APPROACH TO TRAUMA CARE

Timothy Murray, RN, CFRN
OBJECTIVES

- Demonstrate Concepts of Primary and Secondary Patient Assessment
- Establish Management Priorities in Trauma Situations
- Initiating Interventions to Care Management
- Arrange Appropriate Disposition
THE TEAM

- Communication between all team members is the Key
  - Prehospital
  - Core Team
  - Transferring agencies
- Preparedness
- Defined Team Members Roles
  - Who is your team
- Know Your Resources
INITIAL TRAUMA ASSESSMENT

- **Systematic Approach**
  - Primary Survey
  - Secondary Survey
  - Reevaluation

- **Interventions**
  - Definitive Care or Transport
PRIMARY SURVEY

- Across-the-room Observation
  - Treat the greater threat first (C) - ABC

- A - Alertness - Airway - C-Spine
  - Interventions
    - Jaw-Thrust
    - Suction
    - Foreign Body Removal
    - Oral / Nasal Airway
    - Definitive Airway - Intubation
B - Breathing and Ventilation

- Interventions
  - Chest Decompression - Needle vs Tube
  - O2 Delivery - NRB, NC, Bag-Valve, Vent

C - Circulation and Control of Hemorrhage

- Interventions
  - Control Bleeding - Direct pressure, tourniquets
  - Body reposition - PG 15 degrees
  - IV / IO Access
  - Fluid Delivery - NS, PRBC

D - Disability (Neurologic status)

- Interventions
  - CT Scan
PRIMAR Y SURVEY

- **E - Exposure and Environmental Control**
  - Interventions
    - Control of Bleeding
    - Warming – Blankets, Bair hugger, Fluid Warmers, Room Temp

- **F - Full set of Vitals and Family**
  - Interventions
    - Possible further fluid resuscitation
    - Possible Inotropics Agents
    - Active warming
    - Family Involvement
G – Get Resuscitation Adjuncts (LMNOP)

- Interventions
  - L – Lab * T&C, ABG, CBC, Lytes, Lactic Acid, ETOH, SAS, BHCG
  - M – Cardiac Monitor, Fetal Heart tones monitor,
  - N – Nasal / Oral Gastric Tube
  - O – SpO2, ETCO2
  - P – Pain Control * Morphine, Fentanyl, Ketamine, Positioning
    - Sedation - Ketamine, Propofol, Versed, Ativan
SECONDARY SURVEY

- H - History
- H - Head to Toe Assessment
- I - Inspect Posterior Surface
- Ongoing Reevaluation and Post Resuscitation Care
- Definitive Care and/or Transport
SHOCK
STATE OF INADEQUATE TISSUE PERFUSION

- Types
  - Distributive – Vascular Tone
    - Septic, Neurogenic Shock
  - Cardiogenic – Direct Pump Failure
    - Cardiac
  - Hypovolemic – Fluid Depletion
    - Hemorrhagic Trauma
  - Obstructive – Indirect Pump Failure
    - Mechanical, PE, Cardiac Tamponate
HYPOVOLEMIC SHOCK
FLUID DEPLETION - PATHOPHYSIOLOGY

Compensatory stage
- Decrease Arterial pressures which triggers the Baroreceptors
- Sympathetic Nervous System initiates a cascade in Attempting to restore the pressure.
  - Increase in heart, Myocardial Contractility, Peripheral Vascular resistance increases
  - Release of Catecholamine - increases Diastolic pressure, narrowing Pulse pressure

Decompensatory stage
- The compensatory stage is unable to continue to maintain the pressure.
- You become hypotensive
HYPOVOLEMIC SHOCK

FLUID DEPLETION

**S & S**
- Tachycardia
- Tachypnea
- Hypotension
- Narrowing Pulse Pressure (increase Peripheral Vascular Resistance)
- Cool Clammy Skin
- Delayed Capillary Refill - Decrease peripheral perfusion
- Altered Mental Status (Anxiety, Coma)
- Decrease Urine Output

**Treatment**
- Fluid Replacement
- Control of Bleeding
OBSTRUCTIVE SHOCK

INDIRECT PUMP FAILURE – PE, CARDIAC TAMPO NATE

S & S

✓ Tachycardia
✓ Tachypnea
✓ Hypotension
✓ Narrowing Pulse Pressure (increase Peripheral Vascular Resistance)
✓ Cool Clammy mottled skin
✓ Altered Mental Status (Anxiety, Coma)
✓ **Beck’s Triad** – Muffled Heart sounds, Increasing JVD, Hypotension
✓ Absent breath sounds on one side

Treatment

✓ Fix Causation – Pericardiocentesis, Needle decompression..
DISTRIBUTIVE SHOCK
Decrease Vascular Tone - Septic, Neurogenic Shock

**S & S**
- Bradycardia
- Tachypnea
- Hypotension
- Hypothermia
- Warm limbs but cool body, pale-pink, clammy
- Altered Mental Status (Anxiety, Coma)
- Decrease Urine Output

**Treatment**
- Fluid Replacement
- Inotropic Agents - Dopamine
WHAT DOES THIS MEAN

- Baroreceptors
- Cardiac Output
- Pulse Pressures
- Mean Arterial Pressure (MAP)
- Beck’s Triad
- Cushing Triad
- Lethal Triad
WHAT DOES THIS MEAN

- **Baroreceptors**
  - Receptors that set in the Carotid Arteries that monitor the Arterial Pressures
  - Tries to maintain the **Compensation Stage** of shock to continue tissue perfusion
  - They activate the sympathetic Nervous System
    - Increases heart rate (parasympathetic)
    - Increases Myocardial Contractility
    - Increases Systemic Vasoconstriction
    - Increases Peripheral Vascular Resistance
WHAT DOES THIS MEAN

- **Cardiac Output**
  - Blood pressure is determined by the Cardiac Output and Peripheral Vascular Resistance: \( b/p = CO \times PVR \)
  - \( CO \) – is the amount of blood ejected from the Lt Ventricle in one minute
  - \( PVR \) – is the resistance in the peripheral Arteries determined by the Vessel size (vascular constriction)
  - \( SV \) – amount of blood ejected from the Lt Ventricle with each contraction.
  - \( CO = \text{Heart rate (HR)} + \text{Stroke Volume (SV)} \)

- How can the body increase to B/P?
  - Increase heart rate
  - Increase SV (preload)
WHAT DOES THIS MEAN

- **Pulse Pressures (PP)**
  - Systolic Pressure minus Diastolic Pressure (PP=SBP-DBP)
  - Health Adults is about 40 mmHg (120/80)
  - Is considered abnormal if <25% of systolic Value
  - The most common cause of Decreasing (narrowing) PP is drop in Lt ventricular (stroke volume)
    (decrease Cardiac Output (CO))
  - Narrowing PP in trauma suggest significant blood loss (Preload)
  - Increased or widened PP is seen in Increasing ICP (increase in SBP with DBP not increasing or dropping)

- Example:
  - 102/88 – looks normal but PP=14 and 25% of 102 = 25.5.
WHAT DOES THIS MEAN

- Mean Arterial Pressure (MAP)
  - $\text{MAP} = \text{DBP} + \frac{1}{3}(\text{SBP}-\text{DBP})$
  - Normal 70 to 105 mmHg
  - Tells us more about perfusion than B/P (True Organ Perfusion)
  - Target is $\text{MAP} > 65 \text{ mmHg}$ with a good Radial pulse and Good Pulse Oximetry waveform.

- Example:
  - 88/55: Pulse pulse = 34 and > then 25% (22) of SBP, MAP 65 mmHg
  - 102/88: PP = 14 and < then 25% (25.5) of SBP, MAP 92
WHAT DOES THIS MEAN

- Beck’s Triad
  - Hypotension
  - Distended Neck Veins
  - Muffled Heart Sounds

- Seen in **Cardiac Tamponade**
- Obstructive shock
WHAT DOES THIS MEAN

- **Cushing Triad**
  - Bradycardia
  - Widening Pulse Pressure (increasing SBP without increasing DBP)
  - Irregular Respirations (impaired brainstem function)
  - Impending fatal hemiation of the brain

- What do we do?
  - Acute hyperventilation
  - Osmotic Diuretics – NS 3%, Mannitol
  - Elevation of Head
  - Sedation / Pain control
WHAT DOES THIS MEAN

- **Lethal Triad**
  - Hypothermia
  - Coagulopathy
  - Acidosis

*Keep your patients warm.....*
CASE 1

- 23 yr old male found lying unresponsive approximately 35 ft from a vehicle.
- Vehicle appeared to have rolled several times. Several damage to the vehicle. Seat belt remain unbuckled without damage. Front airbag deployed. Unknown time of crash.
- Unresponsive with GCS 3.
- Agonal respirations. Patient being ventilated with Bag-Valve-mask system at 15 l/min
- Fully spine immobilized with long back board and C-Collar
- Vital: P: 144 /min, Spont Resp: 6/min, B/P 75/62, SpO2 unable to obtain
- ETE - 5 mins
CASE 1 - HOSPITAL (Across room) (A)

- Upon arrival you see no uncontrolled bleeding.
- Patient unresponsive and being ventilated with B-V-M
- C-Collar on and appropriate.
- Tongue partially obstructing patient's airway.
- Blood and vomit in oral cavity
- Snoring respirations noted.

**INTERVENTIONS**

- Jaw thrust
- Suction
- Oral Airway
- Intubation - ? RSI
CASE 1 – HOSPITAL CONT (B)

- Respirations shallow at 6/min (spontaneous)
- Minimum chest wall excursion with no movement on Lt side
- Skin is dusky
- There are contusions and lacerations noted on Lt side of chest
- Breath sounds unequal – Air exchange noted on Rt side but none on Lt side
- Bony crepitus noted in upper Lt chest wall
- Subcutaneous Emphysema noted on Lt chest wall and Neck area.
- JVD noted bilaterally.
- No trachea deviation noted

INTERVENTIONS
- Continue Ventilating with B-V-M
- Needle Chest Decompression Lt Side – readied for Chest Tube
CASE 1 CONT (A - Intubation)

- Patient intubated with RSI
- ET Tube placement confirmed (5 points)
  - Epigastric gurgling
  - Breath sounds – Anterior / Axillary
  - Chest wall excursion
  - Skin color improvement
  - ETCO2 indicator
- ET tube secured at 22 cm at front tooth
- Continues to be ventilated with B-V systems at 20 b/min
- Breath Sounds after intubation and Chest decompression – equal with good air exchange
CASE 1 CONT (C)

- No uncontrolled bleeding noted
- Pulses (central very weak) – (peripheral absent)
- Skin cold, clammy, very pale-grey.

**INTERVENTIONS**
- IV vs IO x2
- Fluid Bolus – NS vs PRBCS
- ? Mass transfusion Protocol
- ? TXA
CASE 1 CONT (D)

• GCS = 3 (E1, V1, M1) (RSI)
• Pupils 4mm = very sluggish to react to light

• INTERVENTIONS
  • CT scan Stat
• Abrasions throughout all extremities
• Abrasions and laceration on Lt chest wall
• Contusions and ecchymosis to Lower Lt Abd
• Contusions and ecchymosis and abrasions noted to Lt pelvic area
• Laceration to Lt upper leg
• Laceration across forehead with raccoon eyes and Battle signs bilaterally
• Deformity Lt upper leg with shorting and rotation of leg
• No uncontrolled external bleeding

• INTERVENTION
  • **WARM Environment** – warm room, Bair Hugger, Fluid warmer
CASE 1 CONT (F)

- Pulse 156
- Resp 20 b/min B-V-ET tube
- B/P 76/58
- SPO2 93% on 1.0 FiO2 (good wave form)
- ETCO2 43
- Temp 96.5 F Rectal
- Wt 240 lbs
- Family at bedside

**INTERVENTIONS**
- Continue Fluid infusions (? NS or PRBC)
- Active Warming
- Increase PEEP

- MAP = 64 mmhg
- PP = 18 mmhg, his 25% = 19 mmhg (NPP)
- SpO2 good wave form
- Pulses weak
- Tachycardic
CASE 1 CONT (G)

- Lab (T & C, BS, ABG, Lactic Acid, Calcium)
- Monitor showing Sinus Tachycardia
- OG placement
- Pain Control? Type
  - Morphine
  - Fentanyl
  - Dilaudid
  - Ketamine
CASE 1 CONT SecondarY survey (H)

• Unknow details of crash
• No allergy
• No medications
• Health history
CASE 1 CONT (H) (I)

- Head – Lac/abrasion, Raccoon eyes, Battle signs, Pupils 4 mm non-active
- Neck – Subq air, No further JVD
- Chest – Laceration and abrasion Lt, Needle Lt Chest Wall, Bony crepitus Lt upper chest. Equal Chest wall excursion
- Heart Sounds – Normal S1S2 without murmur
- Abd Lt Lower ecchymosis/ abrasions, Bowel Sounds Absent x 4 quadrants, Firm
- Pelvis Abrasion to Lt side, Movement of the pelvis noted
- No blood at Penal Meatus
- Lt Upper Extremity deformity with shorting and rotation, abrasions and laceration throughout all extremities.
- Back clear, blood in Stool
CASE 1 CONT (H) (I)

• INTERVENTIONS
  - Foley catheter insertion
  - Chest Tube insertion
  - Pelvis Binder - verbalize to all No further pelvis manipulation
  - ? Femoral Traction
  - Back Board Removed
  - FAST
CASE 1 CONT (Definitive care)

• Transport Air vs Ground
QUESTIONS?

timmurraycn05@gmail.com
Thank You