Guidelines for Diagnosing and Managing Pediatric Concussion

First edition, June 2014

REFERENCES and LEVELS OF EVIDENCE
This is the companion document to the *Guidelines for Diagnosing and Managing Pediatric Concussion, First Edition*.

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**Levels of Evidence**

Levels of evidence are used to guide the reader as to the strength of the individual recommendation. There are many ways to grade levels of evidence. Some emphasize the quality of randomized clinical trials. However, because so few randomized clinical trials have studied pediatric concussion, we used a broader system to rank evidence that also emphasizes the strength of systematic reviews or large studies that may not involve interventions. In our system, A is the strongest level of evidence. The levels are defined as follows:

- **A** = Consistent, good-quality, patient-oriented evidence (example, at least one large randomized control trial, meta-analysis or systematic review with homogeneity, or large, high-quality, multi-centre cohort study);
- **B** = Inconsistent or limited-quality patient-oriented evidence (example: smaller cohort studies, case studies or control trials with limitations);
- **C** = Consensus, usual practice, opinion or weaker-level evidence.\(^1\,^2\)

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<table>
<thead>
<tr>
<th>Number</th>
<th>Evidence</th>
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</thead>
<tbody>
<tr>
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<td>Search Strategy for Systematic Review</td>
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Level B


O.3: Ensure policies are in place to accommodate a child/adolescent who has sustained a concussion.

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**O.4: Consider baseline neuro-cognitive testing if the child/adolescent plays high-risk sports—not as a general rule.**

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1.3: Watch for possible symptoms of concussion to evolve.

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1.4: Take a child/adolescent who shows symptoms of concussion to a health care professional.

**Level B**


2.1: Assess and treat any physical, cognitive and neurological deficits.

**Level A**

Level B


2.2: Determine the need for CT imaging.

**Level A**


Level B


2.3: Consider admission or prolonged observation if the child/adolescent shows “red flag” symptoms.

Level B


2.4: Treat acute headaches.

Level C

2.5: Prescribe physical and cognitive rest.

Level B/C


2.6: Discharge the child/adolescent for observation at home under certain conditions.

Level B


3.1: Provide verbal information and written handouts to the child/adolescent and the parents and/or caregivers.

**Level A**


**Level B**


3.1a: Inform on the expected course of recovery and return-to-school/play.

**Level B**


Chapter: References and Levels of Evidence
Guidelines for Diagnosing and Managing Pediatric Concussion


3.1b: Advise on the risks and complications of re-injury, especially of persistent symptoms.

**Level B**


3.1c: Advise on managing sleep proactively.

**Level C**

3.1d: Advise on managing headaches.

**Level B**


### 3.1e: Advise on coping with fatigue.

**Level B**


### 3.1f: Advise on maintaining social networks and interactions.

**Level B**


### 3.1g: Advise on avoiding alcohol and other recreational drugs.

**Level B**


### 3.1h: Advise on avoiding driving during recovery.

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3.1i: Advise on general monitoring, regular follow up with primary care or a sport medicine physician until symptoms disappear, and referral to specialized care after one month if symptoms persist.

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4.1: Recommend that the child/adolescent follow a stepwise return-to-learn plan.

**Level B/C**


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4.4: Develop a return-to-play program only after the child/adolescent has started his/her return-to-learn program.

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**5.1: Assess any modifiers that may delay recovery.**

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**Level B**

5.3: Assess, document and manage significant, prolonged complaints based on specific symptoms, etiology and the time since injury.

**Level B**


5.4a(i): Place every child/adolescent on a program of sleep hygiene.

**Level C**

5.4a(ii): Screen for factors that may influence the child/adolescent's sleep/wake cycle.

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5.4a(iii): Consider non-pharmacological treatments to improve sleep.
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5.4a(iv): Consider prescribing medication on a short-term basis if sleep has not improved.
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### 5.8: Work with the child/adolescent’s primary care professional, school and/or employer regarding accommodations needed to tasks or schedules.

**Level B**


### 5.9: Assess and treat any physical, cognitive and neurological deficits.

**Level B**


**Guideline Summary: Care of the patient with mild traumatic brain injury. [American Association of Neuroscience Nurses] 42. info@guideline.gov (NGC). 2011.**


Appendix 1: Search Strategy for Systematic Review

Medline
- exp Brain Concussion/.
- Post-Concussion Syndrome/.
- (concuss$ or postconcuss$).tw.
- (commotio cerebri or post traumatic encephalopathy).tw.
- ((post commotion or post contusion or post head injury) adj2 syndrome*).tw.
- ((mild or minor or minimal) adj (traumatic brain or tbi)).tw.
- mtbi.tw.
- exp Brain Injuries/.
- ((post or persistent or unresolved or delayed) adj4 (brain or skull or head or injury)).mp.
- 8 and 9.
- or/1-7,10.
- (((severe or moderate) adj2 (head or brain or traumatic or tbi)) not (mild or minor)).ti.
- 11 not 12.
- 13 and (child* or adolescent or infan*).mp.
- 14 not (animal/ not human/).
- limit 15 to English.
- limit 27 to yr="1985 -Current".

Embase
- Brain Concussion/ or Concussion/.
- Post-Concussion Syndrome/.
- (concuss$ or postconcuss$).tw.
- (commotio cerebri or post traumatic encephalopathy).tw.
- ((Post commotion or post contusion or post head injury) adj2 syndrome$).tw.
- ((mild or minor or minimal) adj (traumatic brain or tbi)).tw.
- mtbi.tw.
- exp Brain Injury/.
- ((post or persistent or unresolved or delayed) adj4 (brain or skull or head or injury)).mp.
- (((severe or moderate) adj2 (head or brain or traumatic or tbi)) not (mild or minor)).ti.
- (8 and 9) not 10.
- or/1-7,11.
- 12 and (child* or adolescent or infan*).mp.
- exp animals/ or exp invertebrate/ or animal experiment/ or animal model/ or animal tissue/ or animal cell/ or nonhuman/.
- 14 not exp human/.
- 13 not 15.
- limit 16 to English.
- limit 17 to yr="1985 -Current".
CINAHL
- (MH "Brain Concussion+" OR TX concuss* or postconcuss* OR TX commotio cerebri OR TX post traumatic encephalopathy OR post head injury N3 syndrome* or post contusion N3 syndrome* or post commotion N3 syndrome* OR TX Mild traumatic brain or TX minor traumatic brain or TX minimal traumatic brain or TX mild tbi or TX minor tbi or TX minimal tbi OR TX mtbi) AND ( child* or adolescent or infan*).
- Limiters: Published Date from: 19850101-20141231;English Language.

PsycInfo
- brain concussion/.
- (concuss* or postconcuss*).tw.
- (commotio cerebri or post traumatic encephalopathy).tw.
- ((post commotion or post contusion or post head injury) adj2 syndrome*).tw.
- ((mild or minor or minimal) adj (traumatic brain or tbi)).tw.
- mtbi.tw.
- traumatic brain injury/.
- ((post or persistent or unresolved or delayed) adj4 (brain or skull or head or injury)).mp.
- 7 and 8.
- or/1-6,9.
- limit 10 to (childhood or adolescence <13 to 17 years>).
- (Infan* or newborn* or new-born* or perinat* or neonat* or baby or baby* or babies or toddler* or minors or minors* or boy or boys or boyfriend or boyhood or girl* or kid or kids or child or child* or children* or schoolchild* or schoolchild).mp. or school child.ti,ab. or school child*.ti,ab. or (adolescen* or juvenil* or youth* or teen* or under*age* or pubescen*).mp. or exp pediatrics/ or (pediatric* or paediatric* or peadiatric*).mp. or school.ti,ab. or school*.ti,ab. or (prematur* or preterm*).mp.
- 10 and 12.
- 11 or 13.
- limit 14 to English language.
- limit 15 to yr="1985 -Current".

SportDiscus
- (DE "BRAIN -- Concussion" OR DE "POSTCONCUSSION syndrome").
- Limiters: Published Date: 19850101-20141231; Language: English; Publication Type: Journal Article, Serial publication.

TRIP
- ("m* traumatic brain injury").
- (concussion).
- (pediatric* or paediatric* or child* or adolesc*) from:1985.
- Search in full document.
- Guidelines selected.
CENTRAL

- (concuss$ or postconcuss$).tw.
- (commotio cerebri or post traumatic encephalopathy).tw.
- ((post commotion or post contusion or post head injury) adj2 syndrome*).tw.
- mtbi.tw.
- or/1-4.
- (Infan* or newborn* or new-born* or perinat* or neonat* or baby or baby* or babies or toddler* or minors or minors* or boy or boys or boyfriend or boyhood or girl* or kid or kids or child or child* or children* or schoolchild* or schoolchild).mp. or school child.ti,ab. or school child*.ti,ab. or (adolescen* or juvenil* or youth* or teen* or under*age* or pubescen*).mp. or exp pediatrics/ or (pediatric* or paediatric* or paediatric*).mp. or school.ti,ab. or school*.ti,ab. or (prematur* or preterm*).mp.
- 5 and 6.
- limit 7 to yr="1985 -Current".
- (three non-English records were removed in Reference Manager).