For Rich and Poor, the Message Is Still “Dial 9-1-1”
But Is It Getting Through?

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See related article, pages 1508–1513.

The mantra for public service announcements on stroke has included 911/Emergency Medical System (EMS) use as the first point of contact for patients with stroke symptoms for over 10 years. The rationale behind this is clear. As with chest pain and acute myocardial infarction, 911/EMS use by patients with symptoms of stroke represents an early component in the Chain of Recovery.1 Furthermore, a single message links the urgency of “heart attack” and “brain attack”: reinforcing and directing action by the lay public. Though the benefits of 911/EMS use accrue in both the prehospital and in-hospital settings, it is unclear whether this message is getting through.

In the prehospital arena, stroke patients using 911/EMS arrive to the emergency department faster in comparison to those calling their primary physician or driving to a hospital or primary care site directly. There is also a strong association between EMS use and shorter time periods from symptom onset to hospital arrival—though this likely reflects a greater sense of urgency on the patient’s or bystander’s part rather than reduced transport times. Additionally, almost 20% of patients with stroke symptoms have acute medical conditions requiring paramedic-level interventions in the field, including emergent airway management.2

In the hospital setting, a strong association exists between EMS arrival and reduced time to initial physician evaluation, CT imaging and neurologic consultation and evaluation.

In this issue of Stroke, Kleindorfer et al extend our knowledge of EMS use by patients with stroke in their report on the association of socioeconomic status (SES) and demographics on differences in prehospital transport time for patients with stroke.3 Using data from the Greater Cincinnati/Northern Kentucky Stroke study, the authors performed retrospective analyses at the census tract level using Geographic Information Systems (GIS) mapping with current census and geocoding data for patients with the onset of stroke or TIA while at home. They have made appropriate adjustments to account for the potential effects of increased hospital proximity which could reasonably be found in low SES groups in a dense urban core and present well-defined rules for the management of data conflicts.

In their study, only 38% of eligible patients were identified as arriving via EMS, a figure at the lower end of the range reported from other post-thrombolytic era studies (29% to 65%). In a geographic area with a long history of an active stroke program and substantial, long-term, professional and public education, this raises concerns that the public message to call 911 in response to stroke symptoms may be missing the mark.

An alternate explanation may be the study’s exclusion of patients with stroke onset at locations other than their home (where a greater proportion of subjects may be alone). This resulted in a selection bias, a limitation the authors acknowledge. Even after making reasonable allowances for these limitations, though, concern remains regarding the effectiveness of national and local public stroke education efforts.

Data from the DASH II study indicated that knowledge of stroke symptoms alone was insufficient to increase EMS use in stroke patients (odds ratio 0.63, 95% CI, 0.40 to 0.98) and that interventions to achieve this goal should stress the urgency of stroke.4 EMS activation through 911 appears to be a function primarily of individuals other than the patient with data suggesting 62% to 95% of 911 calls are made by a family member, caregiver, coworker or other bystander. Thus, public service messages should broadly target not only those at risk but also families, friends and coworkers. Recently presented data evaluating local TV reporting of medical news across the top 50 US media markets found only 0.7% of 1799 stories were unique stroke stories. Of the 13 stroke stories, 75% implied that receiving treatment within 7 to 14 hours was effective.5 The optimum method, message and medium to maximize the impact of public education to increase 911 use in patients with stroke symptoms remain to be identified and are worthy of further study.

Encouragingly, the study authors found SES had no significant impact on total EMS time (initial 911 contact to hospital arrival) and that average EMS transport times were very brief (mean dispatch-to-arrival time of 34 minutes). Small (5 minute), statistically significant delays in total EMS time were identified for blacks, consistent with previous findings of discrepancies in access to healthcare in minority populations.

Importantly, the article also provides new information as to the average direct-line distance stroke patients travel via ambulance to reach hospital-based care in this time interval. With the emergence of designated stroke centers, and subsequent potential regionalization of stroke care, this provides key data for the efficient design of EMS protocols allowing delivery of patients to centers with acute treatment capability.
The promise of prehospital systems remains unfulfilled, and each link in the Chain of Recovery must be optimized to enhance the effectiveness of acute stroke therapy. Educational methods to increase patient action in accessing 911 after onset of symptoms should be sought. Though only minimal improvements in overall EMS time appear feasible, it may be possible to more effectively use transport time. This potentially includes the greater use of stroke screening tools such as the Los Angeles Prehospital Stroke Screen, Cincinnati Prehospital Stroke Scale or FAST (Face, Arm, Speech, Time) to provide earlier advance notice to receiving hospitals and stroke teams. The feasibility of neuroprotective agent delivery in the field has been demonstrated and may offer substantial time savings over the in-hospital setting.6,7 Finally, the design of regional EMS systems to leverage the impact of stroke centers should be sought. The findings of Kleindorfer et al indicate much work remains in getting the message, and the systems, right.

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References
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