Adult Trauma
Assessment
Continuing Education
July 2017

NORTHWEST COMMUNITY EMERGENCY MEDICAL SERVICES SYSTEM
EST 1972

What are you doing?

Why are you doing it?

Is it working?

Questions/Comments
regarding this CE are welcome,
and should be directed to:
Susan Wood RN EMT-P
NWC EMSS In-Field Coordinator
swood@nch.org or 847-618-4486

Northwest Community EMSS
Continuing Education

Adult Trauma: Assess for Success

Susan Wood, R.N., EMT-P

National EMS Education standard:

Epidemiology, pathophysiology, psychosocial impact, presentations, prognosis, and management of (complex depth, comprehensive breadth) patients who are involved in a traumatic mechanism of injury.

Assigned readings:

This handout; NWC EMSS SOPs

Goal: Upon completion of the class, each participant will independently do the following with a degree of accuracy that meets or exceeds the standards established for their scope of practice:

OBJECTIVES:

1. identify and demonstrate assessment of components of a thorough general impression
2. assess level of consciousness prior to primary assessment component of trauma exam
3. consider need for and request additional personnel and or equipment as part of scene size up
4. identify essential components of primary assessment for each part of the body
5. identify and address/mitigate life threats identified during primary assessment
6. identify and demonstrate further assessment activities indicated for the trauma patient w/ altered mental status
7. adopt and defend a comprehensive organized assessment plan for the patient with a S&S suggestive of or related to confirmed traumatic mechanism as presented and practiced in this CE
8. formulate plan to either begin transport w/ care and further assessment enroute or complete further assessment on scene, supporting findings up to and including primary assessment
9. demonstrate assessment activities specific to each body part, starting w/ head, to be completed in the secondary survey/assessment
10. discuss and demonstrate ongoing assessments and reassessments, as supported by earlier findings and associated interventions
11. provide patient care interventions as needed in response to initial and repeat and ongoing assessments
12. identify and defend on-scene interventions vs. care provided enroute based on assessment findings
13. accurately identify spine, abdomen, pelvic, and long bone injuries based on exam findings in trauma assessment scenarios
14. verbalize specific interventions indicated for abdomen, pelvic, and long bone injuries identified in trauma assessment scenarios
15. confirm appropriateness of chosen transport destination and need for additional personnel during transport
16. identify the etiology, history and physical findings of hypovolemic shock for implementation of appropriate intervention
17. using the patient history and physical examination findings, implement a treatment plan for a patient in hypovolemic shock
18. review PCR's to determine appropriate assessment and intervention was completed
19. review PCR's to determine is based on patient presentation, if the patient was transported to the appropriate institution to receive the adequate level of care.

Trauma: Assess for Success

Foundation Principles

Management of significant trauma requires understanding of kinematics, an accurate assessment of the event, patient's complaints, interpretation of physical findings, and rate of change with transport to definitive care. (SOPs, p. 39)

While a systematic approach is key to the successful outcome of any trauma patient, EMS must understand that the eye will never see and the hand will not do what the mind does not think of…assessment is the foundational key for all prehospital providers to respond as a team of skilled thinkers. Because only a snapshot is usually provided, it should be considered that all patients have a life-threatening injury which obvious or hidden, until it has been ruled out. Be suspicious! Seek and you may find. EMS must take quick control of the scene to identify all patients, appreciate the mechanism of injury (MOI), identify injuries, and treat in accordance with SOP. Remembering the tools in the toolbox will help to assess and treat for life threatening injury.

Care for the patient can start prior to arrival on the scene based on known injury patterns of known MOI. EMS can identify key questions of importance when rolling to the scene, and based on those findings, one can anticipate treatment and transport guidelines.

Incidence

Traumatic injuries affect all patient populations regardless of race, gender or age. However, specific patient populations are at greater risk of injury even with lesser mechanism of injury (MOI). The very young and elderly populations present specific challenges both in the identification of injury as well as treatment. For our system, falls (especially in the elderly population) and MVCs seem to always top the list of most frequent traumatic injuries. This often results in multisystem trauma including TBI.

FIRST THINGS FIRST

Scene Size Up

Upon arrival, EMS should complete a quick survey of the scene, identifying patient(s), their injuries and priority of care for each. Situational awareness (SA) is a term used frequently in the prehospital setting yet easily put aside when encountering a real life situation. SA is the perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their status after some variable has changed, such as time, or some other variable, such as a predetermined event. It involves being aware of what is happening in the vicinity to understand how information, events, and one's own actions will impact goals and objectives, both immediately and in the future. One with an adept sense of situation awareness generally has a high degree of knowledge with respect to inputs and outputs of a system, an innate "feel" for situations, people, and events that play out because of variables the subject can control. (Wikipedia, 2017)

When EMS responds to a traumatic situation it requires responders to evaluate on an ongoing basis the scene for any hazards as the risk assessment can be dynamic. EMS must assess and intervene as needed. Scene safety includes controlling and correcting hazards/threats: (gas, power lines, animals, people); to form a plan of approach; to remove pt./responders from unsafe environment ASAP; and to attempt to preserve the integrity of possible crime scene evidence.

Anticipation of the MOI must be completed even before EMS arrives on the scene. For years, SOP has reflected that MOI alone will *NOT* afford EMS to directly transport to a Level 1 TC (see p. 41 SOP), however, MOI does allow the provider to anticipate specific injury based on that mechanism. The search for injury patterns based on MOI can and should be anticipated.

Upon arrival to any scene, universal blood/body secretion & sharps precautions should be taken along with the use of appropriate personal protective equipment as needed. Upon arrival, the scene may be very different from what was originally depicted by dispatch. EMS must evaluate for the number of pts; triage and request additional resources if needed. The risk of waiting for resources against the benefit of rapid transport to definitive care must be weighed. Consider if this is a medium or large scale MPI and declare as needed. Is this a MOI involving a low, medium or high speed of energy? Is this blunt or penetrating trauma?

To be prepared is the best action a paramedic can take. As EMS brings care to the patient, so should they take the essential supplies and equipment. For a traumatic incident, preparation including hemorrhage control, airway and oxygen equipment, spine splinting devices, vascular access with IVFs as well as pain management should all be considered essential items to bring to the scene of the patient.

PRIMARY ASSESSMENT

Upon arrival to any scene, EMS now has an opportunity to formulate a general impression including number of patients and MOI firsthand. Information such as the number of patients, ages, general appearance, position and surroundings; obvious injuries or bleeding and purposeful movements the patient may have is high priority. If determination is made that an immediate life threat exists, resuscitation efforts must quickly get underway. In sequential order, the patient's level of consciousness quickly is determined using the AVPU or GCS along with other signs and symptoms including the chief complaint.

For patients that show eternal signs and symptoms of exsanguinating external hemorrhaging, EMS must re-sequence their priorities of care to treat hemorrhage control first. The order is now C-A-B-C-D-E. Traditionally we treat these hemorrhaging patients first with direct pressure unless contraindicated. If this is not enough to stop bleeding, a hemostatic dressing such as Quik-clot™; one of the many tools in our "toolbox" should be used for care of these patients. Currently the system is re-evaluating the complete line of products on the market for hemorrhage control in order to maintain the most effective care for these specific patients. These hemostatic dressings upon contact with blood, takes in small molecules (water) and leaves larger clotting factors and platelets in the wound in order to promote coagulation.

While statistically we do not have many patients in which it is necessary, but if there is a large wound, it should be reminded to EMS that the application of the hemostatic dressing should cover the entire bleeding surface area including the deep areas by packing so as to come in contact with all bleeding areas of the wound. This contact with the area of bleeding will initiate the clotting cascade and the bleeding to cease. If the blood should soak through the first layer of Quik-clot™, then a second layer should be applied. Once the bleeding stops, application of a pressure bandage should be done in order to hold the dressing in place. EMS should NOT remove the blood-soaked bandages from the wound as that may cause additional bleeding to occur. Upon arrival to the hospital, the paramedic should first inform the staff taking over care of the patient that a hemostatic dressing has been applied and document in the ePCR how many dressings were used.

In accordance with the National Registry of EMTs (July 2008) "No research has been published that supports elevation of an extremity or the use of pressure points to control hemorrhage." If bleeding from an extremity remains uncontrolled, the provider must stop it with the use of a tourniquet. Current supply lists the combat application tourniquet (CAT) tourniquet in our system for use.

"Early use of a tourniquet in prehospital settings improved control of extremity hemorrhage and may decrease mortality rates." "57% of deaths might have been prevented by earlier tourniquet use." Author. (Feb. 2008). J Trauma, 64(2 Suppl), S28-37; discussion S37.

Please remember that if the decision to use a tourniquet is made, the buildup of potassium and lactic acid accumulates due to anaerobic metabolism thus causing great pain for the patient.

Airway

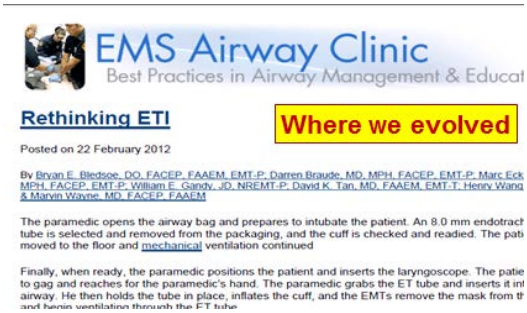
Because of the nature of pre-hospital work, the team concept is utilized. While one provider is caring for hemorrhage control, another is assessing the patient's airway. If the patient is awake and alert, speaking with the provider, the airway is easily assessed and additional information can be identified. A verbal response is considered encouraging. If, on the other hand, assessment reveals snoring, gurgling, stridor or worse yet, silence, c-spine control should be taken in addition to airway control as these are sounds of airway impairment. To open the trauma patient's airway, care should be taken so as to not move the cervical spine. Simultaneously, visually inspect the nose, mouth and pharynx for any bleeding and/or FBAO. If the airway is full of fluid (probably blood or vomitus), suction the patient. Once the airway is clear, keep the airway in the open position, either manually or with adjuncts (oropharyngeal or nasopharyngeal airway). All airway management should start with basic BLS maneuvers while assessment of ALS airway intervention is determined.

When attempting to maintain cervical spine restriction, ***do not*** apply traction. While cervical collars (CC) are usually warranted, there is great concern for internal decapitation from ill-fitting CCs. Often times the CC can restrict the mouth from opening, making oropharynx assessment more difficult. Once the airway is clear of debris, assess to see if the patient is breathing. Remember to maintain vomiting and seizure precautions throughout evaluation.

To intubate or not to intubate?

…that is the question.

Because many of our trauma patients have a MOI that involves multi-system trauma, this is a complex question. The concern in the trauma patient with head injury is the increase in ICP that can occur, thus causing long term injury. Additionally, some researchers claim pre-hospital ETI carries higher morbidity and mortality. They attribute worse outcomes to delays in transport, improperly and unrecognized endotracheal tubes, improper ventilation, aspiration and other such complications. If the patient is unable to maintain their own airway, the desire is upon identification, to proceed in a manner that approaches the airway from least to most invasive.


EMS Airway Clinic
Best Practices in Airway Management & Educat

Rethinking ETI

Where we evolved

Posted on 22 February 2012

By Bryan E. Bledsoe, DO, FACEP, FAAEM, EMT-P; Darren Braude, MD, MPH, FACEP, EMT-P; Marc Eck MPH, FACEP, EMT-P; William E. Gandy, JD, NREMT-P; David K. Tan, MD, FAAEM, EMT-T; Henry Wang & Marvin Wayne, MD, FACEP, FAAEM

The paramedic opens the airway bag and prepares to intubate the patient. An 8.0 mm endotrach tube is selected and removed from the packaging, and the cuff is checked and readied. The pati moved to the floor and mechanical ventilation continued

Finally, when ready, the paramedic positions the patient and inserts the laryngoscope. The patie to gag and reaches for the paramedic's hand. The paramedic grabs the ET tube and inserts it int airway. He then holds the tube in place, inflates the cuff, and the EMTs remove the mask from th and begin ventilating through the ET tube

Questions to ask as EMS approach the airway:

1. Are there any adventitious sounds?
2. What is the level of respiratory distress?
3. What is the patient's level of consciousness including GCS?
4. Are there any obstructions that would limit the patient maintaining their own airway?
5. Do they have any drugs or alcohol on board that might cause the pt to have difficulty in maintaining their own airway?
6. Are they on anti-coagulants that may cause further bleeding?
7. What is the pulse oximetry and capnography ready of this patient?

Advanced airway management has been a topic of great discussion globally in the world of EMS. What is known is the fact that providers have less experience now with the skill of direct intubation. Patient care has deemphasized the need for ETI in a variety of pt populations and as a result, the skill has eroded. That being said, concern also revolves around intubation in the trauma patient. If the patient can be adequately oxygenated and ventilated utilizing BLS maneuvers, that treatment should be continued during transport.

The science says that increasing intrathoracic pressure caused by over ventilation, can cause a decrease in venous return and impaired CO in hypovolemic patients. High intrathoracic pressure also can cause increased ICP. Minimal time is allowed to evaluate the patient's airway including Mallanpati score. If the provider determines that the patient does need to be intubated, the follow up question is do they need drug assisted intubation (DAI)? What we know is that trauma patients can have incredibly difficult airways and currently we utilize direct visual laryngoscopy. Evidence is leading in the direction that video laryngoscopy can be quite effective for EMS when the skill is used infrequently.

Once the patient has been intubated, the next to determine is the rate and tidal volume in which to bag the patient. Until video laryngoscopy is more readily available, our "plan B" is to use the King LT-D airway for management of the difficulty airway. Providers are encouraged NOT to forget the use of the gastric access lumen for suctioning with the Salem sump nasogastric tube.

Breathing

Assessment includes the presence of spontaneous ventilations, the general rate (either fast or slow); the depth and effort (work of breathing). Air movement, symmetry of chest expansion, accessory muscle use; retractions; lung sounds should all be identified.

While previous school of thought proposed hyperventilation in order to decrease ICP, however this is no longer thought to be true. Hyperventilation and hyperinflation therefore must be avoided and the provider should maintain 10 BPM in the trauma patient. This will not only prevent increased ICP, but also maintain cerebral perfusion pressures (CCP).

Continuous assessment and monitoring of pulse oximetry and capnography is vital to measuring adequate oxygenation and ventilation. If the patient becomes hypoxic, identification and treatment must be swift before cardiorespiratory or neurological compromise occurs. Again documentation of these values should occur frequently along with the ETCO2 number and waveform as able as a means of monitoring ventilatory / perfusion / metabolic compromise. Treatment includes correction of the hypoxia. In order to assure adequate ventilation, supplement with oxygen per nasal cannula, NRB or BVM. CPAP can also be utilized for those trauma patients in whom a flail chest is suspected without pneumothorax.

(Chest trauma will be discussed further in September 2017 CE)

If a trauma patient is moved from one place to the next, great care should be taken in order to dislodge the ETT. Reassessment must also occur after each move.

Circulation

Because trauma patients are at great risk for hypovolemia, perfusion status should be assessed early and often. During the primary assessment the actual rate may not be obtained, however one should compare the radial to carotid pulses for presence, generate rate, quality, regularity, and equality. In addition to palpating a pulse, the patients skin color, temperature and moisture should be assessed. As discussed previously, hemorrhage control is a large factor to evaluate on a regular basis. It not addressed initially, it should definitely be evaluated (or re-evaluated) at this time. Through the course of evaluation, if a pelvic fracture is suspected, the pelvis should be assessed EARLY in order to appreciate the potential for hemorrhage and treat aggressively. If time permits, the KED device can be utilized in an upside down fashion to immobilize the pelvis in lieu of a pelvic binder. If equipment not available, wrap a sheet around the patient to minimize the movement of any instability (Grayson, 2011).

If EMS suspects that a patient may have either an injury consistent with cardiac tamponade, a blunt aortic or cardiac injury, treatment should follow the chest trauma SOP on p. 45 (more discussion in September CE).

Much debate and debunking of previous thought regarding the use of IVFs in the trauma patient. GONE are the days of pouring fluids into a trauma patient in an attempt to replenish the volume lost from hypovolemia. This is an area in which EMS must consciously work to appreciate the rationale and adhere to current evidenced based practice. Trauma guidelines in the United States are largely influenced by the Eastern Association for the Surgery of Trauma (EAST) Practice Management Guideline Committee.

Evidence-based EMS: Permissive Hypotension in Trauma

by Hawnwan Philip Moy, MD and Abigail Cosgrove, MD on Feb 23, 2016

http://www.emsworld.com/article/12163910/evidence-based-ems-permissive-hypotension-in-trauma

In accordance with SOP, attempt to give warmed 0.9NS should be made by initiating a large bore IV (14-16g) wide open up to 1 L based on the patients SBP (MAP), coherent mental status and +/- radial pulse. This is a skill to be done while not prolonging scene time. If a peripheral IV is difficult to obtain, an IO line may be used for both adults and children. While cerebral perfusion pressure (CPP) should be maintained, using copious amounts of volume replacement with IVFs is controversial in both blunt and penetrating trauma. If a patient receives a total of 500 mL of IVFs and the SBP (MAP) is not increasing, vasopressor support should be the aggressive choice of managing these patients' volume deficit. Norepinephrine can and should be given to the patient in shock. Now more than ever, the use of fluid replacement is specific to the patient and MOI.

While an old school of thought was to pour several liters of IVFs, this is no longer the case. If aggressive IV fluid replacement is pursued prior to surgical repair, it can result in hemodilution, dilution of clotting factors and potential disruption of the clots formed at the site of injury. Thus the term "permissive hypotension" is now the treatment goal of hypovolemic resuscitation. Current SOP management delineates SBP differently for blunt vs. penetrating injury. For patients sustaining a penetrating injury, the SBP is to be maintained at 80, for blunt trauma, 90 SBP and for head injured patients, SBP of at least 110.

ONE
And
DONE

The New and Novel

Tranexemic Acid (TXA) is a product used in some systems for the purpose of hemodynamic instability for hypovolemia. Some injuries are not able to tamponade with direct pressure, hemostatic dressings or tourniquets. While it is not a new product and has historically been used for cardiovascular surgery and military use, studies are showing the potential for prehospital use. The CRASH-2 and the MATTERs studies discuss reduction in mortality, need for surgery and blood replacement. While the routine use of TXA has not been adopted for use by ITLS nor has the AHA made it a class 1A recommendation at this point, we will continue to follow the literature for its effectiveness of use. (Reed, 2013)

Cervical collars were mentioned earlier; however the need for spine motion restriction (SMR) must also be addressed. The patient who complains about pain to the bony prominences of the spine, who has numbness, tingling or altered sensorium to any part of the body should have SMR until a SCI can be assessed in the emergency department. While some systems have chosen to adopt a prehospital clearance of the cervical spine, such as the NEXUS or Canadian c-spine rule, we have not. Understand however, that the risk of SCI in penetrating trauma without observed deficit is unlikely. (Blackwell, 2017) Please refer to Spine Trauma SOP p. 49-50.

Long bone fractures are another potential life threat for the trauma patient. Stabilization and splinting can occur during pt transport so as to not delay definitive care; however pain control should be addressed prior to movement of the patient. Prehospital providers often fall short of providing patients with adequate analgesia that can hinder the healing process.

Reluctance may stem from a variety of misconceptions including masking symptoms that delays needed care, exacerbating hemodynamic instability, blunting respiratory drive, or exacerbating the condition of a patient with an altered mental status. (Blackwell, 2017) In our system, these concerns have been addressed by the change in pain medication several years ago from morphine to fentanyl. Fentanyl citrate is supplied in 100 mcg/2 mL and may be given IVP/IO/IN/IM. It is a synthetic opiate and short acting narcotic with an onset of minutes. Fentanyl peaks in 3-5 min and lasts 30-60 min. It has less of a histamine release than morphine thus minimizing vasodilation, tachycardia and hypotension. It can be reversed with administration of naloxone. Treatment of pain should include both a pharmacologic and non-pharmacologic option including distraction and cold packs. Pain management is best addressed by using a patient centered approach which is based on the individuals' specific needs and their tolerance of the associated discomfort. If patient is less than 2 yo, OLMC should be contacted for medication administration. A good alternative is ketamine and is approved for use (SOP p. 5) currently for both adults and pediatric patients. Ketamine is a fentanyl alternative to be given at 0.5 mg/kg slow IVP (over 1 min) or IN/IM. It also can be repeated at half dose after 10 min. If giving IV injection, 100 mg/mL concentration should be diluted with equal volume of NS. It is a dissociative anesthetic that produces a cataleptic like state and profound analgesia. It is a good non-narcotic alternative to fentanyl and morphine. Concern is noted if a patient should have a significantly high BP, since it can raise the patients BP. Because of the short acting nature with rapid onset of effect, both fentanyl (Soriya, 2012) and ketamine are not likely to cause any hypotension and is one of the preferred agents for treating trauma patients.

Disability

Upon completion of assessment of the ABCs, a brief neurological evaluation should be assessed, such as the GCS, pupillary size and reactivity, and the ability to move all four extremities. Assessment includes checking a blood glucose level if AMS, and if found to be less than 70, treatment should be in accordance with SOP for Hypoglycemia on p. 32. The GCS can only be adequately assessed provided that the blood glucose level is within normal limits. The GCS as well as the adult revised trauma score is found on p. 40 of the SOPs and should be evaluated in order to determine with level of care is needed to transport. If the patient is nauseous, ondansetron 4 mg IV/PO (standard dosing) is an acceptable treatment plan.

Expose

"The eye does not see and the hand does not feel what the mind does not think of…" As EMS providers, you will NEVER find injury is you are not looking for it; and you will NEVER look for it if you do not have an index of suspicion that there could be an injury. Whether it's a MOI that carries with it, suspected hidden trauma or physiologic findings consistent with specific injury, EMS MUST identify hidden injury. This requires the patient to be exposed! For complete evaluation, inspection, palpation, and auscultation must occur. At the same time, the elements must be taken into consideration and the patient should be kept warm. Temperature can play a detrimental role in the trauma patient if not kept warm.

Transport Decision

After the primary assessment is completed, a transport decision must be made. This decision plays a key role in the outcome of the patient. Based on region triage criteria found on p. 41 of SOP, patients may go either to a level 1 TC or a level 2 TC. Once transport is underway, the secondary assessment can be completed en route to the hospital destination. If the patient being transported has a mechanism consistent with a spinal injury the current means of transferring onto the stretcher is to use a Combicarrier II or scoop stretcher to reduce unnecessary movement (Meenach, 2015). Some think that the pt should never be log rolled in order to move onto the stretcher; however a "sweep" of the body should be done in order to identify bleeding, pain or injury.

Secondary Assessment

Much of the secondary assessment will rely on how stable the trauma patient is and able to offer as information. If the patient is unconscious, the physical examination may still be completed but the SAMPLE history, including medications and allergies with PMH may not be able to be obtained unless family is present. Any change in condition of the C-A-B-Cs must be re-evaluated and treated before moving onto the secondary assessment.

The main goal is to quickly obtain a full set of vital signs. As known, the first BP must always be taken manually and subsequent BP taken automatically is ok, UNLESS the first and second BP is significantly different. The purpose of taking sequential BPs is to monitor for trends, specifically in pulse pressures. This is not accurate if the automated reading is unreliable.

Because of the high incidence of hidden injury, VS including BP and pulse (not monitor reading) should be taken frequently as able.

If the patient is verbal, a SAMPLE history may be obtained. This includes the OPQRST chief complaint, pain scale, with pts age, condition and ability in which to understand EMS. The pts PMH can help in identifying key components of why the patient is presenting in such a manner or not responding to treatment.

The review of systems (ROS) includes evaluation of deformities, contusions, abrasions, punctures or penetrations, burns, tenderness, lacerations, swelling, instability crepitus, distal pulses and motor/sensory deficits (DCAP-BLS-TIC) potentially found anywhere on the patients entire body.

- **HEAD, FACE, EYES, EARS, NOSE, MOUTH:** Drainage; pupils: size, shape, equality, and reactivity; conjugate eye movements; gaze palsies; visual acuity; eye level (symmetry), open & close jaw; malocclusion.
- **NECK:** Carotid pulses, jugular veins, sub-q emphysema, c- spines; may temporarily remove anterior c-collar to assess neck
- **CHEST:** Auscultate lung/heart sounds
- **ABDOMEN**: S&S of injury/peritonitis by quadrant: contour, visible pulsations, pain referral sites, localized tenderness, guarding, rigidity; evidence of rebound tenderness
- **PELVIS/GU:** Inspect perineum for blood at urinary meatus/rectum
- **EXTREMITIES:** Inspect for position, false motion, skin color, and signs of injury
- **BACK/flank:** Note any muscle spasms
- **Neuro:** Affect, behavior, cognition, memory/orientation; select cranial nerves (procedure); motor/sensory; ataxia
- **SKIN/SOFT TISSUE:** Color (variation), moisture; temp, lesions/wounds; sub-q emphysema

In class, we will take time to demonstrate the full primary and secondary assessment of trauma patients.

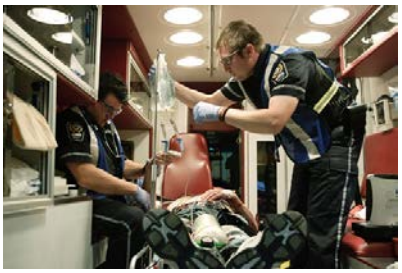
Ongoing Assessment

As time permits, the patient assessment should include reassessment of VS and the patient's response to interventions. Because the goal is to trend VS for response, every patient should have at least two sets of VS. Depending on stability of the pt VS and reassessment should occur at least once every 15 minutes and always after each intervention. The more unstable the pt is, the more frequent the reassessment should occur.

Time-Out Concept

The concept of "time-out" originated from the airline industry but quickly has become a concept adopted by many others. In EMS, this brief period should be utilized for uninterrupted handover of the patient by EMS to the emergency department staff as the continuum of care. This ensures complete information of the patient presentation and care rendered until the written ePCR becomes available to staff.

The Deadly Triad of Trauma Care



While much of medicine has advanced in the last 30 years in trauma care, it is still one of the leading causes of death in any age population. Of these deaths, hemorrhage accounts for up to 40% and remains as the leading preventable cause of trauma-related death.

"The lethal triad of hypothermia, acidosis and coagulopathy has been recognized as a significant cause of death in patients with traumatic injuries" (Gerecht, 2014).

As health care providers, we must be able to understand that this triad is an essential point of understanding in order to adequately and successfully treat the trauma patient. If unrecognized, hypothermia, acidosis and coagulopathy will be left untreated allowing for the cascading action leading to irreversible death.

Once hypothermic, even mildly, the physiologic response to the coagulation of the blood can have devastating consequences. The body's attempt to restore injury is to cause the blood to clot, however when cold, the body looses this ability (coagulopathy) thus creating an environment that cannot stop bleeding. Temperature is one factor in effective clotting; so is the pH of the body.

Acidosis is the other concern that can be detrimental for the trauma patient. "As a trauma patient's perfusion worsens, lactic acid rapidly accumulates in the tissues. This causes the body's pH to drop, resulting in a severe metabolic acidosis. It's important to note that this process frequently occurs in the presence of normal or only slightly abnormal vital signs" (Gerecht, 2014).

The final problem seen in the trauma patient is respiratory acidosis. When injured, the pts normal ability to breathe can become altered or obstructed resulting in a state of hypoventilation. Respiratory depression caused hypercapnia and can be monitored with capnography. Respiratory depression can also be the result of drugs and/or alcohol.

To counteract this lethal triad, EMS must consider means that keep the patient warm, monitor for respiratory depression and intervene when needed.

Information taken from:

Trauma's Lethal Triad of Hypothermia, Acidosis & Coagulopathy Create a Deadly Cycle for Trauma Patients

By Ryan Gerecht, MD, CMTE Wed, Apr 2, 2014

Beyond the Blood Pressure:

Identifying the Mean Arterial Pressure

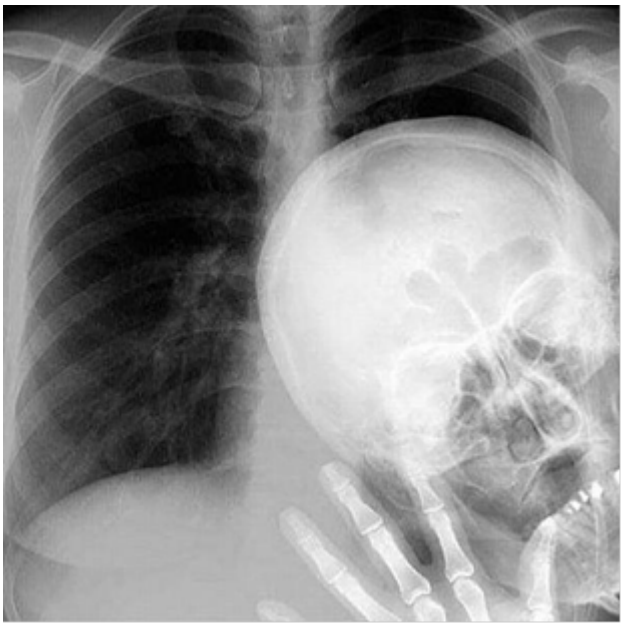
The MAP is often used as an indicator of tissue and organ perfusion. It accounts for the fact that two thirds of the cardiac cycle is spent in diastole. The MAP of no less than 60 mm Hg is believed to be needed to maintain adequate tissue perfusion to the brain, coronary arteries and kidneys. CO x SVR = MAP

To determine the MAP
1/3 pulse pressure + DBP

Normal MAP is 70-110 (Dunn, 2017)

The pulse pressure (PP) must be identified in order to calculate the MAP. The PP is simply calculated by subtracting diastolic from systolic blood pressure. The narrower the PP, the increased concern is for a decreased CO (SV) with compensatory vasoconstriction, tension pneumothorax, cardiac tamponade or hypovolemia with a volume deficit of 15% or greater.

Normal SBP is usually 30-50 mmHg higher than the DBP.



References:

Blackwell, T. Prehospital care of the adult trauma patient. Up To Date, 2017.

Dunn, C. EMT class notes 2017

Gerecht, Ryan. Trauma's lethal triad of hypothermia, acidosis and coagulopathy create a deadly cycle for trauma, 2014.

Grayson, K. The upside down KED, the ambulance driver's perspective. 2011.

Mattera, C. Trauma ITC powerpoint, Paramedic class notes, 2017

Meenach, D. Integrating new methods and products into trauma care. EMS in Focus, 2015.

Moy, H. Cosgrove, A. Evidenced based EMS: permissive hypotension in trauma. EMS World, 2016.

Northwest Community EMS System SOPs

Reed, H. The role of tranexamic acid in EMS and preoperative trauma management. JEMS, 2013.

Soriya, G. McVaney, K., et al. Safety of prehospital intravenous fentanyl for adult trauma patients. Journal of Trauma, V 72, Num.3, 2012.

Thanks for listening!

EST 1972
NORTHWEST COMMUNITY EMERGENCY MEDICAL SERVICES SYSTEM

Psychomotor Trauma Assessment

Assessment Findings	Intervention needed
Dispatch: Hot summer day called in afternoon for two adult males involved in an altercation with a machete	What EMS preparation should be considered before arrival to the scene?
PD on scene and tells you the scene is safe to enter.	
Scene Size up: Arrive to a parking lot of a housing complex for a domestic situation in which one adult male started to attack another male with a machete. Blood is noted on both patients and on the ground. The "attacker" is in the PD car and the victim is sitting on the ground holding a rag around his arm and lifting it in the air.	
Primary Assessment **General Impression:**	Any potential life threats?
What sequencing of priorities is needed for this injury?	
Airway/Spine:	
Breathing:	
Circulation:	

Disability:	
Transport Decision: Based on assessment findings, in accordance with trauma triage criteria, where should EMS transport?	**Level 1 or 2**
What criteria were used to make that decision?	
Secondary Assessment **VS:**	
SAMPLE: Now the pt is unresponsive and able to tell any history.	
ROS Head: Neck: Chest: Abdomen: Pelvis: Extremities: Back: Neuro:	
Ongoing Assessment **Repeat VS:**	
Outcome:	