

# Concussion/ Traumatic Brain Injury



## FAST FACTS

~812,000

children aged 0–17 years were treated for concussion or TBI in US emergency rooms in 2014

## falls

leading cause of TBI-related emergency room visits in children aged 0–17 year

96%

of TBI in children is categorized as mild TBIs (concussions)

## WHEN TO REFER

Refer to Cincinnati Children’s Emergency when red flags are present. Refer patients who: are not improving through typical management as outlined; have a history of cognitive/behavioral issues; have other complicating comorbidities; and/or is not showing gradual improvement; and/or have concerns with school/activity levels to Cincinnati Children’s Brain Health and Wellness Center (no additional testing required).

**If you have clinical questions or to make a referral, contact the Brain Health and Wellness team at 513-803-4323 (HEAD) or [braininjury@cchmc.org](mailto:braininjury@cchmc.org).**

Concussion is the most common cause of brain injury and is caused by a blow to the head, face, neck or body through sport, falling or accident. This sudden injury causes physiologic disruption which leads to neurologic signs and symptoms. Symptoms may develop immediately at time of injury or may be delayed in onset for hours, days or even longer post-injury.

## ASSESSMENT

Perform standard history and physical exam (HPE). Assess for more severe injury. Include musculoskeletal evaluation, neurologic exam (movement, coordination, strength, sensation, reflexes, gait and balance), vision and vestibular assessment, and cognitive performance (memory, concentration, function).

Signs and symptoms may vary over time, and may be significantly different than a prior concussion’s effects.

Physical	Cognitive	Emotional	Sleeping
<ul style="list-style-type: none"> <li>• Headache</li> <li>• Sensitivity to light and/or sound</li> <li>• Nausea/vomiting</li> <li>• Feeling tired/drowsy</li> <li>• Dizzy</li> <li>• Loss of balance or trouble walking</li> <li>• Ringing in ears</li> <li>• Double or blurred vision</li> <li>• Numbness or tingling</li> <li>• Loss of consciousness</li> </ul>	<ul style="list-style-type: none"> <li>• Feeling foggy</li> <li>• Feeling slow</li> <li>• Memory issues</li> <li>• Unable to concentrate</li> <li>• Trouble thinking clearly</li> </ul>	<ul style="list-style-type: none"> <li>• Irritable or fussy</li> <li>• Feeling more emotional, dysregulated, or anxious</li> </ul>	<ul style="list-style-type: none"> <li>• Change in sleeping pattern</li> <li>• Trouble falling asleep</li> <li>• Trouble staying asleep</li> <li>• Sleeping more than usual</li> <li>• Sleeping less</li> </ul>

## HPE RED FLAGS

If any of these red flags are present, emergent evaluation is warranted.

- Repeated vomiting
- Seizure-like episodes
- Severe or progressive headache
- Lethargy/difficult to arouse
- Passes out
- Weakness in arms or legs
- Difficulty recognizing people or places

## MANAGEMENT/TREATMENT

If a concussion is recognized early and properly treated to limit severity and duration of symptoms, most patients recover within 1–3 months. Instruct patient to avoid further head trauma and pace return to activities (cognitive, physical and social, including school work) based on symptom tolerance. Recommend quality sleep, hydration and nutrition. Recommend Tylenol/ibuprofen intermittently for symptom management. Progressions should occur over several stages. Concussion symptoms may vary as the patient attempts to return to normal activities, but severity and frequency of symptoms should gradually improve. Advise patient to contact you if symptoms worsen or do not improve, or if new symptoms arise.

If you would like additional copies of this tool, or would like more information, please contact the Physician Outreach and Engagement team at Cincinnati Children’s.

# Concussion/Traumatic Brain Injury

## Inclusion Criteria

- Suspected brain injury
- Age 0–22 with history of trauma and signs/symptoms of possible concussion

## Patient Presents

## Standard Workup

- History of Present Illness
  - Concussion/recovery
  - Co-morbidities/conditions
  - Time since injury
- Family History
- Physical Exam

## HPE RED FLAGS

- Repeated vomiting
- Seizure-like episodes
- Severe or progressive headache
- Lethargy/difficult to arouse
- Passes out
- Weakness in arms or legs
- Difficulty recognizing people or places

Yes

If any of these red flags are present, emergent evaluation is warranted

No

If no red flags are present, begin rehabilitative care:

- Early walking/return to daily activity as symptoms allow
- May begin physical activity progression when tolerating school and other daily activity
- Follow-up evaluations

Improvement evident

Yes

- Return to daily cognitive/social/physical activity
- Resolution of symptoms observed:
  - Return to normal daily and social activity
  - Physical activity program completed

Yes

Discharge from care

No

- Investigate behaviors and complaints
- Consider additional treatment options
  - Medications, therapies
- Adjust school/work accommodations if needed
- Consider addressing other co-morbidities as needed
- **Consider referral to Cincinnati Children's Brain Health & Wellness team**