Trauma - Head
Pediatric After-Hours Version

- DEFINITION -
* Injuries to the head including scalp, skull and brain trauma

- INITIAL ASSESSMENT QUESTIONS -
1. MECHANISM: "How did the injury happen?" For falls, ask: "What height did he fall from?" and "What surface did he fall against?" (Suspect child abuse if the history is inconsistent with the child’s age or the type of injury.)
2. WHEN: "When did the injury happen?" (Minutes or hours ago)
3. NEUROLOGICAL SYMPTOMS: "Was there any loss of consciousness?" "Are there any other neurological symptoms?"
4. MENTAL STATUS: "Does your child know who he is, who you are, and where he is? What is he doing right now?"
5. LOCATION: "What part of the head was hit?"
6. SCALP APPEARANCE: "What does the scalp look like? Is it bleeding now?" If so, ask: "Is it difficult to stop?"
7. SIZE: For any cuts, bruises, or lumps, ask: "How large is it?" (Inches or centimeters)
8. PAIN: "Is there any pain?" If so, ask: "How bad is it?"
9. TETANUS: For any breaks in the skin, ask: "When was the last tetanus booster?"

- BACKGROUND INFORMATION -

TYPES OF HEAD TRAUMA
* Scalp trauma: cut, scrape, bruise or scalp hematoma (goose egg)
* Skull Trauma: bruises, fracture
* Concussion: usually a brief loss of consciousness (LOC) with amnesia for the event. A child can have a concussion even without LOC (eg, with any altered mental status findings such as brief confusion). A concussion heralds a potentially serious head injury and requires further evaluation.
* Brain trauma: recognized by the presence of Acute Neurological Symptoms: (1) Difficult to awaken OR (2) confused or slow thinking and talking OR (3) slurred speech OR (4) weakness of arms OR (5) unsteady walking.
* Note: The delayed onset of Acute Neurological Symptoms are also included in the EMS (911) category if they persist.
* EXCEPTION: The following acute symptoms do not require an EMS (911) response: Headache, dizziness, vomiting or blurred vision as an isolated symptom.

LACERATIONS: INDICATIONS FOR SUTURING
* Any cut that is split open or gaping probably needs sutures.
* Cuts longer than 1/2 inch (12 mm) usually need sutures.
* On the face, cuts longer than 1/4 inch (6 mm) need sutures.
* Any open wound that may need sutures should be evaluated by a physician and closed as soon as possible to get the best results.
* All open wounds, regardless of the time that has passed since the initial injury, need to be treated to prevent wound infection.

UK RULE FOR PREDICTING SERIOUS HEAD INJURIES (DUNNING 2006)
A prospective study on 22,772 children with head injuries led to the development of a decision rule to identify children at high risk of intracranial complications. The rule has a sensitivity of 98% and specificity of 87%. The data comes from children seen at 10 hospital emergency departments in England. The following is the study's list of high risk factors. All of them were already included in the Head Trauma guideline as indicators to be seen.

### History
- Witnessed loss of consciousness of > 5 minutes duration
- History of amnesia of > 5 minutes duration
- Abnormal drowsiness
- 3 or more vomits after head injury (a vomit is defined as a single discrete episode of vomiting)
- Suspicion of non-accidental injury
- Seizure after head injury in a patient who has no history of epilepsy

### Examination
- Glasgow Coma Score (GCS) < 14, or GCS < 15 if < 1 year old
- Suspicion of penetrating or depressed skull injury or tense fontanelle
- Signs of a basal skull fracture (defined as evidence of blood or cerebrospinal fluid from ear or nose, panda eyes, Battles sign, hemotympanum, facial crepitus or serious facial injury)
- Positive focal neurology (defined as any focal neurology, including motor, sensory, coordination or reflex abnormality)
- Presence of bruise, swelling or laceration > 5 cm (2 inches) if < 1 year old

### Mechanism
- High-speed road traffic accident either as pedestrian, cyclist or occupant (defined as accident with speed > 40 miles per hour)
- Fall of > 3 meters (10 feet) in height
- High-speed injury from a projectile or an object

### DANGEROUS MECHANISMS OF INJURY
- Children who have a dangerous mechanism of injury should be referred for medical evaluation immediately.
- High-risk injuries include free-falls from a great height: e.g., twice the child's height, > 10 feet for school-age children, from parent's arms for infants, diving, etc. This includes most falls down stairways.
- If a child is in a walker at the time, the risk for a serious injury is greatly increased.
- High-speed injuries also carry a greater risk of serious injury (e.g., hit by a car, or passenger in MVA).
- Severe blows from a hard object (e.g., golf club or baseball bat)
- Dangerous injuries for severe neck injuries include trampolines, diving, contact sports, etc.

### VOMITING AS MARKER FOR INTRACRANIAL INJURY

Vomiting occurs in 14 to 19% of children sent to an ED for evaluation of head trauma. Two recent studies looked at the predictive value of vomiting for intracranial injury (ICI) documented by CT scan. Palchak (2003) found an 11.4% incidence of ICI and a 2.3 relative risk with vomiting. Haydel (2003) found a 2.46 relative risk. Based on these 2 studies, in 2004 this triage guideline now refers in any child who has vomiting 2 or more times following a head injury. (Note: neither pediatric study addressed how many times the child had vomited ). An excellent editorial by Greenes (2003) raises questions about the specificity and cost-effectiveness of some soft indications for CT. However, having these patients evaluated neurologically is a safe step.
CONCUSSION: EARLY SYMPTOMS (adapted from Gedeit 2001)
* Definition: altered mental status following a traumatic event. Loss of consciousness is not required.
* Amnesia for the event, retrograde amnesia or memory deficit
* Vacant stare, blank look or visual abnormalities
* Confusion or 'foggy' feeling
* Slurred speech
* Inappropriate or exaggerated emotions
* Dizziness or incoordination
* Headache
* Nausea

CONCUSSION CLASSIFICATION (American Academy of Neurology, 1997)
* Grade 1: Confusion and post-traumatic amnesia < 15 minutes, no LOC (loss of consciousness)
* Grade 2: Confusion and amnesia > 15 minutes, no LOC
* Note: Pre-traumatic (retrograde) amnesia is more serious than post-traumatic amnesia
* Grade 3: Any LOC

When to return to sports: guidelines for physicians:
* Grade 1: After normal neurologically for 20 minutes
* Grade 2: After normal neurologically for 1 week
* Grade 3: After normal neurologically for 4 weeks
* Caution: all children with concussions need a neurological exam. Multiple concussions require longer periods of recovery. The reason we sideline athletes who have a concussion is to prevent the 'second impact injury'. This is a second concussion that occurs within 1 or 2 weeks after the first one. The outcome can be catastrophic or even death.

EXTERNAL OCCIPITAL PROTUBERANCE (EOP): CONFUSION WITH HEMATOMAS

The EOP is a normal bony prominence found at the base of the skull (located at the lower midline of the occipital bone.) It is bony and feels like a hard knot. Its size can vary greatly. Following a fall or other head trauma, some callers (who have never felt it before) attribute it to the fall. The triager’s job is to avoid calling any lump at this site a hematoma. Usually additional questioning will pinpoint the classic site, that it feels like bone and that’s it’s non-tender. Many callers are reassured by being told how to feel their own EOP.

FIRST AID

FIRST AID ADVICE FOR SPINAL CORD INJURY: Do not move child until a spine board is applied.

FIRST AID ADVICE FOR BLEEDING: Apply direct pressure to the entire wound with a clean cloth.

FIRST AID ADVICE FOR SHOCK: Lie down with the feet elevated.

FIRST AID ADVICE FOR PENETRATING OBJECT: If penetrating object still in place, don’t remove it (Reason: removal could increase internal bleeding).
REFERENCES


SEARCH WORDS
AMNESIA
BLACK EYES
BRAIN
BRAIN TRAUMA
BRIEF LOSS OF CONSCIOUSNESS
CNS
CONCUSSION
DIFFICULT TO AWAKEN
EPIDURAL HEMATOMA
FALLS
GOOSE EGG
HEAD
HEAD INJURIES
HEAD INJURY
HEAD TRAUMA
HEADACHE
INJURIES
INJURY
LOC
LOSS OF CONSCIOUSNESS
NECK PAIN
NEURO
RACCOON EYES
SCALP
SCALP BLEEDING
SCALP HEMATOMA
SCALP INJURY
SCALP LACERATION
SEIZURE
SKULL FRACTURE
SUBDURAL HEMATOMA
TRAUMA
UNCONSCIOUS
UNCONSCIOUSNESS

- TRIAGE -

Call EMS 911 Now

[1] Major bleeding (actively dripping or spurting) AND [2] can't be stopped

FIRST AID: apply direct pressure to the entire wound with a clean cloth
CA:  50,  10

[1] Large blood loss AND [2] fainted or too weak to stand

R/O: impending shock
FIRST AID: have child lie down with feet elevated
CA:  50,  10

[1] ACUTE NEURO SYMPTOM AND [2] symptom persists (DEFINITION: difficult to awaken or keep awake OR confused thinking and talking OR slurred speech OR weakness of arms OR unsteady walking)

R/O: cerebral contusion, subdural or epidural hematoma
CA:  50,  10

Seizure (convulsion) occurred

CA:  50,  10

Knocked unconscious for more than 1 minute

CA:  50,  10


FIRST AID: protect the neck from movement. Don't move until a neck brace is applied.
CA:  50,  11,  10

Penetrating head injury (eg arrow, dart, pencil)

FIRST AID: do not remove the object before being seen
Reason: could initiate severe bleeding
CA:  50,  10

Sounds like a life-threatening emergency to the triager

CA:  50,  10

See More Appropriate Guideline

Scalp wound looks infected

Go to Guideline: Wound Infection (Pediatric)
Go to ED Now

Neck pain or stiffness (not moving neck normally)

*R/O: cervical spine injury
*FIRST AID: Discuss protecting the neck from movement before driving in

*CA:  51, 12, 17, 13, 10


(R/O: need for sutures)

*CA:  51, 14, 13, 10

Skin is split open or gaping (or length > ¼ inch or 6 mm on the face)

*R/O: need for sutures

*CA:  51, 17, 15, 13, 10

Can't remember what happened (amnesia)

Reason: probably concussion, but needs neuro exam

*CA:  51, 17, 13, 10

[1] Large swelling AND [2] size > 2 inches (5 cm) (For age < 12 months: size > 1 inch or 2.5 cm) EXCEPTION: external occipital protuberance

*R/O: severe injury causing large hematoma

*CA:  51, 17, 13, 3, 10

Skull has a large dent (especially if hit the edge of something)

*R/O: depressed skull fracture

*CA:  51, 17, 13, 10


*R/O: raccoon eyes from basilar skull fracture

*CA:  51, 17, 13, 10

Dangerous mechanism of Injury caused by high speed (e.g. MVA), great height (eg twice the child’s height) or severe blow from hard objects (eg golf club)

Reason: increased risk of injury

*CA:  51, 17, 13, 10

Sounds like a serious injury to the triager

*CA:  51, 17, 13, 10

Go to ED Now (or PCP triage)

[1] ACUTE NEURO SYMPTOM AND [2] now fine (DEFINITION: difficult to awaken OR confused thinking and talking OR slurred speech OR weakness of arms OR unsteady walking)

*R/O: concussion causing transient neuro symptom

*CA:  52, 17, 13, 10

*R/O: concussion
*CA: 52, 17, 13, 10

Age < 3 months (90 days) (EXCEPTION: very minor type of injury)

*Reason: difficult to assess
*CA: 52, 17, 13, 10


*Reason: neuro status difficult to assess by phone
*CA: 52, 17, 13, 10

[1] SEVERE headache or crying AND [2] not improved after 20 minutes of cold pack

*R/O: severe injury
*CA: 52, 17, 13, 10

Watery or blood-tinged fluid dripping from the NOSE or EARS now
(EXCEPTION: tears from crying)

*R/O: CSF leak from basilar skull fracture
*CA: 52, 17, 13, 10

[1] Vomited 2 or more times AND [2] within 3 days of injury

*CA: 52, 13, 17, 10


*CA: 52, 17, 13, 10

Suspicious history for the injury (especially age < 1 yo)

*R/O: child abuse
*CA: 52, 17, 13, 10

High-risk child (e.g. bleeding disorder, V-P shunt, CNS disease)

*CA: 52, 17, 13, 10


*CA: 52, 13, 10

**See PCP When Office is Open (within 3 days)**

[1] DIRTY cut or scrape AND [2] last tetanus shot > 5 years ago

*CA: 55, 21, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10


*R/O: skull fracture, post-concussion syndrome
*CA: 55, 18, 19, 10

**Home Care**
Scalp swelling, bruise or pain

*Reason: minor head injury and all triage questions negative*

*CA: 58, 1, 3, 4, 5, 6, 7, 8, 9, 10*

Small cut or scrape also present (all triage questions negative)

*CA: 58, 22, 23, 24, 25, 10*

[1] Transient pain or crying AND [2] no visible injury (all triage questions negative)

*CA: 58, 16, 4, 5, 7, 19, 10*

External occipital protuberance, concerns about (all triage questions negative)

*CA: 58, 27, 4, 5, 7, 19, 10*

[1] Black eye (bruise around the eye) AND [2] onset > 24 hours following a forehead bruise (all triage questions negative)

*CA: 58, 26, 19, 10*
- CARE ADVICE (CA) -

1. **REASSURANCE:** It sounds like a scalp injury rather than a brain injury or concussion. Treatment at home should be safe.

2. **BLEEDING:** If there is a scrape or cut, wash it off with soap and water. Then apply pressure with a sterile gauze for 10 minutes to stop any bleeding.

3. **LOCAL COLD:** Apply a cold pack or ice bag wrapped in a wet cloth to any SWELLING for 20 minutes. Big lumps (called goose eggs) are common. Repeat in 1 hour, then prn.

4. **OBSERVATION:** Observe your child closely during the first 2 hours following the injury.
   - Encourage your child to lie down and rest until all symptoms have cleared. (Reassure the parent that mild headache, mild dizziness and nausea are common).
   - Allow your child to sleep if he wants to, but keep him nearby.
   - Awaken after 2 hours of sleeping to check the ability to walk and talk.

5. **DIET:** Offer only clear fluids to drink, in case he vomits. Regular diet OK after 2 hours.

6. **AVOID PAIN MEDICINES:** If the headache is that bad, he needs to be examined.

7. **SPECIAL PRECAUTIONS AT NIGHT:**
   - Awaken your child at the parents' bedtime and again 4 hours later for 2 nights.
   - Sleep in same room as your child for 2 nights.
   - After 48 hours, return to a normal routine.

8. **EXPECTED COURSE:** Most head trauma only causes a scalp injury. The swelling may take a week to resolve. The headache at the site of impact usually clears in 2 to 3 days.

9. **CALL BACK IF**
   - Severe pain/crying persists after 20 minutes of ice pack
   - Neurological symptoms occur during the next 3 days
   - Your child vomits or becomes worse

10. **CARE ADVICE** per Trauma - Head (Pediatric) guideline.

11. **PROTECT the NECK** from any turning or bending. Do not move your child until a neck brace or spine board has been applied.

12. **NECK:** Encourage your child not to move the neck until seen.

13. **NPO:** Do not allow any eating or drinking. Also avoid pain medicines until seen. (Reason: condition may need surgery and general anesthesia)

14. **BLEEDING:** Continue direct pressure with a sterile gauze or cloth until seen.
15. DRESSING: Cover with a sterile gauze or cloth until seen.

16. REASSURANCE: If your child is now acting normal and there is no swelling or bruise, the injury sounds like a minor one. Your child should do fine.

17. BLEEDING: Apply gentle pressure to stop any bleeding. Don't wash this wound before coming in (Reason: could be an open fracture)

18. PAIN: For pain relief, give acetaminophen every 4 hours OR ibuprofen every 6 hours as needed. (See Dosage Table)

19. CALL BACK IF
- Your child becomes worse.

20. N/A

21. TETANUS for DIRTY CUTS: If last tetanus shot was given > 5 years ago, your child needs a booster. See PCP as soon as office is open (3 days or less).

22. REASSURANCE: It sounds like a small cut or scrape that we can treat at home.

23. CUT or SCRAPE:
- Wash the wound with soap and water for 5 minutes.
- For any dirt, scrub gently with a wash cloth.
- For any bleeding, apply direct pressure with a sterile gauze for 10 minutes.
- Apply an antibiotic ointment (OTC) 3 times per day.
- For large scrapes or cuts, cover with a Band-Aid. Change daily or if gets wet.

24. TETANUS for CLEAN CUTS and SCRAPES: If last tetanus shot was given > 10 years ago, needs a booster. Call PCP during regular office hours (within 3 days).

25. CALL BACK IF
- Dirt in the wound persists after scrubbing
- Looks infected (pus, redness)
- Doesn’t heal within 10 days

26. BLACK EYES: Most bruises occur on the forehead. The blood in these bruises can spread downward with gravity and cause black eyes on 1 or both sides. The black eyes begin about 3 days after the forehead bruise and can last 2 weeks. No special treatment is necessary or helpful.

27. REASSURANCE:
- The lump you feel at the base of the skull is a normal bony prominence.
- If you feel carefully, you will find one on yourself or other children
- This is not caused by your child’s injury.

50. CALL EMS 911 NOW: Your child needs immediate medical attention. You need to hang up and call 911 (or an ambulance). (Triager Discretion: I'll call you back in a few minutes to be sure you were able to reach them.)

51. GO TO ED NOW: Your child needs to be seen in the Emergency Department immediately. Go to the ER at ____________ Hospital. Leave now. Drive carefully.
52. **GO TO ED NOW (or PCP triage)**
   IF NO PCP TRIAGE: Your child needs to be seen within the next hour. Go to the ER/UCC at _____________ Hospital. Leave as soon as you can.
   IF PCP TRIAGE REQUIRED: Your child may need to be seen. Your doctor will want to talk with you to decide what's best. I'll page him now. If you haven't heard from the on-call doctor within 30 minutes, or your child becomes worse, go directly to the ER/UCC at _____________ Hospital.

53. **SEE PHYSICIAN WITHIN 4 HOURS (or PCP triage)**
   IF NO PCP TRIAGE: Your child needs to be seen. Go to _______________ (ED/UCC or office if it will be open) within the next 3 or 4 hours. Go sooner if your child becomes worse.
   IF PCP TRIAGE REQUIRED: Your child may need to be seen. Your doctor will want to talk with you to decide what's best. I'll page him now. If you haven't heard from the on-call doctor within 30 minutes, call again. (Note: If PCP can't be reached, send to ED/UCC or office.)

54. **SEE PHYSICIAN WITHIN 24 HOURS**
   IF OFFICE WILL BE OPEN: Your child needs to be examined within the next 24 hours. Call your child's doctor when the office opens, and make an appointment.
   IF OFFICE WILL BE CLOSED AND NO PCP TRIAGE:
   Your child needs to be examined within the next 24 hours. Go to __________ at your convenience.
   IF OFFICE WILL BE CLOSED AND PCP TRIAGE REQUIRED:
   Your child may need to be seen within the next 24 hours. Your doctor will want to talk with you to decide what's best. I'll page him now. (EXCEPTION: from 10 pm to 7 am. Since this isn't serious, we'll hold the page until morning.)

55. **SEE PCP WITHIN 3 DAYS**: Your child needs to be examined within 2 or 3 days. Call your child's doctor during regular office hours and make an appointment.

56. **SEE PCP WITHIN 2 WEEKS**: Your child needs an evaluation for this ongoing problem within the next 2 weeks. Call your child's doctor during regular office hours and make an appointment.

57. **FOLLOW-UP**: Discuss _______ with your child's doctor at the next regular office visit (Call sooner if you become more concerned.)

58. **HOME CARE**: You should be able to treat this at home.

59. **CALL PCP NOW**: You need to discuss this with your child's doctor. I'll page him now. If you haven't heard from the on-call doctor within 30 minutes, call again.

60. **CALL PCP WITHIN 24 HOURS**: You need to discuss this with your child's doctor within the next 24 hours.
   IF OFFICE WILL BE OPEN: Call the office when it opens tomorrow morning.
   IF OFFICE WILL BE CLOSED: I'll page him now. (EXCEPTION: from 9 pm to 9 am. Since this isn't urgent, we'll hold the page until morning.)

61. **CALL PCP WHEN OFFICE IS OPEN**: You need to discuss this with your child's doctor within the next few days. Call him/her during regular office hours.