

RDSTF – Region 5

Standard Principles and Guidelines for Management of the Pediatric Trauma Patient

These are meant as guidelines and are not a requirement

Trauma is a leading cause of morbidity and mortality in children. The evaluation and resuscitation of the pediatric trauma patient is vitally important and sets the tone, intensity and pace of subsequent care. Although the overall process is similar to adults, there are unique anatomic, physiologic, developmental and social characteristics of children that must be accounted for during the resuscitation phase.

GENERAL APPROACH TO PEDIATRIC TRAUMA

Airway:

- Modified jaw thrust if obstructed
- Supplemental 100 % oxygen (including ETCO₂ levels 35-45 normal)

Breathing:

- If breathing spontaneously in no distress, supplemental oxygen
- If breathing with distress, assist with BMV and determine need for secure airway
- If not breathing, Intubation, if difficult airway supplement with BMV or supraglottic airway if available, Failure to ventilate consider a surgical airway
- Pneumothorax
 - Needle decompression
 - Placement of a 14–18 gauge catheter at the 2nd Intercostal space midclavicular line
- Open Pneumothorax
 - Immediately apply an occlusive dressing sealing 2 sides
- FLAIL CHEST: (paradoxical movement of portion of chest wall)
 - position patient with injured side down, unless contraindicated.
 - provide manual stabilization of the flail segment.

NOTE: Assisted positive pressure ventilations using a BVM device may be indicated and may also serve as an “internal splinting” of the flail segment due to lung expansion

Circulation:

- Control active bleeding with direct pressure, hemostatic gauze packing and/or tourniquet, as indicated
- Place one or two peripherally IV
- If failure, place an IO
- Bolus 20/kg crystalloid solution, may repeat x 1
- If TXA available bolus 20/ kg up to a max dose of 1 gram

Disability and exposure:

- Goal is to prevent secondary injury
- Keep patients warm

- Stabilize/immobilize as indicated
- Document any neurodeficits and GCS

PEDIATRIC GLASGOW COMA SCALE (PGCS)				
	> 1 Year	< 1 Year	Score	
EYE OPENING	Spontaneously	Spontaneously	4	
	To verbal command	To shout	3	
	To pain	To pain	2	
	No response	No response	1	
MOTOR RESPONSE	Obeys	Spontaneous	6	
	Localizes pain	Localizes pain	5	
	Flexion-withdrawal	Flexion-withdrawal	4	
	Flexion-abnormal (decorticate rigidity)	Flexion-abnormal (decorticate rigidity)	3	
	Extension (decerebrate rigidity)	Extension (decerebrate rigidity)	2	
	No response	No response	1	
	> 5 Years	2-5 Years	0-23 months	
VERBAL RESPONSE	Oriented	Appropriate words/phrases	Smiles/coos appropriately	5
	Disoriented/confused	Inappropriate words	Cries and is consolable	4
	Inappropriate words	Persistent cries and screams	Persistent inappropriate crying and/or screaming	3
	Incomprehensible sounds	Grunts	Grunts, agitated, and restless	2
	No response	No response	No response	1
TOTAL PEDIATRIC GLASGOW COMA SCORE (3-15):				

PEDIATRIC BURNS

1. Thermal Burns

- Remove clothing, Stop burning process with water or saline, prevent hypothermia
- Cool compress for minor burns
- Dry, clean burn sheet for 2nd, 3rd degree, electrical and chemical burns
- Establish IV access if possible and fluid bolus 20/kg Normal Saline
- For transport times greater than an hour contact medical control for further fluid recs
- Pain medicine per local protocols

2. Chemical burns:

- Determine offending agent(s) and consider HAZMAT intervention
- Wash with copious amounts of clean water and/or sterile normal saline for 10-15 minutes, unless contraindicated by chemical agent (i.e., sodium, potassium and/or lithium metals).
- **CAUTION:** Primary water irrigation is contraindicated
- for Dry Lime/Lye and/or Phenol exposure (may produce further chemical reactions).
- Dry powders should be brushed off prior to flushing with large amounts of water.

- It is advised to contact **MEDICAL CONTROL** for further
- advice.
- If chemical viscous, remove with tongue depressor.

3. Inhalation Injury

- Supplemental oxygen or controlled airway if unconscious
- Suspected cyanide toxicity consider hydroxocobalamin 70mg/kg(to maximum 5 grams) IV?IO over 15 min
- In patients with suspected CO poisoning high flow oxygen

4. Consider transfer to a pediatric trauma center

- Partial thickness burns greater than **10%** total body surface area (TBSA)
- Second degree burns involving “sensitive areas”
- Third degree burns of any TBSA
- Electrical burns, including lightning injury
- Burns to patients who also suffered an inhalation injury or concomitant trauma
- Significant burns from caustic chemicals
- Burn injury in patients who require special social, emotional, or long-term rehabilitative intervention
- Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality

PEDIATRIC EYE EMERGENCY

- Obtain visual history (use of corrective lens, surgeries, use of protective equipment)
- Assist patient in removal of contacts if applicable
- Chemical irritants (ie pepper spray) flush with copious amounts of water or saline
- Thermal burns to eyelids, patch both eyes and cool saline compress
- Impaled object: Immobilize object and patch both eye
- Puncture wound: place rigid eye shield over both eyes
- Foreign body: patch both eyes
- If cannot close eyelids, keep eye moist with a sterile saline dressing

PEDIATRIC HEAD TRAUMA AND INJURIES

1. Airway:

- Assess airway for patency (suction),
- Intubate for GCS less than 8 (unresponsive to stimuli) or signs of herniation (blown pupil or hemiparesis or agonal breathing or posturing) or loss of pharyngeal reflex, persistent hypoxemia.
- Maintain cervical spine precautions while intubating or applying bag-valve-mask ventilation. Do not tape tube over neck area to avoid compression of venous return.
- Avoid nasotracheal intubation.
- Rapid sequence cerebroprotective intubation cocktail preferred (lidocaine, fentanyl, vecuronium) or per local protocol

2. Ventilate

- Maintain normocarbia.
- Administer 100% O₂.
- Oxygenation and ventilation should be assessed continuously by pulse oximetry and end tidal CO₂ monitoring.
- Prophylactic hyperventilation is *not* recommended.

3. Circulation:

- Recognize and stop bleeding.
- Wrap head firmly for open wounds or active bleeding.
- Apply hemostatic agents ie trauma gauze or QuickClot.
- IV fluid resuscitation with 20cc per kg with isotonic crystalloid or bolus with 3% saline solution 2 to 4 cc per kg if available.

4. GCS score (motor response, eye opening, verbal response).

- A quick assessment “AVPU” awake, responds to verbal, responds to pain, unresponsive can be used.
- Hypotension and hypoxemia and seizure activity affect GCS score.
- Check pupils for symmetry.
- Prophylactic use of mannitol *not* recommended, consider 1 gram/kg dose of mannitol for signs of herniation in euvoletic patient.
- Elevate head of backboard 15-30 degrees if normotensive or hypertensive

5. Immobilize spine

- ASSUME a cervical spine injury is present.
- Cervical collar and backboard.
- Avoid excessive neck flexion
- Elevate head of backboard 15-30 degrees if normotensive or hypertensive

SPINAL MOTION RESTRICTION (SMR)

Every injured child should receive an assessment for SMR. The need for spinal immobilization is based on mechanism of injury, mental status, and exam. Not all injured children require a C collar or longboard immobilization.

1. Blunt Trauma that requires SMR

- High risk mechanism: Fall from height, axial load injury, high speed MVC unrestrained, ejection
- Exam: Spinal tenderness or limited ROM, focal deficits (paralysis, paresthesias), child > 2 that can't walk
- Altered sensorium: intoxicated, abnormal GCS, unconscious
- Co morbidities: Downs, hydrocephalus, dwarfism, Osteogenesis imperfecta, Marfan's, Ehler Danlos, JRA, spinal surgery

2. If SMR is indicated but patient cannot tolerate supine position apply all elements they will tolerate and maintain spinal alignment as best as possible

3. Infants in rear facing car seat can be immobilized in car seat as long as stable with no respiratory distress or shock
4. Children in high backed car seat can be extricated in car seat and then placed in SMR if indicated

MUSCULOSKELETAL INJURIES

1. General care

- Remove clothing to expose injury

- If pulseless limb, attempt to place in anatomic position
 - For dislocations immobilize to prevent movement of joint
 - Pain control per local protocol
2. Closed Fractures
- Extremity fractures with obvious deformity, apply splint extending over the joint above and below the deformity in position of comfort, most commonly with small amount of flexion at elbow or knee.
 - Femur fractures do not require Hare Traction splinting, especially given the extremely rapid transport times. Initial management for transportation can be through long leg splinting extending above the hip and ending above the ankle. This allows for improved documentation of pulses and sensibility
 - Pelvis and suspected spine injuries, immobilization will be with cervical collar and through use of the back board for transportation.
3. Open Fractures
- Open fractures need a clean dressing, if possible, with Betadine or saline soaked gauze over wound.
 - If bleeding from an open fracture not controlled with direct pressure on the wound, then apply tourniquet above the level of the fracture or above the adjacent joint, may require a double tourniquet.
 - If agency can administer antibiotics, Ancef 30/kg to max does of 2 Grams

PEDIATRICS

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FROM THE AMERICAN ACADEMY OF PEDIATRICS

Management of Pediatric Trauma

AMERICAN ACADEMY OF PEDIATRICS, PEDIATRIC ORTHOPAEDIC SOCIETY OF NORTH AMERICA Section on Orthopaedics, Committee on Pediatric Emergency Medicine, Section on Critical Care, Section on Surgery, Section on Transport Medicine, Committee on Pediatric Emergency Medicine

Maria J. Mandt, Kari Hayes, Fred Severyn & Kathleen Adalgais (2019):

Appropriate Needle Length for Emergent Pediatric Needle Thoracostomy Utilizing Computed Tomography, Prehospital Emergency Care, DOI: 10.1080/10903127.2019.1566422

The Region 5 Trauma Advisory Board Clinical Leadership Committee would appreciate your feedback on these guidelines. Please click on the link below to take a 1 minute survey to provide your input.

<https://www.surveymonkey.com/r/RDSTF5-CLC-ProtocolsFeedback>