Head Injury

Office Hours Telephone Triage Protocols | Pediatric | 2019

DEFINITION

• Injuries to the head

PAIN SEVERITY is defined as:

• **MILD:** doesn't interfere with normal activities
• **MODERATE:** interferes with normal activities or awakens from sleep
• **SEVERE:** excruciating pain, can't do any normal activities, severe crying
• 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".

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/UCC 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 (especially if hit the edge of something)

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

Discuss with PCP and Callback by Nurse Today

Dirty minor wound and 2 or less tetanus shots (such as vaccine refusers)

Reason: needs tetanus shot and may need Tetanus Immune Globulin (TIG)

See Within 3 Days in Office

Scalp area tenderness persists > 3 days

R/O: skull fracture

For DIRTY cut or scrape, last tetanus shot > 5 years ago

For CLEAN cut or scrape, last tetanus shot > 10 years ago

Triager thinks child needs to be seen for non-urgent problem

Caller wants child seen for non-urgent problem

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.
- Swelling of the scalp does not mean there is any swelling of the brain. The scalp and brain are not connected. They are separated by the skull bone.
- Big lumps or bruising can occur with minor scalp injuries. This is normal. Reason: The scalp has a large blood supply.
- 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.
- After 2 hours awaken your child.
- Check that he is alert and knows who you are. Also check that he can talk and walk normally.

5.] **Diet - Start with Clear Fluids:**
- Offer only clear fluids to drink, in case he vomits.
- Return to regular diet after 2 hours.
- Exception: Babies can continue breast feeding or formula.

6.] **Pain Medicine:**
- For pain relief, give acetaminophen every 4 hours OR ibuprofen every 6 hours as needed (See Dosage Table)
- Caution: 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.
- Also, don't continue pain medicine more than 3 days without seeing your child's PCP.

7.] **Special Precautions for 1 Night:**
- Mainly, sleep in same room as your child for the first night.
- 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 24 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.

9.] **Tetanus Shot for Cuts or Scrapes:**
- A tetanus shot (booster) may be needed for cuts and other open wounds.
- Check your vaccine records to see when your child got the last one.
- **For Dirty Cuts:** If last tetanus shot was given over 5 years ago, your child needs a booster within 3 days.
- **For Clean Cuts and Scrapes:** If last tetanus shot was given over 10 years ago, your child needs a booster within 3 days.
- See your child's doctor for a booster during regular office hours. It's safe to give it within 3 days or less.

10.] **Call Back If:**
- Pain or crying becomes severe
- Vomiting occurs 2 or more times
- Your child becomes difficult to awaken or confused
- Walking or talking becomes difficult
- Headache lasts more than 24 hours
- Scalp tenderness lasts more than 3 days
- Your child becomes worse

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).

BACKGROUND INFORMATION

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 an injury to the brain that changes how the brain normally works. It is usually caused by a sudden blow or jolt to the head that causes it to shake. Many children bump or hit their heads without causing a concussion. Obvious 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 headaches, dizziness, thinking difficulties, school problems or emotional changes for several days to weeks.
- **Brain injuries** defined here as potential structural damage to the brain. 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. A parent carrying an infant down the stairs who either drops the child or falls on the child are also high-risk and should be sent in. 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% 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.

Pain Medicine and Head Injuries

- Post-traumatic headache and scalp pain is a symptom following many head injuries.
- This protocol recommends treating it with acetaminophen or ibuprofen.
- While ibuprofen produces some platelet dysfunction and a small increased risk of bleeding that lasts up to 6 hours, no one in the ED at our Children's Hospital restricts the use of ibuprofen for minor head injury. (Exception: high risk patient with major head injury or underlying bleeding disorder. These patients are referred in).
- Aspirin is never recommended following head trauma. Aspirin produces platelet dysfunction and increased risk of bleeding that lasts for several days.
- Vomiting: Since vomiting after a head injury is a possible marker for intracranial injury, all medicines are avoided during the first 2 hours post-injury.
- There is no medication that makes a concussion get better faster.
- Pain medication may be taken for any headache for the first few days following the concussion, but may be limited in its efficacy. Use of pain medications for headaches beyond 72 hours should be under the direction of the primary care physician after a follow up evaluation is performed. Medication overuse headaches can be caused by taking pain medicine more than 3 days per week. (Walter, 2016; Halstead, 2010)

Raccoon Eyes (Bilateral Black Eyes) Following Head Trauma

- The cause of bilateral black eyes often can be determined by the timing of their onset.
- **Forehead hematomas** cause most of them. Minor falls in young children can cause large forehead bruises. Bilateral black eyes appear 2 to 3 days later. Mechanism is the seepage of blood downward through the tissue planes with the help of gravity.
- **Basilar skull fracture** is occasionally the cause. A fracture of the frontal part of the base of skull can cause blood to seep anteriorly into the orbits. The black eyes usually appear within 24 hours of the initial injury, but can occur later. Often, there is no forehead bruise.
- Basilar skull fractures usually only follow major head trauma. Acute neurological findings (e.g., altered mental status) are usually present.

Second Impact Syndrome (SIS)

- Definition: An athlete who is recovering from a concussion, returns to play before they are fully healed and then goes on to sustain a second head injury.
- Diffuse cerebral swelling can occur, causing brain herniation and sometimes death.
- While there is argument over incidence of SIS, authors agree that the syndrome is rare.
- The best way to prevent SIS is to prevent repeat head trauma while the brain is not fully recovered.

Matching Pediatric Handouts for Callers

Printed home care advice instructions for patients have been written for this guideline. If your software contains them, they can be sent to the caller at the end of your call. Here are the names of the pediatric handouts that relate to this topic:

- Head Injury
- Acetaminophen (Tylenol) Dosage Table - Children
- Ibuprofen (Advil, Motrin) Dosage Table - Children

Expert Reviewers:

- Children's Hospital of Philadelphia (CHOP) Concussion Management committee. See Pediatr Emer Care 2016;32: 149-153 for details of their study.
- Joseph A Grubenhoff MD, Pediatric Emergency Medicine and ED Liaison to Trauma Quality Improvement Committee, Children's Hospital Colorado, Aurora, Colorado.

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