

DPM NEWS

(585) 463-2900 | 44 Celebration Drive, Suite 2100 | mlrems@mlrems.org

DPM Faculty/Staff

Ever wondered who actually works for the Division of Prehospital Medicine? The answers are on *pages 3-4*. Learn more about Heather Lenhardt on *page 17*.

Suspicious Conditions

On *Page 5*, ILO Mark Phillipy provides regional contact information for suspicious incidents that might be related to terrorism and explains which types of incidents should be of concern to EMS providers.

Fluids

Dr. Cushman and Dr. Galton each discuss appropriate fluid administration guidelines and situations on *pages 7-10*.



Check & Inject NY

Syringe Epinephrine Kit for BLS Providers

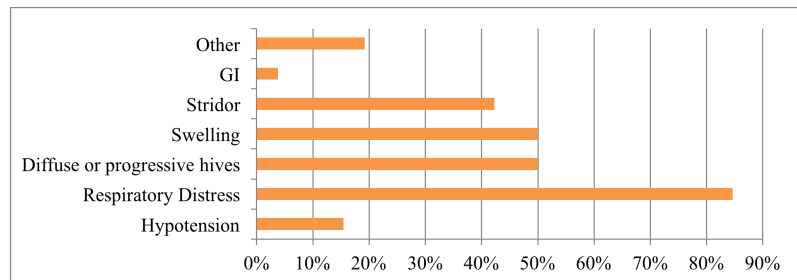
Things continue to go well with the Check & Inject NY pilot program. We are even getting some national attention and have been featured in several articles across the United States.

We couldn't continue with this project without all of our EMS providers' participation and diligence with this program.

This program was presented to the State Emergency Medical Advisory Committee (SEMAC) in September and approved! The pilot will continue until a recommendation is made by the Commissioner and our data analysis will continue.

- **Over 500 Participating Agencies**
- **18 REMAC Endorsements**
- **38 Uses!**

Symptoms noticed in percentages:



Upcoming Events

Melinda Johnston

For more information about any event listed below, please visit the training calendar at MLREMS.org

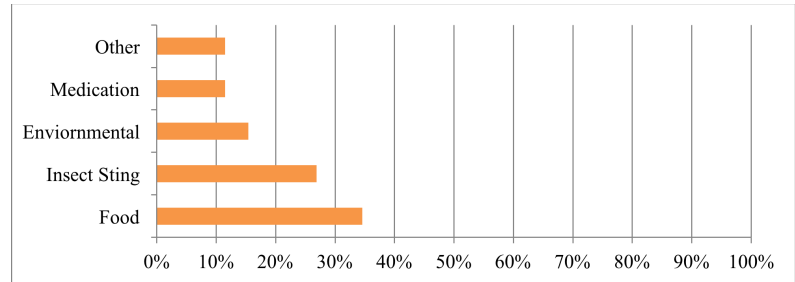
October

- 15 - ALS Core #1 (Henrietta)
- 19 - PHTLS for BLS & ALS
- 22 - ALS Core #2 (Henrietta)
- 25 - AMLS for ALS Providers
- 29 - ALS Core #3 (Henrietta)

November

- 1 - Emergency Pediatric Care for ALS
- 3, 8, 10 - CLI Original
- 5 - ALS Core #4 (Henrietta)
- 5 - ALS Core #1 (SEQ)
- 9 - ALS Core #2 (SEQ)
- 11 - PHTLS for BLS & ALS
- 15 - Stroke Training
- 12 - ALS Core #5
- 19 - ALS Core #6
- 21 - MLREMS/REMAC Meetings

Suspected trigger in percentages



Time

Jeremy T Cushman MD, MS, EMT-P, FACEP

More often than not, time is the enemy of the prehospital provider. This is particularly true for a few, extremely time-sensitive conditions – specifically trauma, stroke, and myocardial infarction – where your decisions as a provider can have dramatic down-stream consequences for the patient. The clock begins to tick when you make patient contact. Here is where your skills in rapid assessment come into play. Although all three conditions begin with different assessments, they all result in the same critical intervention: minimized scene time, rapid transport, and early prehospital notification.

The goal for trauma, stroke, and myocardial infarction patients is to be off the scene in less than ten minutes. Yes, this can be challenging to achieve, but can be done when the entire team understands the goals – rapid assessment and subsequent packaging. For trauma, your assessment of anatomic, physiologic, and mechanism criteria that would require transport to a trauma center remains the same. On scene, there are only two interventions that are likely to make any difference in patient outcome: control of life threatening hemorrhage and relief of an obstructed airway. Correcting either would be the only reason to delay transport as trauma is a surgical disease and minimizing scene time and expediting (safely) transport to a trauma center is the only thing that will make a meaningful difference in their outcome.

Similarly, once you identify an ST segment elevation MI (STEMI), there is nothing that we will do in the field that will impact their disease course – expedited transport to a cardiac center capable of cardiac catheterization is the key to their management. Likewise, your assessment of a patient with a stroke and a

“last to normal” time within 6 hours, means minimizing scene time, rapid transport, and early prehospital notification is the only thing can potentially alter their disease course.

Minimizing scene time can be done – communicating with your on-scene colleagues and working together as a team to package and load is one way; another is deferring any unnecessary procedures until the ambulance is on the way to the hospital. Yes, all three of these patients should ideally have vascular access, but we shouldn't wait on scene to obtain it. Similarly, a 12-lead EKG for a trauma or stroke patient does not change their emergent management. For both interventions, whether a 12-lead or IV, it's great to have them, but never at the expense of prolonging time on scene.

Getting enroute to the hospital is only part of the responsibility, however. Prenotifying the hospital of these time-sensitive conditions is another. In some recent reviews of STEMI's coming to Strong, I have noticed delays of 10, 15, even as much as 35 minutes from the time of provider recognition of a STEMI until calling the hospital. This is completely unacceptable and here is why: you are fabulous diagnosticians and routinely recognize an acute trauma or stroke patient, or diagnose a STEMI – but other than taking them to the hospital there is very little that you have in the back of the ambulance that can alter their disease course. The most powerful tool you have is in your pocket or attached to your belt – your phone.

Prenotification for acute trauma, stroke, and STEMI patients is the most important therapeutic intervention you can apply, and the earlier it is applied, the greater the patient benefit. Take STEMI for example. No hospital in the region maintains a cardiac catheterization team 24/7. As a result, they have to come in from home on off hours and on weekends. During the day, there may be other cases about to start or currently being done. Your phone call – at the patient's side while your colleagues are packaging the patient for transport – could mean 10-20 or even more minutes saved to the time of acute intervention. For acute trauma, stroke, and STEMI patients that means less cell death, and better outcomes.

Now, I realize what I am asking is not always possible – but I would argue it is possible in more than 95% of the patients we care for and thus there is no excuse to not prioritize it on every call. I also realize that although the MIST report has dramatically improved the manner in which we communicate with our ED colleagues, there is some hesitancy to give an incomplete MIST. When providing prenotification, particularly for stroke and STEMI, give us what you can. Don't delay the prehospital report because you don't have all the MIST components yet. You can always call back with more information if you didn't have it.

As a prehospital provider, you have an impressive ability to directly alter a patient's treatment course by recognizing/diagnosing major trauma, an acute stroke, or STEMI, and minimizing scene time with the goal of minimizing total out of hospital time. That should never be done at the loss of prehospital notifications which should be done early, preferably before leaving the scene. That simple intervention has great potential for positively altering the patient's course in these high stakes conditions.






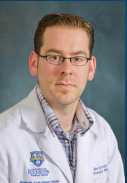






MIST Report Format

Division of Prehospital Medicine Staff

The slides below identify the faculty and staff of the Division of Prehospital Medicine (DPM) which is within the University of Rochester Department of Emergency Medicine. By the way, each of the people below can be reached at: firstname_lastname@urmc.rochester.edu

Division of Prehospital Medicine EMS Physicians

			
<small>Peter Crane, MD, MBA 917</small>	<small>Jeremy Cushman, MD, MS, EMT-P, FACEP 506</small>	<small>Aaron Farney, MD 907</small>	<small>Chris Galton, MD, NREMT-P 909</small>
			
<small>Elizabeth Murray, DO, MBA 908</small>	<small>Benjamin Ostrovsky, MD</small>	<small>Erik Rueckmann, MD</small>	<small>Jay Schueckler, DO 916</small>

Division of Prehospital Medicine Staff

		
<small>Mindy Johnston Administrative Assistant</small>	<small>Heather Lenhardt QI Coordinator EMT-P</small>	<small>Mike Meyer Director of Education EMT-P</small>
		
<small>Eric Rathfelder Training Coordinator EMT-P</small>	<small>Ben Sensenbach Division Administrator EMT-P</small>	




Suspicious Incidents

Mark Phillipy, Intelligence Liason Officer

“Wow, that’s weird...” “Why is that guy staring at us?” “Is he taking pictures?” “You know, I’ve seen that same guy hanging around outside the E.D. at Strong eyeballin’ the ambulances.” “Hub, wonder if we should say something to someone?”

“Hey, you guys like working on the ambulance?” “What kind of hours do you work?” “How many ambulances are on at a time?” “How long does it take you to get to xxx Street?” “Do you always have the police come with you?”

“Um, boss, I wanted to let you know, I was washing my clothes at the Laundromat and, well, my uniform got stolen.”

“Hey Supe, I lost my department ID badge, not sure where...” “Jeez, some guy just flashed me a badge and told me he was an EMT and wanted to help on this call...never seen him before...was acting kind of squirrely too...”

Ever had any of these conversations with your partner, your supervisor, your friends or family, about work? Ever had someone come up to you out of the blue and start asking odd, probing questions about your work? Ever seen someone enter a supposedly secure area of your base and wonder, “What the heck is he doing here?”

If the answer is “Yes,” then let’s take the next step. Let that sixth sense, that feeling that Somethin’ Ain’t Right take hold. Because time and time again, courts across the U.S. have held that if you as an average citizen think something is suspicious, you’re probably right. They hold police to a much higher standard, because of their training, but for those of us in EMS, that hair-on-the-back-of-your-neck feeling is enough to make the call.

“The START Validation of the Nationwide SAR Initiative” (US Dept. of Homeland Security, February 2015) concluded that “pre-incident activities occurring prior to acts of terrorism crimes do often align with existing Suspicious Activity Reporting (SAR) indicators. SAR indicators with the highest prevalence were weapons discovery, materials acquisition/storage, expressed or implied threats, and observation/surveillance...” “...many of these indicators were not only observable prior to terrorist attacks...some indicators were observed by the public.” (p17).

So...who do you call? And what do you want to know before you do?

These days, terrorists, anarchists, and those who just plain want to cause chaos come in a lot of different forms. But there are some common behaviors, called Terrorism Indicators or Suspicious Activity Reporting indicators, that can form the basis for a “founded suspicion” that something dangerous is afoot. So when you start to feel uncomfortable about a situation, start making some notes, and maybe start to correlate your observations with these behaviors:

- Materials Acquisition/Storage – Do you see piles of propane tanks? Boxes of hydrogen peroxide chemical bottles and lab equipment (could it be a clandestine drug lab)?
- Weapons Collection/Discovery – Odd stockpiles of ammunition, guns, edged weapons, seemingly out of place?

- Expressed or Implied Threat - “You’ll see, America has it coming, sooner than you think...” “I’m ready for the Jihad to start here!”
- Misrepresentations - False identity, showing up on scenes, asking questions and trying to elicit information by false pretenses (“Oh, yes, I work for the federal government...”)
- Acquisition of Expertise - Attending flight schools, chemical/hazmat trainings, training programs with no connection with an EMS or Fire agency.
- Observation/Surveillance - Monitoring vehicle and personnel coming and going, staging locations and posts, note taking, sketch making, false calls (particularly repeatedly - testing response times).
- Recruiting/Financing - talking about anti-American, anti-religion, anti-government issues, trying to engage people in not just debate but *joining*.
- Eliciting Information - Along with misrepresentation, seeking information about staffing, response modes and times, relationships with other response agencies, emergency planning/tactics.
- Testing or Probing of Security - Attempts to access secured or private areas/property, “Oh I’m sorry I was looking for a rest room...” Checking/pulling on doors, repeatedly showing up around closing time for admin staff.
- Photography - Still or video, particularly if they are trying to hide their taking of it.
- Sector-Specific Incident - Repeated calls to the same location, often false calls or nonsense calls, with one or more people taking great interest in responders’ actions and tactics.
- Breach/Attempted Intrusion - Usually a followup to tests of security, and often with false or stolen credentials (badges, ID cards, uniforms).
- Theft/Loss/Diversion - Ambulances, identifying equipment, uniforms, ID’s, anything that might confer a sense of authority or official standing.
- Sabotage/Tampering/Vandalism - Slashed tires, broken windows, damaged security features at base sites, broken radio antennas.
- Cyber Attack - Phishing attacks, to gain personally identifying information in order to breach security (to figure out your passwords), or more direct, Denial of Service (DoS) attacks, Ransomware.
- Aviation Activity - Drones as surveillance tools.

In order for a terrorist act to be successful, there must be a well-coordinated process. Very few true terrorist events occur spontaneously. Some of the indicators above are part of the planning process:

- Surveillance

- Information gathering
- Tests of security
- Funding
- Acquiring supplies
- Suspicious persons out of place
- Dry or trial run
- Deploying assets

So what do you do when you think something is out of place, if you feel that one of these indicators is in play?

First, take notes: what does the person look like? Try to be specific about clothing, sex, height if you can, build, facial hair, length of hair. Don't get hung up on "race," talk about what you can see that's obvious and identifiable. Are they driving a car? If so, what kind? Can you see the plate, even a partial?

Don't get into a situation where you run the danger of confronting the person, or being confronted. If they approach you, back away and call for a supervisor or police, depending on your level of concern. And don't go chasing after them or approach *them* just to get info. Do the best you can from a safe distance.

As soon as is practical, contact your supervisor, the local law enforcement agency, and the New York State Intelligence Center at (866) SAFE-NYS (723-3697). Don't be concerned that "it doesn't seem all that serious." The NYSIC employs teams of analysts who are literally waiting for us to call. They field hundreds of tips every week and are trained to pick out the important stuff and pass it along to the people who need to know.

Want to know more? Would you like to learn about what suspicious activity reporting has done in New York and across America in the past few years? How about learning more about identifying clandestine drug labs, bomb-making operations, and other threats to your safety? How do the jihadists recruit people in the homeland? We'll be happy to come to your agency and do some training. Our three hour "Suspicious Activity Reporting" program is eligible for three hours' CME credit through the Bureau of EMS, and you'll learn all this and more. Contact your Monroe County Intelligence Liaison Officers at (585) 753-3816 or ilo@monroecounty.gov.

IV Fluid Resuscitation for the Acutely Ill Patient (Part 2)

Christopher Galton MD, NRP

The topic of prehospital IV crystalloid resuscitation during cardiac arrest has a dearth of data available, unfortunately. To date, there are no published studies comparing different volumes of crystalloid resuscitation during the peri-arrest period. The limited animal studies that have been conducted have not conclusively demonstrated any benefit or drawback to IV fluid administration. The only absolute

indication for IV fluids during cardiac arrest is in the setting of known hypovolemia. In EMS it is rare that we can pinpoint the pathophysiology that led to cardiac arrest. Until some solid evidence based medicine recommendations are developed, we are left treating cardiac arrest as a profound state of shock.

The average human has approximately 70 mL of plasma per kilogram of mass. If the average person from the Rochester area is 70 kg (hah, try 90 kg), then we can assume that the average person has $70 \text{ (mL/kg)} \times 70 \text{ (kg)} = 4900 \text{ (mL)}$ or 4.9 (L) of plasma. Let's round that up to 5 liters to make the math easy. We know the venous system holds approximately 70% of the blood compared to 30% in the arterial system. We also know that venous return to the heart is dependent on forward flow through the muscular arterial system along with patient movement in a piped system with valves. If CPR is only 30% effective at ejecting blood out of the left ventricle, then there is not much forward flow to push blood through the venous system. Obviously, cardiac arrest patients are not moving much blood around.

Now let's apply some of those numbers. If the body has 5 liters of blood then 70% of that blood, or 3.5 liters is stuck in the venous system and 30% or 1.5 liters is in the arterial system. Although it depends on the specific etiology of cardiac arrest, we can presume that cardiac arrest will lead to vascular smooth and skeletal muscle relaxation, creating a bigger "tank" to fill in order to have any forward flow. The epinephrine we give every three minutes will help to constrict any vessels it can get to in this low flow state.

If you think of cardiac arrest as a profound state of shock, volume expansion is critical. We also know that approximately 33% of IV crystalloids remain intravascular and the rest almost immediately escapes into the interstitial space. Translated, if you administer 3 liters of IV crystalloid solutions to a patient, only one liter will remain in the vessels within a few minutes. That might combat the associated poor vascular tone associated with cardiac arrest, but that's with 3 liters of IV crystalloid. We really need some research to guide us, but until then, we are stuck with IV fluids wide open during cardiac arrest.

Aggressive resuscitation becomes increasingly important when we think about treating sepsis and septic shock. These conditions promote a broad inflammatory response that makes the vasculature significantly more porous than it already is. In a normal state of vascular integrity, 33% stays in the vessels. With sepsis, blood vessels turn into Swiss cheese and fluid extravasation occurs at will. In the best case scenario, our 3 liters of IVFs will only get us one liter of intravascular volume, and sepsis is far from the best case scenario.

Treating sepsis and septic shock requires exceptionally large amounts of IV fluids during the acute resuscitation, sometimes over 15-20 liters in the first 24 hours of resuscitation. This leads to the saying "you have to swell to get well" in the ICU. Prehospitally, placing high volume vascular access devices and initiating high volume crystalloid resuscitation can have a significant impact on a patient's morbidity and mortality. As we learn more about sepsis, maintaining adequate mean arterial pressures is becoming more and more important. This may lead to an increasing prehospital role for α_1 agonist medications such as norepinephrine and epinephrine in the future.

In case anyone remembers their physiology, $\text{MAP} = \text{CO} \times \text{SVR}$ (mean arterial pressure = cardiac output x systemic vascular resistance). If we brush some more dust off, $\text{CO} = \text{HR} \times \text{SV}$ (cardiac output = heart rate

x stroke volume). When we combine the equations, $MAP = HR \times SV \times SVR$. In English, to have a blood pressure you need a heart rate, reasonable volumes of blood ejected from the left ventricle, and some vascular tone. You know the heart rate if you check a pulse and CPR will give you whatever stroke volume you can in the arrest situation. We are only left with vasoconstrictors and IV fluids to maintain vascular tone. The simpler version that you have all heard involves the pipes(vessels), the pump (heart), and the fluid (blood).

Until better evidence is available, we should be treating cardiac arrest of unknown etiology as a large volume resuscitation situation. With big access devices, administering three liters of crystalloids is a reasonable goal for prehospital providers. We have the skills sets and knowledge base, so let's start making it happen consistently.

If you have any questions about this column, I can be reached at christopher_galton@urmc.rochester.edu.

IV Fluid Administration

Jeremy T Cushman, MD, MS, EMT-P, FACEP

Our recent performance improvement rubric looked at the administration of IV fluids and found some very interesting practice patterns. You have hopefully already read Dr. Chis Galton's series of articles on related topics: "Don't Let the Orange Catheters Collect Dust," "Abnormal Saline," and "Practical Tips to Improve Your Care of the Acutely Ill Patient," but if not, consider giving them a read. Now keep in mind, Dr. Galton is an anesthesiologist and so he sees the really sick ones – thus his very appropriate guidance that if you want to give fluids for shock, put in an IV that will allow you to fluid resuscitate (a 14g) and not something to make you feel better about having obtained IV access (an 18g). But also keep in mind that nearly 90% of IVs are not used in the hospital for medication/fluid administration. Thus, when a patient needs access for volume resuscitation, they DO need access – lots of it and big bore.

But who really needs IV fluids? The list of clinical conditions to which we have administered IV fluids is impressively long – ranging from multisystem trauma to hypertension (yes, you read right, hypertension). Admittedly, and purposefully, our protocols allow tremendous latitude in the prehospital provider's determination of who needs fluids and who does not. After reviewing our system's results, I think it's time to share a few thoughts on who may benefit, and who may not, from IV fluid administration.

Conditions to consider IV fluid administration include confirmed hypotension (regardless of cause – sepsis, blood loss, etc), burns, hyperglycemia, PEA cardiac arrest, and conditions associated with fluid loss presenting with tachycardia or symptomatic orthostasis (such as nausea/vomiting/diarrhea, or "dehydration"). Keep in mind the important modifier here though – in all of the above there is specific objective clinical evidence of the need for fluid administration (hypotension, tachycardia related to volume depletion, elevated BG, etc). The exception being burns for hopefully obvious reasons.

Conditions in which IV fluids should NOT be given (unless of course you have objective evidence of volume depletion) include hypertension, hypoglycemia, seizures, stroke, isolated head injury, pain, and respiratory conditions (asthma, CHF, COPD, etc). If you think the patient's altered mental status is related to volume depletion, then certainly give IV fluids, but there should be some evidence (exam or vital signs) that speak to that possibility and therefore your documentation should support that

intervention. Similarly, IV fluids are not necessary in syncope patients or my favorite – general illness/ malaise – unless there is objective evidence of volume depletion (clinical orthostasis, tachycardia, hypotension).

I was particularly surprised at the number of respiratory patients getting IV fluids. To my knowledge, there is no evidence to suggest that conditions such as asthma, COPD, and certainly CHF improve with IV fluid administration. To be fair, treatment for pneumonia sometimes includes IV fluid administration along with IV antibiotics for severe cases, but pneumonia is a radiologic diagnosis, not so much a clinical one. The reason I do not favor the indiscriminate administration of IV fluids in the respiratory patient is first, that it does not alter the clinical course and second, that it could cause harm. How? Because particularly in the undifferentiated older adult with an acute respiratory condition, it can be very difficult in the field to differentiate say COPD from CHF. Obviously, if you guessed right and it was “just” COPD then the fluids will not provide benefit, but will not harm. If you guessed wrong, and there was a component of failure in their presentation, then you may be very well causing harm.

So when you are considering giving IVF, consider the following: Do they have a condition that would benefit by fluid administration (eg burns)? Do they have vital sign abnormalities that support your belief that the patient has sustained volume loss (hypotension, HR greater than 90)? Are they on beta blockers and is that masking their response? What is the patient’s response to fluid administration – HR decrease or BP increase? What is the patient’s reassessment after fluid administration (lung sounds particularly)? If I am giving fluids for volume resuscitation in an acutely ill patient, have I placed an appropriate size (14-16g) catheter and do I need more than one vascular access site? [By the way, we looked and the success rate of 14g, 16g, 18g, and 20g catheters is roughly the same regardless of catheter size – 87%] If you are spiking a bag to simply run KVO, why? Just lock it – if you need it for volume resuscitation later then spike the bag.

Every time you give fluids, you should document somewhere on the chart, ideally towards the last entry, what the total volume of fluids was. For agencies using emsCharts the best practice is to Add Action – Medication – Normal Saline at the time the bolus was started; and in the last line of the activity log Add Action – Medication – Normal Saline and document the total volume administered. Other platforms should identify a common practice for documenting fluid administration.

The decision to administer IV fluids, or not, is not as straightforward as one would think. The administration of fluids should be for a physiologic condition that would benefit by fluid administration based upon objective information (clinical condition, tachycardia or hypotension related to volume depletion). If you have not read Dr. Galton’ articles, please do – they shed great light on how to administer fluids to acutely ill patients requiring volume resuscitation. For those that are not in extremis, consider carefully what and how you administer IV fluids, and hopefully this article will help guide you in that consideration.

Kids Corner - Pediatric Refusals

Elizabeth Murray DO

When you see your child covered in blood, a natural response is to seek help via 911. However, when all the blood is wiped away, there might just be a small laceration in the corner of the child's eyebrow. Parents might reasonably decide that they can transport the child to a medical provider (yes, it might be there Pediatrician's Office) on their own. Now, what about the 2 week old that is noted to have some trouble breathing while feeding? Parents realize that the baby quickly settles after taking a break from feeding and now seems fine. They are hesitant to bring their child to the ED as it is Flu season and they are worried about their young baby being exposed to infection. This certainly seems like a reasonable concern. Do you accept a refusal?

It doesn't take long to realize that in EMS, you will always be surprised by a new situation or a "can't make this stuff up" type of call. It's because of this, that it can be hard to develop guidelines to encompass all situations and presenting complaints. Most of the time, we need to take our protocols and then use our best judgment. A call to medical control never hurt either!

Let's go through the major categories in which a sign off is likely not appropriate for a pediatric patient.

Any child less than 60 days old

Very young infants don't do much. In general, if they are doing something that is not their normal or is concerning to parents, it is best to have the baby evaluated. This is especially true in the case of fever (temperature of 100.5 or greater), vomiting, a fall, or the ever confusing ALTE or BRUE (ALTE=Apparent Life Threatening Episode; BRUE=Brief Resolved Unexplained Episode)*. Fever in a young infant is considered a medical emergency and often requires hospitalization. Parents know the warning to let their Pediatrician know if an infant has a fever, but their understanding as to the possible significance of a fever in someone that young is lacking. Further, new parents often feel a lot of "new parent guilt", meaning they worry that they are over-reacting or misinterpreting a situation. They can easily second guess their own judgment. Therefore, support from us is very important, especially when we know the potential severity of a situation.

Something is just not right

It is important to remember that children are often caught in situations for which they have no control. This is also true for their access to care. Perhaps transport to the ED via an ambulance is the only way a mother can get herself and child out of an abusive household. Bruises on non-mobile infants, old or untreated injuries such as burns and lacerations, or the discovery of other serious conditions such as wheezing that went unnoticed by the parents are some examples of signs that should raise your concern that the child is not being cared for and may be in danger. Please don't forget about the teenagers (see last newsletter). They too can be in a dangerous situation and are trying to get out.

Lack of life-saving medication at home

While it is not our responsibility to ensure that all patients have everything they need and you are not a taxi, if you have a reasonable concern that the adult in the house has no way of getting the child the

potentially life-saving medication he needs, transport to the ED makes sense. For example, it's Sunday at 2am and a child is wheezing. 911 is called while the last remaining dose of Albuterol is given to a febrile 3 year old. This child's symptoms will likely recur before most pharmacies are open.

For me, the recurring theme is "let's just talk about it." I'll never be able to create an exhaustive list of acceptable vs. unacceptable sign-offs, but I can tell you that someone is always available (whether at RGH or SMH) to discuss a tricky case. I've even had Paramedics put me on the phone with parents and that was great!

We are each a part of a continuum of care. Doing our work in individual silos adds very little to help the patient.

*Recently, the American Academy of Pediatrics has moved away from the use of ALTE terminology to BRUE. Years of research on the subject has shown that the origin of many of these episodes is not life threatening and therefore, removal of such a scary sounding term is in the best interest of patients and their families. From a prehospital perspective, you likely will not be able to make a determination of exactly why the episode occurred. Therefore, we will continue with the ALTE Protocol as written and transition to the BRUE when the region transitions to the Collaborative Protocols.

Case Review - Stroke

Michael Meyer, EMT-P

Here is a recent stroke case that has some great teaching points.

07:10 – Patient becomes aware that something is not right and has the passenger in his vehicle call 911 after pulling to roadside.

07:20 – An ALS ambulance was dispatched for a 28C2L

07:27 – EMS arrived on scene with a 57 y/o black male sitting on the grass next to the roadway, pouring a bottle of water over his head. He is documented to be CAOx4, and appearing fatigued.

The patient's History of Present Illness (HPI) and initial assessment reports he was driving when he suddenly developed tingling in his right hand and became lightheaded. The patient was able to stop the vehicle and inform his passenger he was not feeling well. The passenger calls 911 and is able to report to EMS that the patient had significant slurring of speech and also difficulty formulating words. The patient did exit the vehicle before EMS arrived and noticed his right leg was weak and experienced increased dizziness.

As EMS arrives at the patient's side, he tells EMS he is very dizzy, weak and feels warm with right-sided numbness. He continues and reports no loss of consciousness, no shortness of breath, no chest pain or altered mental status. He tells EMS he has no diagnosed past medical history, takes no medication and has no known allergies.

The initial neurological exam includes free text that the “Cincinnati stroke scale found unremarkable” but contradicted selections from drop down lists which document there was speech slurring. The pupils are equal and reactive @4mm and radial pulses are weak bilaterally. The left sided extremities are noted to have normal motor and sensation, while the right side has normal motor but abnormal sensation. When the patient was assisted to his feet, he was noticed to be unable to bear weight without assistance.

07:32 – The initial set of vital signs are HR 80, BP 98/60 (manual cuff), R 16 and GCS 4/5/6.

07:37 – The patient is at this point loaded into the ambulance. A second set of vital signs are recorded as HR 82, BP 87/60 (auto cuff), R 16 and GCS 4/5/6. Before transport, a 12-Lead EKG is done and documented with RSR w/o AMI, ectopy, or ischemia. A 16 gauge IV is also initiated without difficulty, and the BG is documented at 112 mg/dL.

07:42 – A non-emergent transport is begun and the patient reports he is starting to feel better at this point as the dizziness has resolved in his current semi-fowlers position, and the numbness is beginning to dissipate. Shortly after the transport is begun, the patient begins to receive a NS drip, and receives a total of 500 cc during his time with EMS.

07:50 – After obtaining vital signs of HR 80, BP 101/66 (auto cuff), R 16 and GCS 4/5/6, a Stroke Alert notification is considered, however deferred due to lack of present neurological findings and hypotension. The patient’s only notable finding at this time is slurred speech.

07:59 – The transport to the Hospital is completed with one additional set of vitals being acquired. Those vital were HR 85, BP 122/75 (auto cuff), R 16 and GCS of 4/5/6. The patient was brought into the ED to await triage.

Let’s take a moment to examine the patient care to this point.

What has gone well? The patient has been evaluated and it appears that there is no acute cardiac event, which is a likely differential with the symptoms provided. The patient has begun to receive fluids for hypotension, and a BG has been performed to help exclude hypoglycemia as responsible for his symptoms. He does not appear in any acute distress at time, and his scene time was very reasonable. What would your differentials be at this point?

Is there anything that could have been done different by this provider? Yes. The provider should have trusted his neurological assessment and made the call for a Stroke Alert to the receiving facility. This patient had a positive Cincinnati Stroke assessment at least once during his time with EMS. The Cincinnati Stroke Scale is comprised of three specific evaluations. The presence of any one ‘abnormal’ finding results in a positive evaluation.

Facial Droop

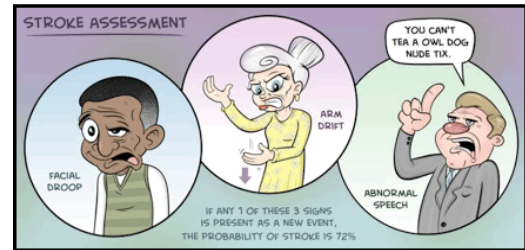
- Normal: Both sides of face move equally
- Abnormal: One side of face does not move at all

Arm Drift

- Normal: Both arms move equally or not at all
- Abnormal: One arm drifts compared to the other

Speech

- Normal: Patient uses correct words with no slurring
- Abnormal: Slurred or inappropriate words or mute



The documentation clearly indicates that at least once during the patient's time with EMS, he was Cincinnati positive. All Primary Stroke Centers in the MLREMS region want to be notified when your patient is Cincinnati positive, even if symptoms have resolved or are resolving. Additionally, there are many other neurological exams which can serve as indicators of stroke, but when you reference the Cincinnati Stroke Scale, remember that it involves three specific evaluations.

Reviewing the chart also found no 'Last Known Normal' time, which is a key piece of information for any stroke patient. If the provider's impression wasn't 'Stroke or TIA' then maybe a last known normal time being omitted makes sense for this patient. However, any time that Stroke or TIA is your primary differential, providers need to be clearly documenting the Last Known Normal time.

Not only is it important to document the time, but it must be accurate. Remember, patients that went to sleep normal, and woke up with symptoms have a last known normal time when they fell asleep. Patients that were seen normal at breakfast and found to have symptoms hours later are Last Known Normal at breakfast, not when they were discovered with symptoms. It is important that we don't assume or approximate these times. If we don't know, or can't determine an accurate last known normal time, then that is what we report.

Finally, don't let an absence of a last known normal, or a last known normal time that is perceived outside 'the window' prevent you from making a Stroke Alert phone call – call the receiving facility, provide them with the information you have, and let them determine if they want to call the Stroke Alert for your patient. Remember to also take advantage of the green Stroke Alert stickers anytime you make that Stroke Alert phone call.

Let's get back to our patient...

08:04 – A triage report was given by EMS with the following being noted in the hospital record: 57 year old male with right arm and leg numbness with reported difficulty speaking. EMS also reports that he was entirely unable to use his right hand to sign paperwork upon their arrival. Currently, he reports the same but does not have gross weakness on rapid exam at triage. A stroke alert was called by the triage nurse.

08:08 – The EMS crew and patient are directed to the CT scanner where the patient receives an Acute Stroke CT. That non-contrast head CT had no evidence of acute hemorrhage to explain the patient's symptoms, but cannot definitively identify whether the patient had, or is having, an acute ischemic stroke.

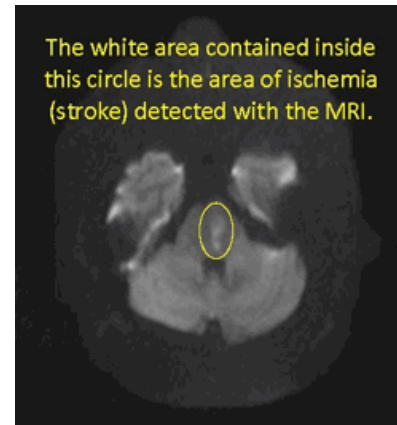
08:15 – Neurology evaluates the patient based on the National Institutes of Health Stroke Scale. He receives an NIHSS score of 2 based on right sided facial weakness, dysarthria (slurred speech) and right hand clumsiness. He also reports that he had dizziness and nausea at the time of symptom onset.

The NIHSS is a much more advanced stroke scale, comprised of 11 detailed questions and a total score of 42 points. Based on that score, predictions can be made towards the severity of the stroke. Although most EMS systems do not routinely utilize the NIHSS scale in the prehospital evaluation of strokes due to the length and detail involved, modified NIHSS scales are currently being considered and evaluated.

NIHSS Scoring:

- 0 - 1 Normal
- 1 - 4 Minor Stroke
- 5 - 15 Moderate Stroke
- 15 - 20 Moderately Severe Stroke
- 20+ Severe Stroke

Based on the NIHSS scoring, the patient may be experiencing a very minor stroke – only one point above normal. In combination with the negative CT results, it is reasonable to have doubts about whether this patient is experiencing a stroke.



However, because of the involvement of his dominant hand, Neurology felt that he had considerable disability and they elected to administer a tissue plasminogen activator (tPA) to this patient to treat any potential clot that may be causing his symptoms as they were concerned that he might be having a stroke.

08:52 – tPA Bolus initiated – an hour and 42 minutes after his symptoms were discovered.

So did this patient experience a stroke? Many of our providers may be confused or raising many of the same questions that presented in this case. A follow-up with Neurology, and a subsequent MRI showed this patient did in fact experience a stroke. The stroke was located in the pons, or brain stem area of the brain. This is an area of the brain which causes disability but where stroke symptoms often go unrecognized.

Symptoms in this area of the brain can include vertigo, dizziness and imbalance without the hallmark of most strokes such a unilateral weakness. Although dizziness alone is not a sign of stroke, the presence of dizziness and imbalance occurring together increases the chances that they symptoms are related to a stroke. Brain stem strokes can also cause double vision, slurred speech and general decrease in a patient's level of consciousness. Patients may also experience signs of incoordination – often mistaken for weakness, difficulty swallowing, and unilateral sensory loss during a stroke in the pons area of the brain. It may also be possible to see a facial droop on one side and weakness on the opposite side of the body. When patient's experience more severe brain stem strokes, they can cause locked-in syndrome, a condition in which survivors can move only their eyes.

The take home message from this case is that strokes located in the brain stem, as well as posterior strokes, are difficult to diagnose, even with the assistance of CT imaging. Recall that any positive

Cincinnati Stroke assessment is highly predictive of stroke. The Last Known Normal times need to be accurately obtained and documented whenever Stroke is our primary differential, and Stroke Alert notifications should be made whenever stroke is suspected.

After receiving treatment with tPA, his symptoms improved and he was able to be discharged home. He has subsequently stopped smoking, and has a new primary care provider. He has been diagnosed with high blood pressure and has started new medication to control the hypertension. Two weeks after his symptoms and subsequent treatments, he has returned to his baseline and is back to work.

Did you find the case review of the stroke patient interesting? Wish you could ask more questions about the diagnosis and treatment? We have an opportunity for you to do just that!

**2017 Collaborative Stroke Training for EMS
Stroke Cases Reviewed
November 15, 2016
Public Safety Training Facility**

Come join members of all the region Stroke Centers as they review EMS cases in an interactive setting. Take advantage of their knowledge as they field questions about some of the more interesting and peculiar cases they have seen.

Save the date – more details will be available soon!

Introducing . . . Heather Lenhardt

You have a unique background for someone involved in EMS. Can you tell me how you got here?

I was surrounded by EMS as a child. My father was an EMT and volunteer firefighter. I was always fascinated with EMS. After graduating with my MBA and working as a Senior Consultant for Manning & Napier for several years, the opportunity for me to get my EMT certification presented itself. Shortly after I went to MCC to get my paramedic certification. Currently, I am per diem at Henrietta Ambulance. Being a road paramedic is integral to the work I do at the University of Rochester.



Heather Lenhardt

What is your role with the Division of Prehospital Medicine?

The majority of my work focuses on EMS Quality Improvement and EMS research. This includes qualitative and quantitative field work to identify areas of strength to leverage and weakness to improve upon.

What do you like to do outside of work?

I have 4 kids so there is not a lot of downtime outside of work. I spend a lot of time alpine skiing in the winter with my family and we all enjoy golfing in the summer.

Is there anything, in particular, EMS-related that you are passionate about for are working to improve?

I look forward to continuing the Quality Improvement work I do for the Division. I am always interested in hearing of best practices that work in EMS. Please don't hesitate to contact me (heather_lenhardt@urmc.rochester.edu).
