Basic Trauma Overview - ABC

Dale Dangleben, MD, FACS
Team

Trauma Room Layout Level 1 & 2

- Monitor
- Respiratory
- Anesthesia
- ICU RN (Level 1 Only)
- Patient
- ED Tech
- Circulating RN
- EMS
- Documenting Scribe Nurse
- Scribe Table
- Trauma / ED Attending

Geisinger
Extended Team

Trauma Room Layout Level 1 & 2

- Monitor
- Rapid Infusion
- IV
- Chest Cart
- Crash Cart
- Sink
- Trauma / ED Attending
- Patient
- Anesthesia
- ICU RN (Level 1 Only)
- Circulating RN
- Respiratory
- Trauma PA/NP Primary
- ED Tech
- Documenting Scribe Nurse
- Scribe Table
- OR RN
- Lab
- Radiology
- Pastoral Care
- Security

Geisinger
Team Leader

- Remains calm
- Maintains control and provides direction
- Stays decisive
- Sees the big picture (situational awareness)
- Is open to other team members input
- Directs resuscitation
- Makes early decision to transfer the patients that exceed the local capabilities

Decrease chaos / optimize care.
Team Members

- Know your roles in the trauma team
- Remain calm
- Be responsive to team leader
- Voice suggestions or concerns
Responsibilities

- Perform the Primary and secondary survey
- Verbalize patient care
- Report completed tasks
Responsibilities

- Monitors the patient
- Manual BP
- Obtains IV access
- Administers medications
- Dresses wounds
- Performs or assists in resuscitative procedures
Responsibilities

- Records data
- Ensures documentation accompanies patient upon transfer
- Assists team members as needed
Responsibilities

- Obtains needed supplies
- Coordinates communication with local and external resources
- Assists team members as needed
Responsibilities

- Place Oxygen on patient
- Manage ventilator if patient intubated
- Manage airway
- Hold C spine
- Manage rapid infuser line where indicated
- Assists team members as needed
Organization of trauma resuscitation area

- Basic adult and pediatric equipment for:
  - Airway management (cart)
  - IV access with warm fluids
  - Chest tube insertion
  - Hemorrhage control (tourniquets, pelvic binders)
  - Immobilization
  - Medications
  - Pediatric length/weight based tape (Broselow Tape)

- Warming capabilities
D-MIST

Demographics
Mechanism/medical complaint
Injuries
Signs (vitals)
Treatment

Age, sex
Mechanism of injury
Time of injury, list injuries, inspections
First set of vitals, any changes, include glucose
Any treatments

Only EMS is allowed to talk during DMIST (≈ 30secs)
Primary Survey

- **A** Airway ----- C spine
- **B** Breathing
- **C** Circulation
- **D** Disability
- **E** Exposure
## Identify Immediate life-threats

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Airway open?</td>
<td>C-spine</td>
</tr>
<tr>
<td>B</td>
<td>Breathing?</td>
<td>Decompression</td>
</tr>
<tr>
<td>C</td>
<td>BP, pulse?</td>
<td>Control bleeding, IV access, fluids</td>
</tr>
<tr>
<td>D</td>
<td>Disability?</td>
<td>GCS, Pupils</td>
</tr>
<tr>
<td>E</td>
<td>Exposure</td>
<td>Keep warm, look for hidden injuries</td>
</tr>
</tbody>
</table>
Secondary Survey

Thorough Head to toe exam

- Head and Neck
- Chest
- Abdomen
- Pelvis
- Extremities

Can be delayed until all life-threatening injuries have been dealt with.....
### History

<table>
<thead>
<tr>
<th>A</th>
<th>Allergies</th>
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<tbody>
<tr>
<td>M</td>
<td>Medications</td>
</tr>
<tr>
<td>P</td>
<td>PMHx</td>
</tr>
<tr>
<td>L</td>
<td>Last Meal</td>
</tr>
<tr>
<td>E</td>
<td>Events related to injury</td>
</tr>
</tbody>
</table>
Adjuncts and tests

<table>
<thead>
<tr>
<th>Adjuncts</th>
<th>Diagnostic tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pulse oximeter</td>
<td>• CXR</td>
</tr>
<tr>
<td>• Cardiac monitor</td>
<td>• Pelvic x-ray</td>
</tr>
<tr>
<td>• Foley catheter</td>
<td>• C-spine x-ray</td>
</tr>
<tr>
<td>• NG tube</td>
<td>• EKG</td>
</tr>
<tr>
<td></td>
<td>• Pregnancy test</td>
</tr>
<tr>
<td></td>
<td>• Labs</td>
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</table>
Airway

Recognizing and managing acute airway compromise are two of the most difficult yet critical skills which the TEAM must master in order to adequately care for the trauma patient.
Airway: Preparation

Organized equipment
Supplies
Medications
Team skills

Immediate accessibility
Recognizing Airway Compromise

Can be rapidly accomplished by talking to patient and eliciting answers to simple questions.

- Look
- Listen
- Feel
Recognizing Airway Compromise

- Head, neck and facial trauma
- Bleeding into airway
- Deformity/swelling
- Noisy breathing
- Burns
- Cyanosis
- GCS 3-8
Absolute Indications for Definitive Airway

Respiratory insufficiency
GCS 3-8
Severe maxillofacial injuries
Severe neck injury with soft tissue swelling
Persistent or uncompensated hemodynamic instability
Relative Indications for Definitive Airway

- Agitation with possible injury to self or others
- Impending or potential airway compromise (flail, large pulmonary contusion, pneumatocele)
- Potential neurologic deterioration during transport
- Prolonged transport time
Airway: Basic Management

High-flow (15 liters) oxygen by mask
  – O₂ sat monitor
In-line stabilization
Chin lift
Jaw thrust
Naso/oropharyngeal airway
Bag valve mask assist
Airway: Advanced Options

- Laryngeal mask airway (LMA)
- Combitube™ or King airway

Intubation
- Orotracheal
- Nasotracheal

Surgical
- Cricothyroidotomy
Rescue Airways

Laryngeal Mask Airway
LMA

King Laryngeal Tracheal Airway
LTA
Airway: Advanced Management

- In-line stabilization
- Cricoid pressure (Sellick maneuver)
- Choose airway method
- Medications
  - Venous access
- Equipment (endotracheal tube, laryngoscope, suction)

(Sellick maneuver)
Airway: Advanced Management

**Rapid Sequence Intubation (RSI)**

- Pre-oxygenate with 100% O₂
- Support with bag-valve mask
- Administer medications
  - Sedate
  - Paralyze
- Intubate

‘...and this is Ralph, your anesthesiologist.’
Rapid sequence intubation

Induction agents

**Etomidate** is now considered the criterion standard of induction agents in its use in RSI. Very short acting non-barbiturate hypnotic agent. Its advantages are rapidity of onset, short duration of action, lack of cardiodepressant effects, marked safety in patients with head injury.

**Ketamine** has direct negative inotropic effect on the myocardium is masked by an increase in blood pressure, heart rate, cardiac output, and an overall decrease in myocardial oxygen consumption.

**Thiopental** has limited role in the ED as induction agents because of their cardiorespiratory depressant activity. Of all the barbiturates, these possess the shortest onset and briefest duration of action.

**Propofol** decreases cerebral metabolism and, consequently, ICP also. It is a myocardial depressant, causing a decrease in mean arterial pressure (MAP). This is compounded by the decrease in the systemic vascular resistance it causes. Both of these factors contribute to an overall decrease in oxygen delivery.
Confirm ET Placement

Listen to bilateral lung fields and epigastrium
Check position of endotracheal tube
Check end tidal CO$_2$
Check O$_2$ saturation
Check position of endotracheal tube with x-ray

“An esophageal intubation is no sin, but there is great sin in not recognizing such a placement.”
Pitfalls

Inability to intubate
Esophageal or right main stem intubation
Development of tension pneumothorax
Loss of airway
  – After paralytic administration
  – Dislodged tube
Equipment failure
Breathing: Impairment

Ventilation volume
- Pneumothorax and hemothorax
- Flail chest
- Diaphragmatic hernia

Mechanics
- Paralysis
- Disruption of chest wall

Circulation
- Shock
- Tension Pneumothorax
- Contusion
Breathing Assessment: Look

Chest rise and symmetry
Respiratory rate
Tracheal alignment
Soft tissue abnormalities
Subcutaneous emphysema
Breathing Assessment: Listen

Breath sounds
- What do you hear?
Breathing Assessment: Adjuncts

- Pulse oximetry
- Colorimetric end tidal CO₂
- Portable chest film
- NG - OG tube
Breathing: Life-threatening Injuries

- Tension pneumothorax
- Massive hemothorax
- Flail chest
- Open pneumothorax

You will miss 30% of pneumothoraces on supine CXR’s.
Tension Pneumothorax

Respiratory distress
Unilateral absence breath sounds
Shock
Distended neck veins
Hyper-resonance on percussion

Needle Decompression
- Second intercostal space
- Mid-clavicular line
Massive Hemothorax

- Hemi-thorax filled with blood
- High mortality rate
- Mass effect (mediastinal shift)
- Exsanguination
Open Pneumothorax

‘Sucking chest wound’
Impaired ventilation

Treatment is 3-sided dressing and chest tube
Breathing Reassessment

How does your team reassess the patient’s breathing?

- Repeat primary survey
- Assure patient is oxygenating and ventilating
- Adjuncts
  - Pulse oximetry
  - End-tidal CO₂
  - Chest x-ray
  - NG - OG tubes
Breathing: Treatments

Chest tube insertion

– What size chest tube?

5th intercostal space anterior to mid-axillary line at infra-mammary crease
Breathing Treatment: Pitfalls

- Inaccurate pulse oximeter readings
- Simple to tension pneumothorax
- Improper placement of chest tube
- Migration of endotracheal tube
Breathing Summary

A team approach is critical to recognize and treat life-threatening breathing problems.

Address breathing after airway is secured.

Reassess after every intervention, being conscious of pitfalls.

Team should have the skills and be prepared to intervene appropriately.
The most common cause of shock in trauma is hemorrhage.
Circulation

Identify and control bleeding
Initiate resuscitation
Define and recognize shock in trauma
Anticipate pitfalls
Trauma Bay Preparation

Warm room
Warm IV fluids
Dressings, splints, sutures, staples
Blood/blood products
Rapid infuser
Tourniquets
Pelvic binder
Circulation: Physiologic Changes in Shock

Increased pulse rate
Decreased mental acuity
Narrowed pulse pressure early
Decreased capillary refill
Clammy skin
Decreased blood pressure
Decreased urine output

<table>
<thead>
<tr>
<th>Class of hemorrhagic shock</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss (mL)</td>
<td>Up to 750</td>
<td>750–1500</td>
<td>1500–2000</td>
<td>&gt; 2000</td>
</tr>
<tr>
<td>Blood loss (% blood volume)</td>
<td>Up to 15</td>
<td>15–30</td>
<td>30–40</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>Pulse rate (per minute)</td>
<td>&lt; 100</td>
<td>100–120</td>
<td>120–140</td>
<td>&gt; 140</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Normal</td>
<td>Normal</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Pulse pressure (mm Hg)</td>
<td>Normal or increased</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Respiratory rate (per minute)</td>
<td>14–20</td>
<td>20–30</td>
<td>30–40</td>
<td>&gt; 35</td>
</tr>
<tr>
<td>Urine output (mL/hour)</td>
<td>&gt; 30</td>
<td>20–30</td>
<td>5–15</td>
<td>Negligible</td>
</tr>
<tr>
<td>Central nervous system/mental status</td>
<td>Slightly anxious</td>
<td>Mildly anxious</td>
<td>Anxious, confused</td>
<td>Confused, lethargic</td>
</tr>
</tbody>
</table>
Circulation: Vascular Access

Peripheral access
  – 2 large bore IV's –
  16 gauge or larger
  – Blood drawn, if not already

Central access
Venous cut down
Intraosseous
Hemorrhagic Shock
Hemorrhage Control

Direct pressure
Close scalp lacerations
Reduce and splint fractures
Immobilize pelvic fractures
Tourniquet
Operating Room (Lap/Thoracotomy etc)
Circulation: Adjuncts

**Urinary Catheter**
- **Contraindications**
  - Blood at urethral meatus
  - High riding prostate
  - Scrotal/labial hematoma

**Pulse oximeter**

**Lab evaluations**
- H/H
- Type and cross
Circulation: Controlled Resuscitation

Stop bleeding as soon as possible

Tolerate systolic BP - 90 – 100 until the hemorrhage is controlled

Continue resuscitation with blood after initial crystalloid
Circulation: Resuscitation Guidelines

Continue resuscitation with blood after initial crystalloid

Warmed IV fluid guidelines
- Adults - 2000 cc of lactated ringer’s or saline
- Peds - 20 cc/kg bolus x 2

Blood
- O negative or positive until type specific available
End Points of Resuscitation

- Improving mental status
- Change in skin color and temperature
- Improved capillary refill
- Urine output begins or becomes adequate
- Pulse normalizes
- Systolic BP 90 to 100 mm Hg
Rapid Responder

Stable endpoints after:
- 1 to 2 liters for adults
- 20 cc/kg for children

Establish maintenance IV rate
Monitor for recurrent shock
Reevaluate ABC’s
Transient Responder

Shock recurs after initial fluid bolus

Reassess ABCs

Stop all visible bleeding

Blood or repeat initial crystalloid, to keep systolic BP at 90-100 (Peds – refer to chart)

Alert OR

Alert Blood bank - Check amount of blood availability
Non-Responder

Shock persists in spite of fluid resuscitation
Reassess ABCs
Stop all visible bleeding
Transfuse as soon as possible
Alert OR
  – Damage control surgery
Blood and blood product availability (MTP)
Persistent Shock

Hemorrhagic
- Unrecognized or uncontrolled bleeding

Non-hemorrhagic
- Cardiac tamponade
- Tension pneumothorax
- Neurogenic shock
- Myocardial infarction
- Massive gastric distension (peds)
Circulation: Pitfalls

**Over resuscitation**
- Increase BP = increase bleeding if bleeding not controlled
- Pulmonary edema
- Hypothermia
- Coagulopathy

**Under resuscitation**
- Usually not enough blood given
- Bleeding not controlled

**Failure to:**
- Recognize compensated shock
- Recognize patients on beta blockers have blunted response
- Realize tachycardia more significant in pediatric patients
- Decompress stomach of pediatric patients
- Recognize patients on anticoagulant
Circulation: Summary

Team and facility preparation
Identify and control bleeding
Begin resuscitation
Define and recognize shock
Define management options
Anticipate pitfalls
Trauma is a Dynamic Process

Continual reassessment is necessary to identify:

Changes in patient’s condition
Possible ongoing blood loss
Response to interventions
Iatrogenic problems
  – Tension pneumothorax
  – Loss of vascular access
WE ARE CREATING GUIDELINES UTILIZE THEM
END

( Until next time )