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GUEST EDITORIAL

Optimization of acute stroke care in the emergency department: a call for better utilization of healthcare resources amid growing shortage of neurologists in the United States

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We assessed, via an observational email survey, the most prevalent manner in which emergency medical services (EMS) stroke code activations are currently managed by U.S. emergency departments (EDs). At certain primary stroke centers (PSCs), the fact that neurologists must be physically present in the ED at a stroke patient's bedside within 15 minutes of arrival lends added urgency to this issue. We sent inquiries to the EMS section of the American College of Emergency Medicine as they form the core of the stroke program model. Participants were drawn from across the country via an email survey (see www.surveymonkey.com). We received a total of 50 responses from EMS medical directors from across the United States, representing both suburban and urban population centers. These responses represented the practices of more than 144 PSCs, with two respondents having access to more than 10 PSCs and 55 comprehensive stroke centers (CSCs), and two other respondents having access to more than 3 CSCs. Some 37 of 46 (80.43%) respondents from PSCs indicated that the EMS stroke code is managed initially by the ED physician. In contrast, 19/46 (47.8%) indicated that the ED physician is primarily responsible for triage and workup in a suspected stroke victim at a CSC. Optimization of acute stroke care requires broadening the scope of the work of ED physicians into the triage, diagnosis, and management of patients who require tissue plasminogen activator (tPA) and bringing uniformity to their role.

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Physician burnout is escalating among neurologists, to the point of becoming a crisis.[1] It is therefore not illogical to conclude that the increased number of stroke alerts have contributed to the worsening workload of neurologists across the country. A workforce analysis of neurologists projected a 19% shortfall by 2025, up from 11% in 2012, signaling the approach of a perfect storm.[2] This alarming prediction comes at a time when U.S. physicians were reporting increased levels of burnout and expressing greater dissatisfaction with their work–life balance between 2011 and 2014.[2] More than half of the physicians surveyed in the same study stated that they had experienced professional burnout. Based on data released by the American Academy of Neurology in 2012, the raw numbers suggest a shortfall of 1,814 neurologists in the United States, accounting for the 11% deficit. By 2025, this shortfall is projected to climb to 3,380, or 19% lower than the required number. As per the American Stroke Association (ASA), an acute stroke occurs every 40 seconds, and the shrinking workforce of neurologists will only make matters worse. Because the overall sensitivity of EMS-suspected strokes is around 73.5%,[3] neurologists are left to sort out the high number of false-positive strokes in the ED, instead of the ED physicians. EMS agencies across the country perform stroke alerts or stroke code activations when transporting suspected stroke patients to the ED, a practice that reduces the door-to-CT (DTC) and door-to-needle (DTN) times for initiation of thrombolytics in eligible stroke patients, thus improving patient outcomes.

Patients are transported either to a PSC or CSC, depending on the availability of local resources. CSCs are generally university-run operations that come complete with "stroke teams" comprised of dedicated stroke attendings, fellows, residents, and students, though CSCs can be

institutions/hospitals that are not affiliated with a university teaching program. In contrast to PSCs, EMS technicians alert the neurology stroke team directly at CSCs, while evaluation of suspected stroke patients at a PSC may be performed by a physician extender, an ED physician, or an on-call neurologist. This overall paradigm is designed to improve DTN and DTC times in cases of acute strokes.

The benefits of tPA in acute stroke management are time-dependent. "Target: Stroke," a national quality-improvement initiative organized by the American Heart Association (AHA) and the ASA, was launched in January of 2010 to address the shortfall in providing timely care to acute stroke patients. Protocols for transport of stroke victims by EMS personnel directly to the imaging suite, thus bypassing the conventional ED triage and full assessment process, have been associated with DTN times of under 30 minutes (based on data from the Target: Stroke phase II "direct-to-CT protocol," released in October of 2014). However, the DTN time for tPA administration varies widely even among hospitals in the AHA/ASA "Get With The Guidelines–Stroke" (GWTG–Stroke) quality-improvement program, where less than 33% of patients had a DTN time under the recommended 60 minutes.[4]

Each of the participants in our survey were asked a battery of questions. The Cincinnati Prehospital Stroke Scale (CPSS) was used by 84.8% of the represented EMS agencies, followed by the Los Angeles Prehospital Stroke Scale (LAPSS) at 15%, the Miami Emergency Neurological Deficit (MEND) checklist at 15%, and the Rapid Arterial Occlusion Evaluation (RACE) at 6.5%. Approximately 80.43% of stroke alerts at PSCs were received and managed by an ED physician, suggesting that up to 19% of all stroke alerts were not. In contrast, 19 of 46 (47.8%) of respondents indicated that the ED physician was primarily responsible for triage and workup of suspected stroke victims at CSCs. Overall, 93% of respondents were "very" or "extremely confident" in the ability of an ED physician to assess and manage suspected stroke patients.

Based on our survey findings, even if severely limited by the low response rates, only 80% of acute stroke patients were managed by ED physicians at PSCs, leaving approximately 20% of patients waiting for a neurologist to perform an evaluation and begin treatment. It seems to us that there is no reason in the world today to delay treatment, particularly when, by design, stroke assessment involves a cookbook approach. Some PSCs have stroke teams that include an ED physician, a neurologist or "another specialist," and either a nurse or physician extender. As a rule, EMS personnel are permitted to initiate stroke code activation prior to ED arrival, but with a staggeringly high rate of around 27% false-positive stroke code activations,[3] the requirement of a neurologist to be present at the time of patient arrival undercuts treatment efficiency. In addition, there are no data which show that cancellation of false-positive strokes in the ED occurs at PSCs and whether the neurologist is notified of this change. Given these facts, some neurologists end up triaging their own false-positive stroke patients. In an ideal world, ED physicians would triage and manage acute stroke patients and consult a neurologist when in doubt.

We therefore reiterate that the ED physician at PSCs should be primarily responsible for assessing all cases of suspected stroke delivered by EMS technicians. Streamlining this process across the nation would bring uniformity, improve patient safety, and enhance timely rendering of services. Although a <15 min arrival of a neurologist is generally recommended in acute stroke case evaluations in the ED, it is unclear as to how precisely this practice is adhered to, since no published data exist. In a seminal opinion paper[5] that described the concept of "time is brain," every minute lost to acute stroke costs 1.9 million cells and 7.5 miles of myelinated fibers, a concept mirrored by a recent study involving large artery occlusion (LVO) strokes which showed that the chance of a good outcome is reduced 6% per hour of delay.[6]

In the best interests of stroke patients, care of acute stroke patients must be the preserve of the ED, since "time is brain." One of the findings in our survey was that EMS agencies assess strokes using different scales, and the LAPSS and CPSS were ranked among the most commonly employed. Some facilities utilize other scales, such as the MEND, the Melbourne Ambulance Stroke Screen, the Ontario Prehospital Stroke Screening Tool, the Dallas Area Stroke Council Stroke Evaluation Sheet, the BREMS Stroke Observation Scale, and the RACE, a tool that can accurately assess stroke severity and identify patients with acute stroke with LVO. However, no data exist to assess the comparative validity of these scales.

Triage by an ED physician should be the standard of care in PSCs. As a stroke scale, the CPSS appears to be the best prehospital stroke screening tool, being associated with higher EMS stroke recognition sensitivity and better positive predictive values.[3] The following strategies should be considered in order to optimize acute stroke care across in the United States: (1) the ED physician should be primarily responsible for assessing and treating all suspected stroke patients delivered by EMS technicians; (2) in contrast to PSCs, the EMS personnel should alert the neurology stroke team directly at CSCs, where stroke fellows, residents, and other capable staff are part of the stroke team; and (3) we strongly recommend that a stroke scale for posterior circulation defects be separately developed, since they make up 20% of all strokes.[7]

Disclosures

Jagannadha Avasarala and Keith Wesley hereby declare that they do not have anything to disclose.

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