be administered within three hours of the onset of a stroke. Waiting too long to give the drug can result in bleeding in the brain, or even death.

"If you make a poor decision using a telephone consultation, you potentially put the patient at risk for a poor outcome," Meyer said. "The question we set out to ask with this five-year study was, 'did we make the right decision?' The answer was overwhelmingly, yes."

Meyer added that this proof that telemedicine results in better treatment decisions than telephone consultations could lead to some immediate changes in how stroke patients in remote areas are evaluated and treated.

"Rural physicians can now provide much needed specialty care to their patients via telemedicine," said George Rodriguez, M.D., of El Centro Regional Medical Center in California, a rural community partner with UC San Diego in its STRokE DOC program and a participating spoke hospital in the clinical trial. "This is welcome news for rural healthcare providers in the U.S."

The UC San Diego researchers say that the next step is a study to evaluate the long-term health outcomes of patients. "What this study tells us is that we need a bigger trial to determine the difference - if any - in clinical outcomes for these patients."

The reliability of telemedicine had already been established, as reported in the journal *Neurology* in 2005, where the UC San Diego team studied Internet-based remote video evaluations of acute stroke patients.

In the current study, the researchers had initially planned a four-year, 400-patient study. However, the study's steering committee halted the trial after an analysis clearly showed that one group was superior to the other based on preliminary data of 222 patients. After final analysis the telemedicine group was noted to be far superior for correct decision-making. When adjusted for initial stroke severity, there was no difference in the number of cases resulting in brain hemorrhage, death, or long-term outcomes between the telemedicine or telephone groups.

Additional contributors to this study include Rema Reman, Ph.D., and Ronald G. Thomas, Ph.D., UCSD Department of Family and Preventive Medicine and Neurosciences; Thomas Hemmen, M.D. and Justin A. Zivin, M.D., Ph.D., UCSD Department of Neurosciences; Richard Obler, M.D., M.P.H., Department of Emergency Medicine, El Centro Regional Medical Center, El Centro, CA; Ramesh Rao, Ph.D., Calit2 and UCSD Jacobs School of Engineering; and Patrick D. Lyden, M.D., FAAN, UCSD Department of Neurosciences and Research Division, Veterans Affairs San Diego Health Center.

The study was supported by the National Institute of Neurological Disorders and Stroke, Calit2, and the Department of Veterans Affairs, Research Division.

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