



Definition

A concussion is an injury to the brain that results in temporary loss of normal brain function.

Medically, it is defined as a clinical syndrome characterized by immediate and transient alteration in brain function, including alteration of mental status or level of consciousness, that results from mechanical force or trauma.

American Association of Neurological Surgeons

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Differential Diagnosis

- Intracranial hemorrhage
- Skull fracture
- Cervical spine injury
- Headache disorders
- Heat Illness
- Hypoglycemia
- Syncope
- Anxiety, depression, post-traumatic stress disorder, panic attack
- Problems with attention (attention deficit hyperactivity disorder)
- Sleep dysfunction

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Escalation of Care

[Pediatric glasgow Coma Scale/Score \(GCS\)](#)



[PECARN Pediatric Head Injury/Trauma Algorithm](#)



[NEXUS Criteria for C-Spine Imaging \(for age > 1 year\)](#)



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Admission Criteria

- Ongoing evaluation/management for associated injuries/conditions
- Inadequate headache control
- Not able to tolerate PO

Patients with isolated concussions who require admission should be admitted to the Neurosurgery service. (If high energy mechanism as described in trauma alert matrix, also discuss with Trauma Surgery)

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Concussion Signs & Symptoms

Age < 5 years

- Headache
- Vomiting
- Poor balance
- Sensitivity to light
- Sensitivity to noise
- Fatigue/sluggish
- Irritable
- Behavioral changes (e.g. clingy, whiny)

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Concussion Signs & Symptoms

Age 5-12 Years

- Headache
- Dizziness
- Room is spinning
- Lightheadedness
- Blurry vision
- Double vision
- Nausea
- Neck pain
- Fatigue
- Gets tired easily
- Trouble paying attention
- Easily distracted
- Hard time concentrating
- Problems remembering what people say
- Problems following directions
- Daydream often
- Feel confused
- Forget things
- Problems finishing tasks
- Trouble figuring things out
- Hard to learn new things

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[Sport Concussion Assessment Tool \(SCAT-5\)](#)
[Ages 5-12 Years](#)

Concussion Signs & Symptoms

Age \geq 13 Years

- Headache
- “Pressure in head”
- Neck pain
- Nausea or vomiting
- Sensitivity to light
- Sensitivity to noise
- Balance problems
- Dizziness
- Blurred vision
- More emotional
- Irritability
- Sadness
- Nervous or anxious
- Confusion
- Feeling like “in a fog”
- Difficulty concentrating
- Difficulty remembering
- “Don’t feel right”
- Feeling slowed down
- Drowsiness
- Fatigue or low energy
- Trouble falling asleep

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[Sport Concussion Assessment Tool \(SCAT-5\)](#)
[Ages \$\geq\$ 13 Years](#)

Age Appropriate Neurologic Exam

Age < 5 years document assessment of:

- General neurologic exam with particular attention to:
 - Cervical spine assessment
 - Alertness
 - Language
 - Behavior
 - Coordination
 - Gait/balance (if ambulatory)

Age ≥ 5 years document assessment of:

- Cervical spine assessment
- Cognitive function
- Vestibular function (e.g. rotating head left and right while looking at a stationary target)
- Extraocular movements
- Gait
- Balance
- Coordination

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Discharge Instructions: Concussion Facts

Concussion Facts

Your child has been diagnosed with a concussion. This is also known as a mild traumatic brain injury. Most children recover relatively quickly and do not have lasting problems after a concussion, but it is important to follow-up with a physician and follow the recommendations below.

Concussions can be associated with several symptoms. These are the most common:

- Headache
- Neck pain
- Noise or light sensitivity
- Dizziness, balance problems, nausea
- Cognitive or “thinking problems” such as feeling mentally foggy, inattention, or memory problems
- Emotional changes such as irritability, sadness, or nervousness
- Sleep problems such as sleeping more than typical or having problems falling asleep

These symptoms are expected to gradually improve over the next days to weeks, but it is important to remember that every concussion is different. Some children are at higher risk for having symptoms that can take longer to improve. This includes children with previous traumatic brain injuries, with learning or emotional problems, with pre-existing headaches, and children experiencing a high level of stress.

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Discharge: Concussion Management at Home

Medical Care: It is very important to follow-up with a health care provider for ongoing concussion care. This can be a Concussion Specialist, such as a health care provider in the Nationwide Children's Hospital Concussion Center or your primary care provider.

Activity: Your child must not return to sports, gym class, or other activities with risk of head impact until they are cleared by a physician. Returning to play too soon- while the brain is still healing- can place your child at risk for worsening the brain injury and delaying recovery time.

Rest: Your child should rest for a few days after the injury. They do not need to stay in a "dark room" or completely rest from all activities, but they should take it easy for 1-2 days. Calm activities such as reading, coloring, playing a quiet game, talking to friends or family are OK. If an activity causes or worsens symptoms, then they should take a break and try again when they are feeling better. As they are recovering, work with your health care provider for guidance on gradually getting back to normal activities.

Screens: For some children, excessive video games, TV, and social media can make symptoms worse. Parents should limit excessive use of screens and encourage frequent breaks especially in the first few days of recovery.

Driving: It is not safe to drive while experiencing concussion symptoms. Your child should not drive until they are cleared to do so by their health care provider.

School: Tell your child's school about their concussion. After a couple days, your child should feel well enough to return to school. Missing school for longer periods of time can actually prolong recovery. Work with your health care provider and your school to create a plan for returning to school. Your child may need to start with a shorter day or a lighter workload or may need some temporary accommodations while at school. If your child is not back in school by 5 days after the concussion or is not able to tolerate full days, call your health care provider.

Headache: In the first 24 hours after injury, pain can be treated with Acetaminophen (Tylenol). After 24 hours, your child can take Acetaminophen or Ibuprofen as needed, unless your doctor has recommended against these. Be careful not to overuse these medications, especially if your child does not find them effective.

Sleep: Your child should get plenty of sleep as they are recovering from their concussion. They should keep regular sleep and wake times, avoid caffeine, and avoid screens in the hour before bedtime. During the first couple days of recovery, they can nap during the day as needed. As they continue to recover, they should gradually return to a regular and consistent sleep schedule.

Managing Stress and Emotions: It is normal for children to feel sad or worried as they are recovering. It can be helpful to provide reassurance and remind them that symptoms are normal after a concussion and we expect them to get better. Ask your child how they are feeling and contact your health care provider if you have concerns about more significant mood changes or concerning behavioral changes.

Warnings Signs- when to seek emergency medical care:

- Declining alertness (difficulty staying awake or responding)
- Seizure (episode of rhythmic shaking, stiffening, and/or unresponsiveness)
- Progressively worsening symptoms including headaches
- Difficulty moving eyes normally
- Facial droop or slurred speech
- Repeated vomiting
- New weakness or numbness in an arm or leg
- If your child expresses any thoughts of suicide or self-harm

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References

- Lumba-Brown A, Yeates KO, et al. Centers for Disease Control and Prevention guideline on the diagnosis and management of mild traumatic brain injury among children. *JAMA Pediatr.* 2018;172(11).
- Rose SC, et al. Concussion Quality Measurement Set. *Neurology.* 2021;97:537-542.
- Ferry B, DeCastro A. Concussion. In: StatPearls. Treasure Island (FL): StatPearls; 2022.

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Metrics

Process Metrics:

- Pathway visualization
- Pathways discharge smart set utilization
- Percentage of patients seen in the ED/UC for a concussion who receive a referral to the Concussion Center

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Clinical Pathway Development

This clinical pathway was developed using the process described in the NCH Clinical Pathway Development Manual Version 6, 2022. Clinical Pathways at Nationwide Children's Hospital (NCH) are standards which provide general guidance to clinicians. Patient choice, clinician judgment, and other relevant factors in diagnosing and treating patients remain central to the selection of diagnostic tests and therapy. The ordering provider assumes all risks associated with care decisions. NCH assumes no responsibility for any adverse consequences, errors, or omissions that may arise from the use or reliance on these guidelines. NCH's clinical pathways are reviewed periodically for consistency with new evidence; however, new developments may not be represented, and NCH makes no guarantees, representations, or warranties with respect to the information provided in this clinical pathway.

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Sport Concussion Assessment Tool (SCAT-5) Ages 5-12 Years

	Not at all/Never	A little/Rarely	Somewhat/ Sometimes	A lot/ Often
I have headaches	0	1	2	3
I feel dizzy	0	1	2	3
I feel like the room is spinning	0	1	2	3
I feel like I'm going to faint	0	1	2	3
Things are blurry when I look at them	0	1	2	3
I see double	0	1	2	3
I feel sick to my stomach	0	1	2	3
My neck hurts	0	1	2	3
I get tired a lot	0	1	2	3
I get tired easily	0	1	2	3
I have trouble paying attention	0	1	2	3
I get distracted easily	0	1	2	3
I have a hard time concentrating	0	1	2	3
I have problems remembering what people tell me	0	1	2	3
I have problems following directions	0	1	2	3
I daydream too much	0	1	2	3
I get confused	0	1	2	3
I forget things	0	1	2	3
I have problems finishing things	0	1	2	3
I have trouble figuring things out	0	1	2	3
It's hard for me to learn new things	0	1	2	3

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Sport Concussion Assessment Tool (SCAT-5) 13 Years and Older

	None	Mild		Moderate		Severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Balance Problems	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred Vision	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or anxious	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Trouble falling asleep	0	1	2	3	4	5	6

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