

# **PEDIATRIC TRAUMA EMERGENCIES**

**Last Revised: January 2015**

**Reviewed 2023**

## PEDIATRIC COMA SCALE

Indicator	Child	Score	Infant	Score
<b>Eye Opening</b>	Spontaneous	4	Spontaneous	4
	To Verbal Stimuli	3	To Verbal Stimuli	3
	To pain only	2	To pain only	2
	No Response	1	No response	1
<b>Verbal Response</b>	Oriented, appropriate	5	Coos and babbles	5
	Confused	4	Irritable cries	4
	Inappropriate	3	Cries to pain	3
	Incomprehensible	2	Moans to pain	2
	No response	1	No response	1
<b>Motor Response*</b>	Obeys commands	6	Moves spontaneously	6
	Localizes pain	5	Withdraws to touch	5
	Withdraws from pain	4	Withdraws to pain	4
	Flexion to pain	3	Decorticate posturing	3
	Extension to pain	2	Decerebrate posturing	2
	No response	1	No response	1

**Total PCS** \_\_\_\_\_

**\*If the patient is intubated, unconscious or preverbal, the most important part of this score is motor response. This section should be carefully evaluated.**

# **INITIAL TRAUMA CARE**

**NOTE:** Appropriate body substance isolation precautions must be used.

## **FR/BLS TREATMENT:**

1. Assure scene is safe.
2. Control C-spine
3. Perform a trauma (ITLS) primary patient assessment.
4. Control any major external bleeding. Consider the need for a tourniquet.
5. Administer OXYGEN by appropriate method when indicated and attempt to maintain oxygen saturation at 94-99%.
6. If patient has inadequate ventilation or respiratory effort refer to the Region Six UNIVERSAL AIRWAY ALGORITHM.
7. Apply spinal motion restriction (immobilization) as indicated.
8. If patient meets category A or B criteria from the Region 6 Trauma Triage Algorithm:
  - a. Transport rapidly\*\* and call for intercept per INTERCEPT CRITERIA. Appropriate patient destination should be determined by the Region 6 Trauma Triage Algorithm.
  - b. Perform a secondary (detailed) survey if patient is packaged and ambulance has not arrived or during transport.
  - c. Scene time should be limited to 10 minutes or less, unless entrapment exists.
9. If category A or B criteria from the Region 6 Trauma Triage Algorithm is not present:
  - a. Continue with the secondary survey and provide supportive care.
  - b. Transport\*\* and call for intercept per INTERCEPT CRITERIA.
10. Reassess frequently; every 5 minutes for unstable patients and every 15 minutes for stable patients.
11. Contact Medical Control.

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## **ILS/ALS TREATMENT:**

1. Continue FR/BLS TREATMENT.
  2. Perform trauma (ITLS) primary patient assessment.
  3. Consider the need for advanced airway; refer to the Region Six UNIVERSAL AIRWAY ALGORITHM.
  4. Obtain vascular access if needed. Do not delay transport to obtain vascular access.
  5. Apply cardiac monitor if needed.
  6. Assess for treatable causes of shock and treat according to the appropriate protocol.
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**\*\* Only if transporting agency.**

# Direct Trauma Transport Triage Criteria

**Purpose:** To define patients who need rapid transport to a trauma or specialty center.

**Policy:** Any patient meeting the criteria below should strongly recommend transport directly to the facility most capable of meeting their needs as defined by the criteria groupings or algorithm. If prolonged scene time or transport is anticipated, refer to “Use of Aeromedical Transport Vehicles” policy. Contact the Resource Hospital for direction as soon as possible if questions exist regarding a specific patient or situation.

**Patients meeting criteria A or B: Initiate rapid transport with scene time no greater than 10 minutes.**

**Airway compromise or management by a Basic level EMS provider without ALS intercept should be transported to the nearest facility.**

## **Criteria:**

1. Presence of any of the following should strongly recommend direct transport to a Level I trauma or specialty center capable of immediate surgery / targeted invasive intervention:
  - a. Sustained hypotension (Adult  $\leq 90$ mmHg; Peds  $\leq 80$ mmHg) with mechanism or exam findings suggesting ongoing blood loss
  - b. GCS (Glasgow Coma Scale) 10 or less
  - c. GSW to the abdomen, back, chest or neck with suspicion of significant injury
  - d. Stab wound to the abdomen, back, chest or neck with suspicion of significant injury
  - e. Uncontrolled bleeding
  - f. Pulseless extremity
  - g. Unstable pelvis fracture (hemodynamically or anatomically unstable)
  - h. Paralysis (spinal cord injury)
  - i. Burns, 2nd or 3rd degree  $>24\%$  TBSA or involving face / airway not meeting other Category A criteria (Direct to Burn Center)
  - j. Amputation proximal to wrist or ankle not meeting other Category A criteria (direct to Re-Implant Center)
  - k. Cardiac Tamponade / Tension Pneumothorax
2. Presence of any of the following should strongly recommend transport to a hospital capable of urgent surgery:
  - a. Respiratory Rate 29
  - b. GCS (Glasgow Coma Scale) 11 – 12 and loss of consciousness  $> 5$  minutes
  - c. Full arrest not meeting Region 6 Field Death Declaration Criteria
  - d. Stabbing or Gunshot wound to abdomen, back, chest or neck (stable)
  - e. Flail chest / Chest wall instability

- f. Head injury with seizure activity, unilaterally dilated pupil, or open / depressed skull fracture
- g. Two or more proximal long bone fractures
- h. MVC (motor vehicle crash) with ejection
- i. Death of occupant in same passenger compartment
- j. Falls  $\geq$  20 ft (Children:  $>10$  ft or 2- 3 x height of the child)
- k. Separation of rider from motorcycle
- l. Pedestrian / bicyclist struck by vehicle and thrown or run over
- m. Vehicle rollover with unbelted passengers

**Treatment:**

1. BLS and ILS units should activate a tiered response or aeromedical transport to gain ALS level skills for the patient if they anticipate prolonged scene or transport time.
2. BLS units without mutual aid / rapid tiered response option should transport the patient to the nearest local hospital.
3. Consider aeromedical transport if quicker and of clinical benefit.
4. Pre-determined landing zones should be utilized whenever feasible for patient handoff to aeromedical teams. The landing zones should be available to all aeromedical transport agencies.

## Region 6 Guideline for the Field Triage of Injured Patients

### Injury Patterns

- RED CRITERIA**  
**High Risk for Severe Injury**
- Penetrating injuries to head, neck, torso, and proximal extremities
  - Skull deformity, suspected skull fracture
  - Suspected spinal injury with new motor or sensory loss
  - Chest wall instability, deformity, or suspected flail chest
  - Suspected pelvic fracture
  - Suspected fracture of two or more proximal long bones
  - Crushed, degloved, mangled or pulseless extremity
  - Amputation proximal to wrist or ankle
  - Active bleeding requiring a tourniquet or wound packing with continuous pressure

### Mental Status & Vital Signs

- All Patients
- Unable to follow commands (Motor GCS < 6)
  - RR < 10 or > 29 breaths/min
  - Respiratory distress or need for respiratory support
  - Room-air pulse oximetry < 90%
- |                                |
|--------------------------------|
| Age 0-9 years                  |
| SBP < 70mmHg + (2 x age years) |
| Age 10-64 years                |
| SBP < 90 mmHg or HR > SBP      |
| Age ≥ 65 years                 |
| SBP < 110 mmHg or HR > SBP     |

*Patients meeting any one of the above RED criteria should be transported to a trauma center available within the geographic constraints of the regional trauma system.*

### Mechanism of Injury

- High Risk Auto Crash
- Partial or complete ejection
- Significant Intrusion (including roof)
  - >12 inches occupant site OR
  - >18 inches any site OR
  - Need for extrication for entrapped patient
- Death in passenger compartment
- Child (Age 0-9) unrestrained or in unsecured child safety seat
- Vehicle telemetry data consistent with severe injury
- Rider separated from transport vehicle with significant impact (e.g. Motorcycle, ATV, Horse, etc)
- Pedestrian/Bicycle rider thrown, run over, or with significant impact
- Fall from height > 10 feet (all ages)

### EMS Judgment\*\*

- Consider additional risk factors including:
- Low level falls in young children (age ≤ 5 years) or older adults (age ≥ 65 years) with significant head impact
  - Anticoagulation use
  - Suspicion of child abuse
  - Special, high resource healthcare needs<sup>^</sup>
  - Pregnancy > 20 weeks
  - Burns in conjunction with trauma<sup>^^</sup>



**If concerned, take to a trauma center**

### YELLOW CRITERIA

**Moderate Risk for Severe Injury**

*Patients meeting any one of the YELLOW CRITERIA WHO DO NOT MEET RED CRITERIA should be preferentially transported to a trauma center, as available within the geographic constraints of the regional trauma system.*

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# **AMPUTATION**

**NOTE:** Do not delay transport of patient to retrieve an entrapped or lost part. Do not complete partial amputations.

## **FR/BLS TREATMENT:**

1. INITIAL TRAUMA CARE.
2. Treat for shock if indicated.
3. Tissue preservation:
  - a. Rinse part gently with normal saline if gross contamination (DO NOT SCRUB).
  - b. Wrap part in moist sterile gauze (part should never be immersed in water).
  - c. Place wrapped part in water tight bag and seal.
  - d. Label bag with name, date and time.
  - e. Place sealed bag into container filled with water and ice and transport with patient. (DO NOT PLACE DIRECTLY ON ICE)

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## **ILS/ALS TREATMENT:**

1. Continue FR/BLS TREATMENT.
2. DO NOT delay transport to obtain vascular access.
3. Consider MORPHINE SULFATE or FENTANYL as needed for pain control:
  - a. MORPHINE SULFATE 0.1 mg/kg slow IVP (max. single dose 5 mg) or 0.2 mg/kg IM (max. dose 10 mg). May repeat IVP dose x 1 after 15 minutes if needed. b. FENTANYL: IV – 1 mcg/kg slow IVP (maximum initial dose 100 mcg); may repeat x 1 after 15 minutes at 0.5 mcg/kg (maximum second dose 50 mcg). IM – 2 mcg/kg (maximum dose 100 mcg). IN – 1 mcg/kg via atomizer\*(maximum initial dose 50 mcg); may repeat x 1 after 5 minutes at 0.5 mcg/kg (maximum second dose 25 mcg).

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**\*Intranasal medications must be administered through an atomizer; Maximum volume per nostril = 1 ml.**

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                             July 2014  
                             January 2015**



# **BURNS**

**NOTE:** Use palm of child's hand to represent 1% of body surface area. All burns in pediatric patients should be assessed for abuse potential.

**CRITERIA:** Any may be present:

1. Inhalation injury.
2. Electrical injury.
3. Significant partial or full thickness burns.
4. Chemical injury.

## **FR/BLS TREATMENT:**

1. Assure scene and rescuer safety; remove patient from source of burn.
  2. INITIAL TRAUMA CARE.
  3. Obtain burn history:
    - a. Type of burn / causative agent / time of burn.
    - b. Location of burn / Injury environment
    - c. Estimate degree and percent of surface area burned (Use palm of patients hand to represent 1% of body surface area.)
  4. Assess and treat burn according to type:
    - a. Superficial thermal burns: Cool with sterile water or saline then cover with moist sterile dressings.
    - b. Partial and full thickness thermal burns: Cover burns with DRY sterile dressings.
    - c. Chemical burns: Flush with water or saline (brush off dry chemical first).
    - d. Electrical burns: Note any secondary fractures or exit wounds caused by the current.
  5. Call for intercept per INTERCEPT CRITERIA.
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## **ILS/ALS TREATMENT:**

1. Continue FR/BLS TREATMENT.
2. Consider the need for an advanced airway if signs of inhalation injury are present.
3. Administer 20 ml/kg NS or LR fluid bolus to maintain adequate perfusion. May repeat to total of 60 ml/kg.
4. Consider MORPHINE SULFATE or FENTANYL as needed for pain control:
  - a. MORPHINE SULFATE 0.1 mg/kg slow IVP (max. single dose 5 mg) or 0.2 mg/kg IM (max. dose 10 mg). May repeat IVP dose x 1 after 15 minutes if needed.
  - b. FENTANYL: IV – 1 mcg/kg slow IVP (maximum initial dose 100 mcg); may repeat x 1 after 15 minutes at 0.5 mcg/kg (maximum second dose 50 mcg).  
IM – 2 mcg/kg (maximum dose 100 mcg).  
IN – 1 mcg/kg via atomizer\*(maximum initial dose 50 mcg); may repeat x 1 after

- 5 minutes at 0.5 mcg/kg (maximum second dose 25 mcg).
5. Treat any dysrhythmias per appropriate protocol.

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# **CHEST INJURIES**

**CRITERIA:** Any may be present:

1. Penetrating or sucking chest wounds.
2. Unstable chest wall segment.
3. Signs of blunt trauma to chest.
4. Paradoxical movement.
5. Tachypnea or respiratory distress with suspected chest injury.

**FR/BLS TREATMENT:**

1. INITIAL TRAUMA CARE.
  2. Treat any obvious chest injuries, as indicated:
    - a. Apply occlusive dressing to sucking chest wounds, leaving one corner open.
    - b. Support any unstable chest wall segments with bulky dressings or hand.
    - c. Control bleeding.
  3. Call for intercept per INTERCEPT CRITERIA.
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**ILS/ALS TREATMENT:**

1. Continue FR/BLS TREATMENT.
  2. NS KVO or saline lock.
  3. Consider the need for a needle decompression:
    - a. Signs of shock
    - b. Decreased or absent breath sounds on affected side.
    - c. Tracheal deviation. (late sign)
-

# **HEAD OR SPINE TRAUMA**

**CRITERIA:** Any may be present:

1. Unresponsive or GCS < 13.
2. Posturing.
3. Unequal pupils.
4. Loss of motor and/ or sensory function.
5. Mechanism that indicates significant potential for injury.

**EXCLUSION:**

1. SBP < 90 – See SHOCK FROM TRAUMA protocol.

**FR/BLS TREATMENT:**

1. INITIAL TRAUMA CARE.
2. Assessment factors to consider:
  - a. Restlessness can be a sign of hypoxia. b. Assume cervical injury in all patients with significant head injury.
  - c. Observe patient closely for changes in LOC.
  - d. Avoid the use of nasal airways with suspected facial fractures.
  - e. Do not treat hypertension in the head-injured patient.
3. Call for intercept per INTERCEPT CRITERIA.

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**ILS/ALS TREATMENT:**

1. Continue FR/BLS TREATMENT.
  2. If unconscious or semi-conscious, manage airway according to the UNIVERSAL AIRWAY ALGORITHM; if signs of elevated intracranial pressure (posturing, unilateral pupil dilation, GCS  $\leq$  8 with hypertension/bradycardia), initiate mild hyperventilation (4 ventilations above normal rate) with 100% oxygen keeping endtidal pCO<sub>2</sub> at 33-35% if able to monitor.
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## **PAINFUL, SWOLLEN, DEFORMED EXTREMITY**

- CRITERIA:** Any may be present:
1. Obvious open fracture
  2. Dislocation
  3. Deformity
  4. Swelling
  5. Point tenderness
  6. History of injury consistent with a fracture.

### **FR/BLS TREATMENT:**

1. INITIAL TRAUMA CARE.
  2. Evaluate PMS (pulse, movement and sensation) distal to the injury.
  3. Immobilize fracture, covering open wounds with sterile gauze.
  4. Reassess PMS distal to the injury.
  5. Call for intercept per INTERCEPT CRITERIA.
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### **ILS/ALS TREATMENT:**

1. Continue FR/BLS TREATMENT.
  2. Consider MORPHINE SULFATE or FENTANYL as needed for pain control:
    - a. MORPHINE SULFATE 0.1 mg/kg slow IVP (max. single dose 5 mg) or 0.2 mg/kg IM (max. dose 10 mg). May repeat IVP dose x 1 after 15 minutes if needed.
    - b. FENTANYL: IV – 1 mcg/kg slow IVP (maximum initial dose 100 mcg); may repeat x 1 after 15 minutes at 0.5 mcg/kg (maximum second dose 50 mcg).  
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# **SHOCK FROM TRAUMA**

**CRITERIA:** Any may be present:

1. Systemic hypotension
2. Altered LOC
3. Inadequate perfusion (pale, cool & mottled)
4. Massive blood loss
5. Crush Syndrome
6. Suspected pelvis or long bone fractures

**FR/BLS TREATMENT:**

1. INITIAL TRAUMA CARE.
  2. If suspected pelvic fracture consider pelvic wrap.
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**ILS TREATMENT:**

1. Continue FR/BLS TREATMENT.
  2. Administer 20 ml/kg NS or LR fluid bolus to maintain adequate perfusion. May repeat fluid bolus to a maximum of 60 ml/kg.
  3. Consider the potential cause for shock:
    - a. Tension Pneumothorax - Needle decompression
    - b. Hemorrhage - Control bleeding, IV fluids
- 

**ALS TREATMENT:**

1. Continue ILS TREATMENT.
  2. Consider the potential cause for shock:
    - a. Tension Pneumothorax - Needle decompression
    - b. Hemorrhage - Control bleeding, IV fluids
    - c. Pericardial tamponade – Pericardiocentesis (as per Pericardiocentesis Care Guideline with Medical Control order only.)
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3. If neurogenic shock is suspected and patient is not responsive to fluid bolus, Medical Control may consider DOPAMINE at 1 gtt/5 kg/minute titrated to desired blood pressure.

# **TRAUMATIC ARREST**

## **FR/BLS TREATMENT:**

1. Initiate CPR.
  2. Initial TRAUMA CARE.
  3. Attempt to maintain inline stabilization throughout assessment and treatment.
  4. Rapid extrication should be utilized if patient is entrapped.
  5. Apply AED. 6. Load and Go within 10 minutes unless patient is entrapped.
  7. Initiate transport. \*\* Call for intercept per INTERCEPT CRITERIA.
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## **ILS TREATMENT:**

1. Continue FR/BLS TREATMENT.
  2. EPINEPHRINE (1:10,000) 0.01mg/kg IV/IO q 3-5 minutes as long as patient remains pulseless.\*
  3. Initiate 2 large bore IV's of NS or LR; Run wide open until patient regains pulse. If a pulse returns then maintain a SBP of 90-100.
  4. Treat subsequent dysrhythmias per appropriate protocol.
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## **ALS TREATMENT:**

1. Continue ILS TREATMENT.
  2. Assess for signs of pericardial tamponade.
  3. If present, Medical Control may order Pericardiocentesis as per Pericardiocentesis Care Guideline.
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