DPM NEWS

(585) 463-2900 | 44 Celebration Drive, Suite 2100 | dpm@urmc.rochester.edu

Aortic Emergencies

On *page 3*, Dr. Galton provides an in-depth look at aortic emergencies. It is not always an emergency and it's not always a AAA!

Mac vs. Miller

Ever wonder which is the best blade? Dr. Farney provides his definitive opinion supported by a study on the topic on *page 7*.

IO vs IV

Should paramedics act more like airline pilots? Eric Thomas thinks so! See part one of an upcoming series on checklists and how they can improve patient care in the prehospital setting on *page 11*.

This is the 12th edition of DPM News which means the newsletter has been published for three complete years now. The goals of producing this newsletter continue to be to increase awareness of the role of the Division of Prehospital Medicine (DPM) in our local EMS system, to communicate relevant work being conducted at DPM to local EMS providers, and to provide education on evidence-based medicine that can improve our practice. Every quarter, I'm impressed with the high quality articles from our EMS physicians, staff, and the community of EMS providers who contribute articles for this publication.

If you have any suggestions for improving the newsletter format, content, or distribution please let me know. We want this newsletter to be as useful as possible to our local EMS providers and if there are things that can make it more so, then I'd like to incorporate those changes. Similarly, if you are a consumer of this newsletter and would like to contribute an article for a future newsletter, please email me at e.rathfelder@gmail.com.

Eric Rathfelder
Editor-In-Chief

Quality Improvement- Documenting the 980

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

There is one call we go on where it's almost guaranteed that someone outside of your agency and billing staff will look at: The 980. That list often includes the Medical Examiner, law enforcement, and particularly for non-natural deaths, many lawyers and possibly even a Court. Earlier this year my office issued an Advisory on considerations at death scene (See Advisory 18-03), and since then we decided to take a quality improvement look at prehospital medical records to see how well we are documenting these encounters.

Upcoming Events

Melinda Johnston

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

October

13 - PHTLS (1 of 2)
13 - PHTLS (2 of 2)
15 - GEMS
19 - BLS Core Content (#1)
22 - REMAC Meeting
26 - BLS Core Content (#2)
29 - PHTLS (2 of 2)

November

3 - AMLS (1 of 2)
4 - AMLS (2 of 2)
7 - GEMS
17 - EPC (1 of 2)
18 - EPC (2 of 2)
19 - MLREMS Meeting
30 - BLS Core Content (#1)

December

1 - ACLS Refresher
7 - BLS Core Content (#1)
8 - PALS Refresher
12 - PHTLS (1 of 2)
13 - PHTLS (2 of 2)
17 - REMAC Meeting

We looked at 165 charts with the outcome of "Dead on Scene". I've provided a summary here, and included a few quotes from your peers who were involved in this review activity. With great variability across agencies and providers, on average 4 of 5 charts had an adequate description of the scene. This is obviously important information to set the stage for what you viewed and may suggest the potential mechanism involved in the death (trauma, medical, etc). Simple explanations like "male found in chair of undisturbed, well kept living room" or "female found at bottom of stairs in unkempt home" can often suffice to set the scene; but equally critical is your description of the position in which you found the patient. If you have to move things to access the patient, it's a good idea to document that as well, that way you can recall it later. You don't have to narrate the location of everything, but a good scene description and how you found the patient is particularly important to paint the picture of the scene to the reader, which could be you in a few years when the case goes to deposition.

> "EMS staff should be documenting the scene more thoroughly and what has been disrupted by staff on location. We as EMS personnel do not know if the scene is a 980, suicide, or even a murder so we should be documenting where we went, if we moved the body, and anything that we do that could have possibly disrupted the scene."
>
> -Comment from a peer reviewer

Another key component is to provide, when possible, the time the patient was last seen alive. This helps identify a timeline and can support your clinical assessment of meeting obvious death criteria. This should also indicate where this information came from. "Daughter last saw patient at 10:30 pm last night before going to bed" or "no bystanders/witnesses to indicate last time seen alive". Point being, just like stroke patients, knowing the last known well (or alive) helps place into context the appropriateness of not beginning any resuscitative efforts.

> "Out of all the charts that I reviewed I believe only one chart noted that the patient was covered with a blanket. After being a part of multiple 980 calls I am fairly confident that we are covering the patient more times than what has been getting documented."
>
> -Comment from a peer reviewer

One item that came up and was mentioned in the Advisory was the covering of victims with a blanket. Although covering a decedent is often done out of respect, it can introduce fibers, DNA, and other materials that were not on the patient at the time of their death. This is why the recommendation in the Advisory is to not cover the victim, unless they are in a public or highly visible location, in which case best practice is to cover them using a sterile burn sheet (these are available through the Monroe County EMS Office). Point here is that if you do something with the body – move it, cover it, etc, that should be documented as well.

Of concern, less than 75% of charts had a physical exam documented. In many cases, it is documented that the patient was "obviously dead" but there is no mention of what criteria made them "obviously dead" (lividity, rigor, decomposition, injury incompatible with life, etc) or a physical exam of where those "obviously dead" findings were found. Point being, you can't just document "obvious death" and indicate no palpable pulse – there should still be a physical exam performed, identifying the position the patient is found, any obvious wounds, any lividity and where it is present; any rigor; etc. I'm not saying that you don't know how to identify a dead person, but in many cases, the documentation does not support the fact that they are obviously dead. Take for example shortness of breath: your exam and documentation would support why you felt it was CHF vs asthma and therefore the treatment pathway you followed. The deceased need the same level of documentation to support your clinical impression of obvious death.

> "The most noted observations of the charts with missing information include poor documentation of the physical findings required for meeting the obvious death criteria. In these instances, phrases such as "patient was obviously dead" or "beyond resuscitation" were used, without including any indication of the physical findings that were present."
>
> -Comment from a peer reviewer

My hope is that by sharing these observations, you will consider them when documenting your next 980 chart. Some say that refusals should be your longest and most thorough chart, and although they may be right, just because the patient is dead doesn't mean you don't need to be on top of your documentation game.

Aortic Emergencies: It's Only the Biggest Vessel in the Body...

Christopher Galton MD, NRP, FP-C

I remember sitting in paramedic class and hearing the "triple A" speech. For the first 5-10 years of my EMS career, the "triple A" remained in every differential and was consistently viewed as deadly. Now that I have a bit more mileage behind me, I have realized how ignorant I remained for many years. I was astonished to find out that many people live long lives with abdominal aortic aneurysms (AAA). I was convinced that if it was realistically on my differential, then a fast ride to the hospital and praying to whoever you pray to was a patient's only chance. I thought I would use this column to dispel that myth.

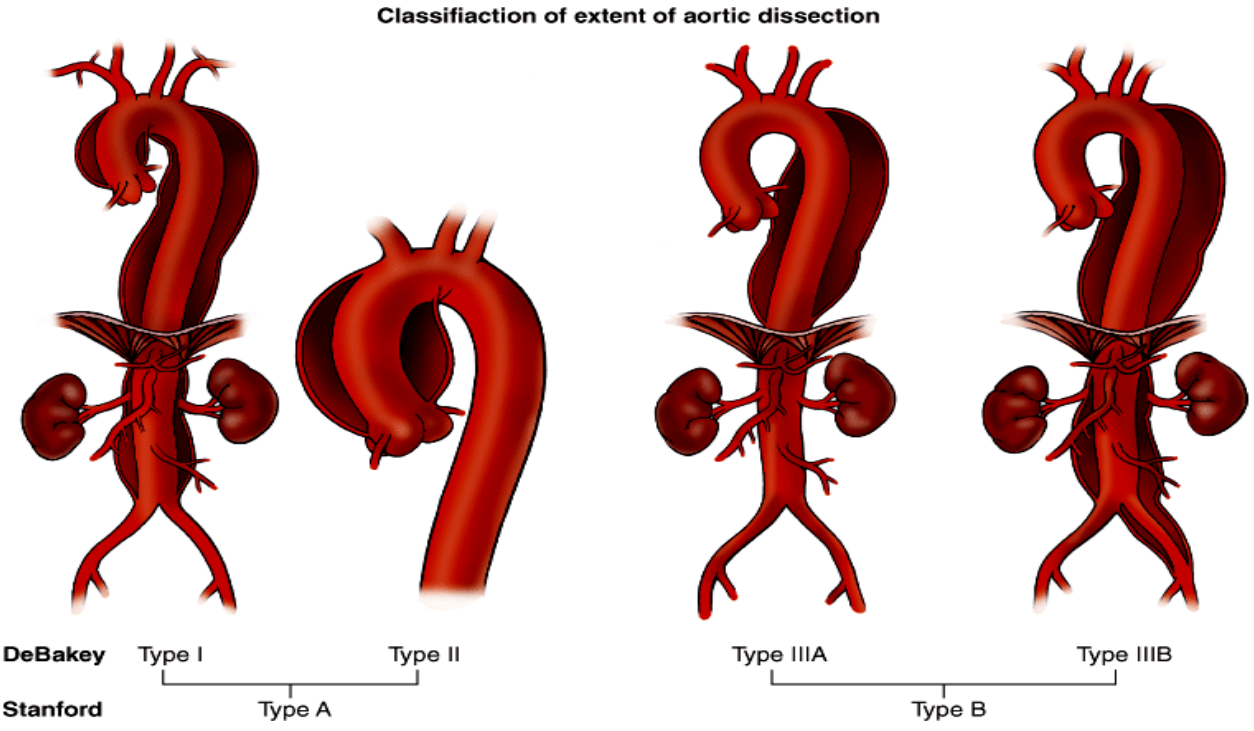
Any artery can develop an aneurysm, which occurs when the artery's wall becomes weak and blood pushes through some of the layers of the artery. When that bulge starts to get bigger acutely and the blood flows into a larger area outside the tunica intima, but not outside the tunica adventitia, then it is referred to as

acutely dissecting. When blood pushes through the tunica adventitia and starts to flow into the abdomen or thoracic cavity, then the aneurysm has ruptured.

In EMS, we traditionally think abdominal aorta, but we frequently deal with other complications of aneurysms without knowing it. The best example of this would be cerebral aneurysms that rupture and lead to intracranial hemorrhage. The textbook symptom is the developing headache with some associated neuro symptoms. The EMS workup for this is stroke until proven otherwise and following your local protocols. We rarely find out after the fact that it was an aneurysm that ruptured and required open clipping, or possibly endovascular coiling or a pipeline repair.

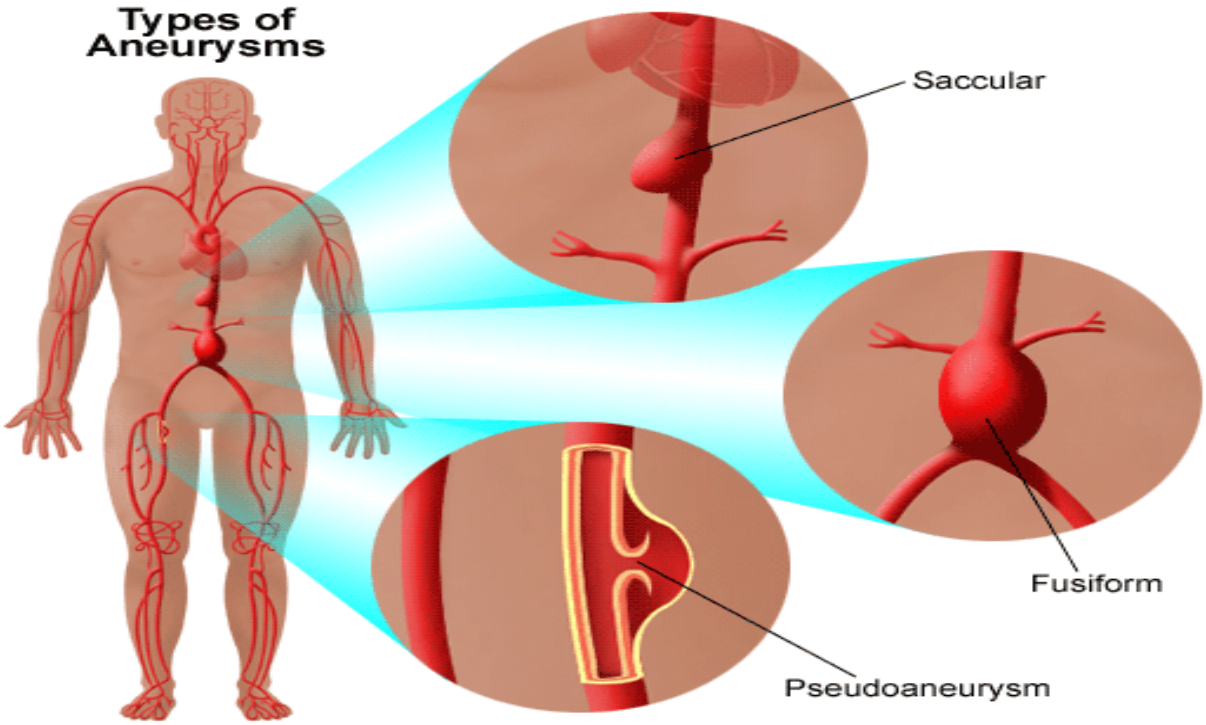
According to the Society for Vascular Surgery's website, approximately 200,000 people are diagnosed with an abdominal aortic aneurysm. A ruptured AAA is the 15th leading cause of death in the US and the 10th leading cause of death for men over 55. This is obviously a significant burden of disease in our society, yet it remains an ethereal topic for us to discuss. I would imagine that few of you know that although the bulk of aneurysms are related to tobacco abuse, a large number are also related to the genetic short straw.

The pathophysiology is very important to understand and I think we frequently make mistakes in EMS thinking of one aortic aneurysm is the same as another. The location of the aneurysm is very important in assessment and treatment. Is the aortic aneurysm thoracic, abdominal, or both? The figure below is a cartoon that explains the two different classifications of aortic dissections, DeBakey and Stanford. It demonstrates that aneurysms can start from the aortic valve and run down past the iliac bifurcation, as well as up into the subclavian or carotid arteries. DeBakey type II aneurysms typically present as chest pain with associated neurologic deficits, which is obviously a nightmare for EMS providers. The isolated abdominal variants can be supra celiac, supra renal, and infra renal. This becomes important because blood flow may be limited to the kidneys or the mesentery.



https://accesssurgery.mhmedical.com/content.aspx?bookid=963&sectionid=55173031

These aneurysms can take many forms. The figure below demonstrates the three primary types of aneurysms, any of which can involve the aorta.



https://stanfordhealthcare.org/medical-conditions/blood-heart-circulation/thoracic-aortic-aneurysm/types.html

People live normal lives with aortic aneurysms and they are not all emergencies. Almost all aneurysms that are symptomatic require surgical intervention and it is an absolute surgical emergency if a thoracic or abdominal aortic aneurysm is ruptured. Asymptomatic aortic aneurysms are frequently repaired in an elective or urgent surgical procedure. Typically, the aneurysm needs to grow to bigger than 5 cm for the risk of further injury and mortality to outweigh the risks associated with the surgery. These criterion are dynamic and change based on an ascending thoracic, descending thoracic, or abdominal location.

The conservatively managed aneurysms make up the majority of patients with this condition. The goal for outpatient management is to reduce the risk of further extension. Since the biggest risk factor for these injuries is tobacco abuse, smoking cessation is the best risk modification strategy. These patients are also started on aspirin and aggressive statin therapy with atorvastatin or rosuvastatin. Finally, aggressive BP control will help to reduce further injury.

There are two acute aortic emergencies that EMS bunches together. The first is an aortic dissection and the second is an aortic rupture. A dissection can come in many variants that range from a simple tunica intima tear, to a tear through to the tunica media, and hematoma formation into one or both of these layers. A rupture is catastrophic and occurs when the aorta is completely perforated and blood is leaking out into the thorax or abdomen.

Patients with an aortic dissection have signs and symptoms that are related to the extent of their dissection. For instance, ascending aortic dissections typically present with tearing chest pain, whereas abdominal aneurysms can cause more posterior pain. The majority of dissections present with pain, which is a very common chief complaint for an EMS run. Other symptoms of dissection can include congestive heart failure, syncope, bradycardia, and neurologic deficits. Most of us remember an instructor telling us that moderate BP variation (typically greater than 20 mmHg of SBP) between the upper extremities can be pathognomonic, but that sign is much less reliable in practice. A chest xray will occasionally reveal a widening of the mediastinum.

Medical treatment of an aortic dissection is focused on providing adequate analgesia and anti-impulse therapy. Pain control is typically achieved with opioid therapy such as fentanyl or hydromorphone. Anti-impulse therapy refers to reducing the velocity and frequency of blood as it is ejected into the aorta out of the left ventricle. This is most frequently accomplished with the short acting beta blocker, esmolol. Once those goals are achieved, aggressive blood pressure control is initiated. The blood pressure is normally driven down with nitroprusside or nicardipine to a level that the patient is still mentating, but not much more. This can be lower than the standard MAP of 65 mmHg that we are accustomed to.

The medical treatment of an aortic rupture is very different from treating a dissection. As EMS providers, we are much more familiar with treatment of a rupture, because it is very similar to the way we treat decompensated traumatic shock. When blood is leaking out of the aorta and into the abdomen, our goal is to limit the exsanguination by avoiding trying to push the blood pressure up through crystalloid resuscitation or vasoactive medications unnecessarily. We should be looking to maintain a MAP of 60-65 mmHg at the maximum, and looking to achieve that with small IV fluid boluses to avoid over compensating. It is important to remember that the mortality associated with prehospital aortic rupture is > 50% and a patient who suffers cardiac arrest related to an aortic rupture has a 100% mortality, even if they are sitting in the OR at that point.

Definitive treatment of an aortic emergency is accomplished by the surgical staff. The type of surgery performed varies based on the location, size, and symptoms. The surgical options can include endovascular options, open abdominal procedures, and open chest procedures with cardiac bypass and circulatory arrest. I remember a vascular surgeon telling me that ruptured AAAs adhere to the rule of 1/3s once they reach the hospital. The first third die before they make it to the OR. The second third die in the OR. You cut the final third into half and the first half die in the hospital while they are recovering. The last half of those patients (or 1/6th) will live to be discharged. When considering a destination facility, understanding which facilities can offer advanced vascular surgical options can provide significant benefit to your patient. In our area, both Rochester General and URMC Strong Memorial can offer that level of service.

Aortic emergencies are some of the most acute patients that we see in EMS. Understanding the injuries and how to treat them can have dramatic impacts on a patient's outcome. If you have any questions about this article, please contact me at christopher_galton@urmc.rochester.edu.

Mac or Miller... Which Blade is Best?

Aaron Farney MD

During a recent RSI debrief, the question of laryngoscope blade selection came up. Traditionally, I've toed the line on this matter, rehearsing each blade's respective advantages, concluding with some variation of "my preference is Macintosh, but use the blade that you're most experienced and comfortable with." But secretly, I've been using *only* Macintosh blades. Macintosh is the way to go, and I'll tell you why.

Anecdotally, I seem to hear about more trouble when Miller blades are involved, but I've assumed that is a result of selective hearing and bias on my part. However, when I heard about a recent success story with a Macintosh blade after initial failure with a Miller, my interest was piqued. Should there be more to blade selection than "personal preference?" *Is one blade truly better than the other?*

Up until now, there has been no evidence to answer this question, which probably explains the high degree of variability in teaching and practice. However, Alter et al. finally tackled this question in a paper recently published in the *American Journal of Emergency Medicine*.

This study's aim was to compare paramedic prehospital intubation success with a Macintosh blade compared to a Miller blade. Researchers retrospectively examined EMS charts of all patients who underwent prehospital endotracheal intubation (ETI) in the Boca Raton, Florida EMS system from 2007 to 2016. For perspective, the system has 20,000 annual calls, is two-tiered, and its ambulances are staffed with two paramedics. Researchers analyzed these charts for first pass success rate, overall intubation success rate, and importantly, *which laryngoscope blade was used*. Results are in the tables below.

First Pass Success Rate

Macintosh	Miller	Difference (95% CI)
1659/1932 (86%)	317/434 (73%)	13% (9-17%)

Overall Intubation Success Rate

Macintosh	Miller	Difference (95% CI)
1822/1932 (96%)	351/434 (81%)	15% (12-18%)

As you can see, the authors concluded that *both first pass success rates and overall intubation success rates for paramedics were higher when Macintosh blades were used*.

To be clear, the results of this study demonstrate correlation, not necessarily causation. This study has all the limitations inherent in a retrospective study – which is prone to bias and unidentified confounding variables. For example, we know nothing about the characteristics of the medics using one blade or the other, and we know nothing about their training. Also, it's only one system, and one may question whether results can be extrapolated, to say, upstate NY. That said, this is the best evidence we currently have available to guide us...and it certainly has garnered my attention.

So, what do we do with this information? Do we throw it away because it's imperfect data and keep flogging our patients with Millers? Or do we take a moment and reflect on our own practice? Do you

know what your first pass and overall intubation success rates are? If they are in the 80s and 90s, you're probably doing OK – don't change anything dramatically (although until it's 99-100%, there is always room for improvement!). But, for those medics out there whose intubation success rates are in the 70s or worse, and who are routinely using Miller blades, I encourage you to seriously reconsider your blade preference. Maybe, just maybe, your blade is holding you back.

Take-home points:

- There are two laryngoscope blades – Macintosh and Miller.
- Paramedics are taught to use both, but typically develop a preference for one or the other.
- Historically, no one knew which was "better".
- A recent retrospective study found that paramedics in Boca Raton, Florida who used a Macintosh blade were 13% more successful on first pass and 15% overall more successful at intubation compared to colleagues who used Miller blades.
- Paramedics with success rates less than 80% and who are routinely using Miller blades should reconsider using Macintosh blades.

Have questions? Want to discuss more? Shoot me an e-mail: Aaron_Farney@urmc.rochester.edu

References

1. *Alter SM et al. Intubation of prehospital patients with curved laryngoscope blade is more successful than with straight blade. American Journal of Emergency Medicine 2018; in press.*

Heat Stroke vs. Heat Exhaustion: A Critical Differentiation

Adrielle Watkins EMT-P

As we exit the dog days of summer it is important that we brush up on our abilities to differentiate heat related injuries and review associated treatment practices. We all have received the basic knowledge in delineating these pathologies, so the intent of this article is to illustrate why these symptoms occur using the basic pathophysiology. As in most illnesses we view things as a spectrum ranging from the mild (heat cramps) to extreme (heat stroke.) As you may be familiar, the symptoms in each of these spectrums are likely as follows. Heat cramps: muscle fatigue, yawning, dizziness, cramping, tiredness. Heat exhaustion: headache, vomiting, fatigue, decreased concentration abilities, decline in mental alertness. Heat stroke: cessation of sweating, flushed, red skin, CNS symptoms such and seizures and coma.

In heat exhaustion we see compensatory mechanisms of increased temperature. The body recognizes that overheating is pathologic to the body and it employs two primary mechanisms to combat this: amplifies its sweating to encourage evaporation and promotes vasodilation, moving blood into vasculature close to the skin. While both of these mechanisms are effective in compensating, prolonged loitering in this state will undoubtedly cause a drop in BP. This decreased BP can be tolerated by a healthy individual, however there is a point where the body recognizes this decreased perfusion as a concern to the body- specifically the brain. This is when the pathophysiology takes a turn from heat exhaustion to heat stroke.

At this point, the body essentially ditches previous efforts of cooling, to restore BP and perfuse the brain. The first attempt to restore BP will be widespread vasoconstriction which will shunt blood to the core and essential organs. Consequently, this perpetuates the increase in body temperature, holding in heat. It

is this mechanism that produces the red, flushed appearance of the skin. The second response is the cessation of sweating, since the BP is low, the body appreciates a need, above all, to profuse the brain and cuts any fluid losses. This is why we notice the termination of the sweating process.

Unfortunately, this last ditch effort of the body to profuse the brain, does the opposite of what the body has been working to do and subsequently rapidly raises body temperature. This is why it is important to expeditiously recognize this state and understand that we need to do the cooling for the body. The effects of this increasing temperature are not minute and include systemic inflammatory response, eliciting increased clotting factors (later leading to disseminated intravascular coagulation or DIC) and at temperatures around and above 105F denaturing of the body's proteins occurs. Secondary pathologies to watch for in heat stroke: renal dysfunction, rhabdomyolysis, DIC, increased cardiac workload in previously compromised patients.

While similar treatment protocols exist for all heat related injuries of active cooling and rehydration exist, the early recognition and aggressive treatment of heat stroke may be particularly invaluable for these ICU-level patients. In all areas of the spectrum, removing the patients from exposure, such as into our air conditioned ambulance is the first step. Active cooling comes next, which includes applying cool packs to major arteries, dampening the skin to facilitate heat via evaporation, and removing heavy clothing. Rehydration is the next important step as these patients are usually excessively volume depleted. Additionally, it is important to recognize the concern for electrolyte imbalances when treating the more profound end of the spectrum and utilizing cardiac monitoring in addition to IVF therapies.

References:

1. *Hifumi, Toru, et al. "Heat Stroke." Journal of Intensive Care 6 (2018) ProQuest. Web. 29 July 2018.*
2. *Peiris AN, Jaroudi S, Noor R. Heat Stroke. JAMA. 2017;318(24):2503. doi:10.1001/jama.2017.18780*

The Paramedic Program at MCC: What's New?

Maia Dorsett, MD, PhD, Program Medical Director
Bill Comella, Program Director and Lead Instructor

On August 27th, the 2018-2019 paramedic class at Monroe Community College (MCC) started their journey towards becoming paramedics. Since its inception, the MCC Paramedic Education Program has turned out hundreds of highly qualified providers under the leadership of Peter Bonadonna. With his retirement, we have taken the opportunity to revise the curriculum to the new National EMS Education Standards which were released not long ago. We wanted to take the opportunity to describe these changes to our local EMS community (and maybe even recruit you to the effort of teaching and mentoring this fantastic class!).

From a medical education perspective, the vision of the program is to educate paramedics who are skillful in critical thinking and clinical decision making, are self-reflective and oriented towards performance improvement. They will not only possess a solid knowledge base but know how to apply it to provide the best possible patient care and understand how knowledge evolves according to scientific evidence. Importantly, they will possess and communicate empathy towards patients, their colleagues and themselves.

With the goal of achieving this vision with new leadership, we have made a few operational and content changes to the program:

•The first major change made was the schedule. For many years, the paramedic program has been a 15 month evening program. After surveying our communities of interest, we have condensed the program into 12 months that corresponds with the college academic year. The class now meets during the day from 8 am – 12:30 pm on Monday/Wednesday/Friday with holidays that largely adhere to the MCC College schedule.

- Some core content topics have been moved much earlier into the schedule. One example of this is Cardiology, including EKG interpretation and ACLS (which will be covered by the end of October), so that students can have ample opportunity to apply this knowledge throughout the course of their clinical time.

- Integration of a research curriculum which includes basic research principles and methods, but also journal clubs during which examples of original literature that changed EMS practice are reviewed.

- Asynchronous learning modules to supplement classroom material.

- The clinical portion of the program is now completely competency-based to adhere to national accreditation standards.

- Physician teaching in the classroom a minimum of several times per month.

This year we had a huge number of applicants and were thrilled at the level of interest in the daytime program. We are very excited about the students we have enrolled.

We are fortunate to have a fantastic group of experienced lab instructors and preceptors, but are always in need of more given everyone's busy schedules. If you are interested, please contact clinical coordinator Jennifer Maher-Everett at the e-mail below.

Want more information about the program and potentially interested in joining future classes? Check out the website: http://www.monroecc.edu/depts/pstc/ems/paramedic. We also encourage students to take classes such as human biology, anatomy and math if they have not done so already to enhance their success.

Questions? Thoughts? Feedback? We welcome it.
Program leadership contact information:
Bill Comella, Program Director, wcomella@monroecc.edu
Nicole Amendolare, Program Manager, namendolare@monroeecc.edu
Jennifer Everett, Program Clinical Coordinator, jeverett@monroecc.edu
Maia Dorsett, MD, PhD, Program Medical Director, Maia_Dorsett@URMC.Rochester.edu

The EMS Checklist Manifesto (part 1)

Eric M. Thomas, MS, PA-C, EMT-B

Modern medicine has granted us stupendous know-how. Yet, avoidable failures remain numerous in health care and in almost every realm of organized activity. Volumes and complexities of knowledge inhibit our ability to consistently deliver proper and safe medicine, at least to a certain degree.

Think, for a second, about the last cardiac arrest scene you were on, or maybe a scene in which it was obvious that the condition of the patient was critical. In either example, there are several hundred decisions that you as the provider needed to execute in caring for that patient. In the setting of critical illness, not only are those decisions imperative, but also time sensitive and made in challenging and austere environments.

Let's arbitrarily call it 200 patient care decisions for the sake of easy math. When to intubate, which blade to choose, IV vs. IO, which drugs to push, how to move the patient, where to move the patient, and where to transport the patient are just a few of the several hundred examples that come to mind. If we assume an error rate of only 1%, which statistically speaking is an underestimation, there will still be 2 medical errors. While this may be a pessimistic approach to such a situation, any single patient care error has the potential to contribute to disease morbidity and mortality.

The skills that we perform regularly are the things that we feel most comfortable with. Skills that we use less frequently are often higher risk, and perhaps it is safe to say that most of us feel less comfortable in those areas. In either case, the way procedures are performed remains highly variable amongst different providers. This variability contributes to inconsistency which in turn results in unsuccessful procedures. As you well know, the dangers of an unsuccessful high risk procedure are not without consequences for our patients.

In consideration of low frequency, high risk procedures, over the coming months we will be taking a detailed look at prehospital intubation. At a preliminary glance, our regional prehospital first pass attempt success rate for intubation is marginal and offers room for improvement. In the upcoming series of this newsletter, we will review the applicability and effectiveness of checklists in the health care environment, regional prehospital intubation data, and implementation of a checklist for prehospital intubation.