Correspondence

An educational intervention allows for greater prehospital recognition of acute stroke☆,☆☆

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To the Editor:

We performed a study to determine whether a brief educational intervention directed at pre-hospital providers would increase the identification of stroke victims in the pre-hospital setting. The purpose of this IRB approved, before-and-after research project was to determine whether the implementation of Advanced Stroke Life Support Class (ASLS) [1] training for pre-hospital providers would lead to improved field identification of stroke.

In June 2014 we presented a didactic and scenario-based 8 h class teaching the Miami Emergency Neurologic Deficit, (MEND) exam [2] as part of the ASLS class which emphasizes the pre-hospital recognition and management of acute stroke to the 25 full-time and 15 part-time paramedics at a local ambulance service with approximately 16,000,911 calls/year. The receiving hospital is a 900-bed suburban teaching hospital with a yearly census of 80,000 and is a JCAHO approved comprehensive Stroke Center. The course consists of lectures, hands on instruction, and small group stations, which included standardized patients mimicking specific stroke syndromes. At each station, the participants were required to complete a patient assessment, identify the stroke syndrome (left brain, right brain, brainstem, cerebellum

and subarachnoid hemorrhage) and recognize candidates for IV tPA. A pre- and post-test was completed on the same day.

The total number of pre-hospital stroke alerts (PHSA) called by the cohort after taking the course was compared to the stroke alerts called by the same ambulance service in the period prior to the intervention. Period A represented the number of PHSA calls during the 19 months prior to any formal instruction. Period B represented PHSA calls 19 months after the class. For both periods we collected the total number of stroke alerts called, the number of strokes correctly identified and the number of PHSAs incorrectly called by this service. We also collected data on interventions (either IV tPA or EVR) for each period.

After the educational intervention (Period B) there were a total of 82 PHSA called (4.0 PHSAs/month). In Period A, there were 38 PHSA called (2.0/month). The number of pre-hospital stroke alerts called per total number of 911 calls were as follows: Period A: 38/17477 (0.22%) and in Period B: (82/24,090, 0.34); 911 calls in Period B had 1.57 times the odds of having a pre-hospital stroke alert called compared to Period A (95% CI 1.07–2.30). The absolute number of alerts called doubled in Period B (82 vs. 38) without sacrificing accuracy (see Table 1).

According to the American Heart Association (AHA), every 40 s a person in the United States suffers from an acute stroke [3]. Current AHA/American Stroke Association (ASA) guidelines state that the use of IV tPA improves functional outcomes at 3–6 months if given within 4.5 h and recommends its use in patients meeting eligibility criteria [4]. It has been shown that favorable outcomes are inversely related to the time between symptom onset and time of treatment [5-6]. A recent study conducted in San Francisco found that up to 39% of acute stroke

Table 1
Characteristics of pre-hospital stroke alerts Period A versus Period B.

	Period A (N = 38)	Period B (N = 82)	p-Value
Mean age	75 ± 14.3	75 ± 15.6	0.82
Gender (% female)	13 (54.2)	47 (57.3)	0.78
True strokes	30 (79.0)	57 (69.5)	0.28
Non-hemorrhagic strokes/not TIA	20 (66.7)	45 (79.0)	
Intracranial hemorrhage	4 (13.3)	6 (10.5)	
TIA	6 (20.0)	6 (10.5)	
Received IV tPA	10 (38.0)	21 (42.0)	0.77
Received IV tPA alone	8 (32.0)	16 (32.0)	1.00
Received EVR	2 (8.0)	9 (18.0)	0.32
Received EVR alone	0	4 (8.0)	0.29
Received both IV tPA and EVR	2 (8.0)	5 (10.0)	1.00
Final diagnosis other than stroke	8	25	0.44
Seizure	2	8	
Hypertensive urgency	0	1	
Complex migraine	2	3	
Psychogenic	1	4	
Brain tumor	1	1	
Bell's palsy	1	0	
Syncope	0	2	
Encephalopathy	0	2	
Other	1	4	

patients were not identified as having stroke symptoms, demonstrating missed opportunities for treatment of acute stroke [7].

Prior to the intervention, the ambulance service studied utilized the Cincinnati Prehospital Stroke Scale (CPSS), which takes about 30 s to perform and assesses the presence or absence of facial droop, arm drift and slurred speech [8-10]. The MEND exam utilized in this course incorporates the CPSS and elements of the NIHSS; it takes about 3 min to complete and should be performed en-route to the hospital [2,11]. It has been shown to correlate with the NIHSS [12] and use of the CPSS has been shown to increase EMS stroke identification sensitivity and positive predictive value [13]. The results of the pre- and post-test in the current study demonstrate mastery of the material with a dramatic improvement in scores and were consistent with those in the initial study [11].

The current study demonstrates that a brief educational intervention increased the number of stroke patients called to the ED as a pre-hospital stroke alert without sacrificing accuracy, thus increasing the number of patients eligible for acute interventions. It is not clear whether the increase in the number of stroke alerts called was partially a result of the Hawthorne effect or whether the confidence gained by successful completion of a course emphasizing identification of stroke syndromes and the possibility of therapeutic intervention was responsible. The fact that the improvement was maintained over a nineteen-month period suggests it was the latter.

In our quite typical EMS system an educational intervention that emphasized early stroke recognition doubled the rate of prehospital alerts and increased the absolute number of therapeutic interventions. The proportion of patients correctly identified as stroke and the proportion of patients receiving intravenous lytic therapy or endovascular reperfusion remained constant.

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