

## **TRAUMA EVALUATION AND MANAGEMENT ADULT AND PEDIATRIC PATIENTS**

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### **Information Needed:**

- Make sure scene is safe
- Number of patients/victims
- Mechanism of injury. Suspect non-accidental injury when physical findings are inconsistent with the history
- Modifying factors: extremes of age (<5 or >65), drugs, alcohol, pregnancy, medications, diseases
- Safety equipment used

### **General Assessment**

The general assessment of all trauma patients should include but is not limited to the following:

- Respiratory status
  - For pediatric patients: work of breathing - nasal flaring, retractions, grunting
- Circulatory status- capillary refill, central and peripheral pulses, skin signs
- Neurologic status using an appropriate GCS scale
- Pain assessment
- Determination if Major Trauma Victim criteria are met

### **Penetrating Trauma and Assault:**

- Type(s) of weapon(s) used, caliber and distance from weapon
- Length, description, angle, and depth of penetration for blades and other objects
- Patient complaints
- Initial level of consciousness and position
- Patient movement and treatment since injury

### **Falls:**

- Cause or precipitating factors
  - Mechanical e.g., tripped, slipped, pushed or jumped
  - Syncope e.g., fainted, dizzy, weak, loss of consciousness, etc
- Height and areas of impact
- Surface fallen upon
- Patient complaints
- Initial level of consciousness and position
- Patient movement and treatment since injury

### **Vehicle Collisions:**

- Vehicle telemetry data, estimated speed, forces, and trajectories
- Type of vehicle
- Type of impact (head-on, rollover, end-over-end, T-bone, auto-pedestrian, etc.)
- Vehicle damage (passenger space intrusion, windshield, and steering wheel, etc.)
- Protective devices (airbags, lap and/or shoulder belt, child seats, helmet, etc.) and damage sustained
- Patient complaints
- Initial level of consciousness and location in vehicle
- Patient movement and treatment since injury
- Extrication time

### **Treatment:**

- Airway with spinal immobilization if indicated
- High flow oxygen, BVM ventilation, or intubation if indicated. Maintain in line stabilization of neck when intubating patients with suspected c-spine injuries
- Assess circulatory status (pulses, skin signs)
- Control external bleeding with direct pressure
- Identify and treat life threatening conditions
- Do not delay transport to perform procedures on scene (perform enroute)
- If patient is unstable or meets Major Trauma Victim criteria, treat (IV/IO therapy, the secondary survey, and treatment) en route.
- IV/IO access with large bore catheter with extension tubing (saline lock) and if hypotensive give fluids titrated to a SBP of >90
- If adult patient remains hypotensive or becomes unstable, place a second large bore IV (en route)
- Secondary survey
- Splint suspected fractures and bandage open wounds
- Cardiac monitor and pulse oximetry
- Consider pain control for moderate to severe pain if there is no evidence of head injury (GCS <15), or no signs and symptoms of hypoperfusion.
- Consider morphine sulfate 2 - 5 mg slow IVP/IO for discomfort. May repeat morphine in 2-5 mg increments every 5 minutes or more up to 20 mg.
- If unable to establish an IV up to 5 mg of Morphine Sulfate may be administered IM. May repeat in up to 5 mg increments every 10 minutes to a max of 20 mg.
- Prior to the administration of morphine sulfate and prior to each repeat dose, the patient's pain and vital signs should be reassessed. The patient must have a SBP >90 mmHg, respirations >12 and be awake to report pain.

- For pediatric patients:
  - Determine patient's length-based weight utilizing the Broselow Tape. If patient's estimated weight is 5 kg or less (GRAY Color Zone), Base Physician contact is required for administration of Morphine Sulfate.
  - Establish vascular access IV/IO
  - For signs and symptoms of hypovolemia give 20 ml/kg fluid bolus of normal saline. Reassess, may repeat twice as indicated. Contact trauma center for additional fluid orders.
  - Administer Morphine Sulfate 0.1 mg/kg slow IVP/IO (max single dose=3.5 mg). May repeat once in 5 minutes provided patient has SBP>90 and no signs of hypoperfusion
  - If unable to establish IV, administer Morphine Sulfate 0.1 mg/kg IM (max single dose=3.5 mg). May repeat once in 20 minutes provided patients has SBP > 90 and no signs of hypoperfusion
  - Have naloxone readily available to reverse any respiratory depression that may occur.
  - Reassess pain intensity after each Morphine Sulfate administration, and document using 0-10 scale.
  - If additional pain medication is indicated, contact Trauma Base Physician

### **Special Trauma Circumstances:**

#### **Chest and Abdominal Trauma**

- Treatment as described above
- For open chest wounds with an air leak, place a three sided occlusive dressing
- Cover eviscerations with moist sterile saline gauze to prevent further contamination or drying
- Immobilize impaled objects in place to prevent further movement
- If pregnant >5 months gestation, place in the left lateral position; if transporting in c-spine precautions, tilt the spine board to the left
  - Consider aggressive fluid resuscitation because pregnant patients can mask symptoms of shock and fetal distress
- For suspected tension pneumothorax (identified by severe respiratory distress in combination with absent breath sounds, tracheal deviation, and hypotension), perform needle pleural decompression

#### **Extremity Trauma**

- Evaluate and treat extremity trauma only after initial stabilization
- Monitor extremity for deformity, open wounds, swelling, shortening and/or rotation
- Check pulses, sensation, movement, and color of extremity

- Control any external bleeding with direct pressure
- Splint injured extremity in the position found unless precluded by extrication considerations and/or patient comfort
- Elevate extremity and apply cold packs
- Cover open wounds with sterile dressings
- If the extremity is pulseless, attempt to place it in normal anatomic position to restore circulation by gentle in-line traction
- If initial repositioning does not restore circulation, DO NOT manipulate further
- If amputated, wrap part in a moist normal saline sterile dressing, place in sealed plastic bag, and place on top of ice or cold pack
- For partial amputation, avoid ice pack and treat as a fracture/dislocation

### **Head, Neck and Facial Trauma**

- Obtain Glasgow Coma Score (GCS)
- If unresponsive with significant head injury and age appropriate GCS <9, bag-valve mask ventilate or intubate as appropriate
- Check for blood or fluid from nose or ears
- For head trauma, elevate head of spine board 15-20 degrees
- Monitor for airway obstruction
- Orally intubate when indicated while maintaining spinal immobilization
- In the absence of significant mid-face trauma, the head injured patient may be nasally intubated if oral intubation or Supraglottic Airway Device is unsuccessful and BVM is inadequate.
  - Supraglottic Airway Device is contraindicated for pediatric patients less than 4 feet (48 inches)
- If eye is injured, cover both eyes with dressings. Avoid pressure to eye for any patients with suspected ruptured globe or penetration
- Keep avulsed teeth in saline soaked gauze and transport with patient

### **Traumatic Cardiac Arrest**

- This requires all of the following
  - Physical signs of trauma and/or blood loss
  - GCS= 3. Use the modified Glasgow Coma Scale for infants and children
  - No respiratory effort
  - No palpable pulses
- Consider pleural decompression for suspected thoracic trauma
- If the patient meets all of the above criteria, determination of death in the field, otherwise initiate rapid transport to trauma center
- Notify coroner

### **Crush Injury Syndrome**

This should be suspected in patients with an extensive crush injury (more than one hand or foot) for greater than one hour. Once the compression is released,

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cellular toxins and potassium may be released into the body. These treatments are utilized to minimize these toxic effects.

- Cardiac Monitor
- IV/IO access
- Albuterol 5 mg via nebulizer, may repeat 2-3 doses, most effective when used close to the release of compression.
- Fluid challenge 250-1000 ml Normal Saline.
  - For pediatric patients: administer Normal Saline fluid bolus. Reassess and may repeat twice as indicated. Use Broselow Tape and San Mateo County Pediatric Reference Card to determine fluid volumes.
  - Pain Management as appropriate
- Sodium bicarbonate 1 mEq/kg IV/IO push.
  - For pediatric patients: use Broselow Tape and San Mateo County Pediatric Reference Card to determine dosages
- For suspected hyperkalemia (peaked T waves, widened QRS) consider calcium chloride 1 gm slowly IVP/IO.
  - For pediatric patients: use Broselow Tape and San Mateo County Pediatric Reference Card to determine dosages

#### **Precautions and Comments:**

- Reassessment of critical patients should occur at least every 5 minutes. Vital signs and other reassessment information should be documented
- An unsafe scene may warrant transport despite low potential for survival
- Preserve the scene of the crime as much as possible
- Remember reporting requirements for suspected non-accidental injury
- Chest injuries significant enough to cause respiratory distress are commonly associated with significant internal blood loss. Reassess frequently for signs and symptoms of hypovolemia
- Significant intrathoracic or intra-abdominal injury may occur without any external signs of injury, particularly in children or the elderly or in the presence of airbag deployment. Consider the mechanism of injury and the forces involved and be highly suspicious of occult trauma.
- Shock in children may be subtle and difficult to recognize. The only signs of compensated shock that a pediatric patient may display is tachycardia and vasoconstriction. In decompensated shock, the pediatric patient can no longer maintain the compensatory mechanisms and perfusion is profoundly affected. If not reversed decompensated shock will lead to cardio-pulmonary failure.
- The Modified Glasgow Coma Scale for infants and children should be utilized to determine neurologic status. If the patient is intubated, unconscious, or preverbal, the most important part of the scale to note is the best motor response.

- Utilize the Broselow Tape and San Mateo County Pediatric Reference Card for determination of drug dosages, fluid volumes, defibrillation/cardioversion joules and appropriate equipment sizes.
- Pay special attention to keeping all trauma patients warm.
- Provide emotional support as appropriate. Contact Public Safety Communication for grief support referral critical incident stress management.