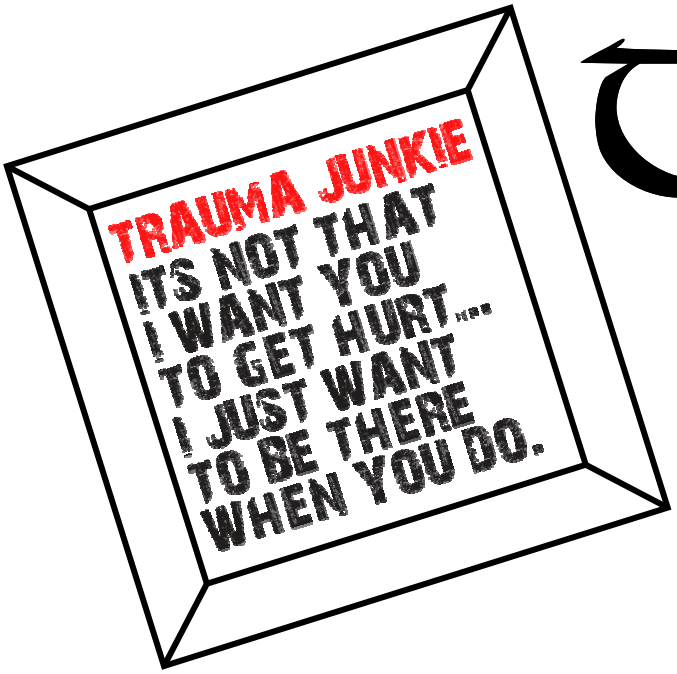
NORTHWEST COMMUNITY EMERGENCY MEDICAL SERVICES SYSTEM

EST 1972

FEBRUARY 2013



TOPICS in TRAUMA

Questions/comments on this module are welcome and should be directed to the author:

Diana Neubecker RN BSN PM, 847.618.4488, dneubecker@nch.org

IMPORTANT Notes:
- Please have SOP's available for this class.
- The format is meant to be primarily discussion (not lecture). The discussion questions are listed in the handout.
- During this CE, *PM's are NOT expected to write down the answer to every question*.
- For questions where PM's do not know the answer – taking notes is encouraged.
- The powerpoint will be made available on the website.

Case Study 1

PM's dispatched for MVC. On arrival, note crash occurred at intersection of 45 mpg roadway, 2 vehicles involved; Vehicle A (lg old sedan) has a moderate amount of front end damage and vehicle B (small sedan) shows signs of a lateral impact w/ moderate damage to driver's side.

Vehicle B driver: 18/M found ambulatory, appears to be upset/slightly agitated, and states he is, "fine." After much encouragement by the crew, the patient agrees to VS and an examination. GCS 15, P 120, R 24, O2 sat 95%, BP 128/92, skin WNL; denies neck/back pain, spine non-tender, no deformity/spasm noted; PERL; face, chest & extremities no wounds/discolorations/deformity/tenderness, lungs clear & equal bilat; abdomen no wounds/discolorations, (+) tenderness to palpation LUQ.

1. What about the pt in vehicle B, should a PM be especially concerned about?

2. Trauma can be blunt or penetrating; which has the higher mortality? Why?

3. Does this pt have any signs of shock? If yes, list s&s.

4. Can the pts emotional state be causing the s&s?

   What can differentiate the etiology?

6. Are the pts VS really abnormal?

7. In what stage of shock does hypotension occur?

8. How much blood has the pt lost at that point?

9. At what stage of shock does tachycardia occur? After how much blood loss?

10. Can shock be present with "normal" VS?

11. Shock Index (SI) = HR/SBP
    - Normal SI = 0.5-0.7
    - Abnormal shock index $\geq$0.9 may indicate serious injury, prolonged ICU, req. for more blood products, & worse outcome
    - SI not reliable in head injury.

12. What is this pts SI?

13. Practice calculating your own SI.

14. What interventions should PM's make?

15. What if pt is refusing transport?

    ▪

16. If OLMC authorizes the refusal, what else should be done?

17. If pt agrees to transport, does he need to have an IV established?

18. In general, why are prehospital IV's discouraged - unless the pts need IVF or medications?

    ▪

19. How can giving a trauma pt IVF decrease their chance for survival?

20. Does that mean IVF are never indicated?
21. What should be done enroute for this pt?
22. Enroute pts pulse increases to 140 and BP is 110/90, what should be done?

23. What if the PM is not comfortable starting an IV enroute?

24. At what rate should the IV be infused?
25. Under what circumstances should the rate of IVF be increased?
26. How much fluid should be given if the above occurs?

27. What IV solution should be used?
28. When else, what other types of calls, should warm IVF be used?
29. When would warm IVF be contraindicated?
30. Under what circumstances should this pt be transported to a L1 TC?

    ▪

31. After this call, when you get back to the station, you learn the other pt had significant chest & abdominal trauma and was transported to a L1 TC. What types of chest & abdominal injuries should be transported to a L1 TC?

    ▪

    The engine crew also tells you the pt was in resp distress, had a SBP of 70, had an obvious bruise on his abdomen and was vomiting. They could not get the O2 sat above 70 with a NRB, so they intubated the pt. Lung sounds were clear & equal bilaterally, but the ETCO2 was 25-30 the entire call.

32. In a hypotensive pt, where should a pulse ox reading be obtained?

33. What is a normal ETCO2?

34. What may have caused the ETCO2 to be 25-30 in this pt?

35. What may happen to pts ETCO2 as the BP improves?

Case Study 2

1. When determining if a pt needs spine immobilization, what criteria needs to be considered first?

2. After determining the above, if it is negative what should be considered second?

3. What are signs should a reliable pt demonstrate?

4. Steps (4) for spine immobilization assessment

    ▪

5. What is the difference between pain & tenderness? T

6. Should the following pts receive spine motion restriction?

    a. Pt dropped bowling ball on foot, experienced so much pain fell to ground striking head, c/o foot (8/10) & head (2/10) pain

    b. MVC w/ 12" of intrusion occupant side, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

    c. MVC w/ 18*" intrusion non-occupant side, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

    d. MVC & pt ejected from vehicle, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

    e. MVC w/ death of other occupant, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

    f. Adult who fell ~20" off roof of house, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

g. Pedestrian stuck by vehicle ~20 mph, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

h. 65 yo pedestrian struck by vehicle ~5-10 mph, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS WNL

i. Motorcyclist in collision ~25 mph, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

j. Diving injury, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

k. Stab wound near spine, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

l. Hit head on cabinet door, fell, confused, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

m. Pt involved in MVC going 30 mph, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

n. Hit head on cabinet door, no fall or LOC, alert, calm, cooperative, neck/spine denies pain or tenderness, PMS exam WNL

7. Why don't we just initiate spine motion restriction on all trauma patients?

8. What harm can come from a LBB?

   ▪

9. How can the harm from LBB be minimized?

   ▪

Case Studv 3

PM's are called to a park for a 16/M who was playing football yesterday and may have suffered a concussion. The 16/M and his parents want him to return to the game, but the coach is refusing saying that he is concerned about second impact syndrome. The parents say they've never heard of "second-impact syndrome" and think the coach is making it up to prevent him from playing. The parents want the PM's to "clear" the 16 year old to return to the game.

1. Is "clearing to return to sports" within a PM's scope of practice?

2. What is second impact syndrome (SIS)?
   - Typically, involves athlete recovering from concussion.
   - Concussion pt may develop cerebral edema (s/s include memory impairment, HA).
   - Brain compensates (auto regulatory mechanism) by limiting blood flow, which leads to ↑ lactate and intracellular acidosis.
   - After concussion, brain extracellular potassium can increase greatly, followed by hypermetabolism, decreased protein synthesis, and reduced oxidative capacity for 10 days.
   - This makes brain more vulnerable to a second injury - of even mild intensity.

   - SIS occurs when pt who has sustained an initial injury sustains a second injury - before the first has completely resolved.
   - When the <u>brain sustains second impact, it may lose its ability to auto regulate intracranial and cerebral perfusion pressures.</u>
   - This may lead to diffuse cerebral edema, followed by brain herniation, and death may occur in 2-5 minutes.

   - Peds & adolescents at highest risk; brain swelling (in minor injury) is greater in children than adults.
   - Since 1945, >90% of head injury sports related fatalities occurred in high school or younger. (Natl Ctr for Catastrophic Sports Injury Research)

Case Study 4-a

5 PM's & 1 EMT on scene. Narrative: "Called to the scene for a car vs pedestrian. Upon arrival found 77 y/o male lying on his side in the street, unconscious but breathing. Pt unresponsive to verbal or pain. Pt was crossing the street on his bicycle when he was hit by a car at about 45 mph. Pt landed on hood of car and into the windshield, then ended up on the pavement. Damage to hood of car and starring of windshield. Pt was not wearing a helmet. Care given as above. Pt has a large hematoma to the back of the right side of his head and a 4 inch laceration to the back of his left heel. Bleeding controlled. No other injuries found. Versed was given prior to king insertion due to jaw clenching. XXX hosp contacted and pt transported to XXX L1 TC. Pt arrived at ed still unconscious and unresponsive but in stable condition." PE: Pupils 3 mm, reactive, breath sounds clear & equal, skin nl, cap refill 2-4 sec, soft-tissue swelling bruising head, lac back of left foot

Time	BP	BP	P	R	O2 sat	GCS	Glucose
x:37	@ patient						
x:38	Spinal Immobilization - Full Supine						
x:40		156/110	54	16 Normal	95 RA	3	107
x:42	Oxygen by BVM						
X:43	ECG – sinus brady						
x:47	Venous Access - extremity L AC 16 – successful						
x:48	Lidocaine IV 100 MG						
x:51	Airway Orotracheal Intubation - 2 attempts - unsuccessful						
x:55		138/98	70	26 Normal	100 RA	3	
x:55	Oxygen by BVM						
x:57	enroute (scene time 20 minutes)						
x:01	Midazolam (Versed) IV 5 MG						
x:05	Airway King LT-D – 1 attempt - successful						
x:07		120/84	74	26 Normal	100 High FiO2		
x:08	@ hospital (transport time 11 minutes)						

1. Was an advanced airway, including 2 attempts at ETI and 1 KLT insertion, indicated?

2. How important is it to monitor capnography when assisting ventilation of head injured pts? Why?

3. What could have been done to decrease the scene time for this pt?

4. Did this pt need a 16 ga IV placed in the L AC?

5. What would explain the pts initial BP of 156/110 and HR of 54?

6. Should anything be done to lower the pts BP? Why? N

7. How did the pts BP change during transport? What may have caused this change?

Good work transporting pt to L1 TC!

Case Study 4-b

4 PM's & 1 EMT on scene for 23/M Narrative: "Dispatched to above location for 1 vehicle MVA rollover. UOA found vehicle upright with heavy damage to roof and A-post. Pt found sitting in vehicle unrestrained, unresponsive and breathing. Off-Duty Paramedic on scene stated pt has been unresponsive and breathing prior to arrival. Pt found to have 2-3in hematoma on top-right anterior of head. Extrication complete and pt was secured to backboard and moved to MICU. Vitals, IV's and airway controlled. Pt continued to breath on his own but remained unresponsive. DAI protocol followed. ETT look completed but tube insertion not done. King LT placed with verification completed. XXX contacted with no orders given. Pt vomited during transport, suction completed. Pt had no change in condition upon arrival at XXX-L1 TC. Pt was moved to ER 3 where care and report were given to ER RN." PE: chest, abd, extremities,skin = nl; head swelling/edema, bleeding controlled, lac, soft tissue swelling/bruising right anterior head; bleeding controlled, lac L forearm

Time	BP	BP	P	R	ETCO2	O2 sat	GCS	Glucose
X:39	@ pt, Spine immobilization – rigid collar		98	20, normal				
X:45	Spine immobilization – long back board							
X:46		110/86	98	20, normal	39	92 RA	3	78
X:47	Airway oropharyngeal							
X:47	Oxygen by BVM							
X:48	Venous access – L hand 18 g – NS 10 mL/hr							
X:48	Venous access – R AC 16 g – NS 10 mL/hr							
X:49	Lidocaine 90 mg IV							
X:49	Depart scene							
X:50	Midazolam 5 mg IV							
X:52	Etomidate 30 mg IV	112/86	110	18, normal	39	97 high O2	3	78
X:53	Benzocaine spray & Airway suctioning							
X:56	Airway orotracheal intubation – UNsuccessful							
X:57	Airway – KLT - successful	136/80	130	18, normal	39	97 high O2	3	78
x:02		136/80	128	10, normal	45	97 high O2	3	78
X:07		140/90	118	10, normal	45	97 high O2	3	78
X:10	Arrive hospital							

1. Was BVM ventilation indicated for a pt with a RR of 20 & normal, & O2 sat of 92% on RA?

2. Did this pt need IV attempts? On-scene?

3. Should intubation attempts be made enroute to the hospital? Why?

4. Why might this pt have vomited?

5. Did this pt need his glucose level checked 5 times?

Good job using capnography & transporting pt to L1 TC.

Reminder: Head Injured Pts

1. When obtaining history from pts with a head injury – what piece of information is important to ask the pt & convey to the hospital?

2. What are names of anticoagulants
   - Abixaban – Eliquis
   - Aspirin
   - Clopidogrel – Plavix
   - Dabigatran – Pradaxa
   - Prasugrel – Effient
   - Rivaroxaban - Xarelto
   - Ticagrelor – Brilinta
   - Ticlopidine – Ticlid
   - Warfarin – Coumadin, Jantoven
   - Dalteparin – Fragmin (SC)
   - Enoxaparin – Lovenox (SC)
   - Fondaparinux – Arixtra (SC)
   - Heparin (IV, SC)
   - Tinzaparin – Innohep (SC)

Case Study 4-c

Time	BP	BP	P	R	O2 sat	ETCO2	GCS
X:55	@ pt	113/52	114	8	85	25	
X:55		98/65	142	10	94	21	
X:58	Airway – oropharyngeal						
X:00	ECG – sinus tachycardia						
X:05	Oxygen by BVM						
X:06		93/54	125	10	87		
X:07	Depart scene						
X:09	Venous access – right AC 16 g – NS 10 mL/hr						
X:10	Airway orotracheal intubation – Unsuccessful						
X:12	Midazolam 5 mg						
X:19	Venous access – extremity 16 g – NS 10 mL/hr						
X:31	Arrive hospital						

7 PM's on scene for 26/M. Narrative: "Units responded to the above location for a motorcycle accident. Upon arrival found a unconcious but breathing pt trapped under part of his motorcycle. Witness's stated that the pt was traveling at a high rate of speed. Pt was wearing a full face helmet. Pt had blood on the ground around his head, bleeding from his mouth and ears, and legs were angled with obvious deformity. Pt assessed and ALS care performed. Pt's helmet had to be removed to secure airway. Pt boarded and collared and rapidly extricated. Pt moved to Ax and began transport to xxxL1 TC. Airway maintained with opa and bag valve mask with constant suctioning. xxxLI TC contacted without orders. Transferred care to er staff without incident." PE: mental unresponsive; skin normal; head bleeding uncontrolled, back of head; face bleeding uncontrolled, bleeding from mouth, ears; lower extremity dislocation/fracture bilateral fractures; abdomen abrasions

Was an advanced airway indicated for this pt? Why?

2. Should ETI attempt have been on-scene or enroute?

3. Should this pt have received more IVF than 10 mL/hr? Why?

4. Why should IVF be given if the pts SBP was >90? Why?

5. Why was midazolam 5 mg given to an unresponsive pt, 2 minutes after an unsuccessful ETI attempt?

6. What effect can midazolam have on the BP?

7. Should this pts ETCO2 have been monitored during BVM ventilation? Why?

8. How much time lapsed between the last set of VS and arrival at the ED?

9. How often should VS be taken in stable & unstable pts?

10. Should a GCS be documented for patients with head injuries?

Good job transporting pt to L1 TC.

Case Study 5

PM's dispatched for 78/F pt who has fallen.

1. What are the 2 most common trauma MOI's for elderly pts?

2. What are some reasons why an elderly pts may fall? Extrinsic , Intrinsic or both

   ▪

3. What are the most common areas injured in elderly trauma pts?

   ▪

4. Elderly pts are at increased risk of central cord syndrome. Why? What are the s&s?

   http://www.ninds.nih.gov/disorders/central_cord/central_cord.htm

5. Why can even minor MOI's in the elderly result in significant injury or death?

   ▪

6. Can a spine injury result from a fall from standing level?

7. What modifications should be made to spine motion restriction when treating an elderly pt?

8. How may medications the pt may be taking, affect on the trauma pt?

   ▪

9. List general principles of caring for elderly trauma pts.

   ▪

Case Study 6

PM's are dispatched to factory for an injured worked. Upon arrival they find a 32/M with an incomplete amputation to his R forearm, just above the wrist, and 5 cm laceration to the palmar surface of his L hand. Co-workers are holding towels on both wounds; however, they are actively bleeding and a large amount of blood is noted the floor.

1. List priorities, for care of this pt, in order.

2. When attempting to control bleeding using the direct pressure technique, which of the following is/are appropriate?
   - □ Use finger tips to apply pressure
   - □ Apply trauma dressing and wrap w/ elastic bandage
   - □ Apply pressure using palmar surface of entire hand, maintaining pressure (without release) for at least 5 minutes

3. Should pressure on pulse point be used to control bleeding? Why?

4. Should the extremity be elevated to control bleeding? Why?

5. What will increase the effectiveness of topical hemostatic agents (e.g., QuikClot)?

6. Should a tourniquet be viewed as a "last resort and used only to save the life of the patient?"

7. When should tourniquets be used?

8. When placing a tourniquet, how tight should it be?

9. Should EMS release a tourniquet once it has been applied?

10. What additional care is this pt likely to need?

    What is the initial and repeat dose of fentanyl?

12. Is IN fentanyl as effective as IV fentanyl?

13. Where should this pt be transported to?

    http://connect.jems.com/forum/topics/what-was-the-sense-of-this

Case Study 7

24/F "Pt was restrained driver whose vehicle was struck in drivers side front wheel. Pt struck her head on side panel and c/o pain in her head. Pt is seven months pregnant and wanted to be examined. Pt denies LOC or any other complaints or injuries. XXX hospital OLMC contacted, no orders. Pt trans w/o incident to ED hall XXX."

1. How does pregnancy change the treatment of this pt?

2. What are the most common cause of fetal death after maternal trauma?

3. What causes the placenta abruptio to occur?