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## The Need for Speed: Two New Studies on Stroke

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But despite all this, 69 percent of stroke victims don't reach the hospital in the first three hours after their stroke symptoms begin, according to a new study led by the University of Michigan Stroke Program and published in the journal *Stroke*.

That delay keeps many patients from receiving tPA, the only approved treatment for stroke caused by blood clots in the brain. If it's given intravenously within the first three hours of the start of a stroke, or injected directly into the brain within six hours, tPA can break up clots and stop or slow the damage caused by strokes.

But in the new study, only 44 percent of patients experiencing full-blown clot-based strokes got to the hospital even within six hours of the start of their symptoms - and 36 percent didn't get there until more than 12 hours had passed. The study was conducted between 2000 and 2005 in Corpus Christi, Texas - an area with no major university hospitals, making it a "real world" snapshot of stroke care in America.

The researchers say their findings confirm previous studies and underscore the importance of public education efforts to help everyone understand that when a stroke strikes, they should call 911 right away.

In fact, in a second paper published in *Stroke*, a U-M-led team describes the positive effects of an education effort aimed at middle-schoolers in the same area of Texas. After three years in which some children received four hours a year of stroke-related instruction and some didn't, a test showed the first group of children was much more likely to know how to recognize a stroke and to indicate they would call 911 if they witnessed someone having a stroke.

"Efforts to speed up patients' arrival at the hospital are absolutely crucial. We have very effective treatments, we just need to get patients to the hospital as fast as possible," says Lewis Morgenstern, M.D., senior author of the hospital study and first author of the school study. "Our first paper really speaks to the need to educate and motivate the public to call 911 for stroke, while the second shows one means to accomplish that goal."

Both studies are from a community-based research effort funded by the National Institute of Neurological Disorders and Stroke, part of the National Institutes of Health. Researchers from the University of Texas at Houston and Eastern Michigan University are also involved.

The hospital study included 2,347 patients with ischemic (clot-based) strokes who reported to hospitals in the study area between January 2000 and June 2005. The average age was 71 years, and just over half were women. U-M stroke neurologist Jennifer Majersik, M.D., led the analysis.

The researchers reviewed medical records in detail, looking for information on what time each patient was last known to be without symptoms, and what time they reached the hospital. In some cases, when an exact time for the start of the symptoms was not known, the researchers used an estimate. They broke the patients up into groups by the time to presentation (arrival) at the hospital: less than three hours, three to six hours, six to 12 hours, and more than 12 hours.

The researchers also assessed how severe the patients' strokes were, and looked for differences in the time to hospital presentation for each severity group. The patients with the most severe strokes made it to the hospital in the fastest time, with nearly half of them making it in less than three hours. In contrast, only 28 percent of patients with the mildest level of stroke made it in that time. The study did not include patients who suffered transient ischemic attacks, also referred to as "mini strokes." Nor did it include patients with "bleeding strokes" such as intracranial hemorrhages.

No matter what kind of stroke or mini-strokes patients have, the best course of action in all cases is to call 911, so that an ambulance or other emergency medical team can arrive and transport the patient to the hospital. Driving to the hospital oneself, or being driven by a friend or loved one, is less ideal because of delays that can occur en route or upon arrival at the hospital.

Even at major hospitals with dedicated 24-hour stroke teams, such as U-M, it can take an hour or more to use diagnostic tests to assess what type of stroke a patient is having and to start tPA treatment. At smaller hospitals, it can be more than an hour -- and intra-arterial tPA, which can be given up to six hours after the start of a stroke, may not be available.

So, a person experiencing a stroke really needs to get to a hospital within two hours of the start of a stroke to have the best chance of receiving tPA, says Morgenstern, who is a professor of neurology, emergency medicine and neurosurgery at the U-M Medical School and a member of the U-M Cardiovascular Center.

This kind of information, and the scientific reasons behind it, is what the public needs to hear from childhood on. That's why Morgenstern and his colleagues, including Kathleen Conley, Ph.D., of the School of Health Promotion and Human Performance at EMU, developed the "Kids Identifying and Defeating Stroke" program, called KIDS for short.

The KIDS project involved middle schoolers in the Corpus Christi district, who were tested on three things: their knowledge of what a stroke is, their ability to identify stroke symptoms and their knowledge of what to do if someone around them appeared to be having a stroke.

One group was tested in both sixth and eighth grades but did not receive any specific in-school training about stroke. The other group was tested in sixth grade before receiving four hours of stroke education each year for three years as part of their school curriculum. They were tested again at the end of the three years. Parents of both groups were also approached for testing.

The students who had had the in-school training tested better in eighth grade than those who had not, with the most dramatic increase in correct answers seen in the part of the test that assessed whether students knew that calling 911 was the best option for responding to a stroke.

The students were also given homework assignments to share the stroke information with their parents or other adults, and assess their

understanding of stroke. However, not enough of these assignments were completed to allow for a valid analysis.

References: KIDS study: Stroke, Nov. 2007, Vol. 38, pp. 2972-2978 Time to presentation: Stroke Dec. 2007; published online at doi: 10.1161/STROKEAHA.107.491852

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CONTACT: CONTACTS: Kara Gavin, [kegavin@umich.edu](mailto:kegavin@umich.edu), or Anne Rueter, [arueter@umich.edu](mailto:arueter@umich.edu), +1-734-764-2220, both of the University of Michigan Health System

Web Site: <http://www.med.umich.edu/>

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