

Emergency Medical Services in Stroke Care: A Rhode Island Perspective

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ADVANCES OVER THE PAST DECADE IN ACUTE stroke care, including the introduction of fibrinolytic and other short-term therapies, have highlighted the critical role of **emergency medical services (EMS)** agencies in optimizing stroke care.¹ Statistics show 29-65% of all stroke patients are treated by EMS.² In order to ensure the greatest outcomes for stroke patients, EMS must be considered an integral part of the stroke care system. The goal of prehospital care must be to deliver the greatest number of stroke patients to a primary stroke center within established timelines to provide for the best outcomes.

RHODE ISLAND EMS

In order to understand the role of EMS within the stroke system of care, we must first understand the EMS system in Rhode Island. The **Rhode Island Department of Health (RIDH)** Division of Emergency Medical Services in conjunction with the **Rhode Island Ambulance Service Coordinating Advisory Board (RIASCAB)** is responsible for the planning, licensing, development, and administration of a comprehensive statewide plan for emergency medical services for the State of Rhode Island. The RIASCAB is comprised of 23 members from various geographic regions of the State, and several areas of expertise.³ In addition to the Department of Health staff, the State

retains a physician medical consultant to oversee clinical aspects of the system including the Rhode Island Prehospital Care Protocols and Standing Orders. The most unique characteristic of Rhode Island emergency medical services is the absence of a mandate requiring individual agencies to have a medical director.

While the most visible component of the system is the nearly 400 licensed ambulances that are positioned in local communities, the State is comprised of 95 separate EMS agencies. The fire service makes up the majority of the EMS service in Rhode Island followed by third party municipal and commercial agencies. The volume and variety of agencies creates a complexity as we look at stroke care because each service has different resources, motivations, education, and experience.

In addition to the breakdown of agency type, we must also analyze the type of provider functioning within the agencies. Currently, there are 4200 licensed EMS personnel in the State, broken down into the following categories: **emergency medical technician (EMT)-Basic**, **EMT-Cardiac**, and **EMT-Paramedic**. Predominately, the prehospital provider is the EMT-Cardiac, which is a provider level unique to Rhode Island. There are also 91 licensed EMT- instructor/coordinators.

PREHOSPITAL CARE STROKE PROTOCOL

The current prehospital stroke care protocol was developed in December of 2002, prior to the recognition of the importance of EMS in stroke care. Ironically, it was not just hospitals that did not realize the importance of EMS; prehospital providers themselves did not realize that their care had such a profound affect on stroke patient outcomes. The Cincinnati Prehospital Stroke Scale is used as an assessment tool in addition to recognition criteria of monocular blindness, vertigo, or ataxia, without impaired consciousness.⁶ In patients who are impaired, providers are referred to the Impaired Consciousness Protocol. Current treatment protocols include: determination of when the patient was last known without symptoms, withholding the administration of oral medications, and administration of oxygen at the highest concentration tolerated. The protocol directs the use of the prehospital stroke scale to determine the treatment priority yet there is no reference to transport the stroke patient to a primary stroke center.⁴ The protocol is a good foundation but must be updated and reorganized to reflect current recommendations for prehospital stroke care and the provisions of the Stroke Prevention and Treatment Act of 2009.⁹

Table 1. Guidelines for EMS Management of Patients with Suspected Stroke²

Recommended

- Manage ABCs
- Cardiac monitoring
- Intravenous access
- Oxygen (as required O2 saturation <92%)
- Assess for hypoglycemia
- NPO
- Alert receiving facility
- Rapid transport to the closest appropriate facility capable of treating acute stroke

Not Recommended

- Dextrose-containing fluids in non-hypoglycemic patients
- Hypotension / excessive blood pressure reduction
- Excessive intravenous fluids

AMERICAN STROKE ASSOCIATION RECOMMENDATIONS

The effective integration of EMS for stroke involves complex interactions among the public, 9-1-1 call center personnel, EMS providers, emergency department providers, and stroke care specialists. The most important goals for prehospital care for stroke patients include the identification of the stroke patient in the field, the provision of appropriate prehospital care to the patient, and the transport of the patient to the most appropriate hospital. All of these goals should be achieved in the shortest amount of time possible.¹

From an EMS system perspective, the **American Stroke Association (ASA)** 2004 Stroke Systems Task Force's original recommendations for EMS in the context of stroke care fall within the following four categories:¹

- Activating and dispatching the EMS response for stroke patients. Stroke systems should require appropriate processes that ensure rapid access to EMS for acute stroke patients.
- EMS responders should use protocols, tools, and training that meet current ASA/AHA guidelines for stroke care.
- Prehospital providers, emergency physicians, and stroke experts should collaborate in the development of EMS training, assessment, treatment, and transportation protocols for stroke.
- Patients should be transported to the nearest stroke center for evaluation and care if a stroke center is located within a reasonable transport distance and transport time. The determination needs to take into account issues such as the availability of stroke centers and geography and whether transportation to a stroke center is possible within the appropriate time for acute therapeutic interventions.

Recent clinical guidelines for EMS personnel are established in *Stroke: Guidelines for the Early Management of Adults with Ischemic Stroke*, which was published in 2007, five years after the current Rhode

Island Prehospital Care Protocols and Standing Orders for stroke were written. Guidelines for EMS management of stroke patients are presented in Table 1.

REVISED PREHOSPITAL CARE STROKE PROTOCOL

The Rhode Island Stroke Task Force, in collaboration with the Rhode Island Stroke Coordinators Network, and the American Stroke Association, has drafted an updated prehospital stroke protocol has been approved by the Rhode Island Department of Health and the RIASCAB. The revised protocol is based on the recommendations set forth in *Stroke: Guidelines for the Early Management of Adults with Ischemic Stroke* as well as the expertise of local stroke experts.

The revised protocol places emphasis on the use of the **Face Arm Speech Time (FAST)** test based on evidence that prehospital providers achieved high levels of detection and diagnostic accuracy for stroke using FAST.⁵ The original recognition criteria were left in place as it was felt that abrupt disturbance of gait and vision disturbances may be the only signs and symptoms in a small number of stroke patients. In addition to wording that reflects not administering aspirin or other medications, the patient should be kept NPO.

Following initial assessment there has been a prioritization of determining the last known well time. In addition to determining the time of onset, the protocol also suggests transporting a witness with the patient or obtaining contact information such as a cell phone number which can be provided to the hospital staff. There is also specific guidance as to important aspects of patient history which should be obtained and documented.

Treatment focuses on obtaining blood glucose analysis to rule out hypoglycemia. Administration of high-flow oxygen has been changed to the use of supplemental oxygen to maintain normal pulse oximetry based on recognized clinical guidance.¹⁰ For **advanced life support providers (ALS)**, the initiation of intravenous access utilizing normal saline solution and the acquisition of an EKG should occur during transport.

The most important component of the revised protocol is designating a **primary stroke center (PSC)** as the

preferred receiving facility for suspected stroke patients. This revision reflects the recommendation as set forth by the ASA and the Rhode Island Stroke Prevention and Treatment Act of 2009. The protocol directs providers to contact medical control at the closest PSC. If a PSC is within a 30-minute transport time, it should be the preferred receiving hospital for patients with suspected stroke.

AREAS OF IMPROVEMENT FOR RHODE ISLAND

Although stroke patients receive quality care in Rhode Island, there is room for improvement as we move forward in a coordinated effort to improve outcomes for the stroke patients of our State. The areas that need improvement to meet established ASA recommendations are: (1) educational standard, (2) feedback, (3) **continuous quality improvement (CQI)** and (4) qualified medical dispatch.

RIDH licenses EMTs to three levels: Basic, Cardiac, and Paramedic. These levels of licensure vary in length from 130 to 1200 hours. Based on the duration of the whole training course, minimal time is dedicated specifically to stroke care in an initial prehospital provider course. RIDH requires recertification every three years with scant attention specifically geared toward stroke education. The ASA recommends that 100% of EMS providers complete a minimum of two hours of instruction on stroke assessment and care as part of their required continuing medical education for certification and re-licensure.¹

Potential roadblocks to increasing the educational component are time, money, and resources. As prehospital providers struggle to meet the demands of the rapidly changing healthcare system, stroke is just one of the many areas that require attention. As previously stated, the majority of the prehospital providers in the State are employed by municipalities. Due to the economic climate, funding that may have been used to provide stroke education is being reallocated. In addition, as RIDH looks toward acceptance of the **Department of Transportation's (DOT)** National Standard Curriculum for all Emergency Medical Service Personnel, there is limited stroke-related subject matter despite the importance of identifying stroke patients.⁷

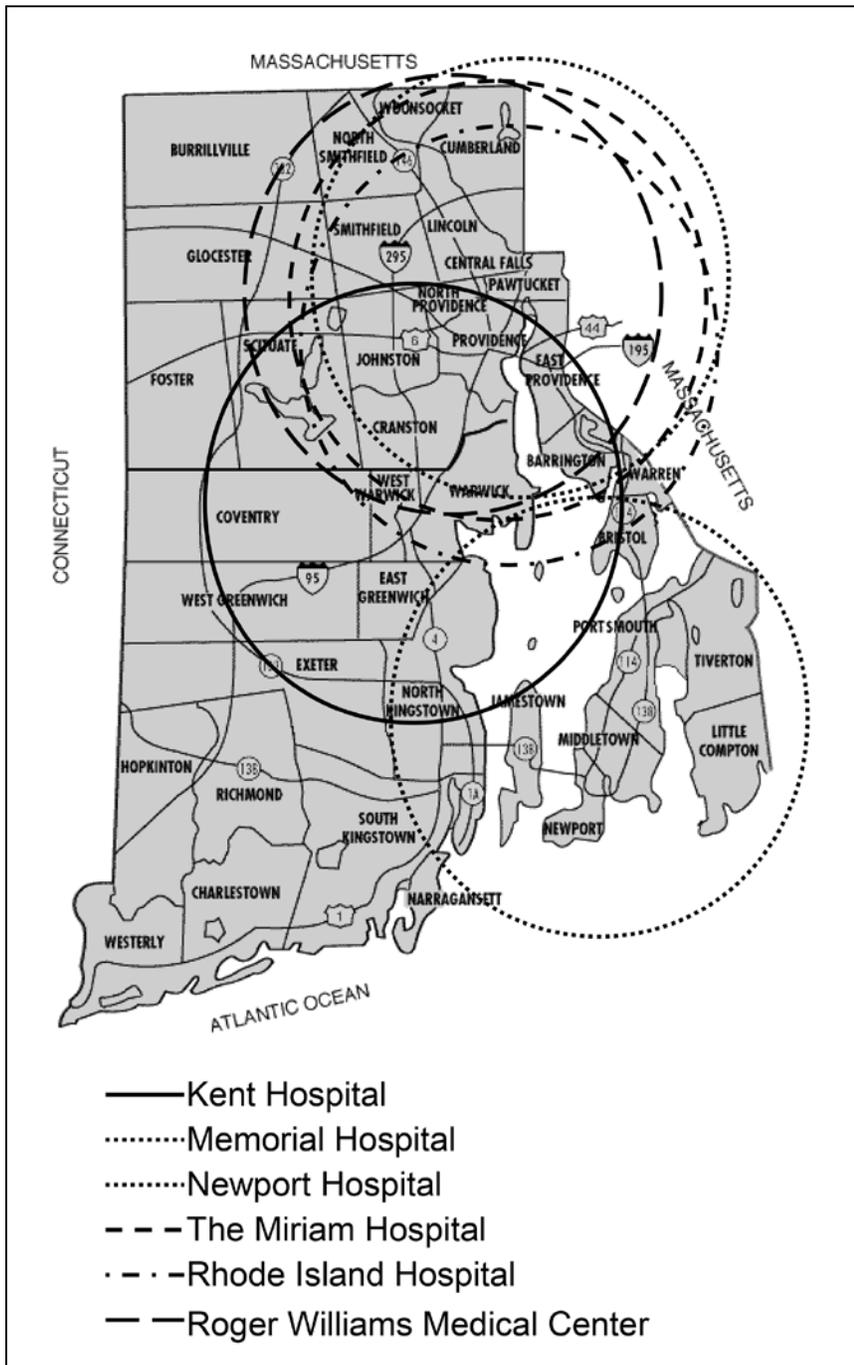


Figure 1. A geographical representation of 30 minute transport times to Rhode Island stroke centers

Many opportunities exist to integrate EMS into the stroke system. (1) Stroke experts can make presentations to EMS agencies. (2) EMS agencies can host stroke experts for ride-alongs. (3) Stroke centers can make contact information available to answer EMS/stroke related questions. (4) Quick-reference stroke educational materials can be made available to EMS personnel. (5) Networking opportunities between EMS and stroke center personnel should be embraced.

The ASA emphasized the importance of feedback when it issued the recommendation that feedback be provided to EMS on 100% of stroke patients.¹ Feedback is critical to improve stroke recognition by prehospital providers. It must be automatic and consistent to ensure that EMS understands when a stroke has been correctly identified in the field as well as capture those strokes that may have been missed. Feedback also allows providers to track patients through the continuum of care. The

objective of feedback is improved care and coordination of stroke patients. Currently, Rhode Island lacks a system of feedback from the hospital to EMS agencies.

The greatest obstacle of feedback to EMS is the **Health Insurance Portability and Accountability Act (HIPAA)**. In an effort to maintain confidentiality of patient's protected medical information, feedback regarding patient outcome becomes a neglected process. In addition to the obstacles that must be overcome for the sake of confidentiality, feedback requires time and personnel that many facilities may not have to devote to the process.

HIPAA permits providers to use and disclose protected health information for certain healthcare operations; many CQI activities fall squarely within the healthcare operation exception.⁸ Stroke experts and EMS leaders must work together to develop a system of feedback that is timely, meaningful, and most of all achievable. Rhode Island should research and build upon the methods of feedback used in successful stroke systems in other states. One example is the feedback tool used by the Saint Luke's Brain and Stroke Institute in Kansas City, Missouri. Debbie Summers, Advanced Practice Registered Nurse and Stroke Program Coordinator at Saint Luke's explained to me, during a personal communication, that Saint Luke's provides feedback on 100% of stroke patients transported by EMS who receive intervention at the stroke center. The feedback provides pre- and post-treatment imaging, clinical outcome, and discharge disposition. The feedback tool can also provide contact information for local stroke experts and a brief explanation of treatment options.

The ASA also recognizes the critical need for CQI within the stroke system of care which should include assessments of all participants of the stroke care team including EMS. CQI must involve the exchange of information between hospitals and external agencies such as emergency medical service systems and dispatch centers. As an objective review of all aspects of care, the goal of CQI is to continuously improve care to stroke patients. In order for CQI to be effective, it must ensure that 100% of stroke patients are included in CQI activities.¹

Recognizing the need to continuously improve care to all patients, RIDH

has mandated that all EMS agencies participate in CQI activities. RIDH is also in the process of developing a standardized **electronic patient care reporting (E-PCR)** system that is **National Emergency Medical Service Information System (NEMSIS)** compliant. The ability to electronically capture and compile NEMSIS data points will allow agencies to determine areas of proficiency and also areas where improvement is needed. Data can also be integrated into national databases for comparison.

The final area where Rhode Island must focus attention to improve outcomes for stroke patients is ensuring that EMS dispatchers are trained according to nationally recognized emergency medical dispatch guidelines. Currently, Rhode Island does not have a standard for personnel that dispatch EMS vehicles. RIDH has established a task force to make recommendations regarding a future standard. The ASA has recommended that 100% of call centers use dispatch guidelines that prioritize patients experiencing stroke symptoms as requiring a high-priority and receive the greatest level of care. EMS dispatchers should also be trained to correctly identify a high percentage of callers experiencing stroke and dispatch resources appropriately. In addition the ASA has established the guideline that the time period between the receipt of a call and the dispatch of EMS personnel should be less than 90 seconds for 90% of stroke related incidents.¹

Mandating that all 911 dispatch centers use nationally recognized emergency medical dispatch guidelines reflecting the recommendations of the American Stroke Association for the care of stroke patients would ensure compliance with many of the recommendations. The greatest barrier

to providing qualified medical dispatch are funding and resources. Until funding can be made available to staff dispatch centers to appropriate levels it will be difficult to accomplish the goal of training dispatchers to meet nationally recognized emergency medical dispatch guidelines

Effective August 1, 2011, the revised prehospital protocol recommends that a primary stroke center should be the preferred destination for stroke patients if they fall within a 30-minute transport radius of the facility. As shown in figure 1, not all Rhode Islanders have equal access to a primary stroke center; the western border of Rhode Island, especially toward the north and south portions of the state, lies beyond the limits of the revised protocol. The certification of additional hospitals as primary stroke centers will allow greater access for these areas that are beyond a 30-minute transport time.

CONCLUSION

Recent data indicates that 29% to 65% of patients with signs or symptoms of acute stroke access their initial medical care via local EMS, which confirms the role of EMS in the chain of survival.² Based on these statistics, the Rhode Island system for stroke care must collaborate to ensure that prehospital providers are attaining the goals set forth by the American Stroke Association to improve the outcomes for stroke patients.

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Disclosure of Financial Interests

The author and/or their spouse/significant other have no financial interests to disclose.

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