



The Written Summary of the EM:RAP Monthly Audio Program



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Source	Anesthesia	I+D with Probing	Irrigation	Packing	Culture	Antibiotics
Roberts and Hedges	Local infiltration and systemic	Yes	Mentions, but no evidence	Gentle packing but no evidence	Not discussed	Not discussed
Rosen's	Local infiltration and systemic	Yes	Yes	Gentle packing	Not recommended	Not recommended
Tintinalli's	Local infiltration, systemic, regional/field block	Yes	Yes	Gentle packing	Not discussed	Generally not needed, clinical judgment
Rakel Textbook	Ring/field block, local anesthesia not effective	Yes	Yes	Gentle packing	Not recommended	Not recommended
UpToDate	Local with field/regional block	Yes	Yes until no visible pus	Gentle packing for large size	Yes, if antibiotics	Discussed separately
NEJM	Local, field/regional and systemic	Yes	Yes until clear	Gentle packing	Optional	Generally not recommended
Guidelines	Not discussed	Yes	Not discussed	Not discussed	Sometimes	Sometimes

Paper Chase 1: Treatment of Cutaneous Abscesses Sanjay Arora MD and Mike Menchine MD

- ▶ Schmitz G et al. *The treatment of cutaneous abscesses: comparison of emergency medicine providers' practice patterns.* West J Emerg Med. 2013 Feb;14(1):23-8. [PMID: 23447753.](https://pubmed.ncbi.nlm.nih.gov/23447753/)
- ▶ We know that skin and soft tissue infections are common presentations in the ED. Most infections with pus are due to MRSA.
- ▶ **There are lots of different guidelines on how to manage abscesses (see summary above).** Most of these guidelines do not have consensus across the board and there is not strong evidence supporting these recommendations.
- ▶ **The goal of this article was to determine what most people are actually doing.** This was a cross-sectional survey of ED providers including attendings, residents and midlevel providers in a wide variety of practice settings; academic, community, military, rural and urban. They posed 15 questions in 4 categories: pain management, irrigation, how the I+D and packing is performed, and use of cultures and antibiotics. They had a response rate of 75%.
- ▶ **Pain management.** 76% gave narcotics in addition to some form of local anesthesia. More than 70% inject anesthetic into the roof of the abscess and then cut into it. 60% did some form of field block.

- ▶ **Irrigation.** Only 48% are irrigating abscesses despite the fact it is recommended by most of the guidelines. Most used saline (94%), a few used tap water and 1% used betadine. Of those irrigating, 66% used high pressure irrigation with a splash guard and 34% just poured it in there.
- ▶ **I+D and packing.** Almost 90% said they made a linear incision. Elliptical incisions were less common and cruciate incisions were rare. Just over 90% are packing the wound. How much packing? 75% filled the wound with packing. 25% used light packing leaving a wick to keep it open. There are some small trials coming out that suggest that packing isn't necessary. Problems with packing: it can be painful and can lead to unnecessary ED follow-up visits. If you pack someone and they return to the ED in 48 hours for a recheck, you do not need to repack them.
- ▶ **Cultures and antibiotics.** 2/3 of respondents in the survey do not send wound cultures. Fewer than 20% said they give antibiotics to everyone with an abscess. Most reserved antibiotics for patients who were diabetic or immunocompromised, had a history of bad MRSA, infections, or had a large area of surrounding cellulitis. The primary goal for abscess treatment is source control: once you get the pus out you probably don't need to give antibiotics. About 1/3 are giving trimethoprim-sulfamethoxazole (TMP-SMX), 8% are giving cephalexin, 8% are giving clindamycin and the remaining 50% give two drugs (the most common combination is TMP-SMX/cephalexin).
- ▶ Previously it was thought that the incision needs to be the size of the abscess. However, some recent research suggests otherwise.

- *Tsoriades SS et al. Incision and loop drainage: a minimally invasive technique for subcutaneous abscess management in children. J Pediatr Surg. 2010 Mar;45(3):606-9. PMID: 20223328.*
- They made two really small incisions about 5mm, looped a drain through the incisions and tied it. 115 patients were included in this study and 95% had no complications.

- ▶ **Take-home messages.** It is unclear whether or not we should be irrigating abscesses after I and D; most people don't do it but almost all the guidelines recommend it. Tight packing is almost never a good idea. It is reasonable to leave a wick in place to allow drainage. You don't need to repack them. Reserve antibiotic use for special circumstances: diabetes, immunocompromised or a large area of surrounding cellulitis.

TPA in Kids

**Mizuho Spangler DO, Nerses Sanossian MD,
and Mel Herbert MD**

Case #1

A previously healthy 14 year old male presented to the Emergency Department. He played soccer and football and was on the Honor Roll. He arrived home a little after midnight with his family and sister after attending a barbecue. He was sitting on the couch, getting ready for bed. He developed a headache of gradual onset in the occipital area that radiated to the front of the head. He did not usually get headaches. He got up to ask his mother for acetaminophen, when his left leg gave out and he fell to the ground. He was assisted up by his family. He noticed he was unable to move his left leg or arm and his face felt tingly. He tried to speak and his speech was slurred. His family called 911. EMS contacted the base station. The story was concerning enough that the neuro service was contacted prior to arrival.

- ▶ **Stroke in a 14 year old?** Also consider: hemorrhage, intoxication, trauma and conversion disorder.

Case #2

Upon arrival, the patient appeared healthy. He had a markedly abnormal neuro exam with 1/5 strength on the affected side. He had sensory deficits and a left facial droop. He had significant dysarthria. The family was at the bedside of the patient and very concerned. He arrived to the ED within 15 minutes after symptom onset. There was no past medical history, no history of trauma and no drug use. No recent illnesses. No family history of coagulopathy, sickle cell or heart disease. No other risk factors. The patient was taken to the CT emergently to rule out a bleed. There was nothing on the CT. The patient was taken to MRI/MRA next for possible dissection or tumor. Neurology was contacted. The neurology attending arrived within 20 minutes. **The MRI was done within 30 minutes and showed a clot in the right MCA without any surrounding ischemia or bleed.**

- ▶ **This was a 14 year old boy with a devastating arterial ischemic stroke.**
- ▶ **There is a lot of controversy over thrombolytics for stroke in adults.** The neurologist recommended TPA. A clot was visible on the CT and MRI. The studies looking at TPA for strokes excluded children under

the age of 18. However, a lot of the case studies in pediatric patients have been in the adolescent age range.

- ▶ **The options?** Do nothing and let this kid end up in wheelchair with a G-tube. Go outside the standard of care. The kid was crying and asked, "What would you do?"
- ▶ **The family decided to proceed with TPA.** The patient received the TPA less than two hours from symptom onset. Nothing happened while he was in the ED. He went to the PICU. An hour later, he was moving his left arm and leg with improved facial droop and speech. He remained in the ICU for several days. A work-up did not find any underlying conditions to explain the stroke. It was thought to be likely secondary to an idiopathic vasculitis. He was discharged to a rehab hospital where he stayed for 3 weeks. **He was discharged home with no deficits.**
- ▶ **Pediatric stroke is underestimated.** Arterial ischemic, hemorrhagic and cerebral venous thrombosis occurs as often as pediatric brain tumors: about 3 to 15 out of every 100,000 kids per year. In western countries, about 55% of strokes in children are ischemic compared to 85% in adults. The rest are hemorrhagic. Underlying risk factors include: congenital and acquired heart disease, sickle cell disease, head trauma, vasculopathies, coagulopathies, metabolic disease, and infections.
- ▶ **Current recommendations are limited and controversial.** There is no consensus on anti-platelet therapy with aspirin and/or heparin. TPA is very controversial. There are some case reports on TPA use, mostly in patients in the adolescent age range.
- ▶ *Amlie-Lefond C et al. Use of alteplase in childhood arterial ischaemic stroke: a multicenter, observational, cohort study. Lancet Neurol. 2009 Jun;8(6):530-6. PMID: 19423401.*
 - This was an observational cohort study that included 687 children with acute arterial ischemic stroke. Only 15 (2%) received TPA. The time elapsed until administration of TPA was often outside the usual window for adults: patients received TPA up to 52 hours after symptom onset. 9 patients received intravenous TPA and 6 received intra-arterial TPA.
 - 2 patients died. One death was due to massive infarction with brain herniation and the other due to brainstem infarction.
 - 4 of the 15 patients had bleeds after TPA but these were not considered acutely symptomatic.
- ▶ *Janjua N et al. Thrombolysis for ischemic stroke in children: data from the nationwide inpatient sample. Stroke. 2007 Jun;38(6):1850-4. PMID: 17431210.*

- ▶ **Kids have strokes.** You need to know about it and think about it beforehand. This case highlights what it means to be an emergency physician. We often have to make important decisions with zero data and no right answer. This happened at a large academic center with 24 hour MRI availability and neurologist present; this is not feasible in most community ERs.
- ▶ **There is no evidence based answer, no FDA approval and no clinical guidelines.** It comes down to a central tenet of emergency medicine: your job sometimes comes down to making life and death decisions with insufficient information. This is OK. This is what you were trained to do. **What is the best thing to do for the patient?**
- ▶ **The neurologist's perspective.**
 - **Strokes in kids are rare, but when they happen they are serious.** Sanossian has given TPA to about 5-6 children prior to this. TPA is given infrequently to children, partly because stroke is difficult to recognize due to its rarity. Stroke is often diagnosed late in children. Also, most pediatric ERs do not have the protocols and pathways in place that stroke centers do.
 - **In the community, most would not have offered TPA.** The labeling is for 18 years and older. The studies on TPA had exclusion criteria of 18 years and most are unwilling to push the envelope. There is evidence from case studies that there may be a benefit in children as well. There is no reason to think that the action of TPA would be different in children than adults.
 - **In this case, the diagnosis was made early and within the window for TPA.**
 - **Did the MRI help make the decision?** MRI is useful when the diagnosis is unclear. In this case, the presentation was clearly consistent with a stroke. MRI can diagnose an ischemic stroke with high sensitivity and specificity. CT scan is just as good at ruling out hemorrhage. MRI confirms that the patient is having a stroke and this increases your comfort level for administering TPA. However, if you are looking for contraindications for TPA, the MRI will not show these more frequently than CT.
 - If there is an aneurysm present, MR may pick it up but patients with aneurysms don't typically present with ischemic stroke.
 - TPA may still be beneficial in carotid artery dissection. The dissection is in the neck, but the thrombus is in the brain.
 - **The most frequent cause of stroke in children is often cryptogenic or unknown. The most commonly identified cause of stroke in this age range is cervical artery dissection.**
 - When a kid presents with focal neurologic deficits, people may question if the kid is making it up and don't consider stroke.
 - **What are some potential bad outcomes?** One of the first cases where Sanossian pushed TPA was in a 15 year old female with a dissection. She had a devastating stroke. The TPA was unable to recanalize the artery and the patient had to receive a hemicraniectomy. Today she is in a graduate program, although she is still unable to move her left arm and has limited movement of her left leg. This bad outcome was likely due to the underlying stroke. **For every 100 patients treated with TPA,**

3 patients will be worse due to the TPA but 32 patients may be helped. If you select the best patients, you will harm some, but you will help more than you harm. You need to discuss risks/benefits with the families.

- **The literature on pediatric stroke is scant.** Sanossian applies the same principles as adult strokes: he feels comfortable administering TPA within a 0-3 hour window after symptom onset in a case that is clearly an ischemic stroke. Outside of the 3 hour window, we need to be very selective in whom we treat. There may be good outcomes in some patients who have not yet developed early swelling but this has to be on a case-by-case basis. It is better to have a neurologist with stroke expertise consulting. This may not be available for most. If you are in a community hospital, it is better to transfer the patient to a tertiary care center. **If it is within the 3 hour window and clearly an ischemic stroke, he encourages treatment with TPA despite the lack of FDA approval as the benefit is likely to outweigh the harm.**
- **What is the dose?** Sanossian recommends the same dose as adults: 0.9 mg/kg with 10% given as bolus over 1 minute and the remainder infused over an hour.
- **How long do you wait to see effects?** The clinical trials showed benefit at 3 months. It is hard to know if the TPA worked or not because the outcome of stroke is so variable. We won't know if it was the TPA or natural history of the stroke that led to a good outcome. However, if we continue to treat people we think will benefit along with providing the best supportive care for stroke, we are doing the best thing for the patient.
- **Should the patient continue on any prophylactic medications?** In this case, it was an idiopathic stroke. It is reasonable to continue him on low dose aspirin for the rest of his life. Low dose aspirin is tolerated well.
- **TPA gets a bad rap.** It isn't terribly effective, but the benefits outweigh the risks.
- **It is important to treat ischemic stroke early and aggressively.** Time is brain. Sanossian suggests if the patient is going to get a diagnostic MRI, consider taking the TPA and administering it after the first sequences that show ischemic stroke and not hemorrhage so the patient can receive it 30-40 minutes earlier.
- **Pediatric stroke will likely remain understudied given its rarity.**
- In the setting of acute stroke, there are a few studies looking at low molecular weight heparin versus aspirin in the first 24 hours after acute stroke and these have shown no difference. **Antiplatelet agents are equivalent to anticoagulation and are the standard of care.**
- A study performed in China showed short-term therapy, with clopidogrel and aspirin, had benefit. *Wang Y et al. Clopidogrel with aspirin in acute minor stroke or transient ischemic attack. N Engl J Med. 2013 Jul 4;369(1):11-9. PMID: 23803136.*
- The POINT study is currently underway in the US looking at aspirin and clopidogrel versus either agent alone in acute stroke.

Dog Bite Myths

Anand Swaminathan MD

- ▶ **4.5 million Americans experience an animal bite every year and these account for approximately 5% of traumatic wounds in the ED.** Dog bites account for the majority of these. We know wound closure leads to better cosmetic outcomes but may result in increased infections. Lacerations repaired in the ED have a 3-7% infection rate in general.
- ▶ **If an animal bite becomes infected, Pasteurella is the most likely pathogen (about 50% for dog bites).** We are told to not close the wound unless it is in a cosmetic location and give antibiotics. **What does the literature say?**
- ▶ *Chen E et al. Primary closure of mammalian bites. Acad Emerg Med. 2000 Feb;7(2):157-61. PMID: 10691074.*
 - They looked at infection rates in 145 mammalian bite wounds that were closed primarily. About 88 of these were dog bites and about 6% became infected.
 - All of the bites were considered for antibiotics but only about 81% actually received antibiotics. The majority were given amoxicillin-clavulanic acid. They found no difference in the rate of infection between patients who received antibiotics and those who didn't, although this was a small group.
 - **They found if dog bites were sutured, about 6% became infected, which is approximately the rate of infection in normal lacerations.** This may be acceptable if cosmesis is the primary concern.
- ▶ *Paschos NK et al. Primary closure versus non-closure of dog bite wounds. A randomised controlled trial. Injury. 2014 Jan;45(1):237-40. PMID: 23916901.*
 - This study included 168 patients with dog bites who were randomized to primary closure or healing by secondary intent. All of the wounds had high pressure irrigation with povidone iodine solution. All of the patients received amoxicillin-clavulanate.
 - **Overall, they found an 8.3% infection rate with no difference between the primary and secondary closures (9.7% versus 6.9% which was not statistically significant).** They found much better cosmesis with primary closure.
 - The group that presented within 8 hours had an infection rate of 4.5%. The rate increased to 22% in patients presenting after 8 hours. They concluded that patients presenting within 8 hours should have primary closure for improved cosmesis as it didn't change the infection rate.
 - Head and face wounds had a lower infection rate.
- ▶ **Neither of these articles looked at if antibiotics were necessary.**
- ▶ *Medeiros I and Saconato H. Antibiotic prophylaxis for mammalian bites. Cochrane Database Syst Rev. 2001;(2):CD001738. PMID: 11406003.*
 - Meta-analysis of 6 studies on dog bites looking at antibiotics versus placebo. They found no evidence that prophylactic antibiotics for dog

bites reduced the rate of infection. They also didn't find a difference between dog and cat bites. There is limited evidence that antibiotics reduced the rate of infection of bites to the hand. They recommended larger studies on the topic.

- ▶ **Where does this leave us? It appears that it is safe to close all dog bites regardless of location in patients who present within 8 hours after injury.** Most patients will present within this time period. If the dog bite is on a non-hand location and you decide to close them, you should probably give them antibiotics because we don't have enough literature to say otherwise. If you leave them open, don't worry about antibiotics. If you have a bite on the hand, right now the best literature says you should give antibiotics whether you close them or not.
- ▶ **You can't apply these studies to patients who are immunocompromised because they are always excluded.**

Paper Chase 2:

Epistaxis Treatment with Tranexamic Acid

Sanjay Arora MD and Mike Menchine MD

- ▶ **Nosebleeds are messy. The patient is usually freaking out and hypertensive. Blood gets everywhere.**
- ▶ You hold pressure for 10-15 minutes and it stops the bleeding. The patient leaves the ED and comes back very annoyed after they get to their car and it starts bleeding again. They don't appreciate that you are trying to avoid jamming large Rhino Rockets into them. What then? Go in there and try to find the source of the bleeding. Give some oxymetazoline. Look for something to cauterize, usually with silver nitrate or an electrocautery device. When that fails, you jam a Rhino Rocket in their nose that needs to stay there for 3-5 days and you have to give them antibiotics to prevent an infection. Then they get pale, diaphoretic and hypotensive from a vagal response. This is a big problem.
- ▶ *Zabed R et al. A new and rapid method for epistaxis treatment using injectable form of tranexamic acid topically: a randomized controlled trial. Am J Emerg Med. 2013 Sep;31(9):1389-92. PMID: 23911102.*
 - They conducted a fairly large randomized trial of tranexamic acid. Tranexamic acid has been getting a lot of press recently because it has decreased mortality in trauma patients who are bleeding to death.
 - Tranexamic acid is an anti-fibrinolytic. It binds plasminogen and prevents it from turning into plasmin, which dissolves clots and makes you keep bleeding. It is widely used in medicine for a variety of uses. It is available over-the-counter for menstrual bleeding in the UK.
 - The study randomized 216 patients. They soaked cotton pledgets in the injectable form of tranexamic acid and then placed these up against the bleeding septum for an unspecified amount of time (probably a few minutes) versus the standard Rhino Rocket approach.
 - **They found 71% of the patients with tranexamic acid stopped bleeding within 10 minutes compared to only 31% with the Rhino Rocket approach.** 95% of the tranexamic acid group was discharged within 2 hours compared to only 6% in the anterior nasal packing group. Patients preferred it. There were very few complications

in either group, mostly limited to nausea. There was no significant difference in the rebleed rate at a few days.

- **There are a lot of problems with this paper.** Nothing was blinded. It is unusual to have bleeding after ten minutes once the Rhino Rocket is placed; they reported 2/3 of the patients continued to bleed 10 minutes after Rhino Rocket placement! There is probably some assessment bias and wishful thinking.
- ▶ **This raises some important points.** You can sometimes control this bleeding locally. It is worth trying to identify the source of the bleeding and cauterize it. If you could place tranexamic acid or some other hemostatic agent against the area, maybe you could avoid the Rhino Rocket.
- ▶ **Rhino Rockets are not ideal.** They are painful. They have to stay in there for a couple of days. The patient has to return to have it removed. You have to give antibiotics. They may rebleed when the packing is removed.
- ▶ **There is a slight increased risk of thrombosis (for example, DVT) when someone receives tranexamic acid.** It is unknown if this applies to topical application. Given that this is so new, you should probably restrict this to people who are low risk for blood clots if you are going to use it.

Fingers and Foleys

Mel Herbert MD and Kenji Inaba MD

- ▶ **Fingers and tubes in every orifice?** This dogma is no longer recommended in the 9th edition of ATLS.
- ▶ **There is still some utility to nasogastric (NG) tubes and foley catheters but they are not recommended routinely.** NG tubes are less useful because we are no longer giving oral contrast routinely for CT scans. They should be reserved for patients at risk of aspiration. The foley catheter is a good monitoring tool for resuscitation in patients, especially burn patients.
- ▶ **The rectal exam is contentious.** Patients don't like it.
 - *Esposito TJ et al. Reasons to omit digital rectal exam in trauma patients: no fingers, no rectum, no useful additional information. J Trauma. 2005 Dec;59(6):1314-9. PMID: 16394903.* This was a prospective study including 512 patients. They looked at how the digital rectal exam compared to other clinical indicators for identifying the 3 most common indications: rectal tone for spinal cord injury, urethral disruption with high riding prostate, GI bleeding or injury. They found between 5-6% of the patients had one of these three injuries.
 - They found the negative predictive value of both the rectal exam and the other clinical indicators was very high: 99%. However, they found that if the other clinical indicators missed the injury, so did the rectal exam. It didn't add any information.
 - **The added value of the rectal exam is very minimal. Routine rectal exam is not recommended.** The only situation where it may be useful is in a transpelvic gunshot wound when you want to see if there is a breach in the mucosa.

- ▶ **What should you do to evaluate spinal cord injury on secondary survey?** If you have clinical indicators of a spinal cord injury such as weakness or paralysis, you can do a rectal exam and document the findings to look for return of reflexes. Performing a rectal exam to diagnose the injury is not the right approach.
- ▶ **When should you put a foley catheter in?** Most patients in whom you want to assess adequate resuscitation should receive a foley catheter. The foley really gives you a good idea of how well you are perfusing the organs, assuming normal renal function. However, it takes hours before this data is available.
- ▶ **When should you not put in a foley catheter?** Patients with a suspected urethral injury. The concern is taking a partial urethral injury and converting it into a complete urethral injury. There are two categories of patients at higher risk: male patients with blunt trauma and a pelvic fracture, and patients with penetrating trauma. Consider in patients with blood at the meatus, perineal or scrotal hematoma, high-riding prostate (which is rare to find), etc. Patients may complain of a desire to void but are unable to do so spontaneously.
 - **Traditionally, we were taught to not place a foley catheter.** This is probably safest. If there is any question of urethral injury, proceed to a diagnostic test such as a retrograde urethrogram. **However, if the patient has low likelihood with just a small perineal hematoma or complaints of an urge to void, it is ok to do one gentle attempt to place a foley catheter with lots of lube.** You should probably get the urologists on board first, because if there is an injury, you can be sure they will blame you. If you meet resistance, stop and proceed to the retrograde urethrogram. If there is a small tear, the treatment is a foley with subsequent epithelialization.
 - **If you have a high suspicion of urethral injury, work in a rural area and need to transfer the patient for a prolonged period of time, it is reasonable for the ER physician to perform the retrograde urethrogram.** It may be done under fluoroscopy or x-ray. You need to have a syringe, contrast and a small foley catheter. The foley catheter is placed up into the meatus about 1-2 cm with gentle insufflation of the balloon (just enough to hold it in place). Inject the contrast and image the urethra in 2 opposing views (AP and lateral). If the retrograde urethrogram is normal, you can place the foley with a fair amount of force if necessary. If it is positive, the patient can be transferred for definitive treatment (usually visualization by urology using a cystoscope with placement of a wire and foley catheter).

Editor's Note: To perform a retrograde urethrogram: Gently place an 8Fr foley catheter into the urethra, just until the balloon disappears into the distal urethra, at the level of the glans. Inflate the balloon with 1-2mL of air/water for a snug fit. If a small foley catheter is not readily available, the tip of a catheter-tip syringe may be gently placed into the distal urethra, at the level of the glans, while gently squeezing the glans around the syringe tip to prevent spillage. The penis should be gently stretched to prevent urethral folding/superimposition on the xray.

Next, slowly inject 10-20mL of water-soluble contrast such as Omnipaque (often diluted to 10% with normal saline) and perform the xray (urethrogram) or fluoroscopy during the last 10mL of contrast injection.

Davis JE, Silverman MA. Chapter 55: Urologic Procedures. In: Roberts J, ed. Roberts and Hedges' Clinical Procedures in Emergency Medicine, 6th edition. Philadelphia, PA: Saunders Elsevier; 2014:1113-1154.

The Lin Sessions

Michelle Lin MD, Bryan Hayes PharmD, Theresa Chan MD, and Brent Toma MD

- ▶ **Occasionally we see patients who swear they have lost a contact lens.** Because they are so transparent, they can be difficult to see. You can use fluorescein to stain the contact lens. FYI, it stains the lens permanently so make sure it is a disposable contact lens first. Use the fluorescein normally and look for a bright yellow-green stained contact lens. You do not need UV light. Then you can remove the lens. The patient will already be prepped to evaluate for an associated corneal abrasion.
- ▶ **Should we be getting our information from digital resources like blogs and podcasts?** Let's say you attempted a technique you heard about on a blog and there was a complication, should you blame the blog? This reflects a genuine concern that you need to have a high standard of review for medical information. Blogs and podcasts are looked upon as second and third tier resources. One of the traditional arguments against digital content is that it lacks peer review.
- ▶ **How effective is the traditional peer review process?** Do we really think that sending out an article to 2-3 reviewers who are busy with their own lives and work is the best strategy? When textbooks are published, is every detail scrutinized to the extent it deserves?
 - **Online resources and blogs may have an advantage over traditional peer review strategies.** Feedback is instantaneous, either through email, comments or social media. Most of the good sites have a person who reviews the material before it is posted. If an error is identified, it can be easily updated. If we publish information online, it allows consumers of the information to interact with us and praise or criticize the information.
 - **People are excited to read the material.** If you have a good post, a lot of people will view it. Many of these will be experts in the area and interested in it.
 - **The best strategy may be to pair traditional peer review with the open forum of blog comments.**
- ▶ **Don't be fooled by the peer review process of textbooks.** There is nothing magic about the process. You are asked to write a book chapter because you are an expert, the resident of the expert or no one else will do it. Then it goes to the editor who fixes the punctuation and then it is published. There is variability in the quality of textbooks so you go to the "good textbooks" like Rosen's or Tintinalli's because they are trusted. It is the same for blogs, you go to the sites that are good sources, where people are known and trusted and there is a process where more than one person is listening to it. Textbooks are way behind current practice.
- ▶ The peer-reviewed journal process is not perfect. You still have to go to the good journals because there are plenty out there that have a poor peer review process.

- ▶ **Remember that all of the sources you look at should be vetted.** The best way to vet these is over time. Who is good? Who is trustworthy? Who admits when they are wrong and corrects errors? Is there a way to give feedback on information via Twitter or other means? If you follow good sources, no matter what they are, you will end up getting good information.
- ▶ **Before you try a new thing or stop doing an old thing, make sure you go through a vetting process.** You may admit a lot of people in your inner city ER even though the blogs say it is unnecessary because you have no follow-up. Or you may discharge home patients that others would admit because you have spectacular follow-up. The practice of medicine has lots of subtlety.
- ▶ **Many in the blogosphere are concerned that they will be sued for something they said.** That would cause the collapse of the entire peer reviewed process. It's possible, but you shouldn't worry about it.
- ▶ **This is a great time to practice medicine.** The amount of information that is available to you is amazing. There are so many great resources available.
- ▶ **Who is the target audience for blogs/podcasts?** Some suggest it should be limited to practicing clinicians with a strong foundation in clinical knowledge because we can recognize and appreciate the subtle clinical nuance of new teaching. Learners coming up now will be using the internet first for information acquisition. Those supervising learners need to be aware of this and meet them there. There needs to be a culture shift in how we teach and coach our learners to critically appraise material.
- ▶ **Following blogs and podcasts can be like sipping from a fire hose.** There are more resources than you can handle. Some form of curation is needed. Here are some tips. Get yourself a nanny, a police dog and a butler to help sort through all of the information. The nanny is the Life in the Fast Lane review at the lifeinthefastlane.com/education where the best content on the web is compiled. The police dog is Google Foam. Todd Raine's customized search engine preferentially finds these resources. If you are looking for content on a specific topic, it is the best place to start. Plug in your keywords and await the awesomeness. The butler is a news aggregator: they are simple, free programs that create an up-to-date feed of the content you request as soon as it is published. They are cloud based, have android and iPhone apps and synchronize across all of your devices. Choices include Feedly, Pulse and Footboard.

Paper Chase 3:

Scanning Everything and Proud!

Sanjay Arora MD and Mike Menchine MD

- ▶ **Pulmonary embolism.** The work-up for these patients is complicated. The diagnostic algorithms aren't that easy to follow. It is a time consuming process that can be costly and lead to radiation and a CT.
- ▶ **We don't use d-dimer well.** It should be used in patients who are low pre-test probability and people in whom you would have ordered a CT. Some hospitals require D-dimer testing prior to CT.

► **CT scanning has had a ten-fold increase in use over the last two decades.** In ED patients with chest pain, the rate has increased from 1.2% in 1995 to 13.7% in 2007. Overdiagnosis has increased. We are diagnosing small, asymptomatic PEs of no consequence, which is driving the mortality down.

► *Feng LB et al. U.S. trends in computed tomography use and diagnoses in emergency department visits by patients with symptoms suggestive of pulmonary embolism, 2001-2009. Acad Emerg Med. 2013 Oct;20(10):1033-40. PMID: 24127707.*

- This study looks at trends in CTs for patients with at least one of the following symptoms: chest pain, dyspnea, or hemoptysis.
- Data was collected from the 2001-2009 National Hospital Ambulatory Medical Care Survey (NHAMCS). The control group was everyone else seen in this time period.
- During the time period, the data collection changed. Prior to 2007, there was no information about the type of CT ordered. After 2007, the CTs were categorized as head CT, not head CT, or unknown. After 2007, they were able to exclude the head CTs. They had subgroups looking at age, race, etc.
- **What did they find?** Overall, about 12% of ED visits each year had one of these symptoms: chest pain, shortness of breath, or hemoptysis. In the control group (i.e. patients who did not have one of these complaints), CT use increased from 6.3% in 2001 to 13.9% in 2007 and then plateaued. In the symptoms group, the CT rate went from 2.6% in 2001 to 13.2% in 2007 before leveling off. This is a five-fold increase in 6 years.
- **The rate change was not different based on the payer group.**
- **The overall diagnosis rate was 2.7%.** This includes patients of varying levels of risk. This was not broken down by year.
- **There are many limitations to this paper.** Large databases are difficult to use. You have to make a lot of assumptions and be very strict about inclusion criteria when using databases. They didn't look at DVTs. We do not know about the decision process of the provider.
- **It does show use of CT is skyrocketing without an equal increase in the rate of diagnosis.**

► **Take-home messages.** When you diagnose a tiny asymptomatic PE, you are dooming people to warfarin, which is a dangerous drug and may not benefit these patients. You are dooming these patients to many more CTs; it has been shown in the literature that once you diagnose these patients with PE, you are much more likely to get a subsequent scan in the future. The costs and radiation will mount up. Be judicious in who you CT. Use clinical decision rules and D-dimers appropriately.

SAH – The Perry Interview

Mizuho Spangler DO and Jeff Perry MD

► **Subarachnoid hemorrhage is a scary thing.** It accounts for 1-3% of all headaches seen in the ED. It can have catastrophic outcomes and is a critical do-not-miss diagnosis. Approximately 20,000 patients walk

into the ED every year with a potentially salvageable SAH and we are still missing between 25-30% on initial presentation.

► **Most of the headaches we see are benign and can be discharged home safely after pain medication.** For patients presenting with a concerning story, such as a thunderclap onset of the worst headache of their life, the work-up is also straightforward. **What about the well-appearing patient with a more obscure story?** In a busy ED, the last thing you want to do is perform a CT/LP in a well-appearing patient with a normal neuro exam who is asking you for a sandwich while playing on an iPhone.

► **Why are we missing so many of these on initial presentation?** The patients may complain only of headache and don't look very ill. It can be challenging to make the diagnosis when the patient has no findings on neurologic exam. The physician may be lured into a false sense of security when the patient appears well and has relief with analgesics.

► *Perry JJ et al. Clinical decision rules to rule out subarachnoid hemorrhage for acute headache. JAMA. 2013 Sep 25;310(12):1248-55. PMID: 24065011.*

- This is a multi-center study that included 10 university-affiliated Canadian emergency departments. Over a 4 year span, they enrolled 2131 patients who were older than 15 years and presented with a sudden headache peaking within 1 hour. The patient had to have presented within 14 days of headache onset. The headaches were nontraumatic.
- Patients who had 3 or more previous similar headaches in the past or had a known history of subarachnoid were excluded. Patients with neurologic deficits were excluded.
- They tried to validate three previously derived decision rules.
- **Rule 1.** Age > 40 yr, neck pain or stiffness, witnessed loss of consciousness, or onset during exertion.
- **Rule 2.** Age > 45 yr, arrival by ambulance, vomiting (> 1 episodes), or diastolic blood pressure > 100mmHg.
- **Rule 3.** Age 45-55 yr, neck pain or stiffness, arrival by ambulance, or systolic blood pressure > 160 mmHg.
- Physicians completed data collection forms which included the three previous rules as well as other clinical variables.
- The clinical decision rule was refined to create the Ottawa SAH rule. **Patients with one or more of the following variables were considered high risk: older than age 40 yr, neck pain or stiffness, witnessed loss of consciousness, onset during exertion, thunderclap headache (instantly peaking pain), or limited neck flexion on exam.**
- **None of the three decision rules had 100% sensitivity.** The best performing rule was Rule 1 and this had a sensitivity of 98.5%. It missed 2 out of 132 subarachnoid hemorrhages. One of these bleeds was not clinically significant: it was a small bleed in the central sulci; the neurosurgery team did a CT angiogram in the ED, which was clear, and they sent the patient home. The patient returned a week later for re-imaging and was fine. The other patient had a clinically significant

aneurysm that required surgical intervention. **With the addition of two variables, they were able to increase the sensitivity to 100%.**

- ▶ **This is ready to use for identifying high risk patients but it needs further validation for identifying low risk patients.**

SAH – The Swadron Response

Mizuho Spangler DO and Stuart Swadron MD

- ▶ **At the end of the day, you have to rely on your clinical gestalt.** However, these rules may be helpful in identifying high risk patients.
- ▶ **There are limitations to this paper.**
 - This is not NEXUS in terms of the methodology. There is a verification bias in this study. Only a minority of these patients received the gold standard of lumbar puncture. Only 83% of the patients of this study received a CT. It might seem like these rules work better than they do, because only the patients where the clinician really thought they had the disease were worked up.
 - There were probably a lot of patients who were not worked up but were actually positive for SAH. The majority of the patients did not have actual follow-up but rather follow-up by proxy outcome assessment. They were followed by other means; checking records, other hospitals, reviewing coroner cases and telephone follow-up. These are notoriously inaccurate. There are plenty of patients with “sudden cardiac death” who do not receive a post-mortem and may be experiencing an aneurysmal bleed.
 - The definition of headache used excludes most headaches. If people adopt this rule, they may use it in a patient population for whom it wasn't intended. There are other differential diagnoses of bad headache etiologies that we need to consider; dissection, thrombosis, infection, etc. These may not present with a headache of maximal intensity in an hour.
- ▶ **Why was neck stiffness included?** If someone has a stiff neck, it usually indicates that the subarachnoid was significant enough that it is causing meningeal signs.
- ▶ **The three most important signs are: sudden at onset, maximal at onset, and different from previous headaches.** This paper reinforces that belief.
- ▶ Some of the clinical indicators, such as arrival by ambulance, may be less predictive in a different patient population. For example, many patients in underserved areas may use ambulances for less emergent conditions. Some people are more prone to vomiting than others.
- ▶ **There are a lot of misconceptions out there that this type of research corrects.** There are doctors who believe that improvement with analgesia rules out subarachnoid hemorrhage. Negative CT angiograms don't mean the patient doesn't have subarachnoid hemorrhage. The worst headache of your life is neither a sensitive or specific finding. Exertional headache syndromes are not normal.

Literature Review

Rob Orman MD and Ryan Radecki MD

- ▶ *Rose MK et al. Clinical clearance of the cervical spine in patients with distracting injuries: It is time to dispel the myth. J Trauma Acute Care Surg. 2012 Aug;73(2):498-502. PMID: 23019677.*
 - This study prospectively gathered data on clinical clearance of C-spine injury by essentially using the NEXUS criteria with the exception of distracting injury.
 - They enrolled 761 patients who had experienced blunt trauma and had at least one distracting injury. When evaluated, 464 patients did not have any tenderness to palpation of the C-spine. All of these patients underwent CT scan of the cervical spine, although some had had their C-collars cleared clinically prior to imaging. 86 patients of the 761 had C-spine injury. Only 1 of these patients, a young woman with a humerus fracture, mandible fracture and traumatic intracranial hemorrhage, was in the group that was clinically cleared.
 - **They determined that NEXUS used without the criteria of lack of distracting injury still had 99% sensitivity.**
- ▶ NEXUS codified the distracting injury as a condition thought by the clinician to be causing enough pain to distract the patient from a second injury. Examples include long bone fracture, visceral injury requiring surgical consultation, a large laceration, degloving, crush injury, large burns or any injury producing acute functional impairment. Any injury may be classified as distracting if it has the potential to impair the patient's ability to appreciate other injuries.
- ▶ Distracting injury alone accounted for 30% of all radiographic studies ordered on 818 NEXUS patients. Some follow-up studies suggested that it may be limited to upper extremity injuries and severe pain.
- ▶ *Heffernan DS et al. What defines a distracting injury in cervical spine assessment? J Trauma. 2005 Dec;59(6):1396-9. PMID: 16394912.*
 - This study included 406 patients with blunt-trauma. 40 patients had cervical spine fractures. Of these 40 patients, 7 had no neck tenderness to palpation. All 7 patients had an upper torso injury. They determined that upper torso injuries may be sufficiently painful to distract from C-spine examination.
- ▶ *Konstantinidis A et al. The presence of nonthoracic distracting injuries does not affect the initial clinical examination of the cervical spine in evaluable blunt trauma patients: a prospective observational study. J Trauma. 2011 Sep;71(3):528-32. PMID: 21248650.*
 - This was a prospective study including 101 patients with cervical spinal injury out of 9,103 blunt-trauma patients. 4 out of the 101 (4%) had no neck pain on examination. All 4 had rib fractures and severe tenderness to palpation of the chest.
- ▶ **The Canadian C-spine rule does not include distracting injury.** Patients under age 65 yr without dangerous mechanism (such as fall from elevation, axial load to the head, high speed motor vehicle accident or with rollover/ejection, collision with motorized recreational vehicle or bicycle collision), who have a low risk factors (simple rear-end motor vehicle collision or sitting position or ambulatory any time or delayed

onset of neck pain or absence of midline C-spine tenderness) and who are able to rotate their neck actively 45 degrees to the left and right do not require imaging. Patients may have midline tenderness to palpation and still be cleared.

► The Rose study doesn't address the extent of opiate administration prior to assessment.

► **If you are going to play around with this decision instrument, you have to be careful.** This has to be carefully qualified with some limitations: intracranial hemorrhage, ribs and facial fractures may be truly distracting injuries. It seems like the literature is narrowing the definition of a distracting injury but we are not ready to call it a myth just yet.

► *Abrahamian EM et al. Association of pyuria and clinical characteristics with the presence of urinary tract infection among patients with acute nephrolithiasis. Ann Emerg Med. 2013 Nov;62(5):526-33. PMID: 23850311.*

- If a patient is toxic or septic, it is not much of a mystery. This can be considered an abscess behind the stone and the stone needs to come out immediately. The urologists don't usually argue with you and take the patient for a stent. More often however, there are a few bacteria or a few white blood cells and you wonder if it is infected. The urine either comes back culture positive or the patient gets sick. Usually urology suggests treating as a complicated UTI with follow-up in clinic.

- This study included 360 patients with acute nephrolithiasis who received noncontrast CT. They cultured the urine of all of the patients with a cutoff of 1000 cfu/mL.

- **The most predictive elements were what you might expect.** If the patient was febrile, they were 10 times more likely to have a UTI. If they were female, they were 27 times more likely to have a UTI. History of UTI and complaints of subjective fevers had a relative risk of about 6. Cystitis symptoms were also mildly predictive.

- Findings on urinalysis that were predictive included positive nitrites which had a positive likelihood ratio of 36. The likelihood ratio of a small amount of leukocyte esterase was about 8.

- **The data doesn't really tell us what to do.** About 25% of the patients with white blood cells in the urine had a urinary tract infection. You are still going to have to talk with the patient about performing a CT to rule out an obstructing stone even when the diagnosis of nephrolithiasis is clinically evident.

- **It is unclear if antibiotics actually make any difference.**

- **If the patient has a few white blood cells or a few bacteria with a stone, the risk of developing an infection increases.** You have a nidus for possible infection, the urine isn't going to drain the way it is supposed to and you might have a little hydronephrosis. You should probably treat these with antibiotics.

► *Paschos NK et al. Primary closure versus non-closure of dog bite wounds. A randomised controlled trial. Injury. 2014 Jan;45(1):237-40. PMID: 23916901.*

- Over time, there has been a trend towards primary closure of dog bite wounds along with antibiotics.

- The authors of this study included 168 patients with dog bites and compared primary closure of wounds with non-closure. All patients had their wounds washed out and were given antibiotics. The outcome measures were infections and cosmetic appearance.

- They found it doesn't seem to matter if you put a few sutures in for improved cosmetic outcome. Their follow-up for infectious complications was at the time of suture removal which ranged from 7-14 days depending on location. Cosmetic outcome was assessed at 4 weeks by a surgeon blinded to treatment strategy.

- **Suturing dog bites improves cosmesis without question.** Rates of infection didn't seem to differ; there were only about 80 patients in each arm of the study and 8 patients with sutures developed infection compared to 6 patients without sutures. There was no statistical difference but the sample sizes were underpowered.

- **Based on this, it is reasonable to offer wound closure to patients for improved cosmesis. There is a risk of infection either way.**

- The rate of infection dramatically increases (4% up to 22%) after eight hours post injury.

- They used high pressure irrigation, although this might not be appropriate for all wounds, especially puncture wounds. They also scrubbed all the wound edges with iodine but this might not be helpful given toxicity. Everyone received antibiotics, which is still up for debate. Only simple wounds were included.

- There wasn't any subgroup analysis for hand lacerations but most of the patients had injuries on the hands or arm.

► *Hollenbeck RD et al. Early cardiac catheterization is associated with improved survival in comatose survivors of cardiac arrest. Resuscitation. 2014 Jan;85(1):88-95. PMID: 23927955.*

- This was a retrospective study including 269 patients who experienced cardiac arrest due to ventricular arrhythmia without STEMI and were treated with therapeutic hypothermia. Of these, 122 received cardiac catheterization while comatose.

- **The authors concluded that comatose survivors of cardiac arrest without STEMI who received therapeutic hypothermia and early cardiac catheterization had significantly decreased mortality.** Acute coronary occlusion was discovered in 26.6% of the patients even when they did not have STEMI on the post-resuscitation EKG.

- Taking survivors of cardiac arrest without STEMI to the cath lab has become very trendy in some institutions. Unfortunately, the evidence behind it is almost all observation and full of bias.

- Clearly, taking survivors of cardiac arrest from acute coronary syndrome such as STEMI to timely catheterization is a good idea. However, the post-cardiac arrest EKG is frequently a mess and troponin testing after cardiac arrest is not terribly predictive of lesions.

- This is a multicenter study at 6 institutions looking at survivors of cardiac arrest suspicious for cardiac etiology (due to ventricular fibrillation or tachycardia). They identified 435 of these patients. 156 of the patients were classified as STEMI. There were 269 patients remaining with ventricular tachycardia or fibrillation and no STEMI.
 - They compared the outcomes between those who went for early catheterization (defined as immediately upon hospital admission or during hypothermia treatment) versus late catheterization (at any other time during the hospitalization).
 - **Approximately 60% of the patients treated with early catheterization had good neurologic outcome compared with 44.5% in the other group.**
 - **They concluded in favor of early catheterization. However, this conclusion is not backed up by the evidence.** When you are doing a non-randomized observational study you do not have control over the individual treatment decisions by the clinician. Each patient has a unique presentation with prognostic and clinical factors that influence how the treating practitioners act. Your results are confounded by the bias of clinicians, who select patients for treatment because they think that this is the best treatment for the patient based on a variety of factors. In resuscitation, this is frequently the patient who has the best prognosis as they are more likely to be aggressive with treatment.
 - **The authors have no idea why early catheterization was helpful.** Only 26% of the patients undergoing early catheterization were found to have an acute coronary occlusion and the patients who received PCI for these lesions during early catheterization had no difference in outcomes compared to the patients who did not receive PCI.
 - **What probably helped these patients more than anything was a greater intensity of care.** The patients who received early catheterization were also more likely to have different management of shock and hemodynamic interventions.
- *Imazio M et al. A randomized trial of colchicine for acute pericarditis. N Engl J Med. 2013 Oct 17;369(16):1522-8. PMID: 23992557.*
- They included 240 patients with acute pericarditis; half were given an NSAID for 3-4 weeks and half were given a NSAID and colchicine. The dose of colchicine was 0.5 mg twice a day for three months in patients >70 kg and 0.5 mg daily for patients <70kg.
 - The three month period of treatment was arbitrary.
 - The primary outcome was incessant or recurrent pericarditis. Colchicine improved symptoms faster and more comprehensively at 72 hours and 1 week follow-up. This was an absolute difference of about 20-25% of patients that were symptom free at each time point. **The number needed to treat was 4.** The group that was randomized to colchicine for 3 months had fewer recurrences: 9.2% compared to 20.8%.
 - The colchicine wasn't associated with any adverse outcomes. However, a single manufacturer currently has exclusive rights to colchicine until July. The average cost of a 3 week prescription has gone from \$7 to \$180.
 - You should check some baseline labs including a basic metabolic panel to evaluate renal and hepatic function and a complete blood count.

- **What are bad things that can happen with colchicine?** It is notorious for GI effects including nausea, vomiting, diarrhea, ileus and abdominal pain. The GI effects in this study were similar between colchicine and NSAIDs, around 10%. Renal insufficiency and hematologic issues. Colchicine is potent and is not a benign drug. If you are planning to use it, you should do some research on dosing and possible interactions.

Krokodil

Stuart Swadron MD and Sean Nordt MD

- **This is a synthetic narcotic opioid.** It originated from Russia. Germany is currently having an outbreak. In Russia, codeine is more widely and easily available. This is used as a precursor and exposed to red phosphorus, gasoline or other solvents, and iodine. It is converted to desomorphine. This can be considered similar to hydromorphone (Dilaudid). It is about 10 times more potent than morphine.
- **It is very unstable so users tend to shoot it up almost immediately.** There can be wide variability in the pH and frequent contaminants. Users may get thrombophlebitis or soft tissue infections.
- **This is usually manufactured in small batches in homes rather than large-scale manufacturing in labs given its instability.**
- There was a reported outbreak in the US in Chicago recently after an increase in soft-tissue lesions. Undercover agents with the DEA did multiple buys and did not identify any Krokodil. They feel it is unlikely that Krokodil has made it to the US.
- **You might consider it if you see an abnormal amount of local tissue destruction, soft tissue infections or increase in overdoses.** This probably responds to naloxone in an appropriate dose. If someone is cyanotic and not breathing, you can give the patient 2mg.
- **There is another fentanyl derivative that is much more potent than fentanyl and morphine, which can take up to 10mg of naloxone.** If you have a patient presenting as a classic opioid overdose but doesn't reverse with 2mg, you can keep upping your dose of naloxone. If that's not working, you can intubate them. Clonidine is also in the differential diagnosis of an opioid overdose that won't reverse.
- **If you think you see Krokodil, get some red top tubes of blood to look for desomorphine.** Call your local DEA.

Paper Chase 4: Rebound Anaphylaxis

Sanjay Arora MD and Mike Menchine MD

- *Grunau BE et al. Incidence of Clinically Important Biphasic Reactions in Emergency Department Patients With Allergic Reactions or Anaphylaxis. Ann Emerg Med. 2013 Nov 13. pii: S0196-0644(13)01536-9. PMID: 24239340.*
- **Anaphylaxis is rare but something that we are well-trained to handle.** We place most of our treatment on managing the airway and controlling hypotension with epinephrine and fluids. **How long do you have to observe the patient?**

- ▶ **There has been a trend over time to broaden the diagnosis of anaphylaxis.** Previously the term anaphylaxis was used to indicate anaphylactic shock. Now guidelines consider anaphylaxis to be a combination of symptoms such as a rash with vomiting, a rash with any respiratory complaint, etc. This expanded definition may change the recommended period of observation.
- ▶ **The study asked how often biphasic reaction occurs.** This was a chart review at 2 institutions looking at all allergy patients over 5 years. They used relatively pristine methods. They included 496 patients with anaphylaxis.
- ▶ **They found that a biphasic reaction was extraordinarily rare.** They found only 2 cases of a biphasic reaction that occurred in the emergency department. One of the cases reported a biphasic reaction within 16 minutes of his presentation to the ED, which seems like it may have been associated with the primary anaphylaxis event rather than a true biphasic reaction. The second case occurred 240 minutes into the ED stay.
- ▶ **They concluded that 0.4% of patients with anaphylaxis had a rebound event while in the ED.** When they looked at the follow-up of all the patients with anaphylaxis, they found a few interesting things. There were very few cases of biphasic reactions. There were only 3 cases and none of these had anaphylaxis as their preceding diagnosis. They were

previously classified as allergic reaction, were treated with medications and then came back with an anaphylactic reaction. **When someone presents with an allergic reaction, be aware that it could get worse.** None of these patients died.

- ▶ **This was a study including only people with anaphylaxis and allergic reaction and a very small percentage of these came back with a rebound event.** Some literature cites a rate of biphasic reactions of 10-20%. Previous literature also suggested these occurred 8-10 hours on average after the initial event leading to recommendations for observation for 12 hours. This literature says this is not the case.
- ▶ **6% of the people that came in with anaphylaxis bounced back to the ER within 7 days.** They came back with rash and a variety of complaints but not anaphylaxis. You do not need to be afraid of a terrible biphasic reaction. You should send them home with an EpiPen and advise them that their rash could get worse in the next few days.
- ▶ **With the expanded definition of anaphylaxis, a lot of these patients probably had mild forms which may explain the low bounceback rate.** If you have a patient that requires multiple doses of epinephrine in the ED or looks like they had a life-threatening case of anaphylaxis, you should observe that patient for a longer period of time. The previous articles included patients with more severe forms of anaphylaxis.

Bonus Section

Pediatric Transport

Ilene Claudius MD, Sol Behar MD, Calvin Lowe MD, and Chuck Sheppard MD

- ▶ **Depending on where you practice, a critical pediatric patient may not only be challenging to manage but may require transport.**
- ▶ **You have a critical patient and decide to do an air transport: what does the hospital pay and what does the family pay?** The bill, like any other service, goes to the patient depending on their insurance. The insurance may have a co-pay for air transport. Medicare has a 20% co-pay.
- ▶ **What factors go into your decision to transport via air versus ground?** In an area like Los Angeles, traffic may factor into the decision. Distance from a tertiary care facility. Some rural facilities may be at least 3-4 hours away from a tertiary care center and air transport may dramatically shorten time of transport. Many rural facilities may have limited staff and resources; a hospital may have only an ER doctor, ER nurse, x-ray tech and floor nurse available overnight. Some facilities may have limited access via ground. There may be only one ambulance available in the area. **Is there a time critical intervention where rapid access would make a difference?**
- ▶ **Are there any absolute contraindications to flying?**
 - If you have patient with bad COPD or heart failure who can't lie flat, it may be better to transport via ground.
 - **What about pneumothorax?** Boyle's law states pressure is inversely proportional to volume and if you go up to 7,000 feet, a pneumothorax

can expand by 30%. If you have a small pneumothorax, you may want to consider evacuating it with a chest tube prior to transport. Transport at 2000-3000 feet is unlikely to cause much change in the volume or make a huge difference.

- Other conditions where you may not want to fly include eye surgery and pneumocephalus.
- You need to consider the cuffs on ET tubes and foley catheters. At 2000-3000 feet, you don't need to fill these with water.
- ▶ **Is there a size limit to air transport?** Depending on make and model of the aircraft, there is a weight limit. Can you physically get the patient in the aircraft? Similar to CT scanners, there is both a weight limit and diameter limit.
- ▶ **What are the main reasons for transport of children?** Trauma. Diabetes. Pneumonia or asthma. Heme-onc patients with new diagnosis. Neonates.
- ▶ **Pre-intubation of pediatric patients prior to transport is not always the best strategy.** For example, intubation of cardiac patients prior to surgery could have some serious complications.
- ▶ **How realistic is intubation during transport?** It is possible but there are multiple factors such as limited space, turbulence that make it less than ideal. If you think that the patient will need to be intubated en route, it is usually done prior to transport.

- ▶ **How often are physicians on the transport team?** It depends. In some situations, it may not be worth waiting the 45 minutes to 1 hour for the arrival of the specialized team. In California, Title 22 requires a physician or neonatologist to be on the transport team for any child under 28 days corrected for gestational age.
- ▶ **If you have a sick neonate that you know will need transport, should you contact the tertiary facility early on or after your work-up?** Do what you can to stabilize the patient. You should make the call early on and get guidance. It can help the receiving facility identify what they need to bring. Do they need to bring prostaglandins or a high frequency ventilator?
- ▶ **Best transport stories?**
 - Past the halfway point during a transport from Hawaii, a neonatal patient with primary pulmonary hypertension (prior to nitrous oxide treatment and on multiple drips such as dopamine and epinephrine) was coded for 3 hours, received 40 rounds of epinephrine and eventually survived.
- ▶ **Differences between children and adults.** Children can easily get hypothermic.
- ▶ **Can you refuse an air transport if you deem it unnecessary?** EMTALA says that the sending physician determines the mode of transport.
- ▶ **Listen to whoever is giving you advice.** If you call multiple teams, let the other teams know you won't need them. If you choose to not follow recommendations, let the team know so they can plan other arrangements.
- ▶ **Resources.** The American Academy of Pediatrics Committee on Transport has some good quality metrics. So does the Air Medical Physicians Association.

Paper Chase 5: Warm IV Fluids

Sanjay Arora and Mike Menchine, MD

- ▶ *Warming intravenous fluids for improved patient comfort in the emergency department: a pilot crossover randomized controlled trial.* Self WH, White SJ, McNaughton CD, Storrow AB, Slovis CM, Collins SP. *West J Emerg Med.* 2013 Sep;14(5) [PMID: 24106555](#).
- ▶ **Cold IV fluids are uncomfortable.** We give lots of intravenous fluids (IVF) in the Emergency Department (ED). The authors state about 25% of ED patients, but it feels like there may be even more.
- ▶ **Safe & Warm IV fluid warmer** was used to warm IVF to 36C (96.8F) for the duration of the infusion.
- ▶ **This pilot study was a double-blinded, crossover RCT.** Patients received sequential boluses (500cc) of body temperature (36C) and room temperature (22C) IVF, with the order randomized. They looked at patient's level of discomfort using a 10 cm visual analog scale (VAS). This was a small study: only 27 patients completed it (1 dropped out). Really sick patients were excluded. In addition to VAS, patients were also asked which bolus they liked better at the end of the study.
- ▶ **Mean VAS was 1.9 cm lower** for the warmed saline group. About 75% of the patients stated they preferred the body temperature fluid.
- ▶ **They are planning a larger study.**

