Impact of a Regional Educational Roll-out on Providers' Knowledge of Acute Stroke Management

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Background

Patients with acute ischemic stroke benefit from vertically integrated regional care plans. These plans should include the public, EMS (emergency medical services), local hospitals, nurses, clinicians, and regional stroke centers. All providers involved in the care must have an adequate personal knowledge base to perform appropriate management.

Maine EMS Region 4 (Figure 2) and Eastern Maine Medical Center (the regional stroke center) developed a regional Acute Stroke Identification and Early Emergency Department Notification protocol. This protocol standardizes EMS stroke screening and mandates EMS pre-arrival "Code Stroke" notification of the ED (emergency department) immediately upon recognition of the stroke. A "Code Stroke" is defined as a patient with symptoms consistent with stroke, at least one new (within 24-48 hours) positive finding on the Cincinnati Prehospital Stroke Scale, and euglycemia or ongoing symptoms after correction of hypoglycemia, The purpose of the early notification is to allow the ED to prepare as much as possible before patient arrival to minimize door to thrombolytic times.

Phase one of the project involved delivery of an educational roll-out session, entitled "The Maine EMS Region 4 'Code Stroke' Identification and Notification Protocol". The session was conducted by Dr. Busko and presented to EMS agencies and all 11 regional hospitals (Figure 3) for EMS providers, emergency department clinicians and nurses, and hospital administrators providing stroke care.

The objective of this study was to demonstrate the efficacy of an educational session/protocol roll-out in imparting knowledge about EMS and ED integrated acute ischemic stroke care and early notification.

Methods

An 8-question test was administered to participants in this study to assess baseline knowledge of acute ischemic stroke management.

Following the pre-test, a 1.25 hour educational session was conducted that included: (1) a discussion of stroke pathology, (2) current stroke therapy, (3) the regional identification and notification protocol, and (4) a discussion of issues in post-therapy transfer. The goals of this educational session were to increase knowledge of acute ischemic stroke care and, ultimately, to increase the number of eligible stroke patients receiving thrombolytics.

The same 8-question test was administered to participants after the educational session and the change in knowledge was assessed. See Figure 1 for the Pre-/Post-test questions. Participants were their own controls. Evaluation of the change in knowledge of acute ischemic stroke management was assessed using the paired *t*-test.

Figure 1. Regional Code Stroke Initiative Pre-/Post-Test

PLEASE CIRCLE THE MOST CORRECT ANSWER

1. The most common type of stroke is
   a) Acute ischemic stroke (occlusive)
   b) Acute hemorrhagic stroke
   c) Subarachnoid hemorrhage
   d) Amaurosis fugax
2. Stroke is the _____ leading cause of death in the United States
   a) 1st
   b) 2nd
   c) 3rd
   d) 4th
3. The American Heart Association currently endorses a _____ window for administration of thrombolytics in acute stroke.
   a) 2.5 hours
   b) 3 hours
   c) 4.5 hours
   d) 6 hours
4. The Food and Drug Administration (FDA) currently approves a _____ window for administration of thrombolytics in acute stroke.
   a) 2.5 hours
   b) 3 hours
   c) 4.5 hours
   d) 6 hours
5. What percentage of all patients presenting with acute ischemic stroke present within 3 hours of the onset of their symptoms?
   a) 10%
   b) 40%
   c) 60%
   d) 90%
6. The Cincinnati Prehospital Stroke Scale assess the following elements:
   a) Speech, Facial Droop, Glasgow Coma Score
   b) Age, Gait, Arm Drift
   c) Speech, Arm Drift, Gait
   d) Speech, Arm Drift, Facial Droop
7. Which of the following makes a post-TPA patient unstable/potentially unstable and therefore ineligible for a Paramedic Interfacility Transport?
   a) The patient has a blood pressure of 185 / 98 even with treatment
   b) The thrombolytic infusion is completed
   c) The patient has a normal mental status
   d) The patient has no life-threatening bleeding
8. Which patient is potentially eligible for thrombolytics for treatment of acute ischemic stroke?
   a) A 52-year old otherwise healthy male who awoke 30 minutes ago after 6 hours of sleep who now has new onset left sided hemiplegia
   b) A 64-year old female with acute onset right upper extremity paralysis with facial droop and aphasia 2 hours prior to arrival and now all the symptoms have resolved
   c) A 44-year old female who had acute left sided hemiparesis lasting 20 minutes that occurred 6 hours ago who now has recurrent and persistent left sided hemiplegia starting 1 hour ago
   d) A 58-year old male with acute right lower extremity paralysis starting 5 hours ago

Figure 2. Northeast Maine EMS, Region 4 is the emergency services medical council serving Penobscot, Hancock, Piscataquis, and Washington counties (12,968 square miles). EMS Services are shown on map (A); Region 4 is highlighted in yellow. The locations of the 11 hospitals in Region 4 are shown in red on map (B).

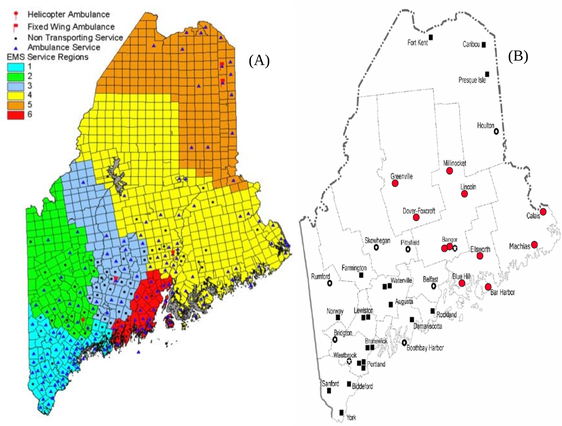

Table 1. Region 4 Statistics

Population Served	247,510
1st Responders	66
Ambulance Attendants	4
Basic EMTs	449
Intermediates	180
Critical Cares	11
Paramedics	128
Total Personnel	838
EMS Services	76
Hospitals	11

Table 2. Participants by License Level

License	Number
RN	10
MD/DO	3
FR	1
EMT-B	13
EMT I	21
EMT-P	32
Other	4
None	15

Results

Participants were enrolled from September 2 to September 16, 2010. During that time, 110 participants enrolled to take the pre-test, attend the educational session, and take the post-test. Ninety-eight (89%) of the participants completed both tests and education session. Twelve participants were unable to take the post-test because they were called out on duty. Knowledge items were drawn from the literature[1-4] and consisted of eight 1-point multiple-choice questions. Total knowledge scores were calculated as the sum of the number of correct items (maximum score, 8).

Mean and Standard Deviation (SD) for Stroke Knowledge (n = 98)

	Mean	SD
Pre-education Test	3.77	(1.15)
Post-education Test	6.36	(1.09)

The mean pre-test score was 3.77 (SD,1.15), the mean post-test score was 6.36 (SD, 1.09), and the mean difference was 2.59 (SD, 1.48) ($p<0.001$).

Discussion

We demonstrate that a 1.25 hour educational session improved participants' baseline knowledge of management of acute ischemic stroke. On November 1, 2010, the EMS protocol will go into effect. Phase 2 of this project will evaluate subsequent changes in practice behavior including event to thrombolytic time, ED arrival to thrombolytic time, and treatment rates amongst eligible patients to determine the clinical impact of this protocol.

Often times changes in practice, particularly protocol roll-outs, are accompanied by educational sessions written specifically for those changes. Unfortunately, such sessions are usually not validated and the assumption without proof is that the participant is learning the session objectives. We demonstrated that a 1.25 hour educational session improved participants' baseline knowledge of management of acute ischemic stroke. On November 1, 2010, the EMS protocol will go into effect. Phase 2 of this project will evaluate subsequent changes in practice behavior including event to thrombolytic time, ED arrival to thrombolytic time, and treatment rates amongst eligible patients to determine the clinical impact of this protocol.

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This study was approved by the Maine EMS IRB
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