SECTION: Pediatric Trauma Emergencies

PROTOCOL TITLE: Injury – Head Injury

REVISED: 06/2017

Protocol 10-4

HEAD INJURY

OVERVIEW:
Brain injury and its accompanying pathologic processes continue to be the leading cause of mortality associated with trauma. Whether the injury is due to a blunt or penetrating mechanism, bleeding or swelling of the brain and surrounding tissue may lead to an increase in pressure within the cranial cavity, otherwise known as intracranial pressure, (ICP). If pressure within the skull is not controlled, neurologic changes may produce signs and symptoms ranging from headache to coma with loss of protective reflexes. Blunt force trauma may result in scalp injury, skull fracture, and meningeal and brain tissue injury. Penetrating trauma may produce focal or diffuse injury, depending on the velocity of the penetrating object. Although the pre-hospital provider cannot reverse the brain tissue damage from the initial / primary brain injury that has already occurred, they can play a major role in preventing or limiting the processes that exacerbate and lead to a secondary brain injury. The pre-hospital provider's goal is to focus on reversing any hypoxia, hypotension, hypercarbia, acidosis, or increasing intracranial pressure.

HPI	Signs and Symptoms	Considerations
• Time of injury • Mechanism: blunt vs penetrating • Loss of consciousness • Bleeding • Past medical history • Medications • Evidence of multi-system trauma	• Pain, swelling, bleeding • Altered mental status, unconsciousness • Respiratory distress, failure • Vomiting • Seizure • Major traumatic mechanism of injury	• Skull fracture • Brain injury (concussion, contusion, hemorrhage, or laceration • Epidural hematoma • Subdural hematoma • Subarachnoid hemorrhage • Spinal injury • Abuse

	EMR	EMT	A	I	P
1. Perform general patient management and baseline GCS.	•	•	•	•	•
2. Support life-threatening problems associated with airway, breathing, and circulation. Obtain mechanism or injury.	•	•	•	•	•
3. Administer oxygen to maintain *SPO_2* 94 - 99%. Consider supporting respirations with a BVM. If signs of hypoventilation are present, ventilate with BVM at an age appropriate rate.	•	•	•	•	•
4. Monitor *capnography* if BVM or intubated/alternative airway. Attempt to maintain between 35 - 45 mm Hg.		•	•	•	•

HEAD INJURY

	EMR	EMT	A	I	P
5. Consider spinal precautions based on MOI. Avoid excessive compression around the neck by cervical collar. Assess and document PMS in all extremities before and after movement.		•	•	•	•
6. Place patient on cardiac monitor.				•	•
7. Establish an IV of normal saline, if indicated, to maintain an appropriate systolic BP: a. Birth to 1 month – 60 mmHg b. 1 month to 1 year – > 70 mmHg c. Greater than 1 year - 70 + [2 x Age (years)]			•	•	•
8. Obtain a blood glucose sample.		•	•	•	•
9. If patient is exhibiting signs of shock, refer to *Pediatric Shock protocol.*		•	•	•	•
10. Transport per *Trauma Triage Scheme* and perform ongoing assessment as indicated.		•	•	•	•

PEARLS:

1. Hyperventilation is not recommended with head-injury patients.
2. One of the most important indicators of worsening head injury is a change in LOC and / or GCS.
3. Increased ICP may cause hypertension and bradycardia (Cushing's response).
4. Hypotension usually indicates injury or shock unrelated to the head injury and should be treated aggressively.
5. A decrease of two (2) or more in the patient's GCS should be considered due to a severe head injury until proven otherwise.
6. Recognize that "normal" blood pressure is not as important as "normal for the patient" when assessing maintenance of adequate cerebral blood flow and adequate cerebral perfusion.

Glasgow Coma Scale Modified for Pediatric Patients	
Eye Opening Response	<1 year
4	Spontaneous
3	To shout
2	To pain
1	None
Verbal Response	0 to 2 years
5	Babbles, coos appropriately
4	Cries but inconsolably
3	Persistent crying or screaming in pain
2	Grunts or moans to pain
1	None
Motor Response	<1 year
6	Spontaneous
5	Localizes pain
4	Withdraws to pain
3	Abnormal flexion to pain (decerebrate)
2	Abnormal extension to pain (decordicate)
1	None

This page intentionally
left blank.