

J. Davies, D. Boudreault, M. Lansberg. *SOS on the iPhone: Improving stroke outcomes by shortening time to treatment. Gerontechnology 2009;8(3):182; doi: 10.4017/gt.2009.08.03.003.00*

An Ischemic stroke starves the brain of the oxygen it needs and can result in permanent and devastating incapacitation. According to the World Health Organization (WHO), stroke now ranks as the second leading cause of death and the leading cause of serious disability in the world¹. Fifteen million people suffer a stroke worldwide each year. Of these, 5 million die and another 5 million are permanently disabled¹. For the 1 million stroke victims in the USA alone, nearly US\$70 billion were spent on stroke-related care in 2007². Although effective treatments exist, patients have only three hours to receive treatment after the onset of stroke symptoms, no matter how subtle they may be, or face permanent disability. However, the most common response to these symptoms is denial. In spite of large-scale educational campaigns, only a small minority of victims receive treatment³. The reasons for delay are multi-factorial and include the following: education: ignorance of stroke symptoms; denial: refusal to acknowledge symptoms and go to the emergency department; clinical pathway selection: other than emergency departments (i.e., primary care physician, family, friends). **Technical description** We developed a device to support senior citizens to recognize signs and symptoms of stroke and to seek emergency treatment. The device is implemented on the iPhone/iTouch platform (*Figure 1*), using the combination of an interactive user environment with integrated internal and external sensors to allow the user to conduct an autonomous neurological examination that (i) helps to learn the signs and symptoms of stroke, (ii) gives an objective means of evaluating, and (iii) allows rapid and accurate activation of the emergency medical system. The stroke exam covers the five most common signs and symptoms that could theoretically identify >99% of events⁴: evaluation of motor weakness, speech deficits, cognitive deficits, headache, and visual deficits using standard neurological exam maneuvers adapted to a mobile electronic environment. Furthermore, we have implemented several novel tests that allow for autonomous self-evaluation of these five aspects. We recognize that seniors are not only the primary victims of stroke but also the largest growing market for at-home entertainment and medical electronics, which indicates an increasing willingness to adopt useful technology. Therefore, the device has been designed to meet the special needs of this population with concessions for impaired dexterity, vision, and hearing. **User studies** We are in the process of conducting a series of user studies to evaluate different aspects of how our target population interacts with the SOS device. It is well-accepted that patients have difficulty following complex prescription drug regimens, so we are evaluating how well seniors are able to adhere to prescribed use of an electronic device. In order to understand how seniors interact with such a device and what compliance measures are necessary to implement, we have recruited healthy seniors who do not currently exhibit signs or symptoms of stroke to use the device. In order to test the efficacy of the device, we have recruited stroke victims to use the device to see how well it is able to detect their signs and symptoms of stroke. Finally, the device will be tested in recent TIA patients to assess its impact on clinical outcomes in this population of high-risk patients.

References

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Figure 1. SOS on the iPhone