EMS Run Review is back with the help of Powerful EMS rotators!

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Case 1: Apneic, Pulseless Newborn
Case 2: Teenager with a Traumatic Head Laceration
Case 3: Elderly Person with a Fall and a Questionable LOC
Case 4: Elderly Fall and Hemiplegia – Trauma vs Stroke code?
Case 5: Bicycle Hit by Truck – Needle Decompression?
Case 6: Cocaine Overdose, Cardiac Arrest
Case 7: Pedestrian vs Vehicle – Agonal breathing
Case 8: Cardiac Arrest in Jail: Medical vs Trauma?
**Case 1: Apneic, Pulseless Newborn**  Sarah Combs, M.D.

It's Engine **. Acute status. Newborn CPR at the birthing center. We’re going to be to you guys in probably less than 10 minutes. ... I’m just going to give you little bits of information as soon as I can get them. We’re trying to get out so we can get to you guys as soon as we can.

**UCSD: What’s your ETA?** Ten. Just right down the street on ** and **.

Like I said, we’re at the Birthing center here. Here for infant CPR. CPR was started before we got here. We got here, we went ahead and took over CPR, starting BVM’ing. They tell me right now we have a sinus bradycardia, at, I believe they said 60, but it’s PEA.

Medic **... transferring right now... trying to get things situated and get over to you guys.. Also please be advised there is a second ambulance coming with the mom that will be following the baby afterwards.

**UCSD, Engine **. Medic ** is going to be transporting baby. Going to be there hopefully within 5 minutes. I’m going to go ahead and take care of the mom.

**UCSD: Do you have sex of the baby and approximate weight?**

I believe I saw female and no weight.... Yeah, no weight.

**UCSD, Engine **. I’m ready to give you some info on the mom. 32yo female. This is her first pregnancy. First birth, no complications, just prenatal vitamins. No history of meds, allergies. Right now we’ve started an 18ga in the left hand. Nasal cannula. We’re about 10 minutes out, just now starting to get her on the gurney.

Want to confirm that you know of our inbound patient, 32 year old female, just post delivery. Child is there at your facility already. Just want to make sure you have full report already.

**UCSD: So I was still actually talking to the NICU and out front, trying to coordinate stuff for the baby. I got respirations 18, the placenta was delivered, pressure of 137/85, hr 96. Does she have a line, is she doing ok, sats, any updates?**

I’d be happy to update you. So she does have a line, 18ga left hand. She is currently sat’ing at 94% on room air, she is breathing 18 with clear lungs. We are going to place her on oxygen via nasal cannula currently at this time. She’s not complaining of anything currently right now. In a position of comfort. ETA to your facility approximately 3 to 4 minutes.

**COMMENTARY:**

**Sarah:** A nerve-wracking and emotional situation. These medics took appropriate action by focusing on high quality CPR. Given that the vast majority of neonatal arrests are due to anoxia, the goal here is delivery of effective breaths and oxygen via the most expeditious route. In most cases, BVM is this route. Focusing on good BVM technique rather than attempting to secure an advanced airway was a sound decision (especially given equipment availability on rigs, which does not cater to neonatal sizes). As CPR was already in progress at the scene, intubating in an attempt to suction meconium from the airways would not be recommended; far better to bag and circulate oxygen to vital organs, even at the cost of pushing some meconium down into the lungs. As part of a PEA arrest, the other key intervention here was epinephrine administration. In ED-based neonatal resuscitations, there has been a move to IO rather than umbilical venous access. Although unlikely to change the outcome here, this is the type of scenario that argues for allowing medics to place a newborn IO without a base hospital order.

**Dr. Kahn:** I agree – this is one of those cases that makes us all remember just how infrequently we have to provide truly critical care to newborns. While we all vaguely remember how to do an Apgar score, get venous access, and resuscitate a newborn, having just a few key facts in mind can help: oxygen and epinephrine are the two critical drugs, good ventilatory support is critical, and always call the base early to get some additional help on board. Great job by the medics here holding things together on a tough call.
Case 2: Teenager With a Traumatic Head Laceration  
Sarah Combs, M.D.

PRE-HOSPITAL REPORT (per PPR – no radio):
Incident: Pt Age: 14 Years; Gender: Male
Chief Complaint: Blunt Trauma - Head/Neck

History: M** responded with E** to out front of an elementary school. AOS TFA a 14 y/o M, found sitting on the curb. The patient states he was involved in a fistfight when someone threw a unknown object that struck the left side of his head. The patient has about a 1 inch laceration, and direct pressure has controlled the bleeding. The patient walked to the ambulance and was assisted onto the gurney.

Pt couldn't sign because of his age and no parent/guardian on scene or at hospital.

Assessment: Time: 1525; Head Injury: Laceration; Sign / Symptom: Bleeding; ALS assessment, about 1 inch laceration to the left side of the head.
Rx: Time: 1557; Placed POC, applied direct pressure to laceration to control the bleeding. Bleeding was controlled.
Transport: Base Called: Scripps Mercy; Transported to UCSD.

FOLLOW UP FROM RADY CHILDREN’S HOSPITAL:
- Patient transferred as a full trauma activation given CT scan performed at UCSD showing a left frontal open comminuted depressed skull fracture with epidural hematoma and dural laceration.
- En route and upon arrival, remained stable with GCS 15, vital signs WNL, no neurologic derangements.
- Physical exam in the ED within normal limits except: “Laceration to the left frontal scalp sutured with a single Vicryl stitch, hematoma to the left frontal scalp”
- 5/12/2014: Taken to the OR by neurosurgery, at which time an elevation of depressed skull fracture, epidural hematoma evacuation and duraplasty was performed. Did well and discharged home the day after, 5/13/2014.
- 6/4/2014 (post-op day 23): Seen in neurosurgery clinic for follow up and staple removal. Reported to be asymptomatic, back in school and doing well.

COMMENTARY:

Sarah: An interesting case, with an apparently fortuitous diagnostic pick up. The medics made a good call bringing this child into the hospital given, by all accounts, the rather unimpressive nature of his external appearance. I wonder if there was something about the story/patient/scene that raised suspicion for them? Similarly, I wonder what triggered the UCSD ED provider to order the head CT? Given that the child was AOX3 and GCS 15 with a non-focal neurologic exam both at the scene and subsequently, both PECARN and the Canadian CT Head Injury/Trauma Rule would have deemed this patient very low risk with head CT unnecessary. A nice case to illustrate the utility of real-time individualized assessment on a patient-by-patient basis (particularly if there are holes or inconsistencies in the history) rather than overly relying on standardized tools.

Dr. Kahn: Every now and then, we find patients who remind us that we’re going to miss things. In this case, it’s possible that the patient was transported given the lack of a person of appropriate age to decide otherwise; however, this could have easily been an AMA if the parents were on scene. It’s a good reminder that when we advise people to follow up at a hospital promptly, even if they don’t want transportation from us, that we should actually mean it. Similarly, if your gut tells you something is wrong – listen to it. Nice save!
**Case 3: Elderly Person With a Fall and Questionable LOC**  
Jimmy Corbett-Detig, M.D.

Summary:

Medic states that they are coming to UCSD with trauma resource.

88 y/o F who lost balance and fell forward while trying to pick something up. Medic’s chief concern is that she is unable to recall event. Per family, medic reports patient is extremely sharp. Medic also notes that prior to this patient was not feeling well and complained of back pain earlier in the day. Found supine on arrival, small hematoma to occiput. Chest, neck, abdomen, pelvis all unremarkable. Patient currently denies any pain but unable to recall event.

HR NSR 78 BP 170/110 SpO2 97% RA

AAOx3. Secondary: just occiput hematoma.

Only history of arthritis and osteoporosis. Patient and family do not report she is taking any medications, and deny that she is taking blood thinners.

Pt in full c-spine, saline lock in left AC. Updated BP is 140/75. FSBG is 102.

MICN: (after talking to doctor), she’s coming to the ED.

Patient reported she’s feeling nauseous on backboard, 4 mg Zofran ordered for IV push.

Note: Although not heard in audio (but found in run report) is that patient who was initially AAOx3 at some point during transport becomes AAOx2.

**ED course:**

Initial ED physician evaluation ok with patient as trauma resource at 8 pm. Initial resident evaluation determines patient is aaox2, sluggish. No signs of skull fracture on exam.

Head CT shows epidural, done at 9:30 pm.

With deteriorating neurologic status and CT scan, decision to intubate, admit to OR for neurosurgical management.

**Jimmy’s thoughts on the case:**

Who is a trauma resource? What are the guidelines for this?

Communication - There was no audio communication that informed base station about deterioration from AAOx3 to AAOx2. Unclear if this was communicated during initial evaluation.

**Dr. Kahn:** Trauma resource decisions are often murky, because there’s no clear policy/guideline to inform them. Compounding this, different centers will do different things with trauma resource patients on arrival. It’s critical to paint a clear initial impression, but also to keep the BHP/MICN updated with any changes in information, as the destination could change. Fortunately, in this case, it likely didn’t cause any change in her overall management or outcome.
**Case 4: Elderly Fall and Hemiplegia – Trauma vs Stroke code?** Jimmy Corbett-Detig, M.D.

Medics report possible trauma. MICN wants to hear story prior to deciding where patient should go.

78 y/o F who fell 2 hours prior to call. She may have urinated on herself. The family put the patient back to bed. Approximately 20-30 minutes prior to call she was noted by family to not be acting appropriately.

Vitals on evaluation: RR 16 98% on RA AAOx2 not following commands and they feel R side of body is more flaccid. PERRL. 145/70 HR Afib rate around 80-90s.

PMH: HTN. Only med is anti-HTN, no blood thinners.

Did you get FSGS? Awaiting results. To reiterate, her eyes are deviated to the R side and R side is more flaccid. Sugar is 109.

UCSD: Do you see any bruises on her head or anything?

Medics: No visible signs of trauma. Given fall 2 hours ago, 30 minutes ago patient acting bizarre, not following commands, gaze to right side. We think patient should go to stroke center.

UCSD: Decision to make this stroke code since she was acting inappropriately for roughly 30-40 minutes.

Patient went to outside hospital, no records.

**Jimmy’s comments:**

- Trauma vs. stroke code?
  - Run through trauma algorithm
  - What to consider a trauma? (see T-460 trauma tree)
    - Immediate algorithm based off GCS <14, SBP < 90, RR <10 or 29
    - If not, medics assess anatomy of injury
      - Aside from anatomic neurologic findings, no noted gross deformities
    - Then proceed to assess mechanism
      - In this case, fall from standing
    - Finally, assess comorbidities (the ones listed apply this to patient)
      - Age 55
      - EMS Provider Judgment
        - No real focus on trauma by EMS, focus was clearly placed on neurologic symptoms
      - Anticoagulants or antiplatelets
        - None
      - LOC reported?
        - None in this case
    - Protocol states that when in doubt take patient to appropriate trauma center

- Stroke protocol?
  - For suspected stroke with major deficit and onset of symptoms known to be <4 hours, consider expediting transport

- Ultimately in this case, real question whether trauma was recognized as a possible etiology for neurologic deterioration. Given the age and mixed picture, it’s possible that a facility that was both a stroke and trauma center may have been most appropriate.

**Dr. Kahn:** These are always a tough call. If the patient had a witnessed sudden onset of symptoms with no immediately antecedent trauma, a stroke center should be able to manage things. However, if there are any questions regarding the time between trauma and onset of neurologic symptoms, the medics and the base should have a discussion about stroke vs. stroke/trauma for destination. Either way, rapid transport to a CT-capable facility is a priority.
**Case 5: Bicycle Hit by truck - Needle Decompression?** Amanda Cobb, M.D.

**Medic** - We arrived on scene here to a roadway to find a 60yo male approximately 220 lbs. So the story is he was riding his bicycle when a car...when he started to turn onto traffic and a truck hit him. Truck was going approximately 25-30 mph. From there 911 was activated. Upon our arrival patient was agonal and pulseless. PEA on the monitor. I started compressions.

There’s crepitis upon his chest, crepitis upon his head, and upon every compression that we have made there has been profuse bleeding from his head. At this point right now he is asystole on the monitor, pulseless and has an end tidal of 10. So we don’t have any history, allergy or meds. For treatment so far we are just doing BLS here. We have an OP in place, we’re assisting ventilations with a BVM attached to O2, we’re doing compressions and like I said, we’ve been PEA that whole time. From other things I can see as far as trauma, there is severe trauma to his head, like I said with profuse bleeding...severe trauma to his chest and a tib/fib fracture to his left leg. Fixed and dilated.

**MICN** - I’m going to get a doc back here... Are you en route?
**Medic** - That’s a negative. We’re looking to pronounce.
**MICN** - Hi this is Dr. *****, can you tell me what you’ve done so far for him?
**Medic** - We have assisted ventilations, we have put him on the pads and from what we saw, he’s in asystole and he’s apneic. His end tidal as of right now is 7.
**MD** - Did you guys needle him?
**Medic** - There is major deformity to his head, major deformity to his chest, he has a tib/fib fracture, there is profuse bleeding on the ground here. I don’t think that would help at this point.
**MD** - Do you know how long he was down before you got there?
**Medic** - The person who hit him with his car called 911 at 1508, so we’re assuming that as soon as it happened, that’s when he called. So 1508 is going to be his down time. We’ve been working him, we haven’t seen anything past asystole. Like I said, his end tidal started out 11, its now 7, and...that’s going to be about it.
**MD** - How bad is the head injury, can you give me a little better idea? Because I would needle him if you’re comfortable doing it.
**Medic** - It’s not about comfortability here, it’s the fact that I think that’s futile. But as far as the trauma to his head, there’s probably about 500cc of blood, all coagulated. Also, there’s bleeding from both of his ears every time we do compressions And what else do you need to know? Like I said...there’s trauma to the chest as well. As soon as I started compressions, I could feel it.
**MD** - Yeah, but he’s a young guy. I mean, what do you have to lose? I would just do it.
**Medic** - Okay so BHP order for a needle T, is that what I’m understanding?
**MD** - Yeah, bilateral.
**Medic** - Confirm that, we’ll get back with updates.
**MD** - If there’s no air, I would just call it then. I can’t think of anything else to do.
**Medic** - Alright, so we’ve done bilateral needle T’s here. No change. Asystole. And...last end tidal I saw was 5.
**MD** - Alright, thanks guys, you can call it.
Amanda: This case raises several issues, one of which is the difficulty medics face in accurately conveying over the radio what exactly they are seeing. Based on the medic’s initial description of the patient to MICN, the patient was in extremely poor condition and transport was likely futile. However, the MD missed the initial description and was trying to quickly play “catch up” once brought into the call by asking the medic to repeat herself regarding the state of the patient and what interventions had been done. This begs the question - is there a faster, more efficient way of conveying this information on these critical patients? One thought that comes to mind is sending a picture or short video clip to better inform the MD and guideprehospital management and BHP orders.

Another issue involves performance of needle thoracostamies in the field. The San Diego County EMS protocol calls for needle thoracostomy to be performed for “severe respiratory distress with unilateral, diminished breath sounds and systolic BP <90” (standing order). Based on the description of the patient by the medic - agonal respirations and pulseless - it’s hard to say that a needle thoracostomy should have been performed by protocol. But when the BHP asked for the procedure to be done, the breakdown in communication became evident. Was it more of a suggestion or an order? The medic was clearly hesitant to perform the procedure because it would be “futile.” It sounds like the medic didn’t feel like the MD had a clear picture of the patient’s condition. Or perhaps, the medic didn’t have a clear understanding of the potential utility of needle thoracostomy. It’s hard to say which was the prevailing factor, but clearly, communication was key here. Also, should the indications for pronouncing a death in the field after blunt trauma be better delineated?

Dr. Kahn: When faced with a pronounce, BHPs often find themselves wondering what we’d do if we were in front of the patient. It’s common to think, “Let’s just try this one more thing…” This is compounded by not actually having the patient in front of us, and sometimes missing key information that was relayed to the MICN earlier. In general, I find the best way to handle these situations is for the BHP to get directly on the radio with the medic, confirm the key information, and ask if you’re missing anything. From there, giving a clear idea of what information you need and your projected disposition can make life much smoother for everybody. We don’t yet have nationally accepted and validated termination of resuscitation guidelines to provide a better evidence base for these decisions, but we’re making progress. Stay tuned...

Case 6: Cocaine Overdose, Cardiac Arrest  Amanda Cobb, M.D.

Medic - This is medic ** with an acute status, was at jail. The patient just coded...went from sinus brady to Vtach, changing to Vfib, and we’re in CPR status now. This is a 25yo male that was brought to the jail. Apparently he ingested a bag of cocaine. We don’t know the size of that bag. He did admit that...he said here when he was brought in to intake that he did ingest a bag of cocaine while he was being apprehended by the police.

MICN - Stand by, let me get a doctor in the room

Medic - So upon arrival, the patient was unconscious, actively seizing, he was breathing about 44 times per minute, ineffective respirations. We went ahead and administered a nasopharyngeal airway and assisted ventilations. His heart rate was going 140x, fast, must have brady’d down, and at this point now while we’re transporting him we’re doing CPR. We don’t know anything about his medical history. We don’t know anything about medications or allergies. We have a 20G established at the base of his right AC...wide open...we’re still assisting ventilations, we are CPR status right now. We watched him go into asystole. We did shock him at 150, and we’re on our second cycle of CPR right now. And would like to administer 1 epi by IV push.

MICN - Copy, BHO at 619 for epi 1mg of 1:10,000. You can give it every 3-5 minutes, prn.

Medic - <unclear>

MICN - What’s your ETA? Are you already en route?

Medic - We’re about 4 minutes away. I’m going to go ahead and attempt intubation right now.

MICN - Alright, copy. If you get a chance, I have a physician ordering some bicarb, I know your hands are full.
Patient Course:

On arrival to the ED, there was ROSC, the patient was intubated, had pupils that were fixed/dilated, and was in status epilepticus. Vitals were BP 105/60 HR 122 T 101.1 RR 23 SpO2 99% EtCO2 >100. EKG showed a wide complex tachycardia that improved with bicarb boluses, and seizures ceased with benzos. Pupils became reactive. Despite the bicarb (a total of 8 amps + an infusion), the patient went back into Vtach without loss of pulses, requiring 2 shocks (150J and 200J), followed by administration of lidocaine bolus and drip, after which he converted to a narrow complex. Labs revealed severe mixed metabolic and respiratory acidoses, AKI, and elevated lactate and CPK.

Initial labs (and selected normal value ranges): Na 152, bicarb 14, AG 46, BUN 12, Cr 1.59, Phos 11.7, lactate 324.4 (4.5-19.8 mg/dL), CPK 229 (0-175 U/L), VBG 6.46, pCO2 of 230

The patient was cooled with fans and ice packs, and activated charcoal was administered. CT head and abdomen/pelvis were unremarkable.

The patient arrived at 6:30 am, and was extubated in the ER by 1:03pm, “speaking, alert.” He was admitted to the ICU. His CPK peaked at nearly 13,000, but serial troponins were negative. His creatinine was 1.59 on admission and improved to 1.08 by time of discharge on hospital day #5. The patient admitted to ingesting approximately 7g of cocaine, possibly as a suicide attempt.

Amanda: This is an interesting case that highlights what can happen after a massive cocaine overdose, including seizure, AKI, rhabdomyolysis, ventricular dysrhythmias, and cardiac arrest. It also highlights the management of cocaine poisoning. The medics did a great job administering ALS; however, sodium bicarbonate - arguably the most important intervention - was not given in the field, although the BHP did ask for it. Instead, the medic indicated that he planned to intubate the patient. Perhaps the MICN should have redirected the medic to administering bicarb over intubation? But that being said, after ingesting 7g of cocaine, the amount of bicarb that could have been given in the 4 minutes before arriving to the ED likely would have been too small to make a difference clinically.

Review of Cocaine Toxicity:

- a local anesthetic and CNS stimulant; acts by inhibiting neuronal re-uptake of catecholamines
- also causes Na+ channel blockade in myocytes, resulting in QRS prolongation
- presents as agitation, delirium, muscle rigidity, seizures, severe hypertension, tachydysrhythmias
- seizures are typically self limited; if prolonged or in status, consider continued absorption, such as from the gut (e.g., body packers or stuffers)
- stroke can be hemorrhagic (from severe HTN), ischemic (from vasospasm), or embolic (from Afib or endocarditis)
- if comatose, consider post-ictal state, intracranial hemorrhage, severe hyperthermia
- severe HTN can result in stroke or aortic dissection
- QRS prolongation can result in Vtach/Vtach and cardiac arrest
- vasospasm can cause MI, stroke, or bowel ischemia
- initial management is primarily with benzos to control HTN, tachycardia, and seizures
- chest pain is common and can be treated with benzos, aspirin, nitrates, and calcium channel blockers
- avoid beta blockers, which can cause a paradoxical worsening of hypertension secondary to loss of vasodilation mediated by β-2 receptors and unopposed α-1 agonism
- however, if HTN is severe and pt is unstable (e.g., aortic dissection), and HTN is refractory to above measures, consider using a short acting beta blocker, such as esmolol, or administer with an alpha blocker, such as phentolamine
- QRS prolongation should be treated with sodium bicarbonate and lidocaine
- consider decontamination with activated charcoal for oral ingestions, if appropriate
- whole bowel irrigation may be used in cases of body packing/stuffing packets of cocaine

Dr. Kahn: It’s possible that the intubation wasn’t immediately beneficial to the patient; given the EtCO2 of >100 on arrival, ventilation might have suffered somewhat in favor of the procedure. This can make a big difference in pH, which in turn can make a big difference in cardiac function and overall survival. Fortunately, the medics did great CPR and gave a clear story, which helped guide the critical first few minutes of management. This was an impressive save that the entire team made possible. Well done!
Case 7: Pedestrian vs Vehicle - Agonal breathing  
Yuko Nakajima, M.D.

**Medic:** Hey we have a trauma coming your way vehicle vs pedestrian with a 20 minute ETA, can you guys handle?

**MICN:** OK, yeah, we’re open go ahead, whenever you’re ready go ahead.

**Medic:** We’ll call him around 70 years old male, about 180 lbs, per witnesses on scene pt was trying to cross the road and was hit by a Range Rover at about 40-45 per hour. From here the story is unclear, he went up and over the hood or he went under the vehicle, pt was found supine, agonal respirations no purposeful movements on scene. He’s breathing around 10 a minute, pretty agonal though, were assisting ventilations. Like I said, no purposeful responses right now we’re calling him unresponsive, can’t really visualize his eyes at this time, and very hard to feel for distal pulses. In regards to secondary I have a uh…OK I’m gonna queue it up to major stuff he’s got a lot of injuries, he’s got a lac to top of his head about 3 inches long with controlled bleeding, his right arm is the main issue, I’m gonna say right now, half of it is avulsed, some tendons showing, some ligaments, no bleeding at this time, we’re gonna splint the arm in a few seconds. We don’t see much in regards to secondary, a lot of different abrasions and lots of bruises going on. Vital signs for you – trying to obtain a blood pressure right now we do not feel one palpated so we’re trying to ---[inaudible], we’re getting a sat as well, end tidal right now is 21. Unknown history, allergies, meds at this time. Treatment for this stage we are assisting ventilation, we are starting an IV, well get back to you what the IV is, and we’ll give you a blood sugar as well. Other than that we have full C-spine precautions … we got a 20G actually in his left arm, right now we just got a blood pressure back it’s 131/94. So, that’s what we’ve got here for right now, will get the blood sugar and that’s it. How do you copy?

**MICN:** Copy. I can give you a run number when you get here - I’ll just stay on the line if you need anything.

**Medic:** Like I said, we got about 20 minutes so I’ll update you in a little bit with what we got see if he goes downhill or if he’s going to maintain.

**MICN:** OK. No problem. Thanks.

**Medic:** Hey the blood sugar is 87. Uh, so we got a blood pressure for you, 132/92. HR is in the 50s now slowly going down, I might do a bolus on board, even if his BP is 132/92, I can’t feel distal pulses right now, and all the blood he’s lost, but see if I should give 500cc, bolus how do you feel about it?

**MICN:** UCSD. Yea I talked to Dr. ––. He’d like to hold fluids for now just ‘cause his blood pressure is stable, he thinks the bradycardia could be from a cardiac contusion and fluids are not indicated right this point but please let us know if there’s another change in the vitals.

**Medic:** I’m cool with that. We’ve just kinda picked up, 2-5 out.

**Patient Course at UCSD:**

- On arrival, unresponsive and bradycardic to 40s.
- Intubation with b/l breath sounds
- Atropine given without improvement in pulse
- CPR initiated, IV fluids given while attempted to place femoral TLC
- Epinephrine given
- Cardiac US performed at bedside with minimal cardiac activity. Code team ran code for 30 minutes with no return of spontaneous circulation, code was called, patient pronounced dead

**Yuko:** This is an unfortunate case – a fatal MVC (Apparently the Range Rover that hit this poor patient drove away?!). The reason why this case was brought up for run review was whether the patient should have been intubated when his breathing was agonal, and whether he should have received fluids. He was BVM’d during transport and not intubated, and he did not receive fluids because his BP was in the 130s. However the patient did not have palpable radial pulses. This is puzzling and it would be tough making decisions. So, here are some facts…..

**Dr. Kahn:** The medics did a fine job staying within the trauma protocol. The protocol, however, may not have kept up with this patient’s needs; this is a known issue with any protocol, as it’s impossible to accurately treat every patient with a protocol instead of individually assessing the patient. Asking for fluids was a good call here, given the lack of radial pulses; checking for central pulses may have helped guide decision making here. As always, when in doubt, call the base early and ask for a BHP.
**Discussion points:**

1. Should this patient have been intubated in the Field?
2. Should this patient have been given fluids in the Field?

**Prehospital Intubation**

- Prehospital endotracheal intubation (ETI) is an area that can be **controversial** but is highly researched.
- Cardiac Arrest - One study by Wang et al. evaluated prehospital ETI at a level 1 trauma center and found a failure rate of 31%, with no improvement in mortality with successful intubation, and resulting in a **recommendation** that **BVM in the prehospital setting is an adequate airway**. However, on secondary analysis, the authors did find prehospital ETI led to improved outcomes when compared to supraglottic airways (SGAs). Another study reviewing the Cardiac Arrest Registry to Enhance Survival (CARES) suggested using no advanced airway led to better outcomes than using either ETI or SGA. A nationwide study in Japan had similar results, suggesting advanced airway management leads to **worse neurological outcomes**. However, both the Japanese and CARES studies were susceptible to unmeasured confounders that were not controlled for in these studies.
- Trauma - Prehospital ETI in trauma research has generally been broad and contradictory.
- One study revealed an association of prehospital ETI with worse hypotension and subsequent risk of death in trauma patients of similar age and injury severity. Another demonstrated that prehospital ETI, when used as the only advanced airway, was associated with worsened 28-day mortality in patients with hemorrhagic shock. In both studies poor outcomes were attributed to underlying hypotension caused by acute blood loss compounded by rapid sequence intubation (RSI) medications and mechanics of ventilation decreasing venous return. However, contrary to the these studies, a review of a trauma database found that in patients with a **GCS of less than 8**, prehospital ETI was associated with improved mortality.
- In general, the current data regarding prehospital ETI and trauma is diverse, with variables including the type of trauma, degree of paramedic training and how outcomes are defined. It’s important to know when and when not to intubate according to circumstances using the most appropriate airway, respecting the procedure and knowing your limitations.

**Fluid Resuscitation in Trauma**

- **Traditional Teaching** is to resuscitate hypotensive trauma patients with IV crystalloids to restore BP to normal range using normal saline/lactated Ringers
- **Recent Concept** is that IV Fluid given before mechanical hemorrhage control increases bleeding. Increasing vessel width stretches clot and increasing BP causes frail clot to fail.
- Other problems with crystalloids in trauma are that It’s not what the patient has lost, and overhydration causes peripheral edema, abdominal compartment syndrome and renal failure, as well as dilution of clotting factors.
- The primary goal of resuscitation from hemorrhagic shock is to identify the source of hemorrhage and control it as rapidly as possible.
- Inappropriately vigorous fluid resuscitation increases the rate of uncontrolled hemorrhage and may worsen survival.
- **Early use of blood products** is appropriate in resuscitation from hemorrhagic shock: they maintain oxygen-carrying capacity and coagulation factor concentration.
- Occult hypoperfusion may occur even in the presence of normal vital signs.
- Resuscitation is not complete until acidosis is resolved.
- Traditional teaching: “*Radial pulse = SBP >80-90 mmHg, *Femoral pulse= SBP> 70 mmHg, *Carotid pulses = SBP >60 mmHg*”. One article found that trauma patients with a radial pulse had a mean SBP of 72.5 mmHg; 83% of the trauma patients with a radial pulse had a SBP of less than 80 mmHg. Trauma patients with a femoral and carotid pulse had a mean SBP of 66.4 mmHg; 83% of the trauma patients with a femoral or carotid pulse had a SBP less than 70 mmHg. It is necessary to have a SBP of 60 mmHg to produce a carotid pulse.
- *Cardiac contusion does cause bradycardia.*
**Case 8: Cardiac Arrest in Jail – Medical vs Trauma?**  
Yuko Nakajima, M.D.

**Medic:** 52 y/o M CPR 5 minutes out.  
**MICN:** Copy that.  
**Medic:** Not much time to get history on this guy but he was at jail – this morning he got with possible some sort of injury, while exercising, fell off the pull up bar, hit his head, immediately vomited and posted. At this time he was in asystole, ----, on our arrival though he was responsive posturing with continuous vomiting. I got nothing further than that for now we got our hands full here.  
**MICN:** Yeah no worries – just one thing – airway. No airway or airway?  
**Medic:** Working on that but we finally got an end-tidal of 10. We’re going to do our best to get his airway but don’t know what we’re dealing with. We’re going to be in the ER.  
**MICN:** Hey, no worries, do what you gotta do.

**Additional information from Comprehensive Report:**  
No 12 lead because managing airway  
No c-collar d/t suctioning  
No airway d/t vomit  
CPR interrupted d/t narrow corridors  
Witnessed by guards  
IV, BVM, lost pulse  
HR 40 -> Asystole/PEA during transport to UCSD. V-fib in ED, shocked

**Patient Course** (From ED provider note)  
-Arrived in PEA, hypertensive, unable to obtain a good O2 sat, oral airway in place and pt getting bagged.  
-Continued to run code using ACLS protocols  
-Secured airway using direct laryngoscopy with the aid of a bougie.  
-Pt regained ROSC and cardiac echo was done which showed hyperdynamic wall mov’t w walls of ventricles touching during systole. ECG with some changes inferiorly but no STEMI. Posterior ECG done which did not show any additional information  
-cardiology consulted for possible ischemic arrest and consideration for cath lab.  
-labs resulted which demonstrated hgb of 3  
-Bedside FAST exam demonstrated free fluid in entire abdomen. Given low hgb suspect that the fluid is blood possibly from a ruptured AAA or splenic or liver lac.  
-Surgery consulted and arrived right away.  
-Femoral triple lumen, A-line, cordis placed, massive transfusion protocol started  
-Pt lost pulses and CPR was started again. He was found to be in Vtach and 200J shock was delivered with good ROSC again afterwards  
-Shortly afterwards pt was transported to the OR, found to have a bleeding abdominal varicele near the splenic flexure. This was oversewn. Abdomen left open.  
-Taken back to the ICU on multiple pressors. Shortly, Code Blue was called for decreasing saturation on maximal vent settings. Pulses lost, CPR started. Family elected to withdraw care. Pt was pronounced dead.

**Yuko:** This is a tough case where it was nearly impossible to determine what the cause of cardiac arrest was with so little information out in the field. From the very limited history, main things that come to mind which may have caused cardiac arrest are MI, CVA (ICH), and with the fall, trauma. There was no knowledge of history of cirrhosis while in the field but the pt turned out to have severe cirrhosis, bad enough to have varices and coagulopathy. It would be difficult to decide whether this patient was medical or trauma in the field but was good that the pt came to UCSD, which would be able to deal with either.  
**Dr. Kahn:** First, thanks to the MICN for getting only critical information then staying out of the medics’ way while they worked hard on this patient! Regarding whether this patient goes to the ED or trauma, the ED can (and did) resuscitate this patient, and (at least at UCSD) is closer – so, good call.
Fun Fact!

Since CPR was interrupted d/t narrow corridors... what’s the deal with mechanical CPR?

- **Manual vs Mechanical (AutoPulse® or LUCAS™) CPR – Equal outcome in survival rate**
  - The CIRC trial (for Circulation Improving Resuscitation Care, sponsored by ZOLL [maker of AutoPulse]) had a unique design formulated to ensure high-quality manual CPR against which the AutoPulse was compared. The CIRC trial began in 2007 with sites in the U.S., Austria and the Netherlands, and involved deployment of more than 500 AutoPulses and training of more than 5,000 medics to use them. Its design was fully described in the journal Resuscitation in 2010.
  - An equal outcome may be a win for the machine. Humans generally can’t provide top-quality CPR in narrow corridors, in the mayhem of the field or in a moving ambulance. They push too slowly or not deep enough; they tire; they’re distracted and interrupted and thrown off balance. Mechanical compressions are relentlessly regular and uniform. Automating CPR frees providers to do other things.
  - Mechanical compression might have been very useful in this kind of situation in the field (narrow corridors, necessity to do many things with limited personnel - secure airway, obtain IV access, apply c-collar/backboard, suction blood, etc.).
  - In San Diego County, mechanical compression is used in some agencies, but is not a required piece of equipment or skill.

For agencies considering the use of automated devices, local experience and nationally published research suggest that CPR should be initiated manually, and the automated device should only be used when it can be introduced without causing a significant delay in compressions. While this might delay transport by a few minutes, the ability to ensure high-quality compressions en route (while still allowing the personnel in the rear of the ambulance to wear seat belts and maximize their safety) likely overcomes this limitation; for that matter, getting to the ED quickly may not be as important as maximizing on scene resuscitation efforts, although this ultimately comes down to an individualized decision made in concert with the base and each agency’s medical direction hierarchy. These devices are expensive, though (perhaps in the ~$20k range), and without strong literature to show superiority over manual CPR, agencies might not feel a strong need to move to their use.

Thanks for your time! If you have any specific cases (either brought to UCSD, or run by UCSD base) that you’d like reviewed and anonymously discussed, please let Dr. Kahn know at ckahn@ucsd.edu. In the meantime, keep up the great work, and stay safe out there!

**DISCLAIMER**

This newsletter is provided to you for educational purposes. Nothing in this newsletter should be construed as medical direction; please be certain to follow all policies and protocols from your governing EMS agency (or agencies). If there is a conflict between those policies and protocols and information contained in this newsletter, please be certain to act only in accordance with the policies and protocols from your agency (or agencies).