Injuries to the head

TRIAGE ASSESSMENT QUESTIONS

Call EMS 911 Now

Acute Neuro 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

A seizure (convulsion) > 1 minute

Knocked unconscious > 1 minute

Not moving neck normally and began within 1 hour of injury (Exception: whiplash injury without any impact)

R/O: cervical spine injury. First Aid: Discuss protecting the neck from movement before transferring the call

Major bleeding that can't be stopped

Sounds like a life-threatening emergency to the triager

See More Appropriate Protocol

Concussion diagnosed by HCP

Go to Protocol: Concussion Follow-up Call (Pediatric)

Wound infection suspected (cut or other wound now looks infected)

Go to Protocol: Wound Infection Suspected (Pediatric)

Go to ED Now

Altered mental status suspected in young child (awake but not alert, not focused, slow to respond)

R/O: concussion, intracranial bleed

Neck pain or stiffness

R/O: cervical spine injury, whiplash injury, muscle strain

Seizure for < 1 minute and now fine

R/O: post-traumatic seizure

Blurred vision persists > 5 minutes

Can't remember what happened (amnesia) or inability to store new memories

Reason: probably concussion

Go to ED Now (or to Office with PCP Approval)

Knocked unconscious < 1 minute and now fine

R/O: concussion
Bleeding that won't stop after 10 minutes of direct pressure

*R/O: laceration*

Skin is split open or gaping (if unsure, refer in if cut length > 1/2 inch or 12 mm on the skin, 1/4 inch or 6 mm on the face)

*R/O: need for sutures*

Large dent in skull caused by edge of something (Exception: hit flat surface)

*R/O: depressed skull fracture*

Acute Neuro Symptom and now fine

*R/O: concussion causing transient neuro symptom*

Dangerous mechanism of injury caused by high speed (e.g., MVA), great height (e.g., under 2 years: 3 feet; over 2 years: 5 feet) or severe blow from hard object (e.g., golf club)

*Reason: increased risk of injury warrants neuro exam*

Vomited 2 or more times within 24 hours of injury

High-risk child (e.g., bleeding disorder, V-P shunt, brain tumor, brain surgery)

Sounds like a serious injury to the triager

**Go to Office Now**

Age under 2 years with large swelling over 2 inches or 5 cm (for age under 12 months: size over 1 inch)

*R/O: severe injury*

Age < 6 months (Exception: very minor type of injury)

*Reason: difficult to assess; consider NAT*

Age < 24 months with fussiness or crying now

*Reason: neuro status difficult to assess by phone*

Watery fluid dripping from the nose or ear while child not crying

*R/O: CSF leak from basilar skull fracture*

SEVERE headache or crying not improved after 20 minutes of cold pack

*R/O: severe injury*

Suspicious story for injury (especially if not yet crawling)

*R/O: child abuse*

Mild concussion suspected by triager

**See Today in Office**

Headache persists > 24 hours

*R/O: skull fracture, post-concussion syndrome*

**See Within 3 Days in Office**

Scalp area tenderness persists > 3 days

*R/O: skull fracture*

No tetanus shot in > 5 years for DIRTY cuts ( > 10 years for CLEAN cuts)
Home Care

Minor head injury

Home Care Advice for Minor Scalp Injuries

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

2. **Wound Care:**
   - 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. **Cold Pack for Pain or Swelling:**
   - For pain or swelling, use a cold pack. You can also use ice wrapped in a wet cloth. Put it on the area for 20 minutes.
   - Repeat in 1 hour, then as needed.
   - Reason: Prevent big lumps ("goose eggs"). Also, reduces pain and helps stop any bleeding.
   - Caution: Avoid frostbite.

4. **Watch Your Child Closely for 2 Hours:**
   - 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. (Note: 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 - Start with Clear Fluids:**
   - Offer only clear fluids to drink, in case he vomits.
   - Return to regular diet after 2 hours.

6. **Pain Medicine:**
   - For pain relief, give acetaminophen every 4 hours OR ibuprofen every 6 hours as needed (See Dosage Table)
   - Never give aspirin to children and teens (Reason: always increases risk of bleeding).
   - Exception: Avoid until 2 hours have passed from injury without any vomiting

7. **Special Precautions for 2 Nights:**
   - Mainly, sleep in same room as your child for 2 nights.
   - Reason: If a complication occurs, you will recognize it because your child will first develop a severe headache, vomiting, confusion or other change in their behavior.
   - Optional: If you are worried, awaken your child once during the night. Check the ability to walk and talk.
   - After 48 hours, return to a normal routine.

8. **Expected Course:**
   - Most head impact only causes a scalp injury.
   - The swelling may take a week to resolve.
   - The scalp tenderness at the site of impact usually clears in 3 days.
Types of Head Injuries

- **Scalp Injury**: Most head injuries only damage the scalp (a cut, scrape, bruise or swelling). It is common for children to fall and hit their head at some point while growing up. This is especially common when a child is learning to walk. Big lumps (bruises) can occur with minor injuries because there is a large blood supply to the scalp. For the same reason small cuts on the head may bleed a lot. Bruises on the forehead sometimes cause black eyes 1 to 3 days later because the blood spreads downward by gravity.

- **Skull Fracture**: Only 1% to 2% of children with head injuries will get a skull fracture. Usually there are no other symptoms except for a headache at the site where the head was hit. Most skull fractures occur without any injury to the brain and they heal easily.

- **Concussion**: A concussion is a mild injury to the brain that changes how the brain normally works. It is usually caused by a sudden blow or jolt to the head. Many children bump or hit their heads without causing a concussion. The most common signs of a concussion are a brief period of confusion or memory loss following the injury. Other signs of a concussion can include a headache, vomiting, dizziness, acting dazed, or being knocked out. A person does NOT need to be knocked out (lose consciousness) to have had a concussion. Following a concussion, some children have ongoing symptoms such as mild headaches, dizziness, thinking difficulties, school problems or emotional changes for several days to weeks.

- **Brain Injuries** are rare but are recognized by the presence of the following Acute Neurological Symptoms: (1) Difficult to awaken or keep awake, OR (2) confused thinking and talking, OR (3) slurred speech, OR (4) weakness of arms or legs, OR (5) unsteady walking.

**Pain Severity Scale**

- **Mild**: doesn’t interfere with normal activities
- **Moderate**: interferes with normal activities or awakens from sleep
- **Severe**: excruciating pain, unable to do any normal activities, incapacitated by pain

**Assessment of Pain Severity**: Base it on the child's current behavior. Ask: "What does the pain keep your child from doing?" Do not ask: "Is the pain Mild, Moderate or Severe?" Reason: Many parents and teens will choose "Severe".
U.S. Rule for Predicting Serious Head Injuries (Kuppermann 2009)

This study analyzed 42,412 patients younger than 18 years presenting to the emergency department within 24 hours of head injury. Data was obtained across 22 hospitals within the Pediatric Emergency Care Applied Research Network in the U.S. All of the identified risk factors are included in the Head Trauma protocol.

Results: The study identified the following risk factors for intracranial complications. If all of the risk factors are absent, the negative predictive value is 100% for clinically-important traumatic brain injury (ciTBI). Approximately 4% of children with altered mental status or evidence of skull fracture will have ciTBI.

History

- Presence of altered mental status (e.g., agitation, sleepiness, slow responsiveness, repetitive questioning)
- Loss of consciousness over 5 seconds
- Severe headache
- Any vomiting (Author’s note: Vomiting once is often associated with the initial hard crying and pain).
- Parental report of abnormal behavior

Examination

- Scalp hematoma other than frontal (for children under 2 years)
- Signs of basilar skull fracture

Mechanism (Severe injury mechanism)

- MVC with ejection from motor vehicle, death of other passenger, rollover
- Pedestrian or unhelmeted bicyclist struck by motor vehicle
- Fall over 5 feet if 2 years or older
- Fall over 3 feet if under 2 years
- Struck by high-impact object (e.g., golf club or baseball bat)

Falls and Dangerous Heights

- Premise: The greater the height of the fall, the more severe the potential injury. Most injuries are seen with falls from heights greater than 5 feet. Mortality rates increase with falls from heights greater than 15 feet (Judy, Pediatrics in Review 2011).
- Falls: Ground-level falls or running into a stationary object are not considered to be high risk.
- Free-falls from a great height are considered high risk. A US study (Kuppermann 2009) defined these heights as over 3 feet for age under 2 years, and over 5 feet for age over 2 years. A similar study from the UK (Dunning 2006) defined the height as twice the child’s height or over 10 feet for school-age children.
- This guideline uses the more conservative cutoffs (3 and 5 feet).
- Practical implication: Countertops are usually 3 feet. Washers and dryers, shopping carts and from parent’s arms are usually over 3 feet. Tables and desks are usually 2 ½ feet. Highchair seats are usually 2 feet.
- Falls down stairways: Since most children roll down the stairs, these accidents are not equivalent to free falls. Nurse judgment is required in these cases. We are most concerned about pre-verbal children younger than 2 years. They need to be seen unless they fall a short distance (e.g., less than 6 stairs). Reason: Standard stair risers are 6 inches each. If a child is in a walker at the time, the risk for a serious injury is greatly increased. Children over age 2 can usually be triaged on the basis of symptoms. A steep concrete stairway is dangerous at any age. So is a free fall that doesn’t include rolling or tumbling.
- Sports that involve height: Dangerous sports for severe neck injuries include trampolines, cheerleading stunts and diving.
Acute Concussion - Symptoms (adapted from McCrory 2009 and Gedeit 2001)

- Loss of consciousness (LOC): only 10-20% of concussions have LOC. LOC prolonged over 1 minute suggests a more serious injury.
- Amnesia for the event, retrograde amnesia or memory deficit. Longer duration of amnesia is more serious.
- Vacant stare, blank look or visual abnormalities
- Altered mental status (e.g., confusion or feeling like "in a fog")
- Slurred speech
- Inappropriate or exaggerated emotions (emotional lability)
- Dizziness or incoordination
- Headache
- Nausea or vomiting
- Cognitive impairment (e.g., slow reaction times)
- Drowsiness or other sleep disturbances

Concussion Treatment

- Treating a concussion requires both Physical Rest and Brain Rest. If symptoms occur (such as headache), the child needs to do less. In 24 hours, they can try again to do the next level.
- Brain rest means a gradual return to full studying and school attendance.
- Physical rest means a gradual return to normal activity, work and gym class.
- Athletes involved in sports need to have a stepwise plan for "return to play". Progressing through stages should be supervised by a doctor or athletic trainer.

Expert Reviewer:

- Joseph A Grubenhoff MD, Pediatric Emergency Medicine and ED Liaison to Trauma Quality Improvement Committee, Children's Hospital Colorado, Aurora, Colorado.

REFERENCES


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