

2026 National EMS Medical Directors Course and Practicum®

Student Case Study Booklet



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Case Study #1

Case Presentation

You are asked by the Chief of Trauma at a local trauma center to investigate a case of a potential misplaced endotracheal tube. The physician states that one of your ALS units brought in a 21-year-old male with a gunshot wound to the chest. The patient was found pulseless by EMS, CPR was started, transport was initiated, and interventions en route included a peripheral IV and endotracheal intubation. **[ePCR, cardiac waveform]**

Upon arrival at the trauma center, an emergency medicine resident looked in the airway with a video laryngoscope and stated that the ET tube was in place. However, when the trauma team performed a thoracotomy, they noted that neither lung was inflating with ventilation and a more careful look with video laryngoscopy showed the ET tube in the esophagus. The patient was re-intubated and placement was confirmed by observing both lungs inflating with ventilation.

No reversible cause was identified upon inspection of the heart and surrounding structures. The patient failed additional resuscitation efforts in the trauma bay and the patient was pronounced.

Learning Objectives

- The gold standard for endotracheal tube confirmation is sustained waveform capnography end tidal CO₂ measurement.
- QA/QI plans for endotracheal intubation should include review of the ETCO₂ data, video files from video laryngoscopy (when available), and EMS patient care report.

Resources

Katz SH, Falk JL. Misplaced endotracheal tubes by paramedics in an urban emergency medical services system. *Ann Emerg Med.* 2001 Jan;37(1):32-7. [10.1067/mem.2001.112098](https://doi.org/10.1067/mem.2001.112098)

Silvestri et al. The Effectiveness of Out-of-Hospital Use of Continuous End-Tidal Carbon Dioxide Monitoring on the Rate of Unrecognized Misplaced Intubation Within a Regional Emergency Medical Services System. *Ann Emerg Med.* 2005. doi:10.1016/j.annemergmed.2004.09.014

Case Study #1

[ePCR]

Chief Complaint (Category: Traumatic Arrest)									
Traumatic Arrest									
ALS Assessment: Completed for Suspected Illness									
History of Present Illness									
Medic 1 dispatched for an unknown age male who had been shot. Upon EMS arrival, the patient was found laying on the sidewalk. The patient was pulseless and apneic. A bullet hole was located in the patient's back. ACLS initiated. An 18G IV was inserted in the patient's left EJ. The patient was intubated with a 7.5 tube. Asystole on the monitor. The patient was transported to UPMC Presbyterian for treatment. Care was transferred to receiving facility staff.									
Activity									
Time	H.R.	B.P.	RA SpO2	ETCO2	Resp	Rhythm	GCS	ECG Method	
	H.R. Method	Method	LOC		Resp Effort				
Action Comment									
12:39	Arrived on scene.								
12:40	0	0 / 0 Manual Cuff	0 Unresponsive		0 Absent		1/1/1		
Baseline vitals obtained.									
12:41	Circ: CPR performed by [REDACTED]. Successful.								
12:45	Transport to UPMC Presbyterian initiated.								
12:47	Intra IV Peripheral IV initiated by [REDACTED] with 18ga. at Left External Jugular. Attempts: 1, successful.								
12:50	Intubation Orotracheal Intubation by [REDACTED] with 7.5, 23cm at lips. Attempts: 1, successful. Placement verified via: Capnography (Waveform), Moisture in Tube, Direct Visualization. Verification by: Another Person on the Same Crew. Secured via Commercial Device.								
12:52	4								
13:01	Transport complete. Care transferred to receiving facility staff.								

[cardiac waveform]



Case Study #2

Case Presentation

You are asked by the local police to investigate two ambulance crashes in your community.

In the first event, a 47 y/o female turned into the path of an ambulance that was responding with lights and sirens to a call. The female was dead at the scene and both EMS employees were seriously injured.

In the second event, six people were injured when an SUV broadsided an ambulance that was driving through a red light in response to an emergency. The SUV was in the far right lane of traffic and cars in the other lanes had stopped to allow the ambulance to proceed. No one involved sustained life-threatening injuries.

Learning Objectives

- Lights and sirens response and transport are deliberate interventions; they have risks and benefits, and these must be weighed both at the system and on the individual call level.
- Insurance agencies often look for training and policies to be in place to minimize risk for these operations.
- The medical director can and should have direct influence on these policies, impacting safety of the patient, the crew, and the community in general.

Resources

Kahn, CA., Pirrallo, RG. and Kuhn, EM. (2001) "Characteristics of Fatal Ambulance Crashes in the United States: an 11-year Retrospective Analysis". *Prehospital Emergency Care*, 5:3, 261 – 269. DOI: <https://doi.org/10.1080/10903120190939751>

Kupas DF, Zavadsky M, Burton B, et al. Joint Statement on Lights & Siren Vehicle Operations on Emergency Medical Services Responses. *Prehosp Emerg Care* . 2022 May-Jun; 26(3): 459-461. <https://doi.org/10.1080/10903127.2022.2044417>

"Lights and Sirens Use by EMS", a NHTSA work product, May 2017.

Case Study #3

Case Presentation

An ALS unit is on scene with two pediatric patients involved in a motor scooter crash. Paramedics report that the father of the children is on scene and is refusing to allow them to be evaluated for treatment and transfer. He indicates that he is a physician on staff at your hospital and he has checked them out and they are fine. Paramedics are concerned for the welfare of the children and contact online medical direction for assistance.

[Supplemental Material: Paramedic report Audio File 1; Medical Control discussion with parent Audio File 2]

Learning Objectives

- Medical directors and other physicians who provide online medical direction play a key role in ensuring safety for their patients, especially the most vulnerable among our population.
- Physicians on scene can cause various problems for EMS; having a plan in advance for how to handle the general physician-on-scene scenarios is key.

Resources

“Out of Hospital Medical Direction and the Intervener Physician”. ACEP Policy Statement, June 2024. <https://www.acep.org/patient-care/policy-statements/out-of-hospital-medical-direction-and-the-intervener-physician>

Case Study #4

Case Presentation

The Fire Chief at one of your fire-based EMS Agencies approaches you about starting a Prehospital Blood Transfusion Program. At a recent national meeting, he learned from colleagues that many such programs were being developed at fire departments around the country. He is very enthusiastic and has already reached out to the city officials to gather support. As you consider several barriers including unclear source of funding, absence of blood product transfusion in the state paramedic scope of practice, and the need to identify partners for blood supply and blood return, he tells you to 'make it happen.'

The Trauma Chair at one Level I Trauma Center learns of this effort and voices his concerns at the regional trauma advisory meeting, which include the lack of demonstrated outcome benefit from field blood administration and concerns of depleting the blood supply needed at the trauma centers, particularly whole blood as a limited resource. He writes to you: "I am all for increased access to blood as early as possible as you know, but looking at the prehospital PRBC and plasma data, it will be hard to justify moving this into the prehospital phase of care. And, as for whole blood, it is unclear if we will even get consensus on the benefits of in-hospital whole blood compared to component therapy."

At the same time, your department educators have many concerns of their own. They are already over-tasked and question who will administrate the program, ensure the paramedic training, and provide quality oversight. They raise questions regarding consent and anticipate resistance from the Jehovah Witness community. One of the paramedics, who is a Jehovah Witness, approached them with questions that they could not answer.

Learning Objectives

- When establishing a new program, it is important to identify all strategic partners and engage them in the program development process
- Anticipate barriers to implementation of new programs and get ahead of the message. Engage with your EMS clinicians and the community served. Identify particular community members that may be affected or have a differing view and incorporate their feedback.

Resources

Prehospital Blood Transfusion Coalition: <https://prehospitaltransfusion.org>

Schaefer RM, Bank EA, Krohmer JR, Haskell A, Taylor AL, Jenkins DH, Holcomb JB. Removing the barriers to prehospital blood: A roadmap to success. J Trauma Acute Care Surg. 2024 Aug 1;97(2S Suppl 1):S138-S144. doi: 10.1097/TA.0000000000004378. Epub 2024 May 1. PMID: 38689393.

Case Study #5

Case Presentation

You have received a request from a supervisor of a large regional 9-1-1 center to evaluate the performance of a telecommunicator in the management of a difficult 9-1-1 call. This request was emailed to you and includes a recording of the call in which a telecommunicator provides pre-arrival CPR instruction to the caller who witnessed a cardiac arrest. The patient survived to hospital discharge and has done well.

The unedited recording of the call was 8 minutes and 42 seconds.

The presented recordings were edited to remove confirmation of location and address (prior to recording 1), a section on moving patient (between 1 and 2) and CPR instruction (after recording 2).

[Supplemental Material: Dispatch audio]

Recording 1 Time Stamp 1:10-2:04

Recording 2 Time Stamp 3:20-5:20

Learning Objectives

- Physician involvement at dispatch centers is a key component in a high functioning system of care.
- The more we learn about cardiac arrest systems of care that are high performing, the more we appreciate the vital role that telecommunicators play in these systems. Telecommunicator CPR can be one of the biggest factors in a high functioning system of care for OHCA.
- QI/QA programs including call review, debrief, and feedback with patient outcomes are excellent interventions that are thought to yield improved performance and patient survival.

Resources

Kurz MC, Bobrow BJ, Buckingham J, et al. "Telecommunicator Cardiopulmonary Resuscitation: A Policy Statement from the American Heart Association". *Circulation*. 2020, 141:e686-700. <https://doi.org/10.1161/CIR.0000000000000744>

Bobrow BJ, Panczyk M, and Subido C. "Dispatch-Assisted Cardiopulmonary Resuscitation: The Anchor Link in the Chain of Survival". *Current Opinions in Critical Care*, 2012, 18:228-233. <http://dx.doi.org/10.1097/MCC.0b013e328351736b>

Case Study #6

Case Presentation

The medical director is asked to review a recent case where a BLS crew was asked to evaluate an unresponsive patient for possible DOA status. The EMT's Patient Care Report, the CAD notes, EMT written statements, and the state Termination of Resuscitation protocol are attached for review.

Scene Information
<p>Description: Ems found a male lying face down on the floor wedged between a nightstand and a mattress. Male had a coat on and was naked from the waist down. The apartment was cold and Poor living conditions.</p> <p>First Agency Unit on Scene?: Yes</p>
History of Present Illness
<p>Ems called for a male that was found doa. Update from dispatch was this was an expected death and another comment said life status was questionable. Upon arrival ems Was directed to the rear apartment. Ems found a male lying face down on the floor wedged between a nightstand and a mattress. Male had a coat on and was naked from the waist down. No obvious signs of life. The apartment was cold and poor living conditions. Ems was working with flashlights to see. Male had what appeared to be scratches on his lower back and the back of his legs. Pt. Also appeared to have blood pooling in the back of his legs from the waist down. Upon touching the male/feeling for a pulse male was extremely cold and no palpable pulses were found via carotid or radial. Ems originally called for a doa time.</p> <p>Police officer on scene saw something move around the male and thought the male was breathing. EMS attempted to move the male onto his back when he became responsive. ems and police were able to get the male onto the bed. Male was unsure how long he was on the floor or what happened to him. Male had swelling around his right eye and what appeared to be blood pulling from the knees down to his feet. Male also had an abrasion to the forehead. A47 was unable to get vitals. Upon arrival of ALS Care was transferred to ALS. BLS crew assisted with extrication.</p>

Case Study #6

16:45:08est	CREATE	Location: xxx TypeDesc: DEATH QUESTIONABLE - COLD/STIFF IN RD Priority:E1
16:48:33	ENTRY	Comment: Medical ProQA recommends dispatch at this time
16:48:33	PROQA	Case09D2A Comment:65-YEAR-OLD, MALE, CONSCIOUSNESS UNKNOWN, BREATHING STATUS UNKNOWN. CC TEXT: EXPECTED DEATH CALLER STATEMENT: 65 YOM EXPECTED DEATH CAD RESPONSE: DELTA DISPATCH CODE: 09D02
16:48:57	DISP	BLS Unit, ALS Unit, Rescue Truck
16:50:10	INFO	Comment: S/C LANDLORDS DAUGHTER / STATES MALE WAS SUPPOSED TO BE OUT OF THE HOME AND SHE JUST WENT IN AND FOUND THE MALE FACE FIRST ON THE FLOOR

16:50:49	INFO	Comment: CALLER RAN OUT OF THE HOME AND STATED THE MALE WAS DEATH BUT COULD NOT CONFIRM / CALLER WOULD NOT CHECK FOR BREATHING /
16:51:12	INFO	Comment: CALLER STATED SHE THOUGHT THE MALE WAS BEYOND HELP BUT DID NOT CONFIRM
16:54:25	*ONSCN	BLS Unit On Scene
16:56:35	MISCA	Comment: ****TIME 1656****
16:57:33	MISCA	EMTs PRONOUNCED AT 1656
17:00:01	MISCA	Comment: FROM Police unit 337 NOT A DOA, MALE STARTING TO MOVE SCRATCH THE DOA, MALE IS MOVING
17:00:53	-ASSOC	BLS Unit going back into residence
17:19:54		ALS Unit on scene
17:24:44	TRANSP	ALS Transporting patient to hospital Not a cardiac arrest

EMT Statements

EMT 1

I was carrying equipment down the steps and met my partner coming up the steps. He said the patient was DOA so we returned to the truck. The police officer on scene radioed for us to come back to the basement because the patient was moving.

EMT 2

We were dispatched to a suspected DOA. I arrived on scene and said to the police officer, "I think the patient is dead." He agreed. The patient was prone, it was in a dark and cramped area. The patient was cold to the touch. I could not feel pulses and the patient had blood pooling in the back of his legs. I thought he was DOA and did not want to disturb the scene. I returned to my vehicle but then the police officer radioed that the patient moved. I returned to the basement

Case Study #6

and rolled the patient over and he began to mumble. We initiated BLS care and told the ALS unit to continue.

State Protocol at time of call

**DEAD ON ARRIVAL (DOA)
STATEWIDE BLS PROTOCOL**

Criteria:

- A.** Patient presenting with the following
 1. Decomposition
 2. Rigor mortis (Caution: do not confuse with stiffness due to cold environment)
 3. Dependent lividity
 4. Decapitation
 5. Unwitnessed cardiac arrest of traumatic cause
 6. Traumatic cardiac arrest in entrapped patient with severe injury that is not compatible with life.
 7. Incineration
 8. Submersion greater than 1 hour
- B.** In cases of mass casualty incidents where the number of seriously injured patients exceeds the providers and resources to care for them, any patient who is apneic and pulseless may be triaged as DOA. ¹

Exclusion Criteria:

- A.** Obviously pregnant patient with cardiac arrest after trauma, if cardiac arrest was witnessed by EMS practitioners. These patients should receive resuscitation and immediate transport to the closest receiving facility. See Trauma Patient Destination Protocol # 180.
- B.** Hypothermia. These patients may be apneic, pulseless, and stiff. Resuscitation should be attempted in hypothermia cases unless body temperature is the same as the surrounding temperature and other signs of death are present (decomposition, lividity, etc...). See hypothermia protocol #681.

Treatment:

- A. All patients:**
 1. Initial Patient Contact – see Protocol # 201.
 2. Verify pulseless and apneic.
 3. Verify patient meets DOA criteria listed above.
 - a. **If any doubt exists, initiate resuscitation and follow Cardiac Arrest Protocol # 331 and consider medical command contact.**
 - b. If patient meets DOA criteria listed above, ALS should be cancelled.
 4. If the scene is a suspected crime scene, see Crime Scene Preservation Guidelines #919.
 5. In all cases where death has been determined, notify the Coroner or Medical Examiner's office or investigating agency. Follow the direction of the Coroner or Medical Examiner's office/investigating agency regarding custody of the body.

Hospital Follow Up

In the ED, the patient was awake but confused. His core temperature was 32⁰ C. He was COVID positive and had significant rhabdomyolysis. He survived to hospital discharge.

Case Study #6

Learning Objectives

- In many systems, Paramedics and even EMTs are empowered to declare death in the field. Some systems require medical direction consultation. Usually there is a systematized approach to these decisions to improve accuracy and reduce bias.

Resources

Verbeek PR, Vermeulen MJ, Ali FH, et al. "Derivation of a Termination-of-resuscitation Guideline for Emergency Medical Technicians using Automated External Defibrillators". Academic Emergency Medicine. July 2002, 9:7, 671-8. <https://doi.org/10.1197/aemj.9.7.671>

Morrison LJ, Verbeek PR, Chan C, et al. "Validation of a Universal Prehospital Termination of Resuscitation Clinical Prediction Rule for Advanced and Basic Life Support Providers". Resuscitation. March 2009, 80:3, 324-8. <https://doi.org/10.1016/j.resuscitation.2008.11.014>

Case Study #7

Case Presentation

A 28 y/o female G2P1 at 26 weeks walks into a small community hospital, which lacks OB services (Hospital A). She complains of diarrhea and crampy lower abdominal pain. The emergency physician examines the patient and determines that she is in labor. She had spontaneous rupture of membranes and her cervical os is dilated to 1 cm. The physician calls the hospital 1 hour away that has inpatient OB services (Hospital B). They refuse the transfer, stating that they cannot care for premature deliveries <900 grams. The physician then calls a tertiary care facility 1.5 hours away by ground, who accepts the transfer (Hospital C).

The local EMS agency is called for transportation. En route to Hospital C, the patient's pain increases. The paramedic identifies that delivery is imminent. The driver reroutes the patient to a closer hospital along the route, which does have OB but no dedicated NICU services (Hospital D). The delivery occurs en route to hospital D, resuscitation is initiated by the paramedic, and the child arrives gray and cyanotic but with a pulse. The child is resuscitated by hospital D, is transferred via air to hospital C, and has a predictably stormy course.

Hospitals, A, B, and C are named in the suit, as is the ambulance company and the EMS medical director for the agency – for transporting a patient outside of their scope of practice, not having sufficient equipment to handle a 26-week gestation infant, and not having appropriate policies in place to prevent paramedics from accepting patients outside of their scope of practice. The EMS agency lost the case and went bankrupt. The hospitals A and B settled for an undisclosed amount.

Learning Objectives

- While the transferring physician is responsible for determining patient stability and level of transport, the EMS agency and Medical Director also have responsibility to ensure policies regarding accepting transfers, necessary equipment, and scope of practice to care for patients.
- Policies should provide a mechanism for EMS clinicians to refuse transfers if they are outside their scope of practice.
- One should consider alternative resources, including air medical transport, CCT, and/or additional staff when the clinical presentation exceeds capabilities of routine ground EMS clinicians.
- Unplanned delivery out-of-hospital puts the infant and mother at greater risk than delivery at a hospital with ED and/or basic OB services with subsequent transfer.
- As perinatal services and other specialty services decrease, the need for transfer is likely to increase. Advanced planning and coordination with hospitals can help to reduce risk.

Resources

Flanagan et al. Is unplanned out-of-hospital birth managed by paramedics 'infrequent', 'normal' and 'uncomplicated'? BMC Pregnancy and Childbirth. 2017. DOI: [10.1186/s12884-017-1617-9](https://doi.org/10.1186/s12884-017-1617-9)

Case Study #8

Case Presentation

You are the EMS medical director for a small, tribal-run EMS agency that serves a remote Native American reservation 60 miles from the nearest trauma center. You receive a phone consultation from one of the EMT-Intermediates requesting medical advice. He is a member of the tribe and is part of the EMS crew providing standby EMS coverage at a tribal ceremony that is closed to non-tribal members. During the ceremony, the crew was summoned to treat an 11-year-old boy who jumped off a low retaining wall (approximately two feet high) and immediately felt a pop and pain in his left knee. He suffered no other injury but is now in significant pain with swelling and deformity of the left knee. The EMT-Intermediate reports that the patient's left patella appears dislocated laterally. Vital signs are BP 125/85, HR 115, RR 20, SpO₂ 97%. Dorsalis pedis pulse on the left foot is strong and regular.

The EMT-Intermediate is now approximately 100 yards away from the patient in the only area that has cell phone signal. He left the patient in care of his EMT-B partner and a Traditional Healer (Medicine Woman). Both the EMT-Intermediate and the Medicine Woman think the patient has a left patella dislocation. The EMT-Intermediate indicates that the Medicine Woman wishes to reduce the dislocation, and asks your thoughts on whether he should provide fentanyl for pain relief before she attempts the reduction. The EMT-Intermediate suspects the patient's parents will decline transport to the hospital should the patella be successfully reduced.

Background

- EMT-Intermediates are allowed to administer fentanyl per EMS scope of practice.
- No EMS clinicians are allowed to perform joint reductions per EMS scope of practice.
- Traditional Healers are not recognized or licensed as EMS clinicians in the state.
- Tribal members experiencing medical or traumatic emergencies at such ceremonies are often reluctant to leave the ceremony, even for emergent medical care.

Learning Objectives

- Many cultures hold medical beliefs that are different from the Western medical beliefs upon which most EMS treatments are based. Additionally, individual members of such cultures may have variable adherence to their cultural beliefs and may simultaneously value their own cultural medical beliefs and Western medical beliefs. It is important for EMS clinicians and EMS physicians to realize when this is the case in their community, and, when such situations present on an EMS scene, strive to provide the best care possible while also respecting a patient's medical beliefs.
- EMS laws and regulations vary significantly between states. Tribal/sovereign and federal EMS agencies are not necessarily covered by state EMS laws and regulations. However, in absence of applicable federal or tribal laws, such agencies may be wise to voluntarily follow state EMS regulations. EMS physicians working with tribal/sovereign and federal EMS agencies must understand the laws and regulations governing their EMS agencies and provide appropriate guidance.
- EMS licensure levels and scopes of practice vary across the United States and internationally. EMS physicians should be aware of the licensure levels and scopes of practice of EMS clinicians in their state and agency.
- Non-EMS medical providers can cause confusion and even harm and liability on EMS scenes. They can also be partners and help bridge a gap between EMS and the patient. EMS agencies and medical directors must have clear policies on how to handle these

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providers in such situations and consider how to engage with them in advance for situations where they are likely to be on scene (e.g., traditional healers in a tribal area, midwives)

Resources

[National EMS Scope of Practice Model](#). National Highway Traffic Safety Administration. 2021.
Example EMT-I Scope of Practice. [New Mexico Administrative Code 7.27.11 Emergency Medical Services Supplemental Licensing Provisions](#).

Case Presentation

A 67-year-old healthy female was an unrestrained driver in a high-speed collision that occurred near a strip mall. An emergency physician, who is also the acting medical director of a neighboring ground EMS service, witnessed the crash from the mall and responded immediately to render first aid. [ePCR]

An ALS ground unit was dispatched at 13:15 (Service A) and, upon their request, an air medical unit was co-dispatched simultaneously (Service B). The onsite physician works for another agency outside the jurisdiction.

The ground paramedic-EMT crew from Service A arrived on scene at 13:25. The patient was noted to be alert but confused and in respiratory distress with diminished left breath sounds, bilateral upper extremity and left lower extremity deformities. Initial BP 50/palpation and HR 107. The paramedic placed an IO and initiated Normal Saline 1 liter bolus. The paramedic lacked prior experience with needle decompression and requested assistance from the physician, who performed a left needle decompression with a rush of air. The patient was loaded in the back of the ambulance for management.

The air medical nurse-paramedic crew from Service B arrived at 13:39 and assumed care. They repeated the needle decompression and transfused 1 unit of packed red blood cells (PRBCs). The paramedic then administered 20mcg push-dose epinephrine for persistent hypotension.

At 13:45, the EMS Supervisor for Service A arrived on scene and immediately directed his crew to drive to the closest facility, which was a Level II Trauma Center 12 miles to the west (ETA 7 min by air, 22 min by ground transport). The physician wanted the patient to go to the Level I Trauma Center 20 miles to the east (ETA 10 min by air, 30 min by ground transport). The Service A Supervisor insisted that they go to the local facility by ground or get out of his ambulance.

The air medical crew consulted their online medical direction physician at the Level I TC and received orders to transport there. The patient was loaded into the aircraft as the second unit of PRBCs is transfusing. The next documented HR was 158 and the non-invasive blood pressure cuff failed to cycle. The paramedics initiated CPR. After 2 doses of epinephrine, placement of an i-gel, and 10 min of CPR the patient arrived at the Level I TC with ongoing compressions. The trauma team continued resuscitation for 20 minutes with thoracotomy and whole blood transfusion; however, the patient expired.

Following the incident, the EMS supervisor complained to the County 9-1-1 system and the State EMS Office asserting that the air medical crew delayed departure and, had they proceeded immediately by ground to the Level II TC, the patient might still be alive. He argued that the patient was in his jurisdiction and the destination decision was his responsibility, not the physician on scene, the air medical crew, or the online command physician.

Case Study #9

Learning Objectives

- It is important to establish policies that address use of air medical resources, destination guidelines, and physician on the scene
- Ensuring clear chain of command and authority on scene will reduce delays to care

Resources

Floccare et al. Appropriate and Safe Utilization of Helicopter Emergency Medical Services A Joint Position Statement with Resource Document. PEC. 2013.
<https://doi.org/10.3109/10903127.2013.804139>

Trauma Center Levels: <https://www.amtrauma.org/page/traumalevels>

Outcomes at Level I and Level II Trauma Centers:

Cudnik MT, Newgard CD, Sayre MR, Steinberg SM. Level I versus Level II trauma centers: an outcomes-based assessment. J Trauma. 2009 May;66(5):1321-6. doi: 10.1097/TA.0b013e3181929e2b. PMID: 19430234. <https://pubmed.ncbi.nlm.nih.gov/19430234/>

Kaji AH, Bosson N, Gausche-Hill M, Dawes AJ, Putnam B, Shepherd T, Lewis RJ. Patient Outcomes at Urban and Suburban Level I Versus Level II Trauma Centers. Ann Emerg Med. 2017 Aug;70(2):161-168. doi: 10.1016/j.annemergmed.2017.01.040. Epub 2017 Feb 28. PMID: 28258762. <https://pubmed.ncbi.nlm.nih.gov/28258762/>

Chalouhi, Nohra MD; Mouchtouris, Nikolaos MD; Saiegh, Fadi Al MD; Starke, Robert M MD; Theofanis, Thana MD; Das, Somnath O BS; Jallo, Jack MD PhD. Comparison of Outcomes in Level I vs Level II Trauma Centers in Patients Undergoing Craniotomy or Craniectomy for Severe Traumatic Brain Injury. Neurosurgery 86(1):p 107-111, January 2020. | DOI: 10.1093/neuros/nyy634. <https://pubmed.ncbi.nlm.nih.gov/30690608/>

Sung Huang Laurent Tsai, Greg Michael Osgood, Joseph K. Canner, Amber Mehmood, Oluwafemi Owodunni, Chun-Yi Su, Tsai-Sheng Fu, Elliott Richard Haut, Trauma Center Outcomes After Transition From Level 2 to Level 1: A National Trauma Data Bank Analysis, Journal of Surgical Research, Volume 264, 2021, 499-509, <https://doi.org/10.1016/j.jss.2021.03.021>.

Physician at the scene:

Dan Bieler, Axel Franke, Rolf Lefering, Sebastian Hentsch, Arnulf Willms, Martin Kulla, Erwin Kollig, Does the presence of an emergency physician influence pre-hospital time, pre-hospital interventions and the mortality of severely injured patients? A matched-pair analysis based on the trauma registry of the German Trauma Society (TraumaRegister DGU®), Injury, Volume 48, Issue 1, 2017, 32-40, <https://doi.org/10.1016/j.injury.2016.08.015>.

Case Study #9

Wilson, Stephanie Laura MBBS, MSc; Gangathimmaiah, Vinay MBBS, MPH. Does prehospital management by doctors affect outcome in major trauma? A systematic review. Journal of Trauma and Acute Care Surgery 83(5):p 965-974, November 2017. | DOI: 10.1097/TA.0000000000001559. <https://pubmed.ncbi.nlm.nih.gov/28590350/>

Case Study # 9

eCPR

Chief Complaint (Category: Adult Trauma (Motor Vehicle))																						
Motor Vehicle Collision with significant traumatic injuries																						
Anatomic Location: Chest,Abdomen,Extremity - Lower,Extremity - Upper																						
History of Present Illness																						
Patient is a 67-year-old female who was involved in a head-on motor vehicle collision. Patient was struck head on at unknown rate of speed. On EMS arrival patient was entrapped in vehicle noted to have diminished breath sounds on the left chest, bilateral upper extremity deformities, and left lower extremity deformity maintaining own airway. EMS splinted bilateral upper extremities, left lower extremity deformity, established intraosseous access with IV fluid, and attempted needle decompression. Patient now for air-medical transport to																						
Medical History	Current Medications	Allergies																				
None Reported Obtained From: Not Recorded	None Reported	No Known Drug Allergies Medication Environmental																				
Neurological Exam																						
Level of Consciousness: Alert Loss of Consciousness: No Chemically Paralyzed: No Mental Present: Oriented-Person		<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4" style="text-align: center;">Glasgow Coma Scale</th> </tr> <tr> <th style="text-align: center;">E</th> <th style="text-align: center;">V</th> <th style="text-align: center;">M</th> <th style="text-align: center;">Tot</th> </tr> <tr> <td style="text-align: center;">Int: 4</td> <td style="text-align: center;">4</td> <td style="text-align: center;">6</td> <td style="text-align: center;">= 14</td> </tr> <tr> <th colspan="4" style="text-align: center;">Revised Trauma Score</th> </tr> <tr> <td colspan="4" style="text-align: center;">6.38</td> </tr> </table>	Glasgow Coma Scale				E	V	M	Tot	Int: 4	4	6	= 14	Revised Trauma Score				6.38			
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Motor Comments: Intact																						
Sensory Comments: Intact																						
Airway	Respiratory																					
Status: Patent Performed By: Other Healthcare Provider	Effort: Distressed Sounds: L: Diminished R: Clear Oxygen: 15 lpm via Non-Rebreather Mask																					
Cardiovascular																						
JVD: Not Appreciated Cap. Refill: Less than 2 Seconds Edema: Not Appreciated	<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">Pulses</th> </tr> <tr> <th style="text-align: center;">Left</th> <th style="text-align: center;">Right</th> </tr> <tr> <td>Carotid:</td> <td></td> </tr> <tr> <td>Radial: Weak</td> <td></td> </tr> <tr> <td>Femoral:</td> <td></td> </tr> </table>		Pulses		Left	Right	Carotid:		Radial: Weak		Femoral:											
Pulses																						
Left	Right																					
Carotid:																						
Radial: Weak																						
Femoral:																						
Motor Vehicle Incident																						
Involved: 2 Airbag: Not Known Location of Pt in Vehicle: Front Seat-Left Side (or motorcycle driver) Vehicle Impact: 12 Extrication Required: Yes Vehicle Body Type: Passenger car Was ACN Used: No																						
Injury Details																						
Trauma Triage Criteria - Age >= 65 years: SBP < 110 mmHg High Risk: - Respiratory distress or need for respiratory support - Suspected fracture of two or more proximal long bones Drugs/Alcohol?: None Reported Mechanism: MVC - Public Equipment: Not Known																						

Case Study # 9

Initial Physical Findings	
Assessment	
Assessment at	
Extremities: Deformity	
Generalized Ab: Normal	
Generalized Back: Normal	
Head: Avulsion	
Head Findings: Right forehead	
Left Lower Leg: Deformity	
Left Upper Arm: Deformity	
Left Upper Leg: Deformity	
Lung: Breath Sounds-Decreased	
Lung Findings: Decreased breath sounds to left chest	
Mental Status: Oriented-Person	
Pelvis/Genitourinary: Normal	
Right Upper Arm: Deformity	
Skin: Pale , Dry	

Fluids Before & During Transport				IVs Prior to Assessment				
INTAKE		OUTPUT		IV#	Gauge	Site	Solution	Rate
Before	During	Before	During	1	IO	Right Tibia	NSS	Bolus
CRYS: 250 mL 750 mL EBL: unknown mL unknown mL								
COLL: 00 mL 700 mL UO: 00 mL 00 mL								

Medications / Infusions Prior to Assessment					
Time	IV# / Other Route	Medication	Concentration	Dose	Drip
PTA	IV#1	Normal Saline		Under pressure	Yes

Impression / Diagnosis	
System: Pulmonary, Abdominal, Musculoskeletal	
Symptoms Present: Breathing Problem, Pain - Pelvic / Abdominal, Pain (General)	
Impression: Traumatic Injury - Significant, Hypovolemia / shock, Respiratory distress, Pain	
CMS Condition: IV Meds Required, Major Trauma, Other Trauma (need for monitor or airway), Other Trauma (suspected internal injuries), Cardiac/Hemodynamic Monitoring Required	
Initial Patient Acuity: Critical (Red)	

Activity												
Time	H.R.	REG	B.P.	MAP	RA	SaO2	Resp	Rhythm	GCS	ECG Method	Temp	Pain
	H.R. Method		B.P Method					Resp Effort				
Action	Comment											
13:39	107				79	30		Sinus Tachycardia, Tachypnea	4/4/5		26.4°C	8
Airway	Electric Monitor - Other Arrived at patient in back of ambulance. Received report and care from paramedic. Placed patient on zoll monitor. All temperatures are ambient. Needle Thoracostomy performed by _____ Role Performing: Paramedic. Mid axially 5th intercostal space. Complications: None, None. Authorization: Via Protocol. Pt. Response: Improved.											
13:42	169											19
Blood Administration	Electric Monitor - Cardiac Blood product administered by _____ Role Performing: Registered Nurse, :Transfusion Consent: Implied/Emergent, Transfusion Consent Date: _____ 13:42, Cross Matched: No, Blood Type: O+, Blood Product: Packed Red Blood Cells, Blood _____ Unit Expire Date: _____ 00:00, Route: Intraosseous(IO), Unit Completed: Yes, Site Administered: left tibia , Warmer Used: No. Complication: None. Pt. Response: Improved.											
13:46	Labs Lab values obtained by _____ Role Performing: Paramedic: GLU: 170.											
13:46	119				53 / 31	39	98	35				
Med.	Electric Monitor - Cardiac Epinephrine 1:100,000 (0.01mg/1mL), 50 mcg via IV - Drip, Rate: 5 mL rapid IV push, concentration: 10mcg/mL, given by _____ . Role Performing: Registered Nurse. Authorization: Via Protocol. Pt. Response: Improved.											

Case Study # 9

13:49	115	95 / 81	88	98	35	Sinus Tachycardia,	26.2°C	
	Electric Monitor - Cardiac	Auto. Cuff	Patient unloaded from ambulance and transferred to stat stretcher. Secured with all straps and rails. Departed for aircraft.					
13:50	Blood Administration	Blood product administered by _____ Role Performing: Paramedic, :Transfusion Consent: Implied/Emergent, Transfusion Consent Date: _____ Cross Matched: No, Blood Type: O+, Blood Product: Packed Red Blood Cells, Blood ID: _____, Unit Expire Date: _____ 00:00, Route: Intraosseous(IO), Volume Infused:350 mL, Unit Completed: No, Transfusion Order:Via Protocol, Site Administered: left tibia , Warmer Used: No. Complication: None. Authorization: Via Protocol.						
13:53	64	92	15					25.5°C
	Electric Monitor - Cardiac	Operations Patient loaded into helicopter and lifted for _____ Operations: Hearing Precautions, Patient Loaded - Hot. by Allan Rhodes. Role Performing: Registered Nurse.						
13:54	158	83	49					23.3°C
	Electric Monitor - Cardiac	Airway Bag Valve Mask performed by _____ Role Performing: Registered Nurse. Complications: None, None. Authorization: Via Protocol.						
13:55	Pulseless Electrical Activity,							
	Cardiac	No pulses, CPR started Defibrillator Pad Application performed by _____ Role Performing: Registered Nurse. Location: Sternum/Apex. Successful. Complication: None. Authorization: Via Protocol.						
13:56	Med.	Epinephrine 1:10,000 (0.1mg/1mL), 1 mg via IV - Drip given by _____ Role Performing: Paramedic. Authorization: Via Protocol. Pt. Response: . Epi pushed, flushed and circulated with CPR						
13:57	Pulseless Electrical Activity,							
	Intubation	Pulses checked, Patient remains PEA, CPR resumed. i-gel Supraglottic Intubation by _____ Role Performing: Registered Nurse with 4, cm from . Attempts: 1, successful. Placement verified by: Auscultation, Moisture in Tube. Secured via Commercial Device. Complication: None. Authorization: Via Protocol. Pt. Response: Unchanged.						
13:59	Hosp. Notify	alert sent by _____ Role Performing: Registered Nurse via Radio. Med Command notified with updated ETA, current patient condition.						
14:00	Pulseless Electrical Activity,							
	Med.	No pulses, continued CPR Epinephrine 1:10,000 (0.1mg/1mL), 1 mg via IV - Drip given by _____ Role Performing: Paramedic. Authorization: Via Protocol. Pt. Response: . Epi pushed, flushed, and circulated with CPR						
14:01	134	114 / 23	55	85	63			
	Electric Monitor - Cardiac	Auto. Cuff	Vital Signs.					
14:02	Pulseless Electrical Activity,							
	Pulses check, remains PEA, CPR resumed.							
14:05	100	118 / 33	63					75
	Electric Monitor - Cardiac	Auto. Cuff	Operations Landed Patient unloaded, Igel placement confirmed with bilateral rise and fall of the chest. CPR continued and departed for ED. Operations: Hearing Precautions, Patient Offload - Hot. by Allan Rhodes. Role Performing: Registered Nurse.					
14:07	154 / 97 118 94 49							
	Auto. Cuff	Vital Signs.						
14:08	58	65 / 21	38					67
	Electric Monitor - Cardiac	Auto. Cuff	Pulseless Electrical Activity,					
	Arrived to emergency room trauma bay. Patient placed on hospital bed. Patient report and care transferred to receiving staff.							

Case Study #10

Case Presentation

Paramedics are called to the home of a 73-year-old male for active seizure. On arrival, they are surprised to find a nurse practitioner on scene, who has initiated management placing an IV. She informs them that the patient is enrolled in a new home hospital program and that she was on scene when he started to seize. They are also directed by the nurse practitioner to speak to the on-call physician, who requests that they transport the patient to his treating hospital, bypassing multiple closer receiving facilities. The paramedics manage the seizure and transport according to the physician's direction.

As the regional medical director, the case is brought to your attention out of concern that paramedics are receiving medical direction from untrained physicians, who have no knowledge of the EMS system or paramedic protocols, and are being directed to transport outside of EMS destination policies.

Narrative

EMS Narrative: [REDACTED] arrived on scene to find a 73 year old male with cc of witnessed seizure by [REDACTED] nurse practitioner. Patient alert and oriented by 2. GCS of 14. NP described a tonic clonic seizure in which she caught the patient preventing trauma. Patient carried by firefighters to gurney and placed on 12 lead ekg, spo2, and Glucose checked. All findings returned within normal limits. During transport patient found to be hypertensive. Patient denies chest pain, shortness of breath, or weakness. No visible oral trauma or incontinence. NP had established a 22G IV in left forearm prior to seizure. Patient transported back to [REDACTED] for treatment at call center physicians direction.

Learning Objectives

- EMS systems should have policies regarding physicians on scene
- Hospital at home programs may involve advanced practitioners and/or physicians that do not have knowledge of the EMS system and EMS clinicians may be called to assist; communicating with the programs to provide some guidance on EMS policies and protocols can improve coordination and patient care
- Ultimately EMS clinicians should receive medical direction from trained physicians/practitioners with knowledge of EMS protocols and follow their destination policies

Resources

Example Physician At the Scene Policy: https://file.lacounty.gov/SDSInter/dhs/206336_816.pdf

Case Presentation

Paramedics are on scene with an intoxicated male in his 30s who had a witnessed fall from standing with blunt head trauma and reported brief loss of consciousness. The paramedics report that on their assessment, the patient is alert and oriented, GCS 15. He has a hematoma to his forehead and no other reported injuries. He has mild hypertension and a heart rate of 105. The patient is with his brother. The patient is refusing transport and the paramedics make contact with online medical direction because they have some concern about not transporting the patient given his level of intoxication and evidence of blunt head trauma.

[Supplemental Material: Audio – paramedic report]

The online medical clinician discusses the case with the paramedic and then talks with the patient, who endorses drinking and has obvious slurred speech. He denies any complaints and continues to refuse transport. He explains that his concern is the cost. He is able to report the prior events with some prompting but continues to state that he will be fine.

There is a brief discussion about involvement of law enforcement, but the paramedic states that they are unlikely to intervene.

The online medical clinician also talks with the brother. It is clear that he has also been drinking. He has a background as a prior EMT and acknowledges the options for a CT scan at the hospital. Ultimately he asks the nurse 'is there beer at the hospital?' and then states 'we will probably see you guys soon.' He refuses paramedic transport and states they will take their own transport to the hospital, though, based on his tone, that is unlikely to occur.

Learning Objectives

- Decision-making capacity is the ability to use information about an illness and proposed treatment options to make a choice that is congruent with one's own values and preferences. This includes understanding the risks and benefits and having the ability to make and communicate a decision regarding the proposed treatment in the patient's primary language.
- Patients who lack decision-making capacity and have a potential life threat may be treated and transported under implied consent.
- EMS policies must balance respect for patient autonomy with patient safety.
- EMS clinicians should receive education on proper assessment of decision-making capacity.
- Involvement of online medical direction can be helpful in establishing decision-making capacity and can assist EMS clinicians in some cases to convince at-risk patients to agree with transport

Resources

Carrillo et al. Critical Steps for Determining Capacity to Refuse Emergency Medical Services Transport A Modified Delphi Study. PEC. 2024.

<https://doi.org/10.1080/10903127.2024.2403650>

Case Study #12

Case Presentation

Paramedics respond to a call for a 31-year-old female, approximately 6 months pregnant, with abdominal pain and vaginal bleeding. On arrival, the patient is sitting on a bed. She reports that she had “a miscarriage” and delivered the infant into the toilet prior to EMS arrival. The paramedics began evaluation of the mother. Upon attempting to evaluate the fetus, they are directed by the patient’s partner to prioritize her care prior to being allowed entry into the bathroom.

The mother’s initial vital signs are blood pressure 112/palp, heart rate 120, and respiratory rate 22. Examination is significant for diffuse abdominal tenderness with guarding and brisk vaginal bleeding. The paramedics placed two 18-gauge IVs and initiated fluid resuscitation.

After delay, the paramedics are permitted to evaluate the fetus, which was noted to be cool, cyanotic, and apneic - therefore determined not viable and placed in a plastic bag for transport.

Online medical direction was consulted en route to the hospital. **[Supplemental Material: Audio – paramedic report]**

On ED arrival, the mother was taken emergently to the operating room for dilatation and curettage. The ED staff evaluated the newborn and found him to have a bradycardic rhythm and agonal respirations. The newborn was intubated, resuscitated, and admitted to the NICU. The hospital course was complicated by respiratory failure, metabolic acidosis, and intracranial hemorrhage. On hospital day seven, the parents and medical team decided to provide comfort-focused care and electively extubate. The infant quickly expired.

Learning Objectives

- It is important to have mental health resources for EMS personnel who will experience challenging calls and potential poor patient outcomes
- Newborn assessment and resuscitation is a low-frequency high-stress event which benefits from regular continuing education.
- Field births require significant resources on scene with the potential for two critical patients; one should consider what resources are dispatched automatically to these calls and what triggers are in place to send additional resources when needed.

Resources

Donnelly. Work-Related Stress and Post Traumatic Stress in EMS. PEC. 2012. <https://doi.org/10.3109/10903127.2011.621044>

Fallon et al. Peer Support Programs to Reduce Organizational Stress and Trauma for Public Safety Workers. Workplace Health & Safety. 2023. <https://doi.org/10.1177/21650799231194623>

Case Study #13

Case Presentation

An EMT crew member in your agency sent an email notifying you of a case from the night before. Briefly, a 53-year-old female called 9-1-1 for shortness of breath. She was seen by the fire department's BLS first responders and triaged to your private ambulance agency for BLS transport. The patient reported she is on hemodialysis 3 days per week but had missed her last 4 sessions. She complained of shortness of breath that worsened with exertion.

The patient was transported to hospital without delay or change in condition. Upon hospital arrival one EMT went inside and was directed by the ED triage nurse to "wait in their rig with the patient" and "we will get you when we have room." The EMT diligently returned to the ED triage nurse multiple times but was returned to the ambulance at each attempt over the course of 3 hours. The patient progressively experienced worsening dyspnea and eventually developed respiratory arrest followed shortly after by cardiac arrest while in the ambulance. At that point, EMTs applied an AED, had one cycle of "no shock advised," and rushed into the ED with ongoing CPR.

Your crew member is upset with the hospital for what they feel was inappropriate hospital arrival decorum.

Learning Objectives

- Delays in offloading a patient can represent significant problems to an EMS system.
- Various strategies have been developed to mitigate this time and return crews to service.

Resources

NAEMSP Position Statement on Ambulance Diversion and Emergency Department Offload Delay, *Prehospital Emergency Care*. 2011, 15(4), 543.

<https://doi.org/10.3109/10903127.2011.598620>

Cooney D, Millen M, Carter A, et al. "Ambulance Diversion and Emergency Department Offload Delay: A Resource Document to Accompany the NAEMSP Position Statement". *Prehospital Emergency Care*. 2011, 15(4), 555–561. <https://doi.org/10.3109/10903127.2011.608871>

Case Study #14

Case Presentation

Sheila Johnson is a 31-year-old paramedic who has worked for the EMS agency for 8 years, 7 years as an EMT and 1 year as a paramedic. Approximately 1 year ago, she began experiencing chronic shoulder pain and weakness that limited her ability to lift. After multiple consultations and diagnostic tests, she was found to have shoulder impingement syndrome. The condition was not work-related, but the agency reassigned Sheila to light duty for several months while she underwent a variety of therapies and surgical intervention. One month following surgery, Sheila presented the attached letter from her physician qualifying her for a full return to independent duty. **[Letter from Dr. Vasquez (see below)]**

Two weeks after she returned to duty, one of the operations supervisors asked her about her new penchant for lollipops. She told him that they were fentanyl, prescribed by her physician to manage her post-op healing and ongoing pain. The operations manager contacts you to discuss this.

Learning Objectives

- An impaired EMS clinician puts patients at risk.
- EMS medical directors are responsible for the quality of the patient care provided by their agency/system. You determine whether an EMS clinician is competent to provide clinical care.
- The US Equal Employment Opportunity Commission (EEOC) has issued guidance on the use of prescription medications in the workplace and the responsibilities of the employer (in this case the EMS agency) and employee. The employer is usually required to provide reasonable accommodations. The employee must show documentation that they are under physician care and have a disability (vs illicit substance use).

Resources

<https://www.eeoc.gov/laws/guidance/use-codeine-oxycodone-and-other-opioids-information-employees>

[Letter from Dr. Vasquez]

Dr. Ronald Vasquez
Midtown Orthopedics
4 North Center Street, Suite 100,
Anytown, USA

Anytown EMS
3215 Hospital Drive
Anytown, USA

12/09/2024

To whom it may concern,

I am writing concerning my patient Ms. Sheila Johnson. Ms. Johnson entered my practice approximately 6 months ago complaining of chronic pain and weakness. Following extensive evaluation, I diagnosed Ms. Johnson with shoulder impingement syndrome. A variety of non-surgical interventions failed to resolve her symptoms so I performed a surgical repair on September 22. The surgery went well and on September 29th Ms. Johnson entered an aggressive physical therapy regimen with the goal of returning to her work as a paramedic with Anytown EMS.

Ms. Johnson has worked hard in physical therapy, and I am happy to report that her strength and capacity have returned to normal. I certify that Ms. Shelia Johnson is physically and mentally ready to return to full duty as a paramedic with your organization.

Please don't hesitate to contact me if you have any questions. Thank you.

Dr. Ronald Vasquez, MD, FACS

Midtown Orthopedics
Incredible surgeons, exemplary service

Case Presentation

EMS and law enforcement are on scene with a severely agitated patient crawling in the street. The patient is alert and talking on initial assessment. The decision is made to restrain the patient in order for EMS to administer ketamine to facilitate transport to the emergency department. The patient is physically restrained by law enforcement personnel. No medical assessment is performed. A paramedic administers IM ketamine and then the patient is lifted onto the stretcher. Despite discussion to avoid prone positioning, the patient is positioned prone on the stretcher, seatbelts are applied, and the patient wheeled to the ambulance without monitoring.

[Video – Patient interaction on scene]

Shortly after the patient is loaded into the ambulance, he is noted to be pulseless and apneic. Resuscitation is initiated; however, the patient ultimately expires.

Learning Objectives

- EMS must have protocols for management of the severely agitated patient that include collaboration with law enforcement and the safe application of restraints when indicated.
- Patients who are restrained may die from positioning that restricts their ability to breathe, leading to hypoxia and acidosis and ultimately asphyxia and myocardial dysfunction.
- Best practices for management of the severely agitated patient include:
 - EMS should perform a timely medical assessment and identify life threats.
 - Individuals should be closely monitored prior, during, after sedation.
 - Verbal de-escalation techniques should be taught and employed as the primary strategy.
 - The least invasive approach to restraint should be applied when indicated, with preference for restraints that are rapidly removable to provide patient care as needed.
 - If law enforcement restraints are applied, one should attempt early transition to medical restraints and positioning whenever possible; the patient should always be placed in the safest possible position, typically supine.
 - The use of chemical restraint should be driven by EMS protocols and involve close monitoring including end-tidal CO₂, pulse oximetry and cardiac rhythm.

Resources

Kupas et al. Clinical Care and Restraint of Agitated or Combative Patients by Emergency Medical Services Practitioners. Prehospital Emergency Care. 2021. <https://doi.org/10.1080/10903127.2021.1917736>

Levy et al. Consensus Statement of the National Association of EMS Physicians International Association of Fire Chiefs and the International Association of Chiefs of Police: Best Practices for Collaboration Between Law Enforcement and Emergency Medical Services During Acute Behavioral Emergencies. PEC. 2024. <https://doi.org/10.1080/10903127.2024.2402530>

15 Principles for Reducing the Risk of Restraint-Related Death. Police Executive Research Forum. September 2024. <https://www.policeforum.org/assets/Restraint.pdf>

Case Study #16

Case Presentation

You are the medical director for a fire-based EMS agency with approximately 120 ALS providers. The agency carries fentanyl, morphine, ketamine, and midazolam, all stored in locked narcotic boxes with paper medication logs. Controlled substance counts are performed at shift change and audited monthly by supervisors.

During routine QA review, the QA manager notes that a senior paramedic appears to administer fentanyl on a higher percentage of calls than agency peers. The medication appears appropriately indicated in documentation, but post-administration pain reassessments are inconsistently recorded. Several PCRs note medication wastage, with the same EMT partner listed repeatedly as the witness.

Separately, a receiving emergency department nurse contacts the agency expressing concern that a patient transported by this medic reported no pain relief after fentanyl administration and stated that the IV flush “burned”. No adverse event was identified in the ED, and the patient was discharged.

Two weeks later, during a random narcotic count, a fentanyl vial is found to be missing from the paramedic’s assigned unit. The paramedic states this is likely a documentation error and denies diversion. He has no prior disciplinary history and is regarded as clinically strong and well respected within the agency.

The operations chief contacts you regarding how to proceed, whether this constitutes diversion, and what obligations exist for reporting or further investigation.

Learning Objectives

- Narcotic diversion in EMS is frequently identified through cumulative patterns rather than single events.
- EMS medical directors must balance just culture, patient safety, clinician wellness, and regulatory compliance.
- Medical directors should understand reporting obligations related to missing or diverted controlled substances.
- Clear agency policies and system design can reduce diversion risk and improve early detection.

Resources

[DEA Diversion Control Division. *Practitioner’s Manual: An Informational Outline of the Controlled Substances Act.*](#)

[American Society of Health Systems Pharmacists Guidelines on Preventing Diversion of Controlled Substances. American Journal of Health Systems Pharmacists. Dec 15, 2022.](#)

Case Study #17

Case Presentation

One of your paramedics calls to notify you about a medication error that occurred earlier in the day.

He and his EMT partner were called to a dermatologist's office for an "allergic reaction." On arrival, they found a 28-year-old healthy male who complained of a racing/pounding heart after an injection of lidocaine with epinephrine. The dermatologist called 9-1-1 due to concern for an allergic reaction.

On assessment, the patient had no angioedema, clear lungs, a heart rate of 108, and otherwise normal vital signs. Due to the physician's concern, the paramedic prepared to treat the patient for anaphylaxis despite the lack of objective findings. He initiated oxygen treatment, established cardiac monitoring, and placed an IV prior to moving the patient to the ambulance.

The paramedic explains that, while in the ambulance, he had vials of both diphenhydramine and epinephrine out and he asked the EMT to draw up "the whole vial" of diphenhydramine (50mg consistent with the local protocols). The EMT handed over the syringe and the paramedic administered the medication IV push. The patient subsequently had an acute onset of severe chest pressure, diaphoresis, and a 1-minute run of ventricular tachycardia, which resolved spontaneously. The chest pain and diaphoresis lasted for approximately 10-15 minutes and resolved shortly after ED arrival.

In retrospect, the medic determined that his partner had drawn up the full 1mg dose of epinephrine 1 mg/ml. He called you to both report the error and request follow-up on the patient. He also informed the emergency physician who received the patient and disclosed the error to the patient and family, who were very upset.

Upon your questions, the paramedic did not confirm what had been drawn up by the EMT. He also states it is common practice in the agency for EMTs to draw up meds, which you had not been aware of.

You reach out to the EMT, who tells you that the medic asked for epinephrine, not diphenhydramine; when the EMT is asked how much, she responds "the whole vial."

You follow up on the patient and learn that he had an NSTEMI based on troponin elevation and wall motion abnormalities seen on a cardiac echo.

Learning Objectives

- Just culture: when mistakes are recognized and disclosed rather than hidden through fears of punishment; allows individuals and organizations to learn from mistakes thus promoting improved services and higher standards of patient care.
- Systems should have a process in place for disclosing medication errors to patients/families. Often, it is beneficial to involve the legal team.

Case Study #17

- Whether disclosing a medication error can be used in a later legal action is state dependent and medical directors should be familiar with their local laws.

Resources

NAEMT Position Statement - Just Culture in EMS

https://www.naemt.org/docs/default-source/advocacy-documents/positions/Just_Culture_in_EMS.pdf?sfvrsn=0

Disclosure of “Nonharmful” Medical Errors and Other Events. Arch Surg.

2012;147(3):282-286. doi:10.1001/archsurg.2011.1005

<https://jamanetwork.com/journals/jamasurgery/fullarticle/1107400>

Berlin L. Will Saying “I’m Sorry” prevent a Malpractice Lawsuit. American Journal of Roentgenology. 2006;187: 10-15. 10.2214/AJR.06.0110

<https://www.ajronline.org/doi/10.2214/AJR.06.0110>

Case Study #18

Case Presentation

You are the medical director of Tri County ALS, a licensed ground Advanced Life Support agency serving approximately 1,500 square miles and a population of 800,000 across a mix of urban, suburban, and rural communities. Under current state regulations, paramedics are permitted to perform endotracheal intubation only in patients who are in cardiac arrest. Drug-Assisted Airway Management (DAAM) – including Rapid Sequence Intubation (RSI), Delayed Sequence Intubation (DSI), and Rapid Sequence Airway (RSA) – has historically been excluded from the ground EMS scope of practice in your state.

Recently, the state launched a pilot initiative to expand the paramedic scope to include DAAM, contingent on local credentialing and medical oversight. In response, your agency's clinical leadership has asked you to develop a DAAM credentialing program, citing infrequent but critical cases where DAAM may provide paramedics with extra tools to meet patient care needs.

As medical director, your task is to design a credentialing pathway that ensures EMS clinician competency, minimizes risk, and includes a robust quality assurance and improvement process.

Learning Objectives

- The components of a competency-base credentialing program should include knowledge, technical skills, attitudes, and clinical judgment.
- Effective strategies include multi-modal assessment tools that reliably measure competence, such as simulation, direct observation, and structured evaluation.
- It is important to develop a framework for maintaining competency, performance monitoring, and re-credentialing that aligns with patient safety, system accountability, and provider growth.

Resources

Jarvis, J. L., Lyng, J. W., Miller, B. L., Perlmutter, M. C., Abraham, H., & Sahni, R. (2022). Prehospital drug assisted airway management: an NAEMSP position statement and resource document. *Prehospital Emergency Care*, 26(sup1), 42-53.

Dorsett, M., Panchal, A. R., Stephens, C., Farcas, A., Leggio, W., Galton, C., ... & Grawey, T. (2022). Prehospital airway management training and education: an NAEMSP position statement and resource document. *Prehospital Emergency Care*, 26(sup1), 3-13.

<https://www.tandfonline.com/doi/full/10.1080/10903127.2021.1990447>

Tavares et al., Global Rating Scale for Paramedic Clinical Competence, *Prehosp Emerg Care*, 2013.

Zoller et al., Objective Structured Assessment in EMS Simulation, *BMC Med Educ*, 2021.

PA Statewide DAAM Pilot (VTR 0623-01): https://pehsc.org/wp-content/uploads/2025/03/VTR-0623-01-Phase-2-RSI-Pilot-Recommendatons_June-21-2023.pdf

National EMS Scope of Practice Model (2019): https://www.ems.gov/assets/National_EMS_Scope_of_Practice_Model_2019.pdf

Case Study #18

NEMSQA Airway Measures Report:

<https://www.nemsqa.org/assets/Airway/2024%20NEMSQA%20Measures%20Report%20Airway%20Management.pdf>

Case Study #19

Case Presentation

Your agency's QA committee received a patient care concern from a receiving hospital in your system. The complaint identified that the ALS provider failed to recognize the acuity of a diabetic patient who was transported. Specifically, the concern addresses the paramedic's limited assessment (vitals and point-of-care glucose were obtained but no ECG was done) and interventions (no IV access was obtained).

You review the PCR.

EMS Agency
PSAP Call Date/Time: 0*/0*/20** 09:00:39

Incident Number: E17xxxxxx

Prehospital Care Report - No PHI

Patient Information

Age: 47 Years

Gender: Female

Provider Impression

Primary Impression: GI/GU - Diarrhea

Secondary GI/GU - Nausea (With Vomiting)
Impression:

Narrative

Narrative: T410 and M408 responded for an ALS emergency for trouble breathing. On arrival, 47 year old female was found lying on the floor of a bedroom. Multiple family members were in the room which made it difficult to assess patient, family was ask to leave the room. Daughter of the patient stated that she had been having nausea and vomiting and diarrhea since that morning. Daughter stated that she has diabetes but doesn't know of any medications or other medical problems. Patient was alert and oriented but uncooperative and would not sit up. Patient was placed on the stairchair to be carried down the stair and to the stretcher. Patient had a bowel movement while she was lying on the floor and was lying in her vomit. Patient would not answer any other questions. Vitals were taken, dext was high, no fever present. Patient denied any pain or trouble breathing. Patient would only ask for water, it was explained why we could not give her any water. Patient was transported to ER with no changes. Patient care was transferred to ER staff.

Past Medical History

Patient Medications

Medication	Dosage	Route
Unable to Complete		

Medication Allergies

Unable to Complete

Environment Allergies

Environmental/Food Allergies

Medical History: Unable to Complete
Medical History Family
Obtained From:

Pregnancy: No
Advance Directives: None

Assessment Exam

Case Study #19

Assessment Summary

06/07/2017 09:39:07

Detailed Findings

Location	Description	Details
Normal Findings		
<u>Skin</u> : Mental Status ;		
Not Done		

Activities

Vitals

Time	BP	Limb Pulse	Pulse Rhythm	Resp Effort	SpO2	Qual	CO2 Level	Other	Glucose	Total Glasgow	Glasgow Coma Score-Eye	Glasgow Coma Score-Verbal	Glasgow Coma Score-Motor	Glasgow Coma Score-Stroke	Stroke	Pt. Position
09:16:35	163/100	73	12-Normal	100	At Room Air	321									No	
09:23:41	160/98	74	12-Normal	100	At Room Air			15	Opens Eyes spontaneously (All Age Groups)	Oriented (>2 Years); Smiles, oriented to sounds, follows objects, interacts	Obeys commands (>2Years); Appropriate response to stimulation	Initial GCS is legitimate	No	12		

Medical Devices

Date/Time of Event (per Medical Device)	Medical Device Event Type	Medical Device ECG Lead	Medical Device ECG Interpretation	Shock or Pacing Energy	Total Number of Shocks Delivered	Pacing Rate	EKG Comments
No data recorded.							

Procedures

Time	Crew	Name	Location	Size of Equipment	Attempts	Response	Success
No data recorded.							

Patient Condition

Complaint Type	Complaint	Duration
Chief (Primary)	vomiting	1 Days
Primary Symptom: GI - Vomiting		Alcohol/Drug Use: None Reported
Other Symptoms: Not Applicable		

Call Type/Location/Disposition

Case Study #19

Urgency:

Destination: Hospital

Response: 911 Response (Scene)
Location: Residence - Single Family Home

Dest. Determ.: Closest Facility

Response Delay: None/No Delay
Type of Scene Delay: None/No Delay
Transport Delay: None/No Delay

Patient Transport/Positioning

Patient Moved to Stairchair
Ambulance:
Patient's Position in Fowlers (Semi-Upright Sitting)
Transport:
Patient Moved From Stretcher
Ambulance:

Response Times and Mileage

Unit Disp.: 06/07/2017 09:00:39
Enroute: 06/07/2017 09:01:11
At Scene: 06/07/2017 09:05:08
At Patient: 06/07/2017 09:06:12
Depart: 06/07/2017 09:16:52
Arrive Dest.: 06/07/2017 09:24:18
In Service: 06/07/2017 09:44:00

Incident Number:
Call Sign: Mxx8

Unit Personnel

Crew Member	Level of Certification	Role
~	EMT-Paramedic	Primary Patient Caregiver-At Scene, Primary Patient Caregiver-Transport
	EMT-Basic	Driver-Response, Driver-Transport, Other Patient Caregiver-At Scene

Call Type: Breathing Problem
Resp. Mode: Emergent (Immediate Response)

Disposition: Treated & Transported
Transport Mode: Emergent (Immediate Response)

You also review the follow up information from the hospital, which is as follows:

“Upon ED arrival, staff immediately recognized the patient was in acute distress. An ECG showed STEMI. She became hypotensive and was taken to the cath lab immediately, where she was found to have an occluded LAD, which was stented. She remained in cardiogenic shock despite multiple vasopressors and suffered cardiac arrest on the cath lab table with subsequent ROSC and Impella placement. The patient was placed on ECMO. Her hospital course was complicated, including by a large left mid-cerebral artery stroke with shift. She ultimately expired.”

You conduct a case review with the QA committee, the crew on scene, and agency leadership all present. During this discussion, the paramedic, who has a number of years of seniority in the agency, identified that the patient and family spoke primarily Arabic, reported the patient was not cooperative, and voiced concern about exposing the patient in the presence of male family members. When asked if the family was asked to leave, the paramedic responded “you know

Case Study #19

how those people are” and did not clarify what attempts, if any, were made to expose the patient enough to start an IV, perform a 12-lead ECG, and otherwise conduct an assessment. At the end of the discussion, the paramedic declined to accept that their actions were anything less than satisfactory and maintained that obtaining IV access or doing a 12 lead ECG would not have changed the outcome of this patient.

Learning Objectives

- Prehospital STEMI detection, routing to PCI-capable hospitals, and pre-arrival notification improves patient outcomes.
- Agencies should have in place tools for communicating with patients who do not speak English, as well as strategies and education on managing a culturally diverse patient population.
- There are disparities in prehospital care based on race/ethnicity and sex/gender.
- Agencies should consider including care disparities based on language barrier into their QA/QI process.

Resources

Savage ML, Hay K, Vollbon W, Doan T, Murdoch DJ, Hammett C, Poulter R, Walters DL, Denman R, Ranasinghe I, Raffel OC. Prehospital Activation of the Cardiac Catheterization Laboratory in ST-Segment-Elevation Myocardial Infarction for Primary Percutaneous Coronary Intervention. *J Am Heart Assoc.* 2023 Jul 18;12(14):e029346. doi: 10.1161/JAHA.122.029346. Epub 2023 Jul 14. PMID: 37449585; PMCID: PMC10382081.

Farcas AM, Joiner AP, Rudman JS, Ramesh K, Torres G, Crowe RP, Curtis T, Tripp R, Bowers K, von Isenburg M, Logan R, Coaxum L, Salazar G, Lozano M Jr, Page D, Haamid A. Disparities in Emergency Medical Services Care Delivery in the United States: A Scoping Review. *Prehosp Emerg Care.* 2023;27(8):1058-1071. doi: 10.1080/10903127.2022.2142344. Epub 2022 Nov 29. PMID: 36369725.

Case Study #20

Case Presentation

You are asked by the mayor of your community to critically evaluate and respond to him regarding the below incident. He is under substantial political pressure regarding the event and needs an assessment of the situation.

EMS was called to the scene of a domestic dispute in which the victim was strangled by their partner. While caring for the victim in the ambulance, the assailant, who had previously run away, returned and attempted to enter the ambulance to get to the victim. Paramedics locked the ambulance for safety, as the suspect was enraged and aggressively attempting to gain access into the ambulance. They called for emergency assistance from police, who arrived 60 seconds later and confronted the suspect outside the ambulance.

The paramedics state that they then heard gunshots and both attempted to cover the patient and hit the floor. One of the paramedics later exited the ambulance and found the suspect down with a gunshot wound to the head. The paramedic started resuscitating the suspect.

The officers state that the suspect became violent with them and continued to fight with them as they attempted to take him to the ground. They state that the suspect straddled one of the officers and attempted to grab that officer's firearm from the holster. The other officer realized this and shot the suspect to prevent him from getting the firearm.

The agency's ambulances have exterior cameras pointing to the front and back that are always recording. There is footage of the officers approaching the rear of the ambulance to confront the suspect but he moves just off camera and the recording subsequently only shows his feet at the upper corner of the frame.

There were bystanders present during this event, which became a high-profile incident. During the ensuing investigation, some of the bystanders stated that they saw the paramedic on top of the suspect holding him down while the officer executed him. The suspect was a Black male and there were subsequent accusations of racism on the part of the officers and paramedics, followed by weeks of riot activity and civil unrest.

Learning Objectives

- It is essential for EMS to engage with and listen to the community we serve. One must establish EMS as a community advocate and resource.
- While on scene cameras can be helpful in confirming appropriate patient care or identifying concerning treatment, they should be balanced with ensuring patient privacy. LE typically have guidance about shutting off cameras in places where privacy would be expected. There is also typically a process for record review and redaction as needed prior to any public records release
- EMS body worn cameras have benefits including QA/QI, documentation accuracy, education and there may be a role for cameras in direct medical direction.
- EMS clinicians should assume they are being recorded during patient encounters, particularly in public spaces, given today's environment. LE BWC are increasingly

Case Study #20

commonplace and bystanders often record scenes. EMS clinicians would benefit from training on how to appropriately manage this on scene.

Resources

Los Angeles County EMS and Law Enforcement Co-Response (ELCoR) Task Force - Guidance Document on Body Worn Cameras 2024.

https://file.lacounty.gov/SDSInter/dhs/1169962_LACElCoRGuidanceDocumentonBodyWornCameras10-7-24_FINAL.pdf

Case Presentation

One of your ALS EMS crews responded emergently to a patient with a self-inflicted gunshot wound to the head. Upon arrival, the patient is pulseless and apneic with PEA on the monitor that changed to asystole during their physical assessment. On exam, the patient had a large caliber penetrating wound to his head and his pupils were 6mm and unreactive bilaterally. Bystanders reported agonal breathing last seen 10 minutes prior to EMS arrival. Per agency protocols, resuscitation was not initiated and the patient was left in the custody of the coroner.

When reviewed by the local trauma QA/QI committee, questions came up as to why this patient did not have an attempt at resuscitation and was not transported to the trauma center 7 minutes away from the call location. There were concerns about potential organ donation as well.

As the medical director for this agency, you are asked to review this case and respond to the trauma committee's concerns.

Learning Objectives

- EMS systems should have protocols and guidelines in place for both termination of resuscitation and withholding of resuscitation for both traumatic and medical causes.
- There are scenarios in which EMS may choose to resuscitate and transport a traumatic arrest patient that they may have otherwise been able to withhold or terminate resuscitation on scene, such as public perception and scene safety.
- The role of EMS in identifying candidates for organ donation has potential but has not been clearly defined.
- If a patient loses pulses in the ambulance, resuscitation cannot be terminated and the patient must be transported to a facility for pronouncement.

Resources

NAEMSP Position Statement. Withholding of Resuscitation for Adult Traumatic Cardiopulmonary Arrest. National Association of EMS Physicians and American College of Surgeons Committee on Trauma. Prehospital Emergency Care 2013;17:291.

<https://www.tandfonline.com/doi/full/10.3109/10903127.2012.755586>

NAEMSP Position Statement. Termination of Resuscitation for Adult Traumatic Cardiopulmonary Arrest. National Association of EMS Physicians and American College of Surgeons Committee on Trauma. Prehospital Emergency Care 2012;16:571.

<https://www.tandfonline.com/doi/full/10.3109/10903127.2012.695857>

Case Study #22

Case Presentation

Paramedics are called to the street outside an apartment complex by the brother of a 27-year-old male who has ingested unknown substances and is acting erratic. Upon their arrival, they find the patient A&Ox1, agitated and uncooperative. The paramedics request law enforcement assistance to restrain the patient but law enforcement refuses to engage the patient, stating that he 'does not fit their criteria.' Paramedics remain concerned for the patient's safety and request the law enforcement supervisor to the scene; however, in the meantime, the patient elopes. Upon contact with online medical direction, the EMS supervisor and the law enforcement supervisor are on scene but the patient is no longer present. The brother went back to the apartment to make some calls. Law enforcement is refusing to assist further.

[Supplemental Material: Audio – paramedic report]

Learning Objectives

- Clear and early communication between EMS and law enforcement on scene is important.
- The primary goals are to prevent the patient from injuring themselves and to protect the public and responding personnel from harm.
- De-escalation and self-preservation are key principles.
- EMS should have specific dispatch protocols regarding deployment strategies to the scene of mental health emergencies, which will depend on local resources.
- The national 988 suicide and crisis hotline may also be a resource; consider how this integrates with 9-1-1 in your system.
- EMS agencies should all have protocols for managing the agitated patient and include guidance on interaction with law enforcement.
- Collaborative trainings between EMS and law enforcement, as well as post-incident debriefings, are valuable.

Resources

Law enforcement disengagement policies: <https://police2peace.org/but-we-cant-just-leave-how-lapd-swat-implemented-a-strategic-disengagement-policy/>

Example guideline for EMS and law enforcement co-response:

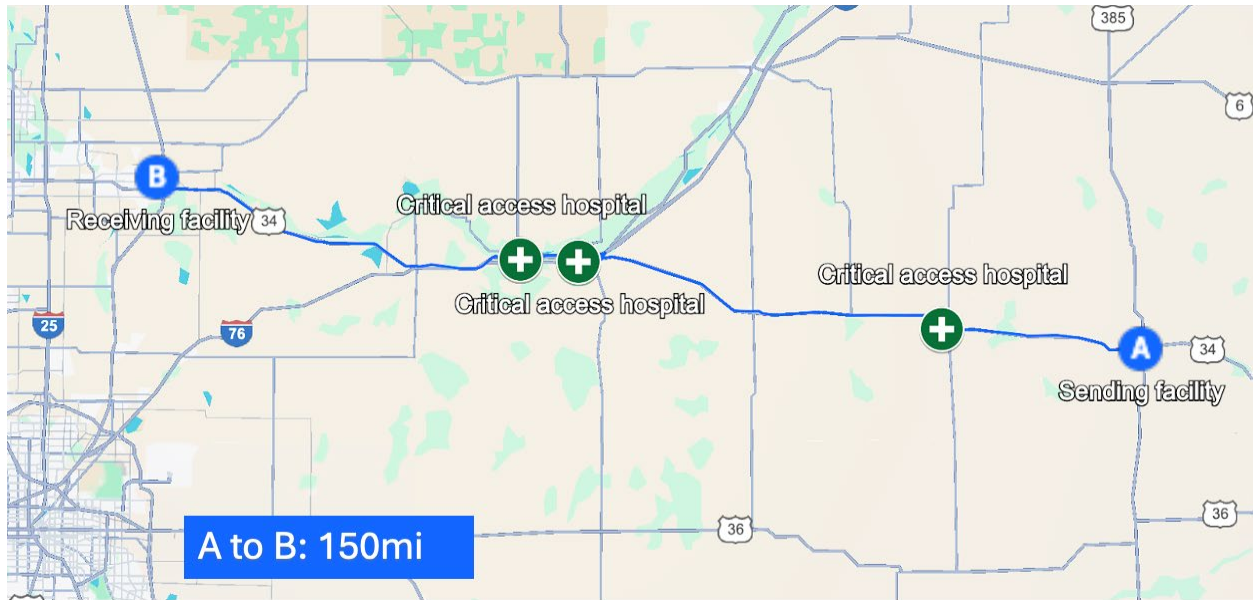
https://file.lacounty.gov/SDSInter/dhs/1163127_1307.4EMSandLawEnforcementCo-Response2024-07-01.pdf

Case Study #23

Case Presentation

You receive a call at 2am from the director of a small, rural EMS agency for which you serve as medical director. The local critical-access hospital requested their services for an interfacility transport (IFT) to an accepting hospital, which is 2.5 hours and 150 miles away. There are 3 critical access hospitals along the way with no closer higher-level facility. [map]

[map]



The director tells you the following information that she received from the hospital: A 67 year-old female presented with acute lower GI bleeding. Her last set of vitals include a heart rate of 106 and a blood pressure of 88/44. The critical access hospital has the ability to do labs and reported a hemoglobin of 4.5. They are transfusing a unit of packed red blood cells and will be able to send a second unit for transfusion during transport. The patient has been accepted to the receiving facility for a higher level of care. She is looking for your advice as to how to respond to this request.

Background

The service has 2 units available, each staffed by 1 paramedic and 1 EMT. They are all starting day 3 of a 72-hour shift. In this state, continuing a facility-initiated transfusion is within scope for ALS.

Learning Objectives

- When considering using a 9-1-1 response agency for IFT, there are many factors that need to be taken into consideration, including appropriate level of care, the effect losing an asset has on local 9-1-1 response resources, provider safety, and availability of other methods of transportation.
- Although the determination of level of care on an IFT is legally the responsibility of the sending provider, it is the responsibility of the transporting EMS agency and medical

Case Study #23

director to offer education and guidance on appropriate transportation, as well as to ensure the agency can provide quality care.

- While there is a lot of published data on air vs. ground transport of trauma and pediatric patients, there do not exist many guidelines on general transport, especially in rural communities, so medical directors and EMS agencies need to develop guidelines and policies for their individual systems with input from local hospital stakeholders.

Resources

Shelton SL ,Swor RA, Domeier R, Lucas R, NAEMSP. Medical Direction for Interfacility Transports. Prehospital Emergency Care 2000;4(4):361-364.

Case Study #24

Case Presentation

A local EMS Agency has offered you a position as the new Medical Director after their longtime Medical Director of 20+ years has retired. The position is funded for 20 hours/month at a rate of \$150/hour to serve as the Medical Director of an urban EMS Agency that serves a population of approximately 100,000. There are 84 personnel including 12 paramedics operating with four assessment units, two ALS units and two BLS units. You are reviewing the contract in which duties and other compensation/benefits are not specified.

Learning Objectives

- When considering a contract for a Medical Director position, be sure to clarify your specific roles and responsibilities, including authority within department structure, responsibility for credentialing and role in remediation decisions, distinguishing your role from occupational health and other expectations such as field response and on-call duties.
- To reduce your liability, consider a professional review of the contract for boilerplate language that may not apply, check the liability insurance coverage to see if it is adequate, ensure medication storage and tracking is up to your standard, and verify that you have authority of oversight if it falls under your responsibilities to order medications, particularly controlled substances.
- For compensation, consider local comparable rates to negotiate your pay and ensure a cost of living adjustment is included. Consider negotiating other sources of compensation such as CME/travel funds.

Resources

Harvard Law School Program on Negotiations Reading List:

<https://www.pon.harvard.edu/daily/negotiation-training-daily/negotiation-books-a-negotiation-reading-list/>

Chris Voss. Never Split the Difference. Harper Business. 2016.

<https://www.amazon.com/Never-Split-Difference-Negotiating-Depended/dp/0062407805>

COST EXERCISE:

Yesterday, you and your EMS director, Eleanor Rigby, met with representatives from Yellow Submarine Medical (YSM) to receive a proposal for the new ZolPak 2050 monitor/defibrillator - a state of the art device, featuring advanced communication, data and AI capabilities. As medical director, you consider this a mandatory acquisition to retain the Penny Lane EMS (PLEMS) system's standing as a leader in out of hospital care, both in its community and nationally. The cost per device is \$30,000.

PLEMS is an Advanced Life Support (ALS) response system with approximately 30,000 incidents annually, transporting approximately 25,000 patients. To ensure both adequate geographical coverage and optimum response times, PLEMS deploys 20 ALS units operating 24/7. PLEMS has a policy of having an additional 20% inventory to ensure redundancy and to provide a device for the physician response vehicle.

Director Rigby recognizes that you have had something of a long-standing collaboration with YSM and has left the final negotiations to you, but stresses that the cost must be within budget. PLEMS has been using the current ZolPak for five years with excellent results. YSM has advised that a reasonable discount is available if all units are purchased in a single acquisition. In addition, it will take the same number of units of the past model in trade at \$5000/unit. Director Rigby is willing to help cover the cost of this purchase through the agency's funded depreciation account. She has asked you to provide the annual costs of the purchase at the next meeting.

Questions:

What is the total number of units needed?

What reasonable discount will you request?

What do you consider to be a reasonable estimate of the useful life years?

What is the revised cost of each unit accounting for these discounts?

Finance Case Study

What is the annual cost for this purchase?

REVENUE EXERCISE:

For a suburban system, Director Rigby operates quite an efficient operation. The unit hour cost is essentially the national median at \$200 and currently the unit hour utilization ratio is 0.28. PLEMS will soon incorporate the small city of Norwegian Wood into its service area, which will add an additional 225 transports to the total. Based on careful analysis, Director Rigby has assessed that there is no need to add unit hours. The result will be an increased efficiency to a 0.29 unit hour utilization.

Gracious as most EMS directors are, Director Rigby has agreed to also help with the revenues needed with some stipulations: first, the savings from only the additional transports will be used to fund the units; second, 50 percent of the revenues collected from patient fees in the new service area can be used for the purchase. The average bill is \$1500 with an average collection of 43%.

Questions:

Before the addition of Norwegian Wood, what is the cost of transport?

After the addition of Norwegian Wood, what is the cost of transport?

What is the savings amount to be applied?

What is the amount of newly collected revenues from patient fees to be applied?

Finance Case Study

What are the total revenues?

Summary:

Are the revenues sufficient to cover the cost of the purchase?

If not, what options do you have to raise additional revenue?

What would be the impact of raising rates? What information would you need to determine that?

EXERCISE 1
DEVELOPING A PROJECT AIM

You recently joined Redland County EMS as part of the clinical quality leadership team. In assessing opportunities for your next quality improvement project, you and the team begin by examining the National EMS Quality Alliance (NEMSQA) suite of measures. Specifically, you start with a review of performance reports related to documentation of vital signs for patients not transported by EMS (TTR-01). Redland County EMS has approximately 50 encounters that end in non-transport per week.

You receive the following data for the last 12 weeks:

Month	TTR-01 % of patients not transported by EMS with documentation of a basic set of vital signs
Week 1	44%
Week 2	24%
Week 3	41%
Week 4	55%
Week 5	35%
Week 6	57%
Week 7	39%
Week 8	47%
Week 9	25%
Week 10	35%
Week 11	42%
Week 12	40%
Average	40%

QI Case Study

1) Does this topic have the elements of a good improvement project? Why or why not?

2) What would good performance look like for this measure?

**EXERCISE 2:
CHANGE IDEAS**

1. Review the driver diagram /table on the next page. Brainstorm change ideas to address all the drivers to complete the table. Use the CHANGE CONCEPTS table on the next page to assist if needed.
2. Pick 1-2 change ideas and discuss how you might carry out an initial PDSA cycle to either build knowledge about whether this will likely improve the process or test a potential change.

QI Case Study

SMART GOAL	PRIMARY DRIVERS	SECONDARY DRIVERS	CHANGE THEORIES	
<p>To obtain a full set of vital signs in at least 90% non-transported patients within one year.</p>	<p>Definition of a “Patient”</p>	<p>Policy / Protocol</p>		
		<p>Culture around “lift assist”</p>		
			<p>Documentation requirements</p>	
			<p>Education</p>	
			<p>Equipment</p>	
	<p>Patient assessment</p>		<p>Education</p>	
			<p>Process</p>	
			<p>Financial concerns</p>	
	<p>Patient preferences</p>		<p>Trust and rapport with EMS clinicians</p>	
			<p>Understanding of health risks</p>	

QI Case Study

Using the change concept list, develop ideas you might test that relate to the secondary drivers on your driver diagram.

Change Concepts

<p>Eliminate Waste</p> <ol style="list-style-type: none"> 1. Eliminate things that are not used 2. Eliminate multiple entries 3. Reduce or eliminate overkill 4. Reduce controls on the system 5. Recycle or reuse 6. Use substitution 7. Reduce classifications 8. Remove intermediaries 9. Match the amount to the need 10. Use sampling 11. Change targets or set points <p>Improve Workflow</p> <ol style="list-style-type: none"> 12. Synchronize 13. Schedule into multiple processes 14. Minimize handoffs 15. Move steps in the process close together 16. Find and remove bottlenecks 17. Use automation 18. Smooth workflow 19. Do tasks in parallel 20. Consider people as in the same system 21. Use multiple processing units 22. Adjust to peak demand <p>Optimize Inventory</p> <ol style="list-style-type: none"> 23. Match inventory to predicted demand 24. Use pull systems 25. Reduce choice of features 26. Reduce multiple brands of the same item <p>Change the Work Environment</p> <ol style="list-style-type: none"> 27. Give people access to information 28. Use proper measurements 29. Take care of basics 30. Reduce demotivating aspects of the pay system 31. Conduct training 32. Implement cross-training 33. Invest more resources in improvement 34. Focus on core process and purpose 35. Share risks 36. Emphasize natural and logical consequences 37. Develop alliances and cooperative relationships 	<p>Enhance Producer/Consumer Relationship</p> <ol style="list-style-type: none"> 38. Listen to customers 39. Coach the customer to use a product/service 40. Focus on the outcome to a customer 41. Use a coordinator 42. Reach agreement on expectations 43. Outsource for “free” 44. Optimize level of inspection 45. Work with suppliers <p>Manage Variation</p> <ol style="list-style-type: none"> 46. Standardization (create a formal process) 47. Stop tampering 48. Develop operational definitions 49. Improve predictions 50. Develop contingency plans 51. Sort product into grades 52. Desensitize 53. Exploit variation <p>Manage Time</p> <ol style="list-style-type: none"> 54. Reduce setup or startup time 55. Set up timing to use discounts 56. Optimize maintenance 57. Extend specialist’s time 58. Reduce wait time <p>Design Systems to Avoid Mistakes</p> <ol style="list-style-type: none"> 59. Use reminders 60. Use differentiation 61. Use constraints 62. Use affordances <p>Focus on the Product or Service</p> <ol style="list-style-type: none"> 63. Mass customize 64. Offer product/service anytime 65. Offer product/service anyplace 66. Emphasize intangibles 67. Influence or take advantage of fashion trends 68. Reduce the number of components 69. Disguise defects or problems 70. Differentiate product using quality dimensions 71. Change the order of process steps 72. Manage uncertainty — not tasks
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Change concepts developed by Associates in Process Improvement. (See: Langley GJ, Nolan KM, Nolan TW, Norman CL, Provost LP. The Improvement Guide. San Francisco: Jossey-Bass Publishers, Inc.; 2009.)

