THE REGIONAL EMERGENCY MEDICAL SERVICES COUNCIL OF NEW YORK CITY, INC.

Regional Emergency Medical Advisory Committee

Minutes

April 18, 2017

The Regional Emergency Medical Advisory Committee (REMAC) of New York City met on Tuesday, April 18, 2017 at the Offices of the Regional EMS Council, 475 Riverside Drive, New York City. This meeting can be viewed via webcast at www.nycremsco.org.

Members		***Present***	***Absent***
Burn Surgeon (1)	Robert J. Winchell, MD		√
Downstate New York Ambulance Association			
Ambulance Service Medical Director (1)	Josef Schenker, MD, Chair		√
Emergency Medical Technicians (Basic/Paramedic) (2)	Michael Vatch, EMTP Robert Ackerman, Alt		√
	Vacant vacant, alt		
EMS Community Emergency Department			
Medical Directors (3)	Nikolaos Alexandrou, MD	√	
	Christopher Graziano, MD		√
	Vacant		
Nurses (2)	Eric Cohen, RN		√
	Mimi Langsam, RN		√
Administrators (2)	Kevin Munjal, MD	√	
	Cindy Baseluos, MD	√	
FDNY EMS			
Commissioner or Non-Physician Designee	Vacant		
Medical Director (3)	Dario Gonzalez, MD	√	
	Glenn Asaeda, MD		√
	Bradley Kaufman, MD, 2nd Vice Chair	√	
Online Medical Control Physicians (2)	Doug Isaacs, MD	√	
	Nathan Reisman, MD	√	
Emergency Medical Technicians (Basic/Paramedic) (2)	Telina Lloyd, EMTP	√	
	Joshua Bucklan, RN, EMTP		√
Greater New York Hospital Association			
President or Non-Physician Designee (1)	Alison Burke		√
Emergency Physician (1)	Jeffrey Rabrich, MD, 1st Vice Chair	√	
Ambulance Service Medical Director (1)	Heidi Cordi, MD		√
	Lewis Marshall, JD, MD		√

On Line Medical Control Physicians (2)	Michael Redlener, MD Michael Hilton, MD, alternate	√	
Emergency Department Administrator (2)	Michael Guttenberg, DO	√	
	Pamela Lai, MD	√	
Emergency Medical Technicians (Basic/Paramedic) (2)	Dominick Battinelli, EMTP	√	
	Scott Chiang, EMTP	√	
Medical Society of New York Physician (1)	Peter Wyer, MD	√	
Medical Standards Committee			
ALS Physician (1)	Paul Barbara, MD	√	
BLS Physician (1)	David Ben-Eli, MD	√	
New York City Department of Health & Mental Hygiene-Emergency Preparedness Program Physician (1)	Celia Quinn, MD, MPH Timothy Styles, MD, MPH, alternate	√	
New York City Health & Hospitals Corporation Physician (1)	Vacant		√
New York City Police Department Physician (1)	Charles Martinez, MD	√	
NYS Volunteer Ambulance & Rescue Association/District 4 & 18			
Ambulance Service Medical Director (1)	Joseph Bove, MD		√
Emergency Medical Technicians (Basic/Paramedic) (2)	Martin Grillo, EMTP	√	
	Vacant		√
Pediatric Emergency Medicine Physician (1)	Matthew Harris, MD		√
	Stephen Blumberg, MD, alternate		
Psychiatric Emergency Medicine Physician (1)	William Fisher, MD	√	
Regional EMS Council NYC Physician (1)	Robert Crupi, MD	√	
Training & Education Committee Physician (1)	Jessica van Voorhees, MD	√	
Trauma Surgeon (1)	Arthur Cooper, MD		√
	Gary Marshall, MD, alternate		
Non-Voting Members			
At Large	Yedidyah Langsam, PhD, EMTP		√
At Large	Anthony Shallash, MD	√	
Public	Christopher Sorrentino, RN	√	

STAFF: Nancy Benedetto, Executive Director Administration
Marie Diglio, Executive Director Operations
Joseph Raneri, Disaster Preparedness Coordinator

GUESTS: James Downey, NYSVA&RA
Madeline Fong, EMTP
Robert Goldstein, EMTP, NYPS-ESU
Rich Menaik, MD, FDNY
M. Meredith Masters, MD, FDNY
Benjamin Zabar, MD, FDNY

Dr. Jeffrey Rabrich, Vice-Chair, called the meeting to order. For the purposes of web casting, a roll call was performed. A quorum was present.

The Minutes of the March 21, 2017 REMAC Meeting were unanimously approved.

Voting Requirements. A quorum is based on the number of voting seats – whether they are filled or vacant. Currently, REMAC has 30 voting seats, so when voting, a majority of members must vote in the affirmative to pass any motion. That means, 16 votes in the affirmative are needed to pass any motion.

CORRESPONDENCE REPORT

The Offices of the Council received the following correspondence:

- **Membership:**
  - No new information
- **From NYS DOH:**
  - Public Notice from New York State Department of Health, Bureau of EMS, Operations Unit, to be read into the REMAC Minutes of the following enforcement actions:

Provider /Agency Name	EMT / Agency #	Penalty	Violation	County of Residence
Andrew Lesce	363713	Six (6) month suspension (already served), 1-year probation beginning 03/20/2017, $1000 civil penalty.	Part 800.16(a)(4)	New York

  - Notice of the following Trauma Center designations:
    - Lincoln Medical Center in the Bronx is a Level 1 Trauma Center for a year

- Mid-Hudson Regional Hospital of Westchester Medical Center as a Level 2 adult Trauma Center for 3 years

- SeniorCare notified NYC REMAC that it is now approved to operate as an Ambulance Transfusion Service (ATS).
  - This service may now administer blood/blood products during transport.

➢ Other:

- Stroke Report from Michael Redlener, MD, Chair
- NYPD ESU Updated ALS Tactical Protocols
- Proposed Non-Transporting ALS Unit Staffing Standards for community paramedicine from Kevin Munjal, MD.

The Office of the Council sent the following correspondence:

➢ Agendas, Minutes and associated attachments for the meeting.

➢ Letter to Commissioner Zucker, NYS DOH, recommending minimum staffing standards for mass gatherings.

- A response was received from Lee Burns, NYS DOH BEMS, stating REMAC does not have authority to impose requirements outside of the EMS System. However, the department would be interested in consulting with the REMAC in the planning and permitting of certain large/high risk events.

SUBCOMMITTEE REPORTS

Medical Standards Committee *(David Ben-Eli, MD, Chair, Paul Barbara, MD, Vice-Chair)*

Dr. David Ben-Eli, Chair, reported the following:

The following Protocol revision is presented in the form of a seconded motion from the Medical Standards Committee:

1. Smoke Inhalation (500A)
   a. The following language has been added to clarify that patient can be treated for more than one symptom:

      #6. Patients with the following symptoms, after exposure to smoke in an enclosed space, should be administered the medications listed in Table 1, if available**, in addition to being treated under the appropriate protocol.**

   b. The GOP will be checked for similar language corrections.

REMAC conducted a roll-call vote, as follows: 17 in favor, 1 opposed and 0 abstentions. The motion carries. The revised protocol is attached.

2. The Medical Standards Committee referred the following discussions to Protocol Committee:
    a. Midazolam Dosing
    b. On-Scene Medical Control
    c. CPAP for BLS
    d. Transport of patients to trauma centers
    e. Community Paramedicine non-transporting ALS unit staffing standards

The next meeting of the Medical Standards Committee will be held on Tuesday, June 6, 2017 at 5:00pm.

REGIONAL COUNCIL UPDATE

The Regional Emergency Medical Services Council of New York City meeting was held on Tuesday, March 28, 2017, at the offices of the Regional Council, NYC. The following is a meeting summary:

- A moment of silence was observed in memory of EMT Yadira Arroyo.
- Fayola Creft was appointed to replace Johanna Miele as alternate for Mordechai Goldfeder, NYCEM
- Joseph Schenker, MD, was appointed as the primary representative from REMAC to REMSCO. Dr. David Ben-Eli will be alternate.
- NYC REMSCO was activated to staff the NYCEM Emergency Operations Center (EOC) during winter storm Stella on 3/13/17 – 3/14/17. Received a small number of requests for tow truck assistance. Will be updating the REMSCO Dialogics system with new agency contacts.
- Finally received shipment of new naloxone. Notification was sent out to agencies so they may come and restock their supply.
- EMS Week is fast approaching. Agencies are asked to submit photos for our EMS Week video. EMS Award nominations must be in by April meeting for submission to SEMSCO in May. The Pizzi Paramedic scholarship is still open for nominations.
- The Regional EMS Council nominated Yadira Arroyo for BLS Provider of the year, posthumously.

The next meeting of the Regional EMS Council will be held April 25, 2017.

JOINT REMSCO/REMAC QA COMMITTEE UPDATE *(JOSEPH SCHENKER, MD, CHAIR)*

The Joint Regional Emergency Medical Services Council/Regional Emergency Medical Advisory Committee (REMAC) Quality Improvement Committee will meet on Wednesday, May 3, 2017.

STATE EMS COUNCIL/SEMAC UPDATE *(Yedidyah Langsam, PhD)*

No report. The next State EMS Council/SEMAC meeting will be held on May 9 – 10, 2017, in Albany.

UNFINISHED BUSINESS

Stroke TAG Report: (Michael Redlener, MD/David Ben-Eli, MD)

Dr. Redlener continued the discussion begun at the Medical Standards Committee meeting. He thanked Dr. David Ben-Eli and Dr. Ethan Brandler for all their work. On behalf of the Stroke TAG, he put forward the following motions:

1. The Stroke TAG recommendations in its report should be a framework for development of a regional stroke system.
    a. REMAC discussed this issue and voted unanimously to support.
2. REMAC and FDNY should go forward with partnerships with AHA and other interested parties.
    a. REMAC discussed this issue and voted unanimously to support.
3. The Stroke Scale component needed for the new Stroke Protocol will be forwarded to the Protocol Committee for incorporation into regional protocols.
    a. REMAC discussed this issue. It was stated that this is an educational issue and must involve input from regional educators. REMAC voted unanimously to support.

NEW BUSINESS

No new business.

No further discussion, the meeting adjourned at 8:00 pm. **The next meeting of the REMAC is scheduled for June 6, 2017.**

500-A

SMOKE INHALATION

This protocol should be utilized ONLY for the management of symptomatic patients after exposure to smoke in an enclosed space and cyanide exposure is suspected.

1. Begin Basic Life Support Procedures
2. If necessary, perform Advanced Airway Management *.
3. Begin Cardiac & Pulse Oximetry monitoring.
4. Begin SpCO monitoring, if available
5. Begin two IV infusions of Normal Saline (0.9% NS). Refer also to Protocol #528 for all patients with burns.
6. Patients with the following symptoms, after exposure to smoke in an enclosed space, should be administered the medications listed in Table 1, if available**, in addition to being treated under the appropriate protocol.**
   - Hypotension not attributable to other obvious causes
   - Altered mental status
   - Coma
   - Seizures
   - Respiratory arrest
   - Cardiac arrest

   NOTE: **Prior to administration of Hydroxocobalamin, obtain three blood samples using the tubes provided in the cyanide toxicity kit, if available.**

   Whenever Hydroxocobalamin is administered, follow with a 20 ml flush of normal saline (0.9% NS) prior to administration of any other medication.
7. In the event of continued hypotension (SBP <90mmHg), administer Dopamine 5 ug/kg/min, IV/Saline Lock drip. If there is insufficient improvement in hemodynamic status, the infusion rate may be increased until the desired therapeutic effects are achieved or adverse effects appear. (Maximum dosage is 20 ug/kg/min, IV/Saline Lock drip.)

* *If the patient is alert prior to performing Advanced Airway Management, refer to Prehospital Sedation in General Operating Procedures. Prior permission from Medical Control is required.*

TABLE 1 One Bottle Kit (5.0gm/200mL/bottle)		
Age Group	Hydroxocobalamin [A]	Sodium Thiosulfate [B]
Infant/Toddler (0-2 years)	¼ bottle	250mg/kg (3cc/kg prepared solution) administered over 10 minutes, IV
Preschool (3-5 years)	1/4 bottle	

Grade School (6-14 years)	1/2 bottle	
Adult (≥15 years)	1 bottle	12.5g 150mL of a prepared solution) administered over 10 minutes IV

[A] Hydroxocobalamin may be mixed with D5W, Normal Saline, or Lactated Ringers. The vented macro drip tubing that accompanies the Cyanokit, should be used, wide open to ensure correct administration time of approximately 15 minutes for the kit.

[B] Sodium Thiosulfate solution should be prepared by adding 12.5g (50mL) to a 100cc bag of D5W.

NOTE: **In the event that only one intravascular access line is established, administer Hydroxocobalamin first before Sodium Thiosulfate.**

MEDICAL CONTROL OPTIONS:

OPTION A: Transportation Decision.

NOTE: **For patients exhibiting signs and symptoms consistent with carbon monoxide poisoning, refer to General Operating Procedures – Transportation Decisions and Procedures.**

CYANIDE TOXICITY KIT (if available)

One (1) 5.0 g bottle of crystalline powder Hydroxocobalamin	One (1) 2 ml fluoride oxalate whole blood tube
One (1) 12.5 g bottles of Sodium Thiosulfate (50 mL of 25% solution)	One (1) 2 ml K2 EDTA tube
Two (2) 100 mL bag 0.9% NS, D_5W, LR	One (1) 2 ml lithium heparin tube
One (1) 100 mL bag D_5W	

New York City REMAC Stroke Systems of Care

Technical Assistance Group II
Report to REMAC
April 18, 2016

Committee Members:
Michael Redlener, MD (Mount Sinai St. Luke's/West)- Chair
David Ben-Eli, MD (FDNY)
Ethan Brandler, MD (SUNY Stonybrook)
Glenn Asaeda, MD (FDNY)
Paul Barbara, MD (Staten Island University Northwell)
Heidi Cordi, MD (NYP Columbia)
Robert Crupi, MD (NYP Queens)
Marie Diglio, EMT-P (REMAC/REMSCO)
Michael Guttenberg, DO (Northwell)
Doug Isaacs, MD (FDNY)
Bradley Kaufman, MD (FDNY)
Pamela Lai, MD (NYP Queens)
Kevin Munjal, MD, MPH (Mount Sinai Hospital)
Joe Schenker, DO (Seniorcare EMS)

OBJECTIVE

To develop an evidence-based, patient-centered, prehospital plan and protocols for the identification, treatment, and transport of patients with potential Large Vessel Occlusion (LVO) stroke in the New York City region, in order to allow optimal definitive treatment for those patients, while balancing the demands of providing care of all patients in the New York City Region.

UPDATE

After the initial Stroke TAG report was presented in June 2016, REMAC has worked to accomplish the Phase 1 recommendations as set forth by this committee. NYC REMAC Stroke TAG members and REMAC leadership have continued to work with the American Heart Association, members of the New York State Stroke Advisory Board, and others to develop the concepts of a System of Care for Stroke in the era of endovascular care for stroke.

This report will present the work done by REMAC Stroke TAG members to incorporate up-to-date literature and national guidance with regard to prehospital stroke care, the triage of acute stroke patients, and transport decision-making for the region.

PHASE 1: INITIAL RECOMMENDATIONS

1. **Expand stroke notification window to 5 hours from 3.5 hours (Accomplished)**
2. **Identify all current and planned interventional Stroke resources in NYC (Accomplished)**
3. **Identify funds for possible Phase 2 Implementation (In Process)**

PHASE 2: RECOMMENDATIONS

Response model

- **BLS response with glucometry evaluation for all CVAC call types**

Three models/options had been discussed as possible updates to the current stroke/CVA model: ALS response, BLS response with glucometry, BLS response without glucometry (with new stroke scale). Given the recent REMAC change, all BLS ambulances will be required to have glucometry capabilities – this change addresses concerns regarding overtriage of possible hypoglycemic patients. While ALS providers will have more medical knowledge and potentially a greater discretion with implementation of the stroke scale for LVO, BLS ambulances are more abundant and may respond more quickly. Additionally, focus on BLS skills and the usage of the stroke scale will enable more rapid scene times.

Transportation Decisions

- **Patients determined to have "Severe Stroke" or "Possible LVO Stroke" will be taken to the closest Comprehensive Stroke Center (CSC) (or Endovascular-Ready Center (TBD)) if transport is ≤ to 15 minutes greater than the closest Primary Stroke Center (PSC), OR the CSC is less than 30 minutes total transport time.**

The American Heart Association recommends that patients with possible LVO symptoms be transported directly to a CSC under the conditions listed in this recommendation. While there is literature demonstrating possible benefit of greater transport times to CSCs, this is a national standard and recommendation that fits with the New York City region given the abundance of Stroke Centers. Recent evidence cited below suggests that bypassing centers with door to needle times of 60 minutes or greater may be beneficial as endovascular capable centers have shorter door to tPA times as compared to primary stroke centers. See appendix 1 for map of existing and proposed comprehensive stroke centers.

- **No On-Line Medical Control contact required for Stroke transport**

On Line Medical Control (Telemetry) had been discussed as a way to support the decision-making process. There are several reasons for the recommendation against using this resource. If we have a scale that is clear and easily implemented, the addition of a physician evaluation will not add to the discretionary quality. Also, given competition for other call needs at OLMC, it is felt that there will be delayed transport for patients with little benefit. In addition, the burden on OLMC with stroke transport decisions will add to an already overloaded OLMC workload. The model for this method is the trauma center designation in that, EMS providers, will be dispatched to the closest specialty center per the criteria decided regionally.

Stroke scale

- **New York City should adapt a one-step stroke scale with evidence-based foundation and utility that appropriately balances test characteristics and practical implementation.**

Over the past year, there has not been overwhelming evidence proving the superiority of one prehospital stroke scale over others in identifying LVO stroke patients. Each EMS system or service has chosen a scale based on the needs and limitations of their environment with mixed results (Need data). The discussion during the Stroke TAG meetings focused on balancing practical implementation versus test characteristics (sensitivity, specificity, positive and negative predictive values) of existing scales.

STROKE TAG II: INTEGRATED STROKE PROTOCOL

This protocol:

- Incorporates elements of the Los Angeles Motor Scale (LAMS) and the Cincinnati Prehospital Stroke Scale (CPSS), to become the primary ONE-STEP tool to evaluate stroke patients.
- Assumes glucometry
- Removes need for Telemetry contact

Exclusion criteria:

1. LOC Yes No
2. SZ (current or PMH) Yes No
3. FS < 60 Yes No
4. Last known well > 5 hours Yes No
5. Age < 45 y/o Yes No
6. Trauma causing symptoms Yes No
7. Wheelchair/bed ridden Yes No

If all NO, proceed with LAMS:

Assess facial droop – 0 (absent) 1 (present)

Assess arm weakness – 0 (absent) 1 (drifts down) 2 (falls rapidly)

Assess grip strength – 0 (normal) 1 (weak grip) 2 (no grip)

- If LAMS sum ≥ 4, transport to Endovascular Stroke Center
- If LAMS sum = 3, assess speech – 0 (normal) 1 (abnormal)
    - If LAMS + Speech sum = 4, transport to Endovascular Stroke Center, otherwise transport to Primary Stroke Center
- If LAMS sum = 1-2, transport to Primary Stroke Center
- If LAMS sum = 0, transport to closest appropriate Emergency Department
- If patient on anticoagulants, and LAMS sum = 1-3, transport to Endovascular Stroke Center.
- If expected transport time to Endovascular Stroke Center exceeds 30 minutes, transport to Primary Stroke Center.

Quality Assurance / Improvement and System Design Evaluation

- **A robust quality improvement and evaluation system must be established to evaluate how system change impacts patient outcome.**

This system should include CSCs, PSCs and EMS as mandatory reporters in order to participate as 911 providers and receiving centers for acute stroke patients. We recommend that REMAC and FDNY partner with a neutral agency or organization to promote this collaboration in the New York City region. This QA/QI and System Design program must have dedicated staffing, funding, and hospital participation (with patient-outcomes reporting), and is essential to monitor the success of this initiative. The region should consider utilizing State EMS / Hospitals database for this project.

Partnerships

- **REMAC should work with regional partners to determine final protocols and recommendations for Stroke Systems of Care in New York City.**

In order to develop a system that best works for patients in the chain of care for acute stroke, we must partner with our hospital-based emergency departments, interventional and general stroke care providers, and regional interested parties to collaborate across the spectrum of care.

Limitations

- **Secondary Transport of Stroke Patients**

This TAG addressed the question of primary stroke treatment and transport, not, the issue of secondary transport. As the number of self-presenting stroke patients is not insignificant, hospitals should have robust, readily available options for transferring patients requiring advanced stroke care to appropriate level of care. Considerations should include, at a minimum, standardized, time-sensitive, transfer processes, protocols for blood pressure control, use of system standardized pumps and medication formularies, and early access to portable transport ventilators for intubated patients.

Telemedicine and Future Initiatives

REMAC and the FDNY recognize the importance of, and will explore opportunities to, incorporate telemedicine and technology solutions to improve the diagnosis and treatment of stroke in NYC. As the operational elements are decided, more work will be done to identify the appropriate resources to enhance regional stroke care efforts.

REFERENCES

Berkhemer OA, Fransen PS, Beumer D, van den Berg LA, et al; MR CLEAN Investigators. A randomized trial of intraarterial treatment for acute ischemic stroke [published correction appears in N Engl J Med. 2015;372:394]. N Engl J Med. 2015;372:11–20. doi: 10.1056/NEJMoa1411587.

Goyal M, Demchuk AM, Menon BK, Eesa M, et al; ESCAPE Trial Investigators. Randomized assessment of rapid endovascular treatment of ischemic stroke. N Engl J Med. 2015;372:1019–1030. doi: 10.1056/NEJMoa1414905.

Saver JL, Goyal M, Bonafe A, Diener HC, et al; SWIFT PRIME Investigators. Stent-retriever thrombectomy after intravenous t-PA vs. t-PA alone in stroke. N Engl J Med. 2015;372:2285–2295. doi: 10.1056/NEJMoa1415061.

Campbell BC, Mitchell PJ, Kleinig TJ, Dewey HM, et al; EXTEND-IA Investigators. Endovascular therapy for ischemic stroke with perfusion-imaging selection. N Engl J Med. 2015;372:1009–1018. doi: 10.1056/NEJMoa1414792.

Jovin TG, Chamorro A, Cobo E, de Miquel MA, et al; REVASCAT Trial Investigators. Thrombectomy within 8 hours after symptom onset in ischemic stroke. N Engl J Med. 2015;372:2296–2306. doi: 10.1056/NEJMoa1503780

Powers WJ, Derdeyn CP, Biller J, et al American Heart Association Stroke Council 2015 American Heart Association/American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment: a Guideline for Healthcare Professionals From the American Heart Association/American Strok Association. Stroke. 2015;46; 3020-3035

Goyal M, Menon BK, van Zwam WH, et al. Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials; Lancet, 2016 Apr 23; 387(10029): 1723-231. DOI: 10.1016/S0149-6736(16)00163-X. Epub 2016 Feb 18

Turc G, Maier B, Naggara O, et al; Clinical Scales Do Not Reliably Identify Acute Ischemic Stroke Patients With Large-Artery Occlusion; Stroke. 2016;47: 1466-1472. DOI:10.1161/STROKEAHA.116.013144

Perez de la Ossa N, Carrera D, Gorchs M, et al Design and validation of a prehospital stroke scale to predict large arterial occlusion; the rapid arterial occlusion evaluation (RACE) scale Stroke. 2014; 45;87-91. Doi: 10.1161/STROKEAHA. 115.009282

Kothari RU, Pancioli A, Liu T, Brott T, Broderick J. Cincinnati Prehospital Stroke Scale; reproducibility and validity. Ann Emerg Med. 1999; 33; 373-378

Katz BS, McMullan JT, Sucharew H, Adeoye O, Broderick JP; Design and validation of a prehospital scale to predict stroke severity: Cincinnati Prehospital Stroke Severity Scale. Stroke. 2015; 46; 1508-1512 doi:10.1161/STROKEAHA.115.008804

Nazliel B, Starkman S, Liebeskind DS, Ovbiagele B, Kim D, Sanossian N, et al. A brief prehospital stroke severity scale identifies ischemic stroke patients harboring persisting large arterial occlusions. Stroke. 2008; 39; 2264-2267. Doi: 10.1161/STROKEAHA.107.508127

Teleb MS, Ver Hage A, Carter J, Jayaraman MV, McTaggart RA. Stroke vision, aphasia, neglect (VAN) assessment – a novel emergent large vessel occlusion screening tool: pilot study and comparison with current severity indices. J NeuroIntervent Surg 2016: 0: 1-5. DOI: 10.1136/neurintsurg-2015-012131

Brandler ES, Sharma M, Sinert RH, Levine SR. Prehospital stroke scales in urban environments: a systematic review. Neurology. 2014;82;2241-2249. Doi: 10.1212/WNL.0000000000000523.

Brandler ES, Sharma M, McCullough F, Ben-Eli D, Kaufman B, Khandelwal P, Helzner E, Sinert RH, Levine SR. Prehospital Stroke Identification: Factors Associated with Diagnostic Accuracy. J Stroke Cerebrovasc Dis. 2015 Sep; 24(9): 2161-6 DOI: 10.1016/j.jstrokecerebrovasdis.2015.06.004. Epub 2015 Jul 7

Sharma M, Helzner E, Sinert R, Levine SR, Brandler ES. Patient characteristics affecting stroke identification by emergency medical service providers in Brooklyn, New York; Intern Emerg Med. 2016 Mar; 11(2) 229-36. Doi: 10.1007/s11739-015-1347-9. Epub 2015 Nov 9

English JD, Yavagal DR, Gupta R, et al. Mechanical Thrombectomy-Ready Comprehensive Stroke Center Requirements and Endovascular Stroke Systems of Care: Recommendations from the Endovascular Stroke Standards Committee of the Society of Vascular and Interventional Neurology (SVIN); Intervent Neurol 2015; 4: 138-150, DOI: 10.1159/000442715

Southerland AM, Johnston KC, Molina CA, Selim MH, Kamal N, Goyal M. Suspected Large Vessel Occlusion: Should Emergency Medical Services Transport to the Nearest Primary Stroke Center or Bypass to a Comprehensive Stroke Center With Endovascular Capabilities; Stroke, 2016; 47:00-00. DOI: 10.1161/STROKEAHA.115.011149

Oostema JA, Konen J, Chassee T, Nasiri M, Reeves MJ. Clinical Predictors of Accurate Prehospital Stroke Recognition; Stroke. 2015;46: 1513-1517 DOI: 10.1161/STROKEAHA.115.008650

Alberts MJ, Latchaw RE, Selman WR, Shepard T, et al. Recommendations for Comprehensive Stroke Centers: A Consensus Statement From the Brain Attack Coalition: Stroke. 2005; 36: 1597-1618. DOI: 10.1161/01.STR.0000170622.07210.b4

Milne MS, Holodinsky JK, Hill MD, Nygren A, Qiu C, Goyal M, et al. Drip 'n ship versus mothership for endovascular treatment: Modeling the best transportation options for optimal outcomes. *Stroke; a journal of cerebral circulation*. 2017;48:791-794

Holodinsky JK, Williamson TS, Kamal N, Mayank D, Hill MD, Goyal M. Drip and ship versus direct to comprehensive stroke center: Conditional probability modeling. *Stroke; a journal of cerebral circulation*. 2017;48:233-238

APPENDIX A: EXISTING AND PROPOSED COMPREHENSIVE STROKE CENTERS