### Head Trauma

#### History
- Time of injury
- Mechanism (blunt vs. penetrating)
- Loss of consciousness
- Bleeding
- Past medical history
- Medications (anticoagulants)

#### Signs and Symptoms
- Evidence of trauma
- Pain, swelling, or bleeding
- AMS
- Unconscious
- Respiratory distress or failure
- Vomiting
- Seizure

#### Differential
- Skull fracture
- Spinal injury
- Abuse

### Treatment

**Spinal Motion Restriction if indicated**
- Secure airway and support respiratory rate
- Elevate head 30 degrees unless contraindicated. Position patient on left side if needed for vomiting

**Hemorrhage Control**
- Direct Pressure
- Pressure Bandage
- Consider Hemostatic Gauze

**Establish IV/IO**
- Cardiac monitor
- EtCO₂ monitoring

**For Nausea/Vomiting Consider**
- **Adults** - Ondansetron 4mg IV/IO/IM/ODT (May repeat every 10 minutes to a Maximum 12mg)
- **Pediatric ≥ 4 years** - Ondansetron IV/IO/IM/ODT
  Use PEDIATAPE and refer to dosing guide (May repeat x1 for pts > 40kg)

**Limit scene time – Transport early**

- **YES**
  - **High flow O₂ via NRB** Maintain SPO₂ as close to 100% as possible
  - If unable to maintain SPO₂ with NRB & BLS maneuvers – Proceed with BVM
  - **AVOID HYPERVENTILATION**

- **E** If SBP approaching 90 or rapidly dropping in adults
  - **Normal Saline bolus 1000ml IV/IO**
  - Reassess patient for criteria above
  - May give additional 500ml IV/IO as long as criteria above exists

- **P** If poor perfusion or shock in peds
  - **Normal Saline bolus IV/IO**
  - Use PEDIATAPE and refer to PEARLS
  - Repeat to age dependent goal SBP
  - May repeat to a **Maximum 1L** as long as criteria above exists

**Exit to Airway TG if indicated**

#### POTENTIAL SEVERE HEAD INJURY?
- Any one of these:
  - LOC at any point
  - GCS ≤ 14
  - Any post-traumatic seizure
  - Multisystem trauma requiring intubation?

**Notify receiving facility. Contact Base Hospital for medical direction, as needed.**

### Age Dependent Signs of Shock
- **Neonate**: < 60mmHg or weak pulses
- **Infant**: < 70mmHg or weak pulses
- **1-10 years**: < 70mmHg + (age in years x2)
- **Over 10 years**: < 90mmHg
- **Over 65 years**: < 110mmHg
**Pearls**

- **Aggressively prevent and treat the “Three H-Bombs” of TBI:**
  - Hypoxemia: Early signs include confusion and restlessness.
  - Hypotension: Usually indicates injury or shock unrelated to head injury and should be treated aggressively.
  - Hyperventilation: Causes vasoconstriction which can lead to decreased blood supply.

- **All potential TBI patients should receive continuous oxygen via NRM. Threshold > 90% O2 saturation with optimal 92-98% readings.**

- **Basic airway management is preferred unless unable to effectively manage with BLS maneuvers. Utilize jaw thrust technique to open the airway. Do not delay scene time to intubate.**

- **If patient shows any sign of inadequate oxygenation, ventilate using BVM. Use of two-finger bag valve technique is critical. Ventilation rates:**
  - Adults 15+: 10 BPM
  - Peds 2-14: 20 BPM
  - Infants: 25 BPM

- **IV Crystalloids if SBP approaching 90 or dropping rapidly in average adult.**

- **Hypotension is age dependent. This is not always reliable and should be interpreted in context with patients normal BP, if known. Shock may be present with a seemingly normal blood pressure:**
  - Neonate: < 60mmHg or weak pulses
  - Infant: < 70 mmHg or weak pulses
  - 1-10 years: < 70 + (age in years x 2)
  - Over 10 years: < 90 mmHg
  - Over 65 years: < 110 mmHg

- **Target ETCO2 of 40 (range 35-45). ETCO2 may be unreliable if the patient was subject to multisystem trauma or poor perfusion.**

- **Initial documentation of GCS is a vital step in the assessment process. Aggressively monitor and document for changes by repeat examination.**

- **Perform modest hyperventilation to maintain an EtCO2 of 30-35 for significant signs of increased intercranial pressure or signs of brainstem herniation (dilated pupil on one side or posturing).**

- **In cases of traumatic arrest, the use of Epi is not indicated.**

- **Scalp hemorrhage can be life threatening. Treat with direct pressure and pressure dressing. If bleeding is not controlled apply hemostatic agent topically.**

- **Consider possibility of domestic violence or abuse.**