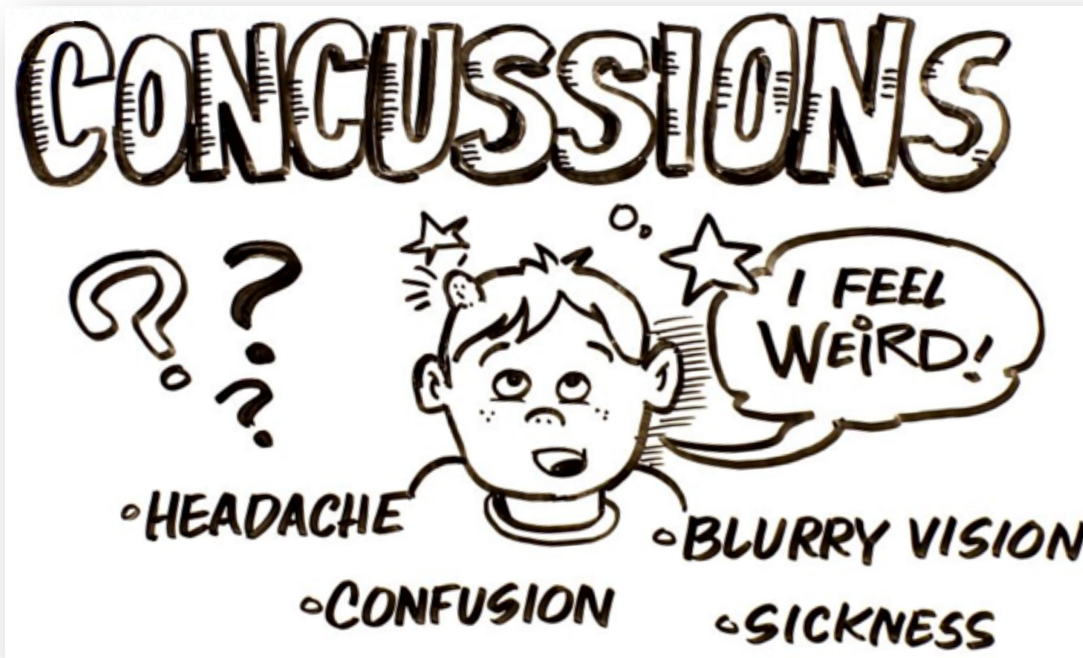


Guidelines for Diagnosing and Managing Pediatric Concussion

First edition, June 2014, v1.1



Ontario Neurotrauma Foundation
Fondation ontarienne de neurotraumatologie

This document is intended to guide health care professionals in diagnosing and managing pediatric—not adult—concussion. It is not for self-diagnosis or treatment. Parents and/or caregivers may bring it to the attention of their child/adolescent’s health care professionals.

The best knowledge available at the time of publication has informed the recommendations in this document. However, health care professionals should also use their own judgment, the preferences of their patients, and factors such as the availability of resources in their decisions.

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About the Ontario Neurotrauma Foundation

The Ontario Neurotrauma Foundation (ONF) is a health research organization that focuses on the practical application of research to improve the lives of people with an acquired brain injury or spinal cord injury, and the prevention of neurotrauma injuries. Through strategic research funding activity and the building of relationships with numerous partners and stakeholders, the ONF fosters, gathers and applies research knowledge to increase the effectiveness and use of prevention, and to improve the systems of care, outcomes, and quality of life of those who have sustained a neurotrauma injury. The Foundation receives its funding from the Government of Ontario.



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Using These Guidelines

Layout

Our objective in designing the layout of this document was to put important information—the recommendations themselves—for the primary users at the front.

Therefore, summaries of recommendations are arranged stepwise, with recommendations for [health care professionals](#) first, followed by those for [parents and/or caregivers](#) and for [schools and/or community sports organizations/centres](#). Hyperlinks take the reader to the full text of each recommendation (located in another section grouped by timeline) and to the related tools. As well, to simplify navigating such a large document, the footer on every page contains hyperlinks to the summaries and to the tools.

Because the recommendations are front and foremost, sections such as [Background](#) and [Notices](#) that are commonly found at the front end of a publication are now at the back.

Target Users and Population

Primary users are

- family or emergency department physicians working in large centres and rural areas, whose patients have ready access to specialized care;
- physicians and health care professionals working in remote regions who have access to the Internet and whose patients have access to specialized care through telemedicine or other means; and
- other health care professionals (example: neuropsychologists, occupational and physical therapists) who play important roles in the management of concussion and persistent symptoms and in rehabilitation.

With these users in mind, we deliberately left out tools that take too long to administer or that are designed for specialists.

Secondary and tertiary users are parents/caregivers, schools and/or community sports organizations/centres. Although this document does not cover prevention, it includes key steps that these users will find helpful in identifying symptoms of concussion and managing recovery at home, school and play.

The **target population** is every child/adolescent aged 5 to 18 years who has or may have sustained a concussion in the previous month.

These **guidelines do not apply to children under 5 years**. Diagnosing concussion in children under five years is controversial because it relies heavily on the child's ability to recognize and/or communicate his/her symptoms. Most preschoolers have not developed that capacity yet. As well, there are no validated tools for this age group.

These **guidelines also do not apply to** children/adolescents who have moderate-to-severe closed head injuries, moderate-to-severe developmental delays, neurological disorders, penetrating brain injuries or brain damage from other causes, such as injuries at birth or in infancy.

General Directions for Clinical Use

We expect that children/adolescents who have sustained a head injury will visit a health care professional soon after the incident for a primary assessment. In this scenario, health care professionals should:

- consider that children/adolescents may:
 - not be fully aware of their symptoms;
 - not be able to articulate their symptoms or describe their effects clearly;
 - respond differently compared to their pre-injury baseline;
- take into account any pre-existing physical and mental conditions/factors that might contribute to symptoms, and consider a broad differential diagnosis, if necessary;
- apply the recommendations in a stepwise fashion as appropriate in combination with their clinical judgment, expertise and the level of evidence that accompanies each recommendation.
- reassure parents/caregivers that symptoms resolve in a reasonable time in most cases;
- refer the child/adolescent to an appropriate specialist if symptoms do not resolve after one month.
- understand that the signs and symptoms of concussion are non-specific, and may have other origins.

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}

¹ http://www.essentialvidenceplus.com/product/ebm_loe.cfm?show=sort. Accessed May 8, 2014.

² Ebell MH, Siwek J, Weiss BD, et al. Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *Am Fam Physician*. 2004;69(3):548-56.

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The strength of the current body of evidence is the exponential growth of articles published on pediatric concussion since 2000. Notably, the literature has clarified the need for pediatric CT imaging in the emergency setting through several well designed prospective multi-centre studies, the results of which will reduce the incidence of unnecessary radiation in children/adolescents.

However, the body of evidence has several limitations. The field of pediatric concussion is still in its infancy compared to that of general traumatic brain injury (moderate and severe). As stated above, very few randomized clinical trials have examined the results of possible therapies, both pharmacological and non-pharmacological. In particular, the ideal duration of physical and cognitive rest remains unknown.³

As well, very few studies have examined pediatric concussion beyond the context of sports injury or examined the long-term outcomes of children/adolescents who have sustained multiple concussions and the possible link to severe cognitive outcomes. Lastly, these guidelines relate to children aged 5 to 18 only. We were unable to include recommendations for preschoolers (aged 0 to 5) due to a lack of literature and validated assessment tools for that age group.

Facilitators and Barriers to Use

Feedback on facilitators and barriers is available in the form of surveys and projects conducted on stakeholder groups, notably by Ontario's Concussions/mTBI Strategy (www.concussionsontario.org). Before developing this document, the [guideline panel](#) consulted surveys that examined, for example, the level of knowledge of concussion of coaches, first responders and health care professionals; the hours dedicated to education on concussion in nursing programs and medical schools—and the resulting level of knowledge; the quality of policies on concussion in schools and/or community sports organizations/centres; and the resources available in the community.

Barriers addressed in this document:

- lack of awareness by the public, health care professionals, school staff, coaches, players, parents and/or caregivers of:
 - what a concussion is (injury to the brain);
 - its symptoms;
 - its initial identification and management, and ongoing management in the case of persistent symptoms.

Facilitators to use of this document:

- broad applicability to health care professionals in a wide variety of settings;
- inclusion of schools, coaches and parents and/or caregivers in the content;
- further feedback from stakeholders as members of the panel;

³ Institute of Medicine (IOM) and National Research Council (NRC). 2013. *Sports-related concussions in youth: Improving the science, changing the culture*. Washington, DC: The National Academies Press.

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- the use of plain language wherever possible;
- the interactive nature of this document;
- adaptation of feedback obtained for the 2013 update of the “*Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age).*”

No regulatory bodies, specialized units, funding mechanisms, etc. governing the care and management of concussion particularly facilitate or impede the uptake and use of these guidelines.

Vocabulary and Abbreviations

Ataxia is a lack of coordination that can be associated with infections, injuries, diseases, or degenerative changes in the central nervous system. Ataxia may affect the fingers, hands, arms, legs, body, speech, and eye movements.⁴

Cervicogenic headache describes headaches that result from a problem in the neck near the base of the skull.⁵

Child/adolescent refers to the general population group for the guidelines document in which:

- ages 3-5 are occasionally and specifically referred to as “**pre-schoolers;**”
- ages 6-12 are referred to as “children;” and
- ages 13-18 are referred to as “adolescents.”

Comorbidity refers to a disease, condition or disorder that a patient may have at the same time as a primary disease. Comorbid diseases may affect the symptoms of the primary disease.⁶

Concussion is the same as **mild traumatic brain injury (mTBI)**, **cranio-cerebral trauma** and **mild/closed head injury** for the purposes of this document. Concussion is defined in the [Background](#).

CT (computed tomography) is an imaging technology that uses x-rays to create pictures of cross-sections (slices) of the body.⁷

Differential diagnosis is a process of elimination to help identify or rule out the presence of a disease where many alternatives are possible.⁸

⁴ *Diagnosis of ataxia*. National Ataxia Foundation. <http://www.ataxia.org/learn/ataxia-diagnosis.aspx>. Accessed February 14, 2014.

⁵ Cervicogenic Headache. NYU Langone Medical Center. <http://pain-medicine.med.nyu.edu/patient-care/conditions-we-treat/cervicogenic-headache>. Accessed February 14, 2014.

⁶ *Comorbidity*. Wikipedia. <http://en.wikipedia.org/wiki/Comorbidity>. Accessed February 14, 2014.

⁷ *CT Scan*. National Institutes of Health. www.nlm.nih.gov/medlineplus/ency/article/003330.htm. Accessed January 14, 2014.

⁸ *Differential Diagnosis*. Wikipedia. http://en.wikipedia.org/wiki/Differential_diagnosis. Accessed February 14, 2014.

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Encephalopathy is a general term that means brain disease, damage, or malfunction.⁹

Etiology is the cause or origin of a disease.

Health care professional is a qualified person, such as a physician, occupational therapist or nurse practitioner, who is responsible for the health of children/adolescents.

MRI (magnetic resonance imaging) uses a magnetic field and radio waves to create detailed images (slices) of the organs and tissues in the body. MRI machines also produce 3D images that can be viewed from different angles.¹⁰

Pathology is the study of the nature of diseases and their causes, processes, development and consequences.¹¹

Persistent symptoms, also called **post-concussion syndrome**, include headache, nausea, vomiting, dizziness, fatigue or low energy, neck pain, blurred vision, sensitivity to light or noise, difficulty concentrating, drowsiness, nervousness or anxiety, and feeling “in a fog,” among others.

Randomized clinical trial is a study in which people are chosen at random to receive one of several medical interventions. One of these interventions may be a standard practice, a sugar pill (placebo) or no intervention at all.¹²

Second impact syndrome is the diffuse swelling and herniation that may occur in the brain after a concussion sustained before being fully recovered from an earlier concussion. Second impact syndrome is extremely rare, but potentially fatal.¹³

Somatic means that something affects the body.

⁹ Encephalopathy. MedecineNet.com. <http://www.medicinenet.com/encephalopathy/article.htm>. Accessed April 26, 2014.

¹⁰ MRI. Mayo Clinic. www.mayoclinic.com/health/mri/MY00227. Accessed January 14, 2014.

¹¹ Pathology. The Free Dictionary. www.thefreedictionary.com/pathology. Accessed February 14, 2014.

¹² *Definition of Randomized Clinical Trial*. <http://www.medterms.com/script/main/art.asp?articlekey=39532>. Accessed June 5, 2014.

¹³ Bey T, Ostick B. *Second Impact Syndrome*. *West J Emerg Med*. 2009; 10(1): 6–10.

Tipsheet/Recommendations for Health Care Professionals

In Advance (before the first activity)

Number		Evidence
0.4	Consider baseline neuro-cognitive testing if the child/adolescent plays high-risk sports—not as a general rule.	B

On Presentation (what are the “red flags”?)

Number		Evidence
2.1	Assess and treat any physical, cognitive and neurological deficits.	A/B
2.2	Determine the need for CT imaging.	A
2.3	Consider admission or prolonged observation if the child/adolescent shows “red flag” symptoms.	B
2.4	Treat acute headaches.	C
2.5	Prescribe physical and cognitive rest.	B/C
2.6	Discharge the child/adolescent for observation at home under certain conditions.	B

On Discharge (what do we tell parents and/or caregivers?)

Number		Evidence
3.1	Provide verbal information and written handouts to the child/adolescent and the parents and/or caregivers.	A/B
3.1a	Inform on the expected course of recovery and return-to-learn/play.	B
3.1b	Advise on the risks and complications of re-injury, especially of persistent symptoms.	B
3.1c	Advise on managing sleep proactively.	C
3.1d	Advise on managing headaches.	B
3.1e	Advise on coping with fatigue.	B
3.1f	Advise on maintaining social networks and interactions.	B
3.1g	Advise on avoiding alcohol and other recreational drugs.	B
3.1h	Advise on avoiding driving during recovery.	B
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.	B/C

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On Interim Assessment (when can the child/adolescent return to learn/play?)

Number		Evidence
<u>4.1</u>	Recommend that the child/adolescent follow a stepwise return-to-learn plan.	B/C
<u>4.2</u>	Develop a return-to-learn program after acute symptoms have improved.	B/C
<u>4.3</u>	Recommend additional assessment and accommodations if symptoms worsen or fail to improve.	B/C
<u>4.4</u>	Develop a return-to-play program only after the child/adolescent has started his/her return-to-learn program.	B
<u>4.5</u>	Refer any child/adolescent who has sustained multiple concussions to an expert in sport concussion to help with return-to-play decisions and/or retirement from contact sports.	B
<u>3.1</u>	Provide verbal information and written handouts to the child/adolescent and the parents and/or caregivers.	A/B

On Re-assessment after one month (what do we do next if the child/adolescent still has symptoms?)

Number		Evidence
<u>5.1</u>	Assess any modifiers that may delay recovery.	B
<u>5.2</u>	Make sure the child/adolescent is not taking any medication that might mask or modify the symptoms.	B
<u>5.3</u>	Assess, document and manage significant, prolonged complaints based on specific symptoms, etiology and the time since injury.	B
<u>5.9</u>	Assess and treat any physical, cognitive and neurological deficits.	B
<u>5.4a(i)</u>	Place every child/adolescent on a program of sleep hygiene.	C
<u>5.4a(ii)</u>	Screen for factors that may influence the child/adolescent's sleep/wake cycle.	B
<u>5.4a(iii)</u>	Consider non-pharmacological treatments to improve sleep.	C
<u>5.4a(iv)</u>	Consider prescribing medication on a short-term basis if sleep has not improved.	C
<u>5.4a(v)</u>	Refer the child/adolescent to a pediatric sleep specialist if sleep has not improved.	C
<u>5.4b(i)</u>	Take a history of any headaches.	B
<u>5.4b(ii)</u>	Establish the degree and duration of the disability that the headaches cause.	B
<u>5.4b(iii)</u>	Perform a neurological exam and a head/neck exam.	C
<u>5.4b(iv)</u>	Consider non-pharmacological, complementary and/or alternative medicine therapies for headache.	C
<u>5.4b(v)</u>	Consider treating migraine headaches with prescription medication.	B

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5.4c(i)	Assess for persistent cognitive difficulties.	B
5.4c(ii)	Manage any cognitive impairments.	B
5.4d(i)	Assess for balance and vestibular impairments.	B
5.4d(ii)	Assess for benign positional vertigo.	B
5.4d(iii)	Refer for further assessment and treatment if balance and/or vestibular system are dysfunctional.	B
5.4e(i)	Assess ongoing vision dysfunctions.	B
5.4e(ii)	Refer children/adolescents who have changes in functional vision to a specialist.	B
5.4f(i)	Assess and manage persistent fatigue if it is a significant symptom.	B
5.4g(i)	Assess for existing and new mental health symptoms and disorders.	B
5.4g(ii)	Ask the child/adolescent and parents and/or caregivers to report on mood and feelings.	B
5.4g(iii)	Treat any mental health symptoms.	B
5.4g(iv)	Consider referring to a specialist with experience in pediatric mental health.	B
5.5	Recommend rehabilitation therapy to improve symptoms and mobility, as needed.	B
5.6	Consider a broad differential diagnosis.	C
5.7	Consider the need for specialized therapy if symptoms persist.	B
5.8	Work with the child/adolescent's primary care professional, school and/or employer regarding accommodations needed to tasks or schedules.	B
3.1	Provide verbal information and written handouts to the child/adolescent and the parents and/or caregivers.	A/B

Tipsheet/Recommendations for Parents and/or Caregivers

In Advance (before the first activity)

Number		Evidence
<u>0.1</u>	Learn to recognize the symptoms of concussion.	B
<u>0.4</u>	Consider baseline neuro-cognitive testing if the child/adolescent plays high-risk sports—not as a general rule.	B

On Injury (if I suspect the child/adolescent has a concussion)

Number		Evidence
<u>1.1</u>	Remove the child/adolescent from play immediately if you suspect a concussion.	B
<u>1.2</u>	Assess the child/adolescent for symptoms related to concussion.	B
<u>1.3</u>	Watch for possible symptoms of concussion to evolve.	B
<u>1.4</u>	Take a child/adolescent who shows symptoms of concussion to a health care professional.	B

On Discharge from Acute Care (what do we do at home?)

Number		Evidence
<u>3.1j</u>	Follow the written and verbal information your health care professional gives you.	B/C
<u>4.2</u>	Develop a return-to-learn program after acute symptoms have improved.	B/C

On Re-assessment After One Month (what do we do next if the child/adolescent still has symptoms?)

Number		Evidence
<u>5.8</u>	Work with the child/adolescent’s primary care professional, school and/or employer regarding accommodations needed to tasks or schedules.	B

Tipsheet/Recommendations for Schools, Community Sports Organizations/Centres

In Advance (before the first activity)

Number		Evidence
0.1	Learn to recognize the symptoms of concussion.	B
0.2	Adopt a formal policy that prevents a child/adolescent who may have sustained a concussion from returning to play on the same day as the injury.	B
0.3	Ensure policies are in place to accommodate a child/adolescent who has sustained a concussion.	B
0.4	Consider baseline neuro-cognitive testing if the child/adolescent plays high-risk sports—not as a general rule.	B

On Injury (if I suspect the child/adolescent has a concussion)

Number		Evidence
1.1	Remove the child/adolescent from play immediately if you suspect a concussion.	B
1.2	Assess the child/adolescent for symptoms related to concussion.	B
1.3	Watch for possible symptoms of concussion to evolve.	B
1.4	Take a child/adolescent who shows symptoms of concussion to a health care professional.	B

On return to school (what do we monitor in the longer term?)

Number		Evidence
4.2	Develop a return-to-learn program after acute symptoms have improved.	B/C
4.3	Recommend additional assessment and accommodations if symptoms worsen or fail to improve.	B/C
4.4	Develop a return-to-play program only after the child/adolescent has started his/her return-to-learn program.	B
3.1f	Advise on maintaining social networks and interactions.	B
5.4g(i)	Assess for existing and new mental health symptoms and disorders.	B
5.4g(ii)	Ask the child/adolescent and parents and/or caregivers to report on mood and feelings.	B
5.8	Work with the child/adolescent's primary care professional, school and/or employer regarding accommodations needed to tasks or schedules.	B

Recommendations by Timeline

In Advance (before the first activity)

O.1: Learn to recognize the symptoms of concussion.

When: Before the child/adolescent engages in any physical activity.

Who: Anyone observing and caring for children/adolescents.

- Example: teachers, coaches, parents, peers.

How: Bring the following tools to sports sessions (practice or match), events and activities.

- [Tool 0.1](#): Pocket Concussion Recognition Tool for children, adolescents and adults.
- [Tool 0.3](#): Parachute Concussion Guidelines for Parents & Caregivers.

Why: So that you are ready and able to provide the best immediate support and appropriate action to any child, in case it is needed.

Level of evidence: B.

O.2: Adopt a formal policy that prevents a child/adolescent who may have sustained a concussion from returning to play on the same day as the injury.

When: As soon as possible, if not done already.

Who: School boards, community sports organizations/centres.

How:

- Incorporate information from the following tool in the policy:
 - [Tool 0.7](#): Ontario Ministry of Education School Board Policies for Concussion.
- Publicize the policy widely among schools and their staff.

Why:

- Schools and their staff should be ready to act decisively if they suspect that a child/adolescent has sustained a concussion.
- Jurisdictions such as Ontario expect all school boards to have a policy on concussion by January 30, 2015.

Level of evidence: B.

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

When: As soon as possible, if not done already.

Who: School boards, community sports organizations/centres.

How:

- Incorporate information from the following tools into the school board's policy. Note that there is evidence stating the need for physical and cognitive rest, but no clear answer as to the ideal duration. Therefore, we offer tools for two approaches: Tools

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followed by “a” reflect a standard approach, those followed by “b” reflect a more conservative approach.

- [Tool 0.4a](#): Parachute After a Concussion Guidelines for Return to Play.
- [Tool 0.4b](#): CanChild Return to Activity Guidelines for Children and Youth.
- [Tool 0.5a](#): ACE Post-Concussion Gradual Return to School.
- [Tool 0.5b](#): CanChild Return to School Guidelines for Children and Youth.
- [Tool 0.6](#): CanChild Activity Suggestions for Recovery Stages After Concussion.
- [Tool 0.7](#): Ontario Ministry of Education School Board Policies for Concussion.
- Publicize these policies widely among schools and their staff.
- Allow the child/adolescent:
 - enough time away from school to begin cognitive recovery;
 - accommodations to support cognitive deficits, such as additional time for homework and/or exams during recovery;
 - exemptions from physical activities until cleared by his/her primary care professional.

Why:

- Schools and their staff should be ready to promote the child/adolescent’s recovery and effective return-to-school/play.
- Jurisdictions such as Ontario expect all school boards to have a policy on concussion by January 30, 2015.

Level of evidence: B.

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

When: Before the child/adolescent plays a practice or match.

Who:

- Parents and/or caregivers.
- Health care professionals.
 - Example: family physicians, pediatricians, nurse-practitioners.
- School boards, community sports organizations/centres.

How: Contact a health care professional for referral to a qualified professional for a neuro-cognitive assessment.

Why:

- To provide baseline information on children/adolescents who play high-risk sports in case they sustain a concussion.
- To assist with return-to-play decisions.

Level of evidence: B.

On Injury (if I suspect concussion)

1.1: Remove the child/adolescent from play immediately if you suspect a concussion.

When: On injury, on site.

Who: Anyone observing and caring for children/adolescents.

- Example: teachers, coaches, parents, peers, health care professionals.

How: Do not let the child/adolescent return to play or practice that day. “If in doubt, sit them out.”

- [Recommendation 0.1](#): Learn to recognize symptoms of concussion.
- Use the evidence in the following tools written by experts.
 - Teachers, coaches, parents, peers and others
 - [Tool 0.1](#): Pocket Concussion Recognition Tool for children, adolescents and adults.
 - [Tool 0.3](#): Parachute Concussion Guidelines for Parents & Caregivers.
 - Health care professionals
 - [Tool 0.2](#): ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12 (symptom evaluation).
 - [Tool 1.1](#): SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+.

Why:

- To assess the child/adolescent as soon as possible.
- To avoid another blow that would:
 - complicate the injury further;
 - have a longer recovery time due to the higher risk of persistent symptoms;
 - potentially put the child/adolescent’s life at risk (second impact syndrome).

Level of evidence: B (ages 13+).

1.2: Assess the child/adolescent for symptoms related to concussion.

When: On injury, on site if possible.

Who: Onsite health care professional and/or responsible adult.

- Example: Team physician, coach, trainer.

How:

- Assess the injury (responsible adult).
 - [Tool 0.1](#): Pocket Concussion Recognition Tool for children, adolescents and adults
- Assess and monitor symptoms (onsite health care professional).
 - [Tool 0.2](#): ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12 (symptom evaluation).
 - [Tool 1.1](#): SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+ (symptom evaluation).
- Do not leave the child/adolescent alone.

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Why:

- Monitoring will help detect any worsening conditions and promote recovery.
- Symptoms may only appear several hours after a concussion.
- Concussion is an evolving injury; symptoms may change over time.

Level of evidence: B (ages 13+).

1.3: Watch for possible symptoms of concussion to evolve.

When: For (1-2 days) after injury.

Who: Anyone observing and caring for children/adolescents.

- Example: teachers, coaches, parents, peers.

How: Monitor for symptoms or changes in behaviour.

- Tool 0.1: Pocket Concussion Recognition Tool for children, adolescents and adults.

Why:

- Symptoms may only appear several hours after a concussion.
- Concussion is an evolving injury; symptoms may change over time.
- Awareness of the signs and symptoms that could indicate a concussion or more serious brain injury will help ensure that the child/adolescent receives the necessary diagnosis and treatment to promote recovery.

Level of evidence: B.

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

When: On injury or as soon as possible after symptoms appear.

Who: Anyone observing and caring for children/adolescents.

- Example: Teachers, coaches, parents, peers.

How:

- Take the child/adolescent to a family physician, primary care sport medicine physician, nurse practitioner or to the nearest Emergency Department.
- Arrange an ambulance service for children/adolescents with any of the “red flag” symptoms in the following tool:
 - Tool 0.1: Pocket Concussion Recognition Tool for children, adolescents and adults.

Why: To confirm the diagnosis of concussion, and to rule out other potentially serious injuries that may require medical intervention.

Level of evidence: B.

On Presentation (what are the “red flags”?)

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

When: On presentation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, sport medicine physician, nurse-practitioners.

How:

- Take a history; do an examination and a cognitive screen, assess for persistent symptoms; review mental health. Use the following tools as appropriate.
 - [Tool 2.1](#): Management of Acute Symptoms Algorithm.
 - [Tool 2.2](#): Acute Concussion Evaluation (ACE).
 - [Tool 0.2](#): ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12 (symptom evaluation).
 - [Tool 1.1](#): SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+ (symptom evaluation).
 - [Tool 2.4](#): Neurologic and Musculoskeletal Exam.
- Consider signs and symptoms in context with the child/adolescent’s normal performance, especially for those with learning and communication deficits, ADHD and/or physical disabilities.
- Find out if the child/adolescent plays high-risk sports and has had baseline neuro-cognitive testing ([Recommendation 0.4](#) for parents and/or caregivers.)
- [Recommendation 5.1](#): Assess any modifiers that may delay recovery.

Why:

- To start treatment immediately or decide on further tests.
- To prevent re-injury, the worsening of symptoms or a prolonged recovery.

Level of evidence: A for assess (ages 13+); B for treat.

2.2: Determine the need for CT imaging.

When: On presentation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners.

How: Use the following tools, as appropriate.

- [Tool 2.5](#): PECARN Management Algorithm for Children After Head Trauma.
- [Tool 2.9](#): Algorithm for the management of the pediatric patient ≥ 2 years with minor head trauma.

Why: Most children/adolescents who have sustained a head injury do not need imaging. For those who do, a CT scan is the most appropriate technology in the acute setting to identify skull fractures and important lesions, such as hemorrhage.

Level of evidence: A.

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

When: On presentation, after negative results of imaging.

Who: Health care professionals.

- Example: Emergency Department and other hospital-based physicians.

How: See Section D on “red flag” symptoms in the following tool.

- [Tool 2.2](#): Acute Concussion Evaluation (ACE).

Why: To monitor the presence of other injuries that might negatively affect recovery.

Level of evidence: B.

2.4: Treat acute headaches.

When: On presentation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners.

How:

- Prescribe
 - acetaminophen or ibuprofen for children and adolescents;
 - acetaminophen, ibuprofen or naproxen for adolescents.
 - [Tool 5.6](#): Approved Medications for Pediatric Indications.
 - [Tool 5.12](#): General Considerations Regarding Pharmacotherapy.
- Rule out intracranial bleeds before prescribing NSAIDs.
- Avoid around-the-clock dosing to prevent a medication-overuse headache.

Why: To relieve acute symptoms.

Level of evidence: C.

2.5: Prescribe physical and cognitive rest.

When: On presentation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners.

How:

- Prescribe an initial 24-48 hour period of rest.
- Ask parents and/or caregivers to check for symptoms in 24-hour intervals.
- Note that there is evidence stating the need for physical and cognitive rest, but no clear answer as to the ideal duration. Extreme prolonged rest may delay recovery. Therefore, we offer tools for two approaches. Tools followed by “a” reflect a standard approach, those followed by “b” reflect a more conservative approach. Use clinical judgment.
 - [Tool 0.4a](#): Parachute After a Concussion Guidelines for Return to Play.
 - [Tool 0.4b](#): CanChild Return to Activity Guidelines for Children and Youth.
 - [Tool 0.5a](#): ACE Post-Concussion Gradual Return to School.

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- [Tool 0.5b](#): CanChild Return to School Guidelines for Children and Youth.
- [Tool 0.6](#): CanChild Activity Suggestions for Recovery Stages After Concussion.

Why:

- Physical and cognitive rest are the key initial strategies to manage concussion. Most people recover fully from concussion with physical and cognitive rest, although the recovery rate can be variable and unpredictable.

Level of evidence: B for need for rest; C for ideal duration of rest.

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

When: On presentation, after a period of observation without “red flag” symptoms.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners.

How: Assess the child/adolescent for the following.

- Normal mental status (alertness/behaviour/cognition) with improving symptoms.
- No clinical risk factors indicating the need for a CT scan, or a normal result if a CT scan was done.
- No indicators for prolonged hospital observation, such as:
 - worsening symptoms;
 - persistent clinical symptoms (vomiting, severe headache, etc.);
 - bleeding disorders (use clinical judgment);
 - multi-system injuries (use clinical judgment);
 - comorbid symptoms (use clinical judgment).
- [Recommendation 3.1](#): Provide verbal information and written handouts to the child/adolescent and the parents and/or caregivers.

Why: Patients who meet these criteria can be discharged safely.

Level of evidence: B.

On Discharge (“what do we tell parents and/or caregivers?”) and “what do we do at home?”)

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

When: On discharge, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How:

- Write a discharge note based on:
 - [Tool 3.1](#): Template Letter of Accommodation from Physician to School.
 - [Tool 4.4](#): Returning to School-based Activities After Concussion Care Plan.
- Apply recommendations in [On discharge](#), as needed.

Why: Providing education and written instructions to patients, parents and/or caregivers leads to a better recovery.

Level of evidence: A for intensive educational program; B for written instructions.

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

When: On discharge, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Provide verbal information and written handouts.

- Lifestyle strategies and expectations. Note that tools followed by “a” reflect a standard approach, those followed by “b” reflect a more conservative approach. Use clinical judgment.
 - [Tool 0.4a](#): Parachute After a Concussion Guidelines for Return to Play.
 - [Tool 0.4b](#): CanChild Return to Activity Guidelines for Children and Youth.
 - [Tool 0.5a](#): ACE Post-Concussion Gradual Return to School.
 - [Tool 0.5b](#): CanChild Return to School Guidelines for Children and Youth.
 - [Tool 0.6](#): CanChild Activity Suggestions for Recovery Stages After Concussion.
 - [Tool 4.5](#): Return-to-school Information and Strategies.
- Anticipatory guidance:
 - Verbal reassurance:
 - that current symptoms are expected and common;
 - about expected positive recovery;
 - about the burden and distress in parents and/or caregivers of children/adolescents who have sustained a concussion.

Why: Parents and/or caregivers need to know that most patients recover fully from concussion even though the recovery rate is variable and unpredictable. However, some children/adolescents still have symptoms at one month and beyond, and need to be monitored. Providing information reduces anxiety and helps set realistic expectations, promote recovery and prevent re-injury.

Level of evidence: B.

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

When: On discharge, interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How:

- Advise parents and/or caregivers that the child/adolescent should avoid high speed and/or contact activities that may increase his/her risk of sustaining another concussion—especially during the recovery period.
- [Recommendation 4.5](#): Refer any child/adolescent who has sustained multiple concussions to an expert in sport concussion to help with return-to-play decisions and/or retirement from contact sports.

Why: Returning to activity before the child/adolescent has recovered puts him/her at greater risk of sustaining another, more severe concussion.

Level of evidence: B.

3.1c: Advise on managing sleep proactively.

When: On discharge, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Provide verbal information and written handouts.

- [Tool 3.2](#): Strategies to Promote Good Sleep and Alertness.

Why:

- Sleep disturbances are common symptoms of concussion, and need to be managed to ensure a timely recovery.
- Good sleep habits promote good health.

Level of evidence: C.

3.1d: Advise on managing headaches.

When: On discharge, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, neuropsychologists.

How: Provide written handout.

- [Tool 5.3](#): pedMIDAS Headache Severity Tool for Children aged 4-18.

Why:

- To relieve acute symptoms;
- To prevent the worsening of symptoms or prolonged recovery.

Level of evidence: B.

3.1e: Advise on coping with fatigue.

When: On discharge, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Provide verbal information.

- Fatigue can come on suddenly or with minimum exertion.
- Parents and/or caregivers should try to identify the triggers of fatigue.

Why: To set expectations, and to help cope with symptoms.

Level of evidence: B.

3.1f: Advise on maintaining social networks and interactions.

When: On discharge, on interim evaluation, on re-evaluation.

Who:

- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.
- Qualified school-based professionals.
 - Example: teachers, guidance counsellors.

How: Encourage children/adolescents to participate in rewarding social activities; modified as needed.

- Identify these activities and suggest modifications, as appropriate.
- Note that children/adolescents who have persistent symptoms may be less able to participate in rewarding social activities.

Why:

- Reducing the risk of mental health issues and social isolation may promote recovery.
- Adolescents tend to have reduced social leisure activities one year after concussion.

Level of evidence: B.

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

When: On discharge, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

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How: Provide verbal information.

- Children/adolescents should not consume alcohol and/or recreational drugs at all—especially after a concussion.

Why:

- To prevent the child/adolescent from self-medicating and resorting to drugs to relieve symptoms.
- To avoid the negative effect on recovery of alcohol and recreational drugs.
- To avoid impaired judgment, which could lead to risky behaviour that causes further harm.

Level of evidence: B.

3.1h: Advise on avoiding driving during recovery.

When: On discharge, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Provide verbal information.

- Driving is a complex, coordinated process that requires vision, balance, reaction time, judgment, cognition and attention. Concussion may have affected some or all of these skills.

Why: Avoiding driving can prevent motor vehicle accidents and, therefore, injury to the adolescent or to others.

Level of evidence: B.

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.

When: On discharge, interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Provide verbal information and written handouts. Tools followed by “a” reflect a standard approach, those followed by “b” reflect a more conservative approach. Use clinical judgment.

- [Tool 0.4a](#): Parachute After a Concussion Guidelines for Return to Play.
- [Tool 0.4b](#): CanChild Return to Activity Guidelines for Children and Youth.
- [Tool 0.5a](#): ACE Post-Concussion Gradual Return to School.
- [Tool 0.5b](#): CanChild Return to School Guidelines for Children and Youth.
- [Tool 0.6](#): CanChild Activity Suggestions for Recovery Stages After Concussion.

Why: To monitor progress and promote recovery.

Level of evidence: B for need for rest; C for ideal duration of rest.

3.1j: Follow the written and verbal information your health care professional gives you.

When: On discharge, interim evaluation, on re-evaluation.

Who: Parents and/or caregivers.

How:

- Make sure the health care professional gives you information and tools (see [On Discharge](#)) on the following, as needed:
 - Return to school/play/activity;
 - Variable recovery rate and timeline;
 - Second impact syndrome;
 - Sleep hygiene;
 - Headaches;
 - Fatigue;
 - Alcohol, recreational drugs and driving;
 - Social networks;
 - Daily informal monitoring of symptoms;
 - Follow-ups.
- Use the following tools and instructions:
 - [Recommendation 2.5](#): Make sure the child/adolescent gets physical and cognitive rest.
 - Watch for possible symptoms of concussion to evolve. ([Recommendation 1.3](#)).
 - Make sure your child/adolescent attends follow-up appointments.
 - [Recommendation 4.2](#): Develop a return-to-learn program after acute symptoms have improved.

Why: To monitor progress and promote recovery.

Level of evidence: B for need for rest; C for ideal duration of rest.

On Interim Assessment (when can the child/adolescent return to learn/play?) and On Return to School (what do we monitor in the longer term?)

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

When: On interim evaluation.

Who:

- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How:

- Note that there is evidence stating the need for physical and cognitive rest, but no clear answer as to the ideal duration. Extreme prolonged rest may delay recovery. Therefore, we offer tools for two approaches. Tools followed by “a” reflect a standard approach, those followed by “b” reflect a more conservative approach. Use clinical judgment.
 - [Tool 0.5a](#): ACE Post-Concussion Gradual Return to School.
 - [Tool 0.5b](#): CanChild Return to School Guidelines for Children and Youth.
- Consider the following:
 - Within 72 hours of injury:
 - [Recommendation 2.5](#): Prescribe physical and cognitive rest.
 - If symptom-free, recommend that the child/adolescent returns to academic and/or school related activities gradually, as tolerated and as long as symptoms do not reoccur.
 - If symptomatic, recommend that the child/adolescent does not attend school or participate in school-related activities at home.
 - 3-6 days after injury:
 - If symptom-free, recommend that the child/adolescent returns to academic and/or school related activities gradually, as tolerated and as long as symptoms do not reoccur.
 - If symptoms are improving but worsen with cognitive activity, recommend that the child/adolescent does not attend school and/or participate in school-related activities.
 - One week or more after injury:
 - If still symptomatic, develop individualized return-to-learn accommodations with gradually increasing course load and hours of attendance, as tolerated.
 - Recommend that parents and/or caregivers and the school establish accommodations and support for return-to-learn. Consider referring to an appropriate specialist.

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Why:

- The health care professional must give permission for the child/adolescent to return to school because concussion may affect his/her ability to learn.
- It is reasonable for a child/adolescent to miss a day or two of school after concussion, regardless of symptoms. However, it is also important not to allow or encourage the child/adolescent to "settle into the habit" of missing school, which can create its own problems.
- The school setting provides beneficial contact with peers and social support.

Level of evidence: B for need for rest; C for ideal duration of rest.

4.2: Develop a return-to-learn program after acute symptoms have improved.

When: On interim evaluation, on re-evaluation.

Who:

- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, speech-language pathologists, neuropsychologists.
- Qualified school-based professionals.
 - Example: teachers.
- Parents and/or caregivers.

How:

- [Recommendation 2.1](#): Assess and treat any physical, cognitive and neurological deficits.
- Re-assess weekly.
- Manage the gradual return to activity on a case-by-case basis. Recovery from concussion is highly variable.
- Begin a schedule of cognitive challenges mixed with rest periods, and monitor symptom response. Example: family engagement (lunch or dinner with family), general home activities (making a sandwich, walking the dog), 10-15 minutes of texting, 30 minutes TV show, 20 minutes of homework.
- Note that there is evidence stating the need for physical and cognitive rest, but no clear answer as to the ideal duration. Extreme prolonged rest may delay recovery. Therefore, we offer tools for two approaches. Tools followed by "a" reflect a standard approach, those followed by "b" reflect a more conservative approach. Use clinical judgment.
 - [Tool 0.5a](#): ACE Post-Concussion Gradual Return to School.
 - [Tool 0.5b](#): CanChild Return to School Guidelines for Children and Youth.
 - [Tool 4.3](#): Academic Accommodations for Concussed Students.
 - [Tool 4.2](#): Template Letter of Accommodation from School to Parents/Caregivers.
 - [Tool 4.4](#): Returning to School-based Activities After Concussion Care Plan.
- Prioritize return-to-learn before return-to-work. For older teens who work, refer to the "*Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)*."
 - http://onf.org/system/attachments/201/original/ONF_mTBI_Guidelines_2nd_Edition_MODULE_12.pdf.

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Why:

- Parents and/or caregivers need to know that most patients recover fully from concussion even though the recovery rate is variable and unpredictable.
- The key to the initial management of concussion is physical and cognitive rest, which allow symptoms to resolve.

Level of evidence: B for need for rest; C for ideal duration of rest.

4.3: Recommend additional assessment and accommodations if symptoms worsen or fail to improve.

When: On interim evaluation, on re-evaluation.

Who:

- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, neuropsychologists, speech-language pathologists, occupational and physical therapists.
- Qualified school-based professionals.
 - Example: teachers.

How:

- Note that there is evidence stating the need for physical and cognitive rest, but no clear answer as to the ideal duration. Extreme prolonged rest may delay recovery. Therefore, we offer tools for two approaches. Tools followed by “a” reflect a standard approach, those followed by “b” reflect a more conservative approach. Use clinical judgment.
- Use the following tool to assess progress.
 - [Tool 0.4a](#): Parachute After a Concussion Guidelines for Return to Play.
 - [Tool 0.4b](#): CanChild Return to Activity Guidelines for Children and Youth.
- Develop an individual education plan (IEP) at school. Use the following tool.
 - www.edu.gov.on.ca/eng/general/elemsec/speced/iep/iep.html.
- Repeat neuro-cognitive testing if the child/adolescent had a baseline done already.
- Consider referring to an appropriate specialist.

Why: To promote successful return to learn/play.

Level of evidence: B for need for rest; C for ideal duration of rest.

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

When: On interim evaluation

Who:

- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.
- Qualified school-based professionals.
 - Example: teachers, coaches.

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How:

- Note that there is evidence stating the need for physical and cognitive rest, but no clear answer as to the ideal duration. Extreme prolonged rest may delay recovery. Therefore, we offer tools for two approaches. Tools followed by “a” reflect a standard approach, those followed by “b” reflect a more conservative approach. Use clinical judgment.
 - [Tool 0.4a](#): Parachute After a Concussion Guidelines for Return to Play.
 - [Tool 0.4b](#): CanChild Return to Activity Guidelines for Children and Youth.
 - [Tool 0.6](#): CanChild Activity Suggestions for Recovery Stages After Concussion.
 - [Tool 4.1](#): OPHEA Documentation for a Diagnosed Concussion – Return to Learn/Return to Physical Activity Plan.
 - [Tool 4.2](#): Template Letter of Accommodation from School to Parents/Caregivers.
- Base decisions regarding return-to-play on clinical judgment, expertise and symptoms.

Why:

- To promote an optimal recovery. A gradual return to play is the best way to make sure that the child/adolescent remains symptom-free when he/she fully engages in sport.
- **Level of evidence:** B for need for rest; C for ideal duration of rest.

4.5: Refer any child/adolescent who has sustained multiple concussions to an expert in sport concussion to help with return-to-play decisions and/or retirement from contact sports.

When: On interim evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Refer to an appropriate specialist in concussion management (example: sport medicine physician, brain injury clinic, neurologist) who also has expertise in pediatrics.

Why:

- Return-to-play decisions are more complicated in athletes who have sustained multiple concussions.
- An expert in sport concussion can advise on other decisions surrounding return-to-play and/or retirement.

Level of evidence: B.

On Re-assessment After One Month (what do we do next if the child/adolescent still has symptoms?)

5.1: Assess any modifiers that may delay recovery.

When: On presentation, on interim evaluation, on re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, speech-language pathologists, occupational and physical therapists, neuropsychologists.

How:

- Use the following tool.
 - [Tool 2.3](#): Modifiers for Concussion.
- Assess for increased risk of persistent symptoms where:
 - there is a history of learning difficulties, behavioural problems or loss of consciousness;
 - the child/adolescent had an initial headache, nausea, vomiting or dizziness after the concussion.

Why: To customize management to the individual child/adolescent and promote recovery.

Level of evidence: B.

5.2: Make sure the child/adolescent is not taking any medication that might mask or modify the symptoms.

When: On presentation, on re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, neuropsychologists.

How: Ask whether the child/adolescent is taking prescribed or over-the-counter medications/supplements, and is drinking alcohol or taking recreational drugs.

Why:

- To avoid a premature return-to-play that might endanger the child/adolescent's health.
- To determine if any medications or supplements are masking symptoms.
- To document anything that may require particular attention.

Level of evidence: B.

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

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, speech-language pathologists, occupational and physical therapists, neuropsychologists.

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How:

- Investigate all contributing factors and develop a management strategy.
 - [Recommendation 2.1](#): Assess and treat any physical, cognitive and neurological deficits.
 - [Tool 2.6](#): Management of Persistent Symptoms Algorithm.
 - [Tool 5.13](#): Post-concussion Symptom Inventory for Children aged 5-7.
 - [Tool 5.14](#): Post-concussion Symptom Inventory for Children aged 8-12.
 - [Tool 5.15](#): Post-concussion Symptom Inventory Self-assessment, ages 13-18.
- Examine the child/adolescent based on symptoms described.
 - [Tool 2.3](#): Modifiers for Concussion.
- [Recommendations 5.4a](#), [5.4b](#), [5.4c](#), [5.4d](#), [5.4e](#), [5.4f](#), [5.4g](#), as needed.
- Order further investigations as needed.

Why: To identify and treat the underlying causes of persistent symptoms. Persistent symptoms can be non-specific and may mask or mimic symptoms of other conditions, such as depression, anxiety disorders and chronic pain.

Level of evidence: B.

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

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Use the following tool.

- [Tool 3.2](#): Strategies to Promote Good Sleep and Alertness.

Why: Improving sleep may contribute to general recovery and alleviate symptoms such as mood, anxiety, pain, fatigue and cognitive problems, if these are present.

Level of evidence: C.

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

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, speech-language pathologists, occupational and physical therapists, neuropsychologists.

How: Ask about:

- Other medical conditions (example: enlarged tonsils, obesity, obstruction, sleep related breathing disorders);
- Other medications (especially stimulants);
- Mood or anxiety disorders;
- Early morning headaches (possible sleep apnea);
- Unhealthy habits (lack of exercise, variable sleep-wake schedule, excessive napping, excessive time spent in bed, exercising close to bedtime).

Why: To identify factors that could be treated or changed to improve the child/adolescent's sleep and recovery.

Level of evidence: B.

5.4a(iii): Consider non-pharmacological treatments to improve sleep.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How:

- Consider supplements of magnesium, melatonin and zinc, as needed.
 - [Tool 5.6](#): Approved Medications for Pediatric Indications.
- Consider referring to a cognitive behaviour specialist.
- Consider acupuncture or mindfulness-based stress reduction therapy.

Why: To improve sleep and recovery without the use of medication that may have side-effects.

Level of evidence: C.

5.4a(iv): Consider prescribing medication on a short-term basis if sleep has not improved.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How: Consider prescribing trazodone, zopiclone, as appropriate.

- [Tool 5.6](#): Approved Medications for Pediatric Indications.
- [Tool 5.12](#): General Considerations Regarding Pharmacotherapy.

Why: To promote better sleep.

Level of evidence: C.

5.4a(v): Refer the child/adolescent to a pediatric sleep specialist if sleep has not improved.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, neuropsychologists.

How: Provide the names of specialists with experience in assessing concussion and in polysomnography (example: sleep study, Multiple Sleep Latency Test, Maintenance of Wakefulness Test).

Why: To resolve sleep disturbances and rule out possible sleep-related breathing disorders, nocturnal seizures, periodic limb movements or narcolepsy.

Level of evidence: C.

5.4b(i): Take a history of any headaches.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How:

- Use the following tools, as appropriate.
 - [Tool 2.8](#): Assessment of Children and Adolescents with Headache.
 - [Tool 5.2](#): Diagnostic Criteria for Headaches.
 - [Tool 5.3](#): pedMIDAS Headache Severity Tool for Children aged 4-18.
- Ask about:
 - Family history of migraine;
 - Sleep habits/quality;
 - Family and friends;
 - Academic performance.

Why:

- To identify the subtype of headache that most closely resembles the symptoms.
- To identify the most appropriate treatment. Some post-traumatic headaches are unclassifiable.

Level of evidence: B.

5.4b(ii): Establish the degree and duration of the disability that the headaches cause.

When: On re-evaluation

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How: Ask the child/adolescent or the parents and/or caregivers to record headaches that require medication.

- [Tool 5.3](#): pedMIDAS Headache Severity Tool for Children aged 4-18.
- [iHeadache](#): Free Headache and Migraine Diary App.

Why:

- To document medication use and the frequency, severity and triggers of the headaches.
- To identify the most appropriate treatment.
- To establish a baseline against which to compare, and monitor the response to treatment.

Level of evidence: B.

5.4b(iii): Perform a neurological exam and a head/neck exam.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How: Use the following tool.

- [Tool 2.4](#): Neurologic and Musculoskeletal Exam.

Why: To rule out other important pathologies and confirm the diagnosis.

Level of evidence: C.

5.4b(iv): Consider non-pharmacological, complementary and/or alternative medicine therapies for headache.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How:

- [Tool 5.1](#): Management of Persistent Headache in Children Algorithm.
- [Tool 3.2](#): Strategies to Promote Good Sleep and Alertness.
- Provide the following, as needed:
 - Names of specialists in, for example, relaxation therapy.
 - Names of massage therapists and acupuncturists/acupressurists (cervicogenic/tension).
- Consider natural health products, such as vitamins (example: B2, riboflavin).

Why: To target the source of the headache and decrease symptoms without medication, particularly if the child/adolescent or the parents and/or caregivers are reluctant to use medication.

Level of evidence: C.

5.4b(v): Consider treating migraine headaches with prescription medication.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How:

- Prescribe medication, as needed.
 - [Tool 5.1](#): Management of Persistent Headache in Children Algorithm.
 - [Tool 5.6](#): Approved Medications for Pediatric Indications.
 - [Tool 5.12](#): General Considerations Regarding Pharmacotherapy.
- Consider referring to a neurologist.

Why: To relieve symptoms.

Level of evidence: B.

5.4c(i): Assess for persistent cognitive difficulties.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, speech-language pathologists, occupational/physical therapists, neuropsychologists.

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How:

- Use the following tool:
 - [Tool 5.11](#): Screening Questions for Persistent Cognitive Difficulties.
- Consider referring to a pediatric neuropsychologist if the child/adolescent reports having a problem before the injury.

Why: To inform management of:

- return-to-learn and daily activities;
- potential persistent symptoms that should be monitored.

Level of evidence: B.

5.4c(ii): Manage any cognitive impairments.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, speech-language pathologists, neuropsychologists.

How:

- Inform parents and/or caregivers, schools and/or employers of accommodations needed to tasks or schedules.
 - [Tool 3.1](#): Template Letter of Accommodation from Physician to School.
 - [Tool 4.3](#): Academic Accommodations for Concussed Students.
 - [Tool 4.5](#): Return-to-school Information and Strategies.
- Refer to a neuropsychologist if symptoms interfere with daily functioning.

Why:

- To inform management of symptoms, return-to-learn and daily activities.
- To clarify the most appropriate treatment options and accommodations based on the child/adolescent's characteristics.
- To promote cognitive recovery and avoid errors or setbacks at school or work.

Level of evidence: B.

5.4d(i): Assess for balance and vestibular impairments.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How:

- Perform a neurological exam.
 - [Tool 2.4](#): Neurologic and Musculoskeletal Exam.
- Assess balance using the following tools, as appropriate.
 - [Tool 0.2](#): ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12 (balance examination).
 - [Tool 1.1](#): SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+ (balance examination).
- Use clinical judgment regarding age-appropriate level of skills.

Why: To find out which systems (visual reflexes, inner ear, musculoskeletal, nervous system or brain) might be contributing to dizziness, headaches and balance problems, if the child/adolescent has them.

Level of evidence: B. (for ages 13+).

5.4d(ii): Assess for benign positional vertigo.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How:

- Use the following tool.
 - **Tool 5.4:** Dix-Hallpike Manoeuvre and Particle Repositioning Manoeuvre.
- Perform a canalith repositioning manoeuvre if the result of the Dix-Hallpike manoeuvre is positive.

Why: Benign positional vertigo is a readily treatable cause of balance problems. The trauma that caused the concussion may have dislodged the canalith crystals (otoconia) in the inner ear. If this is the case, the repositioning manoeuvre may relieve symptoms related to dizziness.

Level of evidence: B.

5.4d(iii): Refer for further assessment and treatment if balance and/or vestibular system are dysfunctional.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How:

- Provide the name of an appropriate specialist, including an audiologist if the child/adolescent has auditory symptoms.
- Refer children/adolescents with persistent vestibular symptoms to a physiotherapist.

Why: Vestibular rehabilitation may improve balance and mobility.

Level of evidence: B.

5.4e(i): Assess ongoing vision dysfunctions.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How: Use the following tools.

- **Tool 2.4:** Neurologic and Musculoskeletal Exam.
- **Tool 5.5:** Initial Assessment of Cognitive Visual Impairment in Children.

Why: To prevent the worsening of symptoms or prolonged recovery.

Level of evidence: B.

5.4e(ii): Refer children/adolescents who have changes in functional vision to a specialist.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners.

How: Provide the names of neuro-ophthalmologists or neuro-optometrists.

Why: To provide a specialized level of care.

Level of evidence: B.

5.4f(i): Assess and manage persistent fatigue if it is a significant symptom.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How:

- Take a history of the symptoms.
- Aim for a gradual increase in exercise/activity that matches improvement in symptoms.
- Emphasize that spreading activities throughout the day helps patients achieve more, and that they should avoid doing too much at once.
 - Consider referring to an occupational therapist to learn energy-saving techniques.
- Encourage good sleep hygiene.
 - [Tool 3.2](#): Strategies to Promote Good Sleep and Alertness.
- Encourage the child/adolescent to plan meaningful goals, record activity achievement, and identify patterns of fatigue by using a notebook or diary.
- Inform the child/adolescent and the parents and/or caregivers that fatigue can be worsened by low mood or stress.
- Provide verbal information on coping strategies for fatigue.

Why: To prevent the worsening of symptoms or a prolonged recovery.

Level of evidence: B.

5.4g(i): Assess for existing and new mental health symptoms and disorders.

When: On re-evaluation.

Who:

- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, neuropsychologists.
- Qualified school-based professionals.
 - Example: teachers.

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How:

- Use the following tools, as appropriate.
 - [Tool 2.7](#): HEADS-ED Tool for Monitoring Pediatric Mental Health in the ED.
 - [Interactive web version](#).
 - [Tool 5.8](#): Mood and Feelings Questionnaire, Child Self-Report.
 - [Tool 5.9](#): Mood and Feelings Questionnaire, Parent Report on Child.
 - [Tool 5.10](#): Screen for Child Anxiety Related Disorders (SCARED).
- Ask about
 - Somatoform disorders.
 - Family functioning.
- Refer to a mental health specialist, as appropriate (use clinical judgment).

Why: Identifying common mental health disorders early could:

- prevent/mitigate additional persistent symptoms such as learning and behaviour problems;
- treat the mental health disorder itself, and prevent it from becoming a long-term problem.

Level of evidence: B.

5.4g(ii): Ask the child/adolescent and parents and/or caregivers to report on mood and feelings.

When: On re-evaluation and on referral (repeatedly as needed).

Who:

- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.
- Qualified school-based professionals.
 - Example: teachers.

How: Ask the child/adolescent and parents and/or caregivers to complete the following, as appropriate.

- [Tool 5.8](#): Mood and Feelings Questionnaire, Child Self-Report.
- [Tool 5.9](#): Mood and Feelings Questionnaire, Parent Report on Child.

Why: Identifying common mental health disorders early could:

- assess the association of physical symptoms and restrictions to activity on mental health.
- treat the mental health disorder itself, and prevent it from becoming a long-term problem.

Level of evidence: B.

5.4g(iii): Treat any mental health symptoms.

When: On re-evaluation. When indicated throughout management based on symptoms and response to treatment.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists.

How:

- Base treatment on individual factors, patient preferences, severity of symptoms, co-morbidity.
 - [Tool 5.7](#): Management of Persistent Mental Health Disorders Algorithm.
 - [Tool 5.6](#): Approved Medications for Pediatric Indications.
 - [Tool 5.12](#): General Considerations Regarding Pharmacotherapy.
- Consider referring to a local health care professional or to a specialist with experience in pediatric mental health if unable to manage.

Why: Identifying common mental health disorders early could:

- prevent/mitigate additional persistent symptoms such as learning and behaviour problems;
- treat the mental health disorder itself, and prevent it from becoming a long-term problem.

Level of evidence: B.

5.4g(iv): Consider referring to a specialist with experience in pediatric mental health.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, neuropsychologists, occupational and physical therapists.

How:

- Confirm that:
 - The symptoms are complex and/or severe.
 - Treatment in the first month after injury has not been effective.
 - Standard medications have failed or are contra-indicated.
 - Prominent/major risk factors may affect the course of recovery.
- Provide the name of a specialist with experience in pediatric mental health.
- Continue treating other symptoms.

Why: Identifying common mental health disorders early could:

- prevent/mitigate additional persistent symptoms such as learning and behaviour problems;
- treat the mental health disorder itself, and prevent it from becoming a long-term problem.

Level of evidence: B.

5.5: Recommend rehabilitation therapy to improve symptoms and mobility, as needed.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: Provide the names of certified exercise physiologists or sport medicine physicians who have experience in concussion and return-to-play protocols.

Why:

- A gradual, closely supervised active rehabilitation program could improve the recovery of children/adolescents who are slow to return to full physical activity.
- Exercise promotes sleep, energy, mood and cognitive performance, and avoids the loss of fitness.

Level of evidence: B.

5.6: Consider a broad differential diagnosis.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.

How: In this order.

- Take a history.
 - [Tool 2.6](#): Management of Persistent Symptoms Algorithm.
- Examine the child/adolescent based on symptoms.
- Review mental health, perform a post-concussive assessment and a cognitive screen.
 - [Recommendation 5.4g\(i\)](#): Assess for existing and new mental health symptoms and disorders.

Why: To identify and treat the underlying causes of persistent symptoms. Persistent symptoms can be non-specific and may mimic symptoms of other conditions such as depression, anxiety disorders and chronic pain.

Level of evidence: C.

5.7: Consider the need for specialized therapy if symptoms persist.

When: On re-evaluation.

Who: Health care professionals.

- Example: Family physicians, pediatricians, nurse-practitioners, speech-language pathologists, occupational and physical therapists, neuropsychologists.

How: Refer the child/adolescent for specialty or multi-disciplinary assessments, according to his/her symptoms.

- [Recommendation 4.3](#): Recommend additional assessment and accommodations if symptoms worsen or fail to improve.

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- [Recommendation 4.5](#): Refer any child/adolescent who has sustained multiple concussions to an expert in sport concussion to help with return-to-play decisions and/or retirement from contact sports.
- [Recommendation 5.4a\(v\)](#): Refer the child/adolescent to a pediatric sleep specialist if sleep has not improved.
- [Recommendation 5.4d\(iii\)](#): Refer for further assessment and treatment if balance and/or vestibular system are dysfunctional.
- [Recommendation 5.4e\(ii\)](#): Refer children/adolescents who have changes in functional vision to a specialist.
- [Recommendation 5.4g\(iv\)](#): Consider referring to a specialist with experience in pediatric mental health.
- [Recommendation 5.5](#): Recommend rehabilitation therapy to improve symptoms and mobility, as needed.

Why: To promote recovery and avoid the development of persistent symptoms.

Level of evidence: B.

5.8: Work with the child/adolescent's primary care professional, school and/or employer regarding accommodations needed to tasks or schedules.

When: At home, in between evaluations.

Who:

- Parents and/or caregivers.
- Health care professionals.
 - Example: Family physicians, pediatricians, nurse-practitioners, occupational and physical therapists, neuropsychologists.
- Qualified school-based professionals.
 - Example: teachers, coaches.

How:

- Discuss [Recommendation 4.3](#) on additional assessment and accommodations if symptoms fail to improve and [Recommendation 5.4c\(ii\)](#) on managing cognitive impairments with your primary care professional.
- Use the following tools, as appropriate.
 - [Tool 4.2](#): Template Letter of Accommodation from School to Parents/Caregivers.
 - [Tool 4.3](#): Academic Accommodations for Concussed Students.
 - [Tool 4.4](#): Returning to School-based Activities After Concussion Care Plan.
 - [Tool 4.5](#): Return-to-school Information and Strategies.

Why: To promote recovery and avoid the development of persistent symptoms.

Level of evidence: B.

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

When: On re-evaluation.

Who: Health care professionals.

- Example: Emergency Department physicians, family physicians, pediatricians, nurse-practitioners, speech-language pathologists, occupational and physical therapists, neuropsychologists.

How:

- Take a history; do an examination and a cognitive screen, assess for persistent symptoms; review mental health. Use the following tools as appropriate.
 - [Tool 2.3](#): Modifiers for Concussion.
 - [Tool 2.4](#): Neurologic and Musculoskeletal Exam.
 - [Tool 2.5](#): PECARN Management Algorithm for Children After Head Trauma.
 - [Tool 2.7](#): HEADS-ED Tool for Monitoring Pediatric Mental Health in the ED.
 - [Interactive web version](#).
 - [Tool 2.8](#): Assessment of Children and Adolescents with Headache.
 - [Tool 5.5](#): Initial Assessment of Cognitive Visual Impairment in Children.
 - [Tool 5.13](#): Post-concussion Symptom Inventory for Children aged 5-7.
 - [Tool 5.14](#): Post-concussion Symptom Inventory for Children aged 8-12.
 - [Tool 5.15](#): Post-concussion Symptom Inventory Self-assessment, ages 13-18.
- Consider signs and symptoms in context with the child/adolescent's normal performance, especially for those with learning and communication deficits, ADHD and/or physical disabilities.
- Compare results of neuro-cognitive testing with the baseline, if a baseline was done ([Recommendation 0.4](#) for parents and/or caregivers.)

Why:

- To continue treatment or decide on further action.
- To treat ongoing symptoms.

Level of evidence: B for treat.

Background

Pediatric Concussion and Persistent Symptoms

Concussion is an injury to the brain caused by a blow to the head or to another part of the body that causes the head to spin or jolt. Even though concussions are common among children/adolescents, especially if they play contact sports such as hockey, these injuries tend to go unnoticed since there is often no bleeding, bruising or loss of consciousness, and symptoms ([Tool 0.1](#): Pocket Concussion Recognition Tool for children, adolescents and adults) can be very vague. Symptoms are usually temporary. Most children/adolescents recover fully within one month of injury.¹⁴

While there are no comprehensive numbers for pediatric concussion in Canada, data from eight pediatric emergency departments across Canada show that one out of every 70 visits to those departments is for concussion. As well, those who report concussion most often are aged 9–22 years;¹⁵ and 10–20 percent of hockey players aged 9–17 years report at least one head injury per year.^{16,17}

Symptoms that last more than one month are called persistent symptoms (see [Vocabulary and Abbreviations](#) for a non-exhaustive list). A study done in Alberta, Canada, showed that 11 percent of children/adolescents still had symptoms after three months, and 2.3 percent after a year.¹⁸ Children/adolescents seem to be more prone to persistent symptoms than adults and, because the original concussion may not be recognized, they may suffer for months or years.

Persistent symptoms disrupt daily living and participation in school and activities.

Children/adolescents may

- miss weeks or even months out of the school year, affecting marks and risking their promotion to the next grade;
- have attention and memory deficits, making schoolwork a challenge and requiring special accommodations to maintain required academic levels;
- become clumsy and accident-prone, where once they were strong athletes;
- become socially withdrawn to cope with headaches and mood changes, on top of the social isolation caused by resigning from athletic teams.

¹⁴ Zemek R, Farion KJ, Sampson M, et al. Prognosticators of persistent symptoms following pediatric concussion: a systematic review. *JAMA Pediatrics*. 013;167(3):259-65.

¹⁵ Ontario Injury Prevention Resource Centre. Ontario injury spotlight.

www.oninjuryresources.ca/downloads/misc/Jan-Feb.08.OISpotlight.pdf. Accessed February 27, 2012.

¹⁶ Raaij F, Vaidya N, Vaidya K, et al. Patterns of mouthguard utilization among atom and pee wee minor ice hockey players: a pilot study. *Clin J Sport Med*. 2011; 21(4):320-324.

¹⁷ Emery C, Kang J, Shrier I, et al. Risk of injury associated with bodychecking experience among youth hockey players. *CMAJ*. 2011;183(11):1249-1256.

¹⁸ Barlow KM, Crawford S, Stevenson A, et al. Epidemiology of postconcussion syndrome in pediatric mild traumatic brain injury. *Pediatrics*. 2010;126(2):e374-e381.

Need for Guidelines on Pediatric Concussion

After years of minimizing its impact, concussion is slowly being recognized as potentially serious. The media report regularly on concussions sustained by well-known athletes, which may place them at greater risk of long-term cognitive impairment and chronic traumatic encephalopathy in the years after injury. Even President Obama called for more research into pediatric concussion at a White House summit on the subject in May 2014 that brought health care professionals, parents, young athletes and coaches together.¹⁹

Children/adolescents are not immune to very long-term consequences such as these, or to persistent symptoms. Repeated concussions sustained during school years can cause permanent learning disabilities and neuropsychiatric problems.^{20,21} Evidence also suggests that sustaining one concussion increases the risk of sustaining others.²²

As well, health care professionals vary widely in how they manage pediatric concussion,²³ especially on return-to-play and recommendations on cognitive rest²⁴—perhaps because of ambivalence on the ideal return-to-learn/play instructions in pediatrics.²⁵ Therefore, there is a clear and urgent need to develop guidelines to diagnose and manage pediatric concussion.²⁶ Such guidelines would standardize and guide clinical practice based on the best available evidence, and prevent the consequences of persistent symptoms, which are mostly avoidable.

Rationale

A pan-Canadian study on knowledge of concussion among pediatric emergency care professionals confirmed that knowledge and management of this injury vary widely. It found, for example, that only 22 percent of respondents commonly or always use concussion scoring scales, 70 percent commonly or always use balance-testing tools, and 80 percent commonly or always refer to published guidelines.²⁷ These findings confirm those of other studies.^{28,29,30,31}

¹⁹ Superville D. *Obama: Too Little Info About Youth Concussions*. <http://abcnews.go.com/Health/wireStory/obama-info-youth-concussions-23914614>. Accessed June 5, 2014.

²⁰ Meehan WP III, Bachur RG. *Sport-related concussion*. *Pediatrics*. 2009;123(1): 114-123.

²¹ Marchie A, Cusimano MD. *Bodychecking and concussions in ice hockey: should our youth pay the price?* *CMAJ*. 2003;169(2):124-128.

²² Swaine R, Tremblay C, Plat W, et al. *Previous head injury is a risk factor for subsequent head injury in children: a longitudinal cohort study*. *Pediatrics*. 2007;119(4):749-758.

²³ Sharpe S, Koo B, Shepherd M, et al. *Mild traumatic brain injury: Improving quality of care in the paediatric emergency department setting*. *Journal of Paediatrics and Child Health*. 2012;48:170-176.

²⁴ Zemek R, Eady K, Moreau K, et al *Pediatric Emergency Knowledge of Concussion Diagnosis and Initial Management*. (accepted to CJEM December 2013).

²⁵ McCrory P1, Meeuwisse WH, Aubry M, et al. *Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012*. *Br J Sports Med*. 2013;47(5):250-8.

²⁶ Robert G, Frederick R, Morgan F, et al. *Sports-Related Concussions in Youth: Improving the Science, Changing the Culture*; Institute of Medicine; National Research Council; ISBN 978-0-309-28800-2. http://www.nap.edu/catalog.php?record_id=18377. Accessed April 22, 2014.

²⁷ Zemek R, Eady K, Moreau K, et al. *Pediatric Emergency Knowledge of Concussion Diagnosis and Initial Management*. (accepted to CJEM December 2013).

With such little standardization of how to diagnose and manage pediatric concussion and persistent symptoms, the need for guidelines is clear.

In 2011, the Ontario Neurotrauma Foundation (ONF) published the “*Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)*,” a guide to help health care professionals diagnose and manage adult concussion specifically. The members of the project team who developed that document deliberately excluded children/adolescents because they felt it was important to develop guidelines that explicitly address the needs of this group—the one with the highest incidence of concussion.

The ONF sponsored a project team to develop guidelines for children/adolescents in 2013, citing the opportunity to use feedback from the adult guidelines, updated that year, to address some of the barriers for uptake, include suggestions to refine the document and address the impact of concussion on parents/caregivers and schools and/or sports organizations.

This document aligns perfectly with the ONF’s goal of funding practical, innovative and results-focused research that can improve quality of life and clinical practice, and prevent brain-related injuries.

Objectives

- To develop high quality, evidence-based recommendations that:
 - standardize the diagnosis and management of pediatric concussion;
 - are relevant and useful for health care professionals;
 - improve the care of children/adolescents who have sustained a concussion;
 - reduce the impact of concussion on the mental health, social engagement and academic participation of children/adolescents during their formative years;
 - identify knowledge gaps in the literature that require more research.

Health Questions

- Are the diagnosis and treatment of concussion and persistent symptoms different in children/adolescents than in adults?
- Can the diagnosis and treatment of concussion and persistent symptoms in children/adolescents be improved and standardized by creating user-friendly guidelines for health care professionals?

²⁸ Zonfrillo MR, Master CL, Grady MF, et al. Pediatric providers' self-reported knowledge, practices, and attitudes about concussion. *Pediatrics*. 2012;130(6):1120-5.

²⁹ Lebrun CM, Mrazik M, Prasad AS, et al. *Br J Sports Med*. 2013;47:54–59.

³⁰ Bazarian JJ, Veenema T, Brayer AF, et al. Knowledge of concussion guidelines among practitioners caring for children. *Clin Pediatr (Phila)*. 2001;40:207–12.

³¹ Giebel S, Kothari R, Koestner A, et al. Factors Influencing Emergency Medicine Physicians’ Management of Sports-related Concussions: A Community-wide Study. *J Emerg Med*. 2011;41(6):649–54.

Further Research

As stated in [Target Users and Population](#), [Levels of Evidence](#) and elsewhere in these guidelines:

- we found no validated clinical tools for concussion for children aged 0 to 5. This age group would benefit from new knowledge of all aspects of concussion.
- the diagnosis and management of non-sports-related pediatric concussion would benefit from further studies.
- we found very limited research on pharmacotherapy in pediatric concussion (and in concussion in general). This would be a valuable area of study.
- we are obliged to offer two approaches to the duration cognitive rest for lack of consensus in one direction or another. Since return-to-learn is an important part of a child/adolescent's life, definitive evidence on this would have a direct effect on recovery.
- we also recommend further consultation with children/adolescents and their parents and/or caregivers on the outcomes that are important to them. This would inform future editions of these guidelines.

The Institute of Medicine³² published a thorough document on future directions for concussion that highlights additional issues that need attention. We defer to the level of detail in that document.

³² Institute of Medicine (IOM) and National Research Council (NRC). 2013. *Sports-related concussions in youth: Improving the science, changing the culture*. Washington, DC: The National Academies Press.

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Guidelines for Diagnosing and Managing Pediatric Concussion

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Methodology

Guideline Panel

The project leader engaged a team of experts from Canada and the USA to represent the full spectrum of pediatric health disciplines and expertise in concussion on a national and international scale ([guideline panel](#)). As well, to ensure that the document represents the perspectives of as many groups of stakeholders as possible, the panel included the chair of the 2012 Zurich Concussion in Sport Conference, the co-founder and director of the Brain Injury Centre (Harvard University), the chair of the American Academy of Neurology Concussion American Academy of Neurology Concussion Guidelines, the developer of commonly used post-concussion tools (example: ACE, PCSI), community- and school-based experts and organizational stakeholders, and the funder, the ONF. The choice of members reflected the focus on clinical assessment and management rather than prevention.

The members of the panel declared any [competing interests](#) and identified their area(s) of expertise for reviewing papers.

Guideline Model

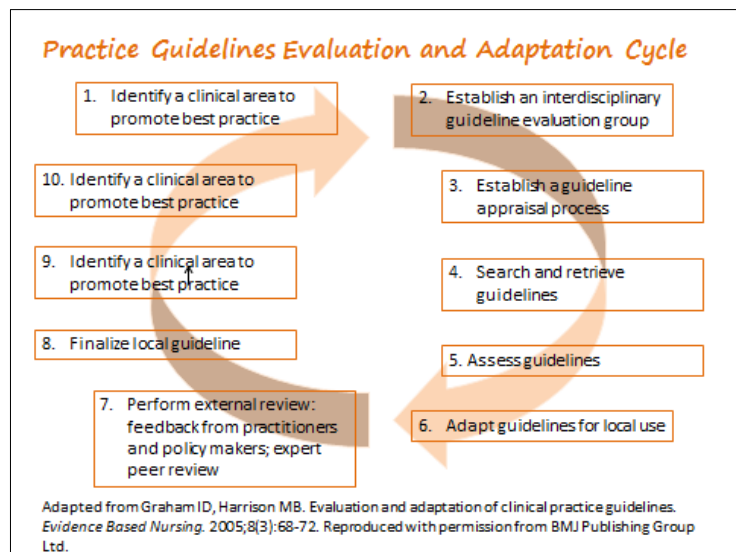
The project leader used the Practice Guidelines Evaluation and Adaptation Cycle (see diagram, right) as the model for developing the guidelines.

The [need](#) and [rationale](#) for guidelines on pediatric concussion had already been established.

Glazer Method of Reaching Consensus

Like the Delphi and nominal group approach, Dr. Edward Glaser and the National Institutes of Health's developed a method of reaching consensus in which various levels of participation interact with the main level (a core group that includes the project leader and that chooses its own members internally). The project document is revised internally until considered suitable, and critiqued by health care professionals who have been engaged for their expertise and prominence. Those comments are included in a redraft until the core group is satisfied with the result.

Among the characteristics of the Glaser method are the degree of support behind the project following a statement by experts of a demonstrated need, the number of organizations and



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Guidelines for Diagnosing and Managing Pediatric Concussion

people invited to comment at every stage, and the involvement of a leader who would be called a “knowledge broker” in today’s language.

The project team chose the Glaser method³³ of reaching consensus as the most suitable for its situation, given the attributed voting and commenting tools and the group-based discussions at the consensus meeting (see below). Where there was uncertainty at any stage, the project leader sent the text in question to the designated experts for further review.

Literature Search and Synthesis of Information

The panel agreed to use the definition of concussion provided in the 4th *Zurich Consensus Statement*.³⁴

A comprehensive literature search was done to identify research and guidelines that might be relevant, such as:

- diagnostic challenges unique to pediatrics, including the decision to obtain neuroimaging in the acute care setting;
- potential modifiers for persistent symptoms;
- management of concussion in children/adolescents as it differs from that in adults;
- return-to-school/play recommendations and rehabilitation interventions for the children/adolescents;
- impact of mental health;
- social engagement and academic and participation challenges for children/adolescents.

Inclusion criteria were concussion/mild traumatic brain injury (mTBI), systematic reviews, guidelines or primary research on concussion/mTBI. Exclusion criteria were adult-only populations, conference abstracts and papers either not peer-reviewed or that focused on prevention, and patients in whom CT or MRI imaging showed structural changes or bleeding.

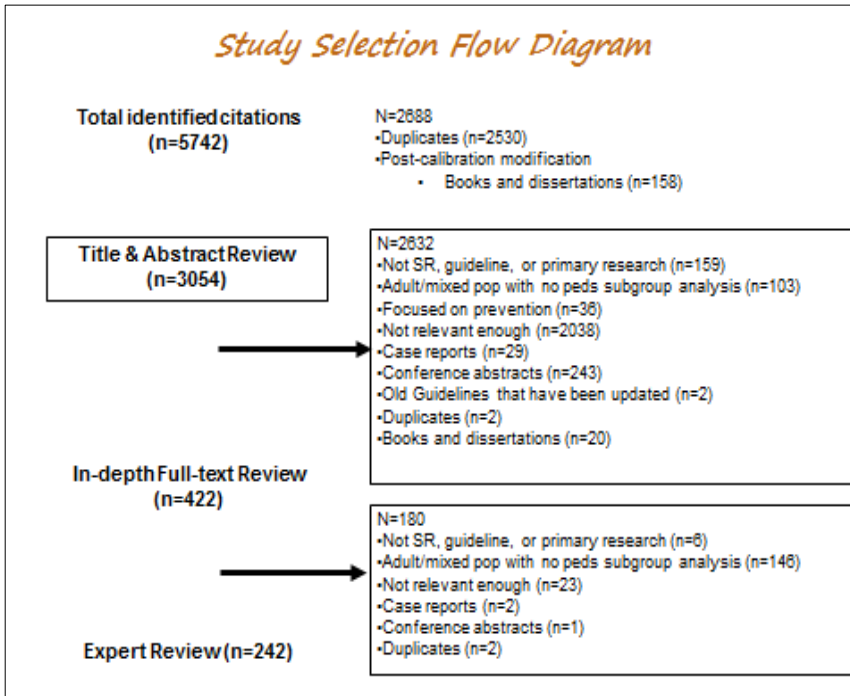
The panel collaborated with the co-chairs from the 2013 update of the “*Guidelines for Concussion/Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)*” to identify articles that addressed the pediatric population to help streamline efforts and reduce duplication.

A PhD librarian/information specialist generated the search string, and had it reviewed using Peer Review of Electronic Search Strategies (PRESS). See Appendix 1: Search Strategy for Systematic Review in the complementary *References and Levels of Evidence* document. The search string did not impose any limits on language or study design. Once accepted, it was used to search the following databases: MEDLINE, Embase, PsycINFO, CENTRAL, CINAHL, SPORTDiscus and TRIPDatabase. The literature search resulted in over 3,000 unique articles and 13 domains of interest (see table below).

³³ Fink A, Kosecoff J, Chassin M, et al. Consensus Methods: Characteristics and Guidelines for Use. *American Journal of Public Health* 1984;74(9):979-983

³⁴ McCrory P, Meeuwisse WH, Aubry M, et al. *Br J Sports Med* 2013;47:250–258.

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Two reviewers independently screened each identified citation as “definitely,” “possibly,” or “clearly not” meeting inclusion criteria using a standard screening tool. A research assistant/ medical student performed duplicate review on a sample of 132 abstracts to evaluate the inter-rater agreement of the article’s eligibility. In the event of disagreement or uncertainty, the project leader consulted the full text and resolved differences. Following this exercise, the inclusion criteria were modified to exclude books and

dissertations, which pared the list of articles down to about 400. After a further review of the full text of each, the list was narrowed to 242 articles (see diagram, above).

The remaining articles were sorted into 15 domains (two were added to the original 13) using Mendeley reference manager, version 1.11. Articles were assigned to panel members with expertise in those domains to assess the quality of the studies and their strength/limitations, determine their applicability to pediatric concussion and assign a level of evidence ([General Directions for Clinical Use](#)) to potentially relevant papers. The papers were made available through a web-based data-sharing tool (Alfresco) to improve the efficiency of collaboration and to manage and store documents in a secure place.

<i>Domains</i>	<i># of Articles*</i>
0. Background	35
1. Diagnosis and assessment of Concussion	106
2. Management of Concussion	31
3. Sport-related Concussion	97
4. Diagnosis and assessment of persistent symptoms following concussion	71
5. Management of persistent symptoms following concussion	12
6. Posttraumatic headache	6
7. Persistent sleep disturbances	6
8. Persistent mental health disorders	23
9. Persistent cognitive difficulties	37
10. Persistent balance disorders	6

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11. Persistent vision disorders	6
12. Persistent fatigue	2
13. Considerations for returning to school or work	7
14. Social interactions and environmental support	11
15. Knowledge translation	18

* Some articles apply to more than one domain; therefore the above total adds up to more than 242.

Consensus Meeting

The [project team](#), including stakeholders, attended the consensus meeting held on November 19, 2013 in Ottawa, Ontario. Participants worked in groups according to their expertise to draft the initial recommendations based on existing guidelines and generate new ones based on their review of the papers, the level of evidence assigned or their clinical expertise if they found no evidence ([General Directions for Clinical Use](#)). This was done using the ADAPTE process (a systematic approach for the adaptation of guidelines that was used to develop and update the “*Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)*.”

Recommendations

Since most concussions resolve within one month, the panel decided that a document based on timelines would be more helpful for clinicians (the primary users of the guidelines) than one based on themes. The initial recommendations in the 15 domains were reorganized as follows:

[In Advance](#) and [On injury](#) address issues such as adopting policies on concussion and recognizing symptoms in schools and/or sports organizations, and were designed primarily for schools and parents and/or caregivers. [On presentation](#) covers acute care, such as initial diagnosis and management. [On discharge](#) focuses on the verbal and written information needed to reassure and educate parents and/or caregivers on the course of recovery. [On interim assessment](#) evaluates child/adolescent’s early recovery, and introduces return-to-learn/play processes. Finally, [On re-assessment](#) reinforces cognitive and physical rest, if required, and provides guidance on managing persistent symptoms.

The initial recommendations were also converted from statements into bulleted action items, incorporating the tools recommended for use and a short sentence to explain the necessity of the action immediately below. The project team felt that clinicians, schools and/or community sports organizations/centres, and parents and/or caregivers alike would find this format easy to follow. This design is also suitable for converting the recommendations into an interactive web tool or mobile app, should funding materialize. The recommendations were created using the *Appraisal of Guidelines for REsearch & Evaluation Instrument (AGREE II)*³⁵ tool as a foundation for content.

³⁵ Brouwers M, Kho ME, Browman GP, et al. on behalf of the AGREE Next Steps Consortium. AGREE II: Advancing guideline development, reporting and evaluation in healthcare. *Can Med Assoc J.* 2010;182:E839-842.

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Panel members took into consideration the potential benefits, side effects and risks when drafting the recommendations. Particularly unique to pediatrics, for example, is the limited approval of drugs such as NSAIDs for pediatric use by regulatory organizations such as Health Canada and the US Food and Drug Administration, as demonstrated in [Tool 5.6: Approved Medications for Pediatric Indications](#).

Following the conference, the tools, recommendations and guidelines document were refined repeatedly until consensus through an on-line feedback and voting process (REDCap). A final PDF was circulated among [external reviewers](#) (who were not involved in the development process) and finalized based on their feedback.

External Review

External reviewers (see [Project Team](#) for their qualifications and affiliations) were chosen for their expertise in relevant areas of pediatrics, their role as stakeholders in improving care and management of pediatric concussion, and their dispersed geographical locations:

- Kissick: sports medicine;
- Mannix: pediatric emergency medicine;
- Emery: the epidemiology of pediatric sport injuries, and the development of outcome measurements in injury prevention and rehabilitation in sport medicine.

None of the external reviewers was involved in developing these guidelines or in updating the “*Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)*,” which the ONF also funded.

The reviewers’ role was to assess the quality of the document and provide feedback with which to finalize its content. Each reviewer received an electronic copy of:

- the draft guidelines document;
- the *Appraisal of Guidelines for REsearch & Evaluation Instrument (AGREE II)*³⁶ to use its rating scale for scoring;
- review sheets on which to record their scores in response to AGREE II categories and add comments.

The reviewers rated the guidelines document in the following categories:

- Scope and purpose 94%
- Stakeholder involvement 89%
- Rigour of development 91%
- Clarity of presentation 90%
- Applicability 94%
- Editorial independence 95%

The scores are broken down on the following page.

The reviewers also rated the overall guidelines document 90 percent for quality. After their specific comments to improve the guidelines were addressed, all three reviewers said they would recommend the document for use as-is.

³⁶ Brouwers M, Kho ME, Browman GP, et al on behalf of the AGREE Next Steps Consortium. AGREE II: Advancing guideline development, reporting and evaluation in healthcare. *Can Med Assoc J.* 2010;182:E839-842.

Summary of Quality Ratings from Reviewers

Under AGREE II, guidelines are rated on a seven-point scale, where 1 = strongly disagree and 7 = strongly agree. The reviewers' scores were combined and converted into a percentage.

<i>Item</i>	<i>Percentage</i>
Domain 1: Scope and Purpose	
<i>The overall objectives of the guideline are specifically described.</i>	95%
<i>The health questions covered by the guideline are specifically described.</i>	95%
<i>The population (patients, public, etc.) to whom the guideline applies is specifically described.</i>	90%
Domain 2: Stakeholder Involvement	
<i>The guideline development group includes individuals from all relevant professional groups.</i>	100%
<i>The views and preferences of the target population (patients, public, etc.) have been sought</i>	76%
<i>The target users of the guideline are clearly defined.</i>	90%
Domain 3: Rigour of Development	
<i>Systematic methods were used to search for evidence.</i>	90%
<i>The criteria for selecting the evidence are clearly described.</i>	90%
<i>The strengths and limitations of the body of evidence are clearly described.</i>	67%
<i>The methods for formulating the recommendations are clearly described.</i>	100%
<i>The health benefits, side effects and risks have been considered in formulating the recommendations.</i>	90%
<i>There is an explicit link between the recommendations and the supporting evidence.</i>	95%
<i>The guideline has been reviewed by external experts before being published.</i>	95%
<i>A procedure for updating the guideline is provided.</i>	100%
Domain 4: Clarity of Presentation	
<i>The recommendations are specific and unambiguous.</i>	90%
<i>Options for managing the health issue are clearly presented.</i>	95%
<i>Key recommendations are easily identifiable.</i>	86%
Domain 5: Applicability	
<i>The guideline describes facilitators and barriers to application.</i>	100%
<i>The guideline provides advice and/or tools on how the recommendations can be put into practice.</i>	95%
<i>The potential resource implications of applying the recommendations have been considered.</i>	81%
<i>The guideline presents monitoring and/or auditing criteria.</i>	100%
Domain 6: Editorial Independence	
<i>The views of the funding body have not influenced the content of the guideline.</i>	90%
<i>Competing interests of guideline development group members have been recorded and addressed.</i>	100%

Derivative Products, Costs, Updates, Auditing Criteria

Derivative Products

Using this opportunity to plan for the future and to facilitate its use, the document has been designed so that:

- summary recommendations for [health care professionals](#), [schools and/or sports organizations](#) and [parents and/or caregivers](#) can be pulled/copied out and used as convenient **cheat sheets** in a number of settings (example: schools, clinic, emergency department).
- recommendations are ready to transform into an **interactive web tool** or **mobile app**, since they are all hyperlinked and follow a standardized format.

Cost Implications

The ONF will fund the cost of posting the guidelines document on its website. This is the only cost involved in using the document as an interactive web tool. The document, its information and tools will be downloadable at no charge. Users will need no special knowledge to handle the document, other than a basic understanding of point-and-click technology—should they choose to use a soft copy on their tablets, laptop or desktop computers.

Should users prefer a paper copy, they will be responsible for the photocopying or printing cost.

We are applying for funding to convert the document into a more highly interactive web-based tool or mobile app. We are also looking at opportunities for low-cost knowledge translation, since there is no budget for that presently.

As uptake of these guidelines increases and with greater recognition of concussion generally, we expect that specialists may receive more referrals to see children/adolescents with persistent symptoms. We also expect that access to these specialists may be a challenge until resources increase to meet the need.

Updates

As well, the ONF has committed to updating these guidelines and any derivative products (proposed for 2017). At that time, the ONF will contact the project leader to discuss new research or other criteria that might trigger an update. Once an update has been triggered, the project leader will assemble a team, starting with the members of the current [guideline panel](#). Steps to complete the update will likely be similar to those reported in [Methodology](#), plus feedback mechanisms to gauge facilitators and barriers to using this version.

Chapter: **Derivative Products, Costs, Updates, Auditing Criteria**

Guidelines for Diagnosing and Managing Pediatric Concussion

In the meantime, the ONF will collect questions, messages, changes and errata (info@onf.org) that pertain to the update. It will post any feedback that affects how the document works or informs on the webpages on which the guidelines reside (<http://onf.org/documents/guidelines-for-pediatric-concussion> and www.concussionsontario.org/guidelines-for-pediatric-concussion).

Auditing Criteria

The project leader will obtain feedback on the following criteria to inform the update, once it has been triggered. Other criteria may be added before then.

- Appropriateness for children/adolescents who have sustained a concussion;
- User friendliness for all [user groups](#), and how health care professionals use the guidelines in practice;
- Perceived barriers to adoption and possible refinements to future versions.
- Applicability and accessibility across a range of situations and clinical settings;
- Validity;
- The extent to which the guidelines standardize the assessment and management of pediatric concussion.
- Improved knowledge of concussion in all expected user groups;
- Knowledge mobilization of the guidelines through user groups (downloads, sharing, etc.).

Notices

Editorial Independence

The project leader maintained full authority over the editorial content of these guidelines, under advice from members of the [project team](#). Editorial decisions were made in teams of members with diverse backgrounds and expertise, and based on the relevance of the works reviewed to the subject matter, not on the views or interests of the Ontario Neurotrauma Foundation (the funder).

Because of her specific knowledge of knowledge transfer and concussion, and to represent the Foundation as an end-user of the guidelines, one employee of the Foundation had a monitoring role on the project team and moderated a discussion on KT in that context. She was not in a position to influence decisions.

Competing Interests

Members of the [guideline panel](#) and the [external reviewers](#) were asked for details about potential conflicts of interest. They made the following statements:

- **Gerard Gioia:** I am the author of several clinical measures, such as the Postconcussion Symptom Inventory (PCSI), Acute Concussion Evaluation (ACE), for which I do not receive monetary benefit. I am also a creator/ author on measures for which I do receive royalty payments, including the Behavior Rating Inventory of Executive Function (BRIEF) and the Tasks of Executive Control (TEC).
- **Chris Giza:** I receive the following funding: NCAA Concussion Task Force (travel expenses) and research grant; California State Athletic Commission (travel expenses only); Joseph Drown Foundation (research grant), NIH (research grants). Relatives have no conflicts.
- **Corinne Kagan:** I represent the sponsor of the Guideline (Ontario Neurotrauma Foundation). I will make every effort not to interfere with the editorial independence of the guideline developers. As a member of the consensus group, I will add comments only as pertain to implementation and clarity, knowledge translation and use, system of care and policy issues of the materials.
- **Anna McCormick:** I occasionally bill privately to complete forms or reports for insurance purposes.
- **William Meehan:** I receive funding from the NFL Players' Association and royalties from Prager Publishing for the book, *Kids, Sports, and Concussion: A guide for coaches and parents*; and Wolters Kluwer for working as an author on *UpToDate*.

The project leader evaluated the statements and decided that these people did not face a conflict of interest in terms of creating or reviewing this document.

Rights

The guidelines document (print and electronic) and its derivatives may not be sold by any third party. Although these products will carry a notice of the ONF’s copyright, users are encouraged to download them at no charge for their personal use.

The ONF requires that any organization that endorses or encourages the use of these guidelines, wherever in the world, create hyperlinks back to the webpages on which the guidelines reside (<http://onf.org/documents/guidelines-for-pediatric-concussion> and www.concussionsontario.org/guidelines-for-pediatric-concussion).

Acknowledgements

The success of every project is due to the effort of many people who come together with a common goal. The project leader profoundly thanks the following people and organizations who contributed to this document.

- the Ontario Neurotrauma Foundation for funding and supporting the project;
- all members of the [project team](#) for their hard work and guidance;
- the consensus panel and working group that developed the “*Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)*,” including support from the Ottawa Hospital Research Institute (OHRI) and OHRI research staff Kelly Weegar, Kelsey Scheier and Hayley MacLeay.

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Tool 01: Pocket Concussion Recognition Tool for children, adolescents and adults

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 0.1: Pocket Concussion Recognition Tool for children, adolescents and adults

Pocket CONCUSSION RECOGNITION TOOL™

To help identify concussion in children, youth and adults



RECOGNIZE & REMOVE

Concussion should be suspected **if one or more** of the following visible clues, signs, symptoms or errors in memory questions are present.

1. Visible clues of suspected concussion

Any one or more of the following visual clues can indicate a possible concussion:

- Loss of consciousness or responsiveness
- Lying motionless on ground/Slow to get up
- Unsteady on feet / Balance problems or falling over/Incoordination
- Grabbing/Clutching of head
- Dazed, blank or vacant look
- Confused/Not aware of plays or events

2. Signs and symptoms of suspected concussion

Presence of any one or more of the following signs & symptoms may suggest a concussion:

- | | |
|--------------------------|----------------------------|
| - Loss of consciousness | - Headache |
| - Seizure or convulsion | - Dizziness |
| - Balance problems | - Confusion |
| - Nausea or vomiting | - Feeling slowed down |
| - Drowsiness | - "Pressure in head" |
| - More emotional | - Blurred vision |
| - Irritability | - Sensitivity to light |
| - Sadness | - Amnesia |
| - Fatigue or low energy | - Feeling like "in a fog" |
| - Nervous or anxious | - Neck Pain |
| - "Don't feel right" | - Sensitivity to noise |
| - Difficulty remembering | - Difficulty concentrating |

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3. Memory function

Failure to answer any of these questions correctly may suggest a concussion.

- "What venue are we at today?"
- "Which half is it now?"
- "Who scored last in this game?"
- "What team did you play last week/game?"
- "Did your team win the last game?"

Any athlete with a suspected concussion should be IMMEDIATELY REMOVED FROM PLAY, and should not be returned to activity until they are assessed medically. Athletes with a suspected concussion should not be left alone and should not drive a motor vehicle.

It is recommended that, in all cases of suspected concussion, the player is referred to a medical professional for diagnosis and guidance as well as return to play decisions, even if the symptoms resolve.

RED FLAGS

If ANY of the following are reported then the player should be safely and immediately removed from the field. If no qualified medical professional is available, consider transporting by ambulance for urgent medical assessment:

- | | |
|--|---------------------------------|
| - Athlete complains of neck pain | - Deteriorating conscious state |
| - Increasing confusion or irritability | - Severe or increasing headache |
| - Repeated vomiting | - Unusual behaviour change |
| - Seizure or convulsion | - Double vision |
| - Weakness or tingling/burning in arms or legs | |

Remember:

- In all cases, the basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the player (other than required for airway support) unless trained to do so
- Do not remove helmet (if present) unless trained to do so.

from McCrory et. al, Consensus Statement on Concussion in Sport. Br J Sports Med 47 (S), 2013

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Tool 0.2: ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12

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Tool 0.2: ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12

Downloaded from bjsm.bmj.com on March 10, 2014 - Published by group.bmj.com

Child-SCAT3™



Sport Concussion Assessment Tool for children ages 5 to 12 years

For use by medical professionals only

What is childSCAT3?

The ChildSCAT3 is a standardized tool for evaluating injured children for concussion and can be used in children aged from 5 to 12 years. It supersedes the original SCAT and the SCAT2 published in 2005 and 2009, respectively. For older persons, ages 13 years and over, please use the SCAT3. The ChildSCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool. Preseason baseline testing with the ChildSCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the ChildSCAT3 are provided on page 3. If you are not familiar with the ChildSCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision and any reproduction in a digital form require approval by the Concussion in Sport Group.

NOTE: The diagnosis of a concussion is a clinical judgment, ideally made by a medical professional. The ChildSCAT3 should not be used solely to make, or exclude, the diagnosis of concussion in the absence of clinical judgement. An athlete may have a concussion even if their ChildSCAT3 is "normal".

What is a concussion?

A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific signs and/or symptoms (like those listed below) and most often does not involve loss of consciousness. Concussion should be suspected in the presence of any one or more of the following:

- Symptoms (e.g., headache), or
- Physical signs (e.g., unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour (e.g., change in personality).

SIDELINE ASSESSMENT

Indications for Emergency Management

NOTE: A hit to the head can sometimes be associated with a more severe brain injury. If the concussed child displays any of the following, then do not proceed with the ChildSCAT3; instead activate emergency procedures and urgent transportation to the nearest hospital:

- Glasgow Coma score less than 15
- Deteriorating mental status
- Potential spinal injury
- Progressive, worsening symptoms or new neurologic signs
- Persistent vomiting
- Evidence of skull fracture
- Post traumatic seizures
- Coagulopathy
- History of Neurosurgery (eg Shunt)
- Multiple injuries

1 Glasgow coma scale (GCS)

Best eye response (E)

No eye opening	1
Eye opening in response to pain	2
Eye opening to speech	3
Eyes opening spontaneously	4

Best verbal response (V)

No verbal response	1
Incomprehensible sounds	2
Inappropriate words	3
Confused	4
Oriented	5

Best motor response (M)

No motor response	1
Extension to pain	2
Abnormal flexion to pain	3
Flexion/Withdrawal to pain	4
Localizes to pain	5
Obeys commands	6

Glasgow Coma score (E + V + M) of 15

GCS should be recorded for all athletes in case of subsequent deterioration.

Potential signs of concussion?

If any of the following signs are observed after a direct or indirect blow to the head, the child should stop participation, be evaluated by a medical professional and **should not be permitted to return to sport the same day** if a concussion is suspected.

- Any loss of consciousness? Y N
 "If so, how long?" _____
- Balance or motor incoordination (stumbles, slow/laboured movements, etc.)? Y N
 Disorientation or confusion (inability to respond appropriately to questions)? Y N
 Loss of memory: Y N
 "If so, how long?" _____
- "Before or after the injury?" _____
- Blank or vacant look: Y N
 Visible facial injury in combination with any of the above: Y N

2 Sideline Assessment – child-Maddocks Score³

"I am going to ask you a few questions, please listen carefully and give your best effort."

Modified Maddocks questions (1 point for each correct answer)

Where are we at now?	0	1
Is it before or after lunch?	0	1
What did you have last lesson/class?	0	1
What is your teacher's name?	0	1
child-Maddocks score	of 4	

Child-Maddocks score is for sideline diagnosis of concussion only and is not used for serial testing.

Any child with a suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration (i.e., should not be left alone). No child diagnosed with concussion should be returned to sports participation on the day of injury.

BACKGROUND

Name: _____ Date/Time of Injury: _____
 Examiner: _____ Date of Assessment: _____
 Sport/team/school: _____
 Age: _____ Gender: M F
 Current school year/grade: _____
 Dominant hand: right left neither
 Mechanism of Injury ("tell me what happened?"): _____

For Parent / carer to complete:

- How many concussions has the child had in the past? _____
 When was the most recent concussion? _____
 How long was the recovery from the most recent concussion? _____
- Has the child ever been hospitalized or had medical imaging done (CT or MRI) for a head injury? Y N
 Has the child ever been diagnosed with headaches or migraines? Y N
 Does the child have a learning disability, dyslexia, ADD/ADHD, seizure disorder? Y N
 Has the child ever been diagnosed with depression, anxiety or other psychiatric disorder? Y N
 Has anyone in the family ever been diagnosed with any of these problems? Y N
 Is the child on any medications? If yes, please list: Y N

Tool 0.2: ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12

Guidelines for Diagnosing and Managing Pediatric Concussion

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SYMPTOM EVALUATION

3

Child report

Name:	never	rarely	sometimes	often
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
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
I get tired a lot	0	1	2	3
I get tired easily	0	1	2	3

Total number of symptoms (Maximum possible 20)

Symptom severity score (Maximum possible 20x3 = 60)

self rated clinician interview self rated and clinician monitored

4

Parent report

The child	never	rarely	sometimes	often
has trouble sustaining attention	0	1	2	3
is easily distracted	0	1	2	3
has difficulty concentrating	0	1	2	3
has problems remembering what he/she is told	0	1	2	3
has difficulty following directions	0	1	2	3
tends to daydream	0	1	2	3
gets confused	0	1	2	3
is forgetful	0	1	2	3
has difficulty completing tasks	0	1	2	3
has poor problem solving skills	0	1	2	3
has problems learning	0	1	2	3
has headaches	0	1	2	3
feels dizzy	0	1	2	3
has a feeling that the room is spinning	0	1	2	3
feels faint	0	1	2	3
has blurred vision	0	1	2	3
has double vision	0	1	2	3
experiences nausea	0	1	2	3
gets tired a lot	0	1	2	3
gets tired easily	0	1	2	3

Total number of symptoms (Maximum possible 20)

Symptom severity score (Maximum possible 20x3 = 60)

Do the symptoms get worse with physical activity? Y N

Do the symptoms get worse with mental activity? Y N

parent self rated clinician interview parent self rated and clinician monitored

Overall rating for parent/teacher/coach/carer to answer.
How different is the child acting compared to his/her usual self?

Please circle one response:

no different very different unsure N/A

Name of person completing Parent-report:

Relationship to child of person completing Parent-report:

Scoring on the ChildSCAT3 should not be used as a stand-alone method to diagnose concussion, measure recovery or make decisions about an athlete's readiness to return to competition after concussion.

COGNITIVE & PHYSICAL EVALUATION

5

Cognitive assessment

Standardized Assessment of Concussion – Child Version (SAC-C)⁴

Orientation (1 point for each correct answer)

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1

Orientation score of 4

Immediate memory

List	Trial 1	Trial 2	Trial 3	Alternative word list					
elbow	0	1	0	1	0	1	candle	baby	finger
apple	0	1	0	1	0	1	paper	monkey	penny
carpet	0	1	0	1	0	1	sugar	perfume	blanket
saddle	0	1	0	1	0	1	sandwich	sunset	lemon
bubble	0	1	0	1	0	1	wagon	iron	insect

Total

Immediate memory score total of 15

Concentration: Digits Backward

List	Trial 1	Alternative digit list			
6-2	0	1	5-2	4-1	4-9
4-9-3	0	1	6-2-9	5-2-6	4-1-5
3-8-1-4	0	1	3-2-7-9	1-7-9-5	4-9-6-8
6-2-9-7-1	0	1	1-5-2-8-6	3-8-5-2-7	6-1-8-4-3
7-1-8-4-6-2	0	1	5-3-9-1-4-8	8-3-1-9-6-4	7-2-4-8-5-6

Total of 5

Concentration: Days in Reverse Order (1 pt. for entire sequence correct)

Sunday-Saturday-Friday-Thursday-Wednesday-Tuesday-Monday	0	1
--	---	---

Concentration score of 6

6

Neck Examination:

Range of motion Tenderness Upper and lower limb sensation & strength

Findings:

7

Balance examination

Do one or both of the following tests.
Footwear (shoes, barefoot, braces, tape, etc.)

Modified Balance Error Scoring System (BESS) testing⁵
Which foot was tested (i.e. which is the non-dominant foot) Left Right
Testing surface (hard floor, field, etc.)

Condition

Double leg stance: Errors

Tandem stance (non-dominant foot at back): Errors

Tandem gait^{6,7}
Time taken to complete (best of 4 trials): seconds
If child attempted, but unable to complete tandem gait, mark here

8

Coordination examination

Upper limb coordination

Which arm was tested: Left Right

Coordination score of 1

9

SAC Delayed Recall⁴

Delayed recall score of 5

Since signs and symptoms may evolve over time, it is important to consider repeat evaluation in the acute assessment of concussion.

Tool 0.2: ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12

Guidelines for Diagnosing and Managing Pediatric Concussion

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INSTRUCTIONS

Words in *italics* throughout the ChildSCAT3 are the instructions given to the child by the tester.

Sideline Assessment – child-Maddocks Score

To be completed on the sideline/in the playground, immediately following concussion. There is no requirement to repeat these questions at follow-up.

Symptom Scale⁸

In situations where the symptom scale is being completed after exercise, it should still be done in a resting state, at least 10 minutes post exercise.

On the day of injury

- the child is to complete the Child Report, according to how he/she feels now.

On all subsequent days

- the child is to complete the Child Report, according to how he/she feels today, and
- the parent/carer is to complete the Parent Report according to how the child has been over the previous 24 hours.

Standardized Assessment of Concussion – Child Version (SAC-C)⁴

Orientation

Ask each question on the score sheet. A correct answer for each question scores 1 point. If the child does not understand the question, gives an incorrect answer, or no answer, then the score for that question is 0 points.

Immediate memory

"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order."

Trials 2 & 3:

"I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before."

Complete all 3 trials regardless of score on trial 1 & 2. Read the words at a rate of one per second. **Score 1 pt. for each correct response.** Total score equals sum across all 3 trials. Do not inform the child that delayed recall will be tested.

Concentration

Digits Backward:

"I am going to read you a string of numbers and when I am done, you repeat them back to me backwards, in reverse order of how I read them to you. For example, if I say 7-1, you would say 1-7."

If correct, go to next string length. If incorrect, read trial 2. **One point possible for each string length.** Stop after incorrect on both trials. The digits should be read at the rate of one per second.

Days in Reverse Order:

"Now tell me the days of the week in reverse order. Start with Sunday and go backward. So you'll say Sunday, Saturday, ... Go ahead"

1 pt. for entire sequence correct

Delayed recall

The delayed recall should be performed after completion of the Balance and Coordination Examination.

"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."

Circle each word correctly recalled. **Total score equals number of words recalled.**

Balance examination

These instructions are to be read by the person administering the childSCAT3, and each balance task should be demonstrated to the child. The child should then be asked to copy what the examiner demonstrated.

Modified Balance Error Scoring System (BESS) testing⁹

This balance testing is based on a modified version of the Balance Error Scoring System (BESS)⁹. A stopwatch or watch with a second hand is required for this testing.

"I am now going to test your balance. Please take your shoes off, roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of two different parts."

(a) Double leg stance:

The first stance is standing with the feet together with hands on hips and with eyes closed. The child should try to maintain stability in that position for 20 seconds. You should inform the child that you will be counting the number of times the child moves out of this position. You should start timing when the child is set and the eyes are closed.

(b) Tandem stance:

Instruct the child to stand heel-to-toe with the non-dominant foot in the back. Weight should be evenly distributed across both feet. Again, the child should try to maintain stability for 20 seconds with hands on hips and eyes closed. You should inform the child that you will be counting the number of times the child moves out of this position. If the child stumbles out of this position, instruct him/her to open the eyes and return to the start position and continue balancing. You should start timing when the child is set and the eyes are closed.

Balance testing – types of errors - Parts (a) and (b)

1. Hands lifted off iliac crest
2. Opening eyes
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
6. Remaining out of test position > 5 sec

Each of the 20-second trials is scored by counting the errors, or deviations from the proper stance, accumulated by the child. The examiner will begin counting errors only after the child has assumed the proper start position. **The modified BESS is calculated by adding one error point for each error during the two 20-second tests. The maximum total number of errors for any single condition is 10.** If a child commits multiple errors simultaneously, only one error is recorded but the child should quickly return to the testing position, and counting should resume once subject is set. Children who are unable to maintain the testing procedure for a minimum of **five seconds** at the start are assigned the highest possible score, ten, for that testing condition.

OPTION: For further assessment, the same 2 stances can be performed on a surface of medium density foam (e.g., approximately 50cm x 40cm x 6cm).

Tandem Gait^{6,7}

Use a clock (with a second hand) or stopwatch to measure the time taken to complete this task. Instruction for the examiner – **Demonstrate the following to the child:**

The child is instructed to stand with their feet together behind a starting line (the test is best done with footwear removed). Then, they walk in a forward direction as quickly and as accurately as possible along a 38mm wide (sports tape), 3 meter line with an alternate foot heel-to-toe gait ensuring that they approximate their heel and toe on each step. Once they cross the end of the 3m line, they turn 180 degrees and return to the starting point using the same gait. A total of 4 trials are done and the best time is retained. Children fail the test if they step off the line, have a separation between their heel and toe, or if they touch or grab the examiner or an object. In this case, the time is not recorded and the trial repeated, if appropriate.

Explain to the child that you will time how long it takes them to walk to the end of the line and back.

Coordination examination

Upper limb coordination

Finger-to-nose (FTN) task:

The tester should demonstrate it to the child.

"I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended). When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose as quickly and as accurately as possible."

Scoring: 5 correct repetitions in < 4 seconds = 1

Note for testers: Children fail the test if they do not touch their nose, do not fully extend their elbow or do not perform five repetitions. **Failure should be scored as 0.**

References & Footnotes

1. This tool has been developed by a group of international experts at the 4th International Consensus meeting on Concussion in Sport held in Zurich, Switzerland in November 2012. The full details of the conference outcomes and the authors of the tool are published in The BJSM Injury Prevention and Health Protection, 2013, Volume 47, Issue 5. The outcome paper will also be simultaneously co-published in other leading biomedical journals with the copyright held by the Concussion in Sport Group, to allow unrestricted distribution, providing no alterations are made.
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Tool 0.2: ChildSCAT3 Sport Concussion Assessment Tool for Children aged 5-12

Guidelines for Diagnosing and Managing Pediatric Concussion

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CHILD ATHLETE INFORMATION

Any child suspected of having a concussion should be removed from play, and then seek medical evaluation. The child must NOT return to play or sport on the same day as the suspected concussion.

Signs to watch for

Problems could arise over the first 24–48 hours. The child should not be left alone and must go to a hospital at once if they develop any of the following:

- New Headache, or Headache gets worse
- Persistent or increasing neck pain
- Becomes drowsy or can't be woken up
- Can not recognise people or places
- Has Nausea or Vomiting
- Behaves unusually, seems confused, or is irritable
- Has any seizures (arms and/or legs jerk uncontrollably)
- Has weakness, numbness or tingling (arms, legs or face)
- Is unsteady walking or standing
- Has slurred speech
- Has difficulty understanding speech or directions

Remember, it is better to be safe.

Always consult your doctor after a suspected concussion.

Return to school

Concussion may impact on the child's cognitive ability to learn at school. This must be considered, and medical clearance is required before the child may return to school. **It is reasonable for a child to miss a day or two of school after concussion, but extended absence is uncommon.** In some children, a graduated return to school program will need to be developed for the child. The child will progress through the return to school program provided that there is no worsening of symptoms. If any particular activity worsens symptoms, the child will abstain from that activity until it no longer causes symptom worsening. Use of computers and internet should follow a similar graduated program, provided that it does not worsen symptoms. This program should include communication between the parents, teachers, and health professionals and will vary from child to child. The return to school program should consider:

- Extra time to complete assignments/tests
- Quiet room to complete assignments/tests
- Avoidance of noisy areas such as cafeterias, assembly halls, sporting events, music class, shop class, etc
- Frequent breaks during class, homework, tests
- No more than one exam/day
- Shorter assignments
- Repetition/memory cues
- Use of peer helper/tutor
- Reassurance from teachers that student will be supported through recovery through accommodations, workload reduction, alternate forms of testing
- Later start times, half days, only certain classes

The child is not to return to play or sport until he/she has successfully returned to school/learning, without worsening of symptoms. Medical clearance should be given before return to play.

If there are any doubts, management should be referred to a qualified health practitioner, expert in the management of concussion in children.

Return to sport

There should be no return to play until the child has successfully returned to school/learning, without worsening of symptoms.

Children must not be returned to play the same day of injury.

When returning children to play, they should **medically cleared and then follow a stepwise supervised program**, with stages of progression.

For example:

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
No activity	Physical and cognitive rest	Recovery
Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity, 70% maximum predicted heart rate. No resistance training	Increase heart rate
Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities	Add movement
Non-contact training drills	Progression to more complex training drills, eg passing drills in football and ice hockey. May start progressive resistance training	Exercise, coordination, and cognitive load
Full contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
Return to play	Normal game play	

There should be approximately 24 hours (or longer) for each stage and the child should drop back to the previous asymptomatic level if any post-concussive symptoms recur. Resistance training should only be added in the later stages.

If the child is symptomatic for more than 10 days, then review by a health practitioner, expert in the management of concussion, is recommended.

Medical clearance should be given before return to play.

Notes:

CONCUSSION INJURY ADVICE FOR THE CHILD AND PARENTS / CARERS

(To be given to the **person monitoring** the concussed child)

This child has received an injury to the head. A careful medical examination has been carried out and no sign of any serious complications has been found. It is expected that recovery will be rapid, but the child will need monitoring for the next 24 hours by a responsible adult.

If you notice any change in behavior, vomiting, dizziness, worsening headache, double vision or excessive drowsiness, please call an ambulance to transport the child to hospital immediately.

Other important points:

- Following concussion, the child should rest for at least 24 hours.
- The child should avoid any computer, internet or electronic gaming activity if these activities make symptoms worse.
- The child should not be given any medications, including pain killers, unless prescribed by a medical practitioner.
- The child must not return to school until medically cleared.
- The child must not return to sport or play until medically cleared.

Clinic phone number

Patient's name

Date/time of injury

Date/time of medical review

Treating physician

Contact details or stamp

Tool 0.3: Parachute Concussion Guidelines for Parents & Caregivers
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 0.3: Parachute Concussion Guidelines for Parents & Caregivers



WHAT IS A CONCUSSION?

A concussion is a brain injury that cannot be seen on routine x-rays, CT scans, or MRIs. It affects the way a child may think and remember things, and can cause a variety of symptoms.

WHAT ARE THE SYMPTOMS AND SIGNS OF CONCUSSION?

A CHILD DOES NOT NEED TO BE KNOCKED OUT (LOSE CONSCIOUSNESS) TO HAVE HAD A CONCUSSION.

THINKING PROBLEMS	CHILD'S COMPLAINTS	OTHER PROBLEMS
<ul style="list-style-type: none"> • Does not know time, date, place, period of game, opposing team, score of game • General confusion • Cannot remember things that happened before and after the injury • Knocked out 	<ul style="list-style-type: none"> • Headache • Dizziness • Feels dazed • Feels "dinged" or stunned; "having my bell rung" • Sees stars, flashing lights • Ringing in the ears • Sleepiness • Loss of vision • Sees double or blurry • Stomachache, stomach pain, nausea 	<ul style="list-style-type: none"> • Poor coordination or balance • Blank stare/glassy eyed • Vomiting • Slurred speech • Slow to answer questions or follow directions • Easily distracted • Poor concentration • Strange or inappropriate emotions (ie. laughing, crying, getting mad easily) • Not playing as well

WHAT CAUSES A CONCUSSION?

Any blow to the head, face or neck, or a blow to the body which causes a sudden jarring of the head may cause a concussion (ie. a ball to the head, being checked into the boards in hockey).

WHAT SHOULD YOU DO IF YOUR CHILD GETS A CONCUSSION?

Your child should stop playing the sport right away. They should not be left alone and should be seen by a doctor as soon as possible that day. If your child is knocked out, call an ambulance to take him/her to the hospital immediately. Do not move your child or remove any equipment such as helmet, in case of a cervical spine injury. Wait for paramedics to arrive.


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CONCUSSION GUIDELINES FOR PARENTS & CAREGIVERS



HOW LONG WILL IT TAKE FOR MY CHILD TO GET BETTER?

The signs and symptoms of a concussion often last for 7-10 days but may last much longer. In some cases, children may take many weeks or months to heal. Having had previous concussions may increase the chance that a person may take longer to heal.

HOW IS A CONCUSSION TREATED?

THE MOST IMPORTANT TREATMENT FOR A CONCUSSION IS REST.

The child should not exercise, go to school or do any activities that may make them worse, like riding a bike, play wrestling, reading, working on the computer or playing video games. If your child goes back to activities before they are completely better, they are more likely to get worse, and to have symptoms longer. Even though it is very hard for an active child to rest, this is the most important step.

Once your child is completely better at rest (all symptoms have resolved), they can start a step-wise increase in activities. It is important that your child is seen by a doctor before he/she begins the steps needed to return to activity, to make sure he/she is completely better. If possible, your child should be seen by a doctor with experience in treating concussions.

WHEN CAN MY CHILD RETURN TO SCHOOL?

Sometimes children who have a concussion may find it hard to concentrate in school and may get a worse headache or feel sick to their stomach if they are in school. Children should stay home from school if their symptoms get worse while they are in class. Once they feel better, they can try going back to school part time to start (eg. for half days initially) and if they are okay with that, then they can go back full time.

WHEN CAN MY CHILD RETURN TO SPORT?

It is very important that your child not go back to sports if he/she has any concussion symptoms or signs. Return to sport and activity must follow a step-wise approach:

STEP 1) No activity, complete rest. Once back to normal and cleared by a doctor, go to step 2.

STEP 2) Light exercise such as walking or stationary cycling, for 10-15 minutes.

STEP 3) Sport specific aerobic activity (ie. skating in hockey, running in soccer), for 20-30 minutes. **NO CONTACT.**

STEP 4) "On field" practice such as ball drills, shooting drills, and other activities with **NO CONTACT** (ie. no checking, no heading the ball, etc.).

STEP 5) "On field" practice with body contact, once cleared by a doctor.

STEP 6) Game play.

Note: **Each step must take a minimum of one day.** If your child has any symptoms of a concussion (e.g. headache, feeling sick to his/her stomach) that come back either during activity, or later that day, your child should stop the activity immediately and rest until symptoms resolve, for a minimum of 24 hours. Your child should be seen by a doctor and cleared again before starting the step wise protocol again.

When should I take my child to the doctor?

Every child who gets a head injury should be seen by a doctor as soon as possible. Your child should go back to the doctor **IMMEDIATELY** if, after being told he/she has a concussion, he/she has worsening of symptoms such as:

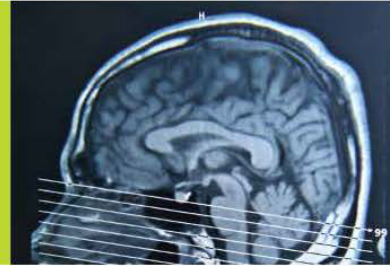
1. being more confused
2. headache that is getting worse
3. vomiting more than twice
4. strange behaviour
5. not waking up
6. having any trouble walking
7. having a seizure

Problems caused by a head injury can get worse later that day or night. The child should not be left alone and should be checked throughout the night. If you have any concerns about the child's breathing or how they are sleeping, wake them up. Otherwise, let them sleep. If they seem to be getting worse, you should see your doctor immediately. **NO CHILD SHOULD GO BACK TO SPORT UNTIL THEY HAVE BEEN CLEARED TO DO SO BY A DOCTOR.**

Tool 0.4a: Parachute After a Concussion Guidelines for Return to Play
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 0.4a: Parachute After a Concussion Guidelines for Return to Play

After a Concussion Guidelines for
RETURN TO PLAY



A **CONCUSSION** is a serious event, but you can recover fully from such an injury if the brain is given enough time to rest and recuperate. Returning to normal activities, including sport participation, is a step-wise process that requires patience, attention, and caution.

Each step must take a **minimum of one day** but could last longer, depending on the player and his or her specific situation.

STEP 1: No activity, only complete rest.

Limit school, work and tasks requiring concentration. Refrain from physical activity until symptoms are gone. Once symptoms are gone, a physician, preferably one with experience managing concussions, should be consulted before beginning a step wise return to play process.

STEP 2: Light aerobic exercise.

Activities such as walking or stationary cycling. The player should be supervised by someone who can help monitor for symptoms and signs. No resistance training or weight lifting. The duration and intensity of the aerobic exercise can be gradually increased over time if no symptoms or signs return during the exercise or the next day.

Symptoms? Return to rest until symptoms have resolved. If symptoms persist, consult a physician.

No symptoms? Proceed to Step 3 the next day.

STEP 3: Sport specific activities.

Activities such as skating or throwing can begin at step 3. There should be no body contact or other jarring motions such as high speed stops or hitting a baseball with a bat.

Symptoms? Return to rest until symptoms have resolved. If symptoms persist, consult a physician.

No symptoms? Proceed to Step 4 the next day.

STEP 4: Begin Drills without body contact.

Symptoms? Return to rest until symptoms have resolved.

If symptoms persist, consult a physician.

No symptoms? The time needed to progress from non-contact exercise will vary with the severity of the concussion and with the player.

Proceed to Step 5 only after medical clearance.

STEP 5: Begin drills with body contact.

Symptoms? Return to rest until symptoms have resolved.

If symptoms persist, consult a physician.

No symptoms? Proceed to Step 6 the next day.

STEP 6: Game play.



Parachute is bringing attention to preventable injury and helping Canadians reduce their risk of injury and enjoy long lives lived to the fullest.

www.parachutecanada.org

RETURN TO PLAY GUIDELINES



NEVER RETURN TO PLAY IF YOU STILL HAVE SYMPTOMS!

A player who returns to active play before full recovery from the first concussion is at high risk of sustaining another concussion, with symptoms that may be increased and prolonged.

HOW LONG DOES THIS PROCESS TAKE?

These steps do not correspond to days! It may take many days to progress through one step, especially if the concussion is severe. As soon as symptoms appear, the player should return to rest until symptoms have resolved and wait at least one more day before attempting any activity.

The only way to heal a brain is to rest it.

HOW DO I FIND THE RIGHT DOCTOR?

When dealing with concussions, it is important to see a doctor who is knowledgeable in concussion management. This might include your physician or someone such as a sports medicine specialist. Your family doctor maybe required to submit a referral to see a specialist. Contact the Canadian Academy of Sport and Exercise Medicine (CASEM) to find a sports medical physician in your area. Visit www.casm-acms.org for more information. You can also refer your doctor to parachutecanada.org for more information.

WHO DO THESE GUIDELINES APPLY TO?

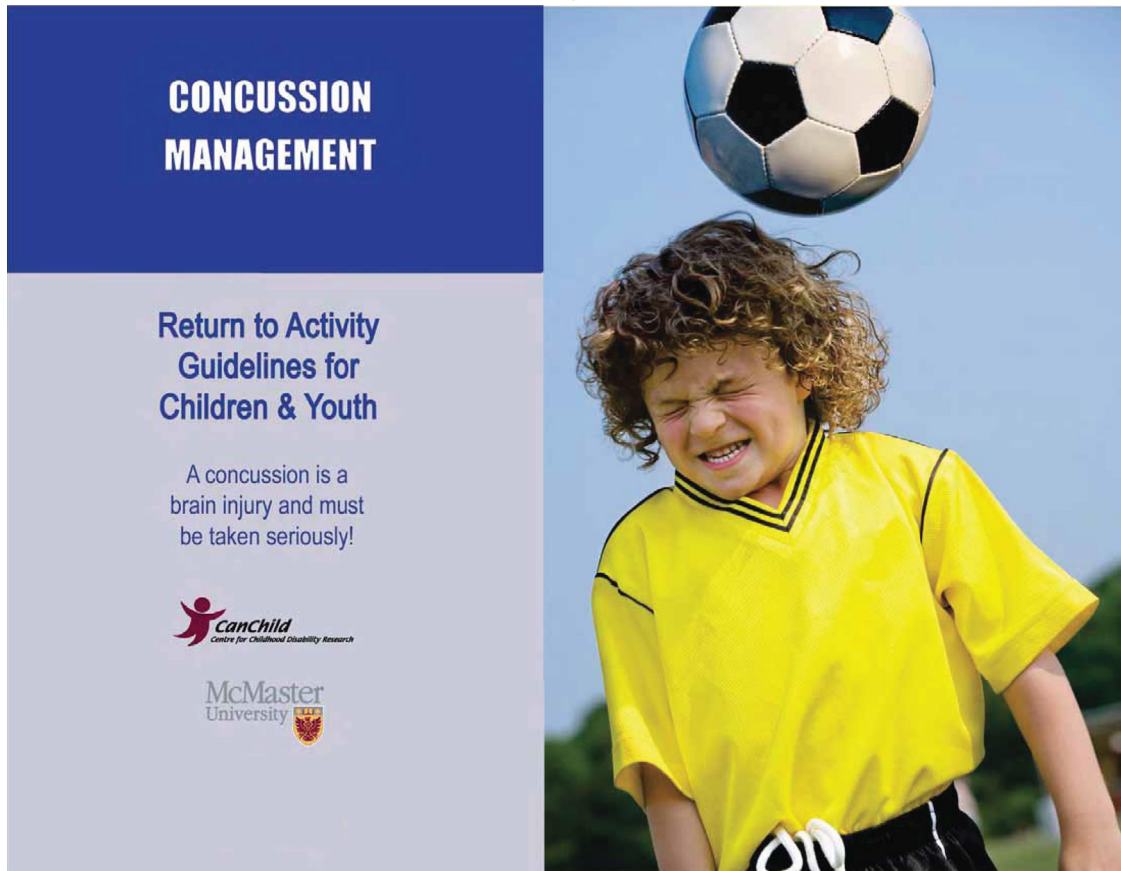
These guidelines were developed for children over the age of 10; those younger may require special guidelines, and more conservative treatment and care. Return to Play Guidelines should be at the discretion of the physician.

WHAT IF MY SYMPTOMS RETURN DURING THIS PROCESS?

Sometimes these steps can cause symptoms of a concussion to return. This means that the brain has not yet healed, and needs more rest. If any signs or symptoms return during the Return To Play process, they should stop the activity and rest until symptoms have resolved. The player must be re-evaluated by a physician before trying any activity again. Remember, symptoms may return later that day or the next, not necessarily during the activity!

Tool 0.4b: CanChild Return to Activity Guidelines for Children and Youth
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 0.4b: CanChild Return to Activity Guidelines for Children and Youth



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Tool 0.4b: CanChild Return to Activity Guidelines for Children and Youth
Guidelines for Diagnosing and Managing Pediatric Concussion

Return to Activity Guidelines

These guidelines should be followed in discussion with a physician or brain injury clinician.

STEP 1: No Activity and Complete Rest

- **NO** physical activity if symptomatic
- Which symptom group are you in: **BLUE, PURPLE, or GREEN?** →

**Get clearance from a physician or brain injury clinician before beginning STEP 2*

STEP 2: Light Exercise

- **NO** resistance training or weight lifting
- **10-15 minutes** light exercise, maximum twice a day
e.g., walking, stationary cycling, light jogging, freestyle swimming

STEP 3: Individual Sport-Specific Activity

- **NO** body/head contact, spins, dives, jumps, high speed stops, hitting a baseball with a bat, or other jarring motions
- **20-30 minutes** general conditioning, maximum twice a day.
e.g., skating, running, throwing

STEP 4: Sport-Specific Practice with Team, NO CONTACT

- **NO** checking, heading the ball, tackling, live scrimmages
- Begin activities with one other teammate and then by the end of this step progress to full team practice, with **NO** contact.
e.g., ball drills, shooting/passing drills, or other non-contact activities
- Begin resistance training and 'beginner level' sport-specific skills. Increase skill level over time.

**Get clearance from a physician or brain injury clinician before beginning STEPS 5 and 6*

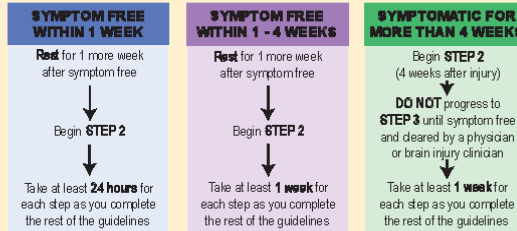
STEP 5: Sport-Specific Practice with Team and CONTACT

- Participate in normal training activities. If symptom free, you are ready to return to competition!

STEP 6: Return to Activity, Sport or Game Play

Which group are you in?

Choose your symptom group and follow the instructions below.



STOP If symptoms return, rest for at least 24 hours and then go back to the previous step

Overriding Recommendations for Return to Contact Sport

- If positive neuroimaging findings → Take at least 3 months off from contact sport
- If 2 concussions in 3 months → Take 6 months off from the time of the most recent injury
- If 3 or more concussions in 1 year → Take 1 year off from the time of the most recent injury
- Discuss retirement from sport after 3 or more concussions, especially if symptoms are prolonged and affecting performance

But continue to exercise!

Also see the McMaster Return to School Guidelines

Reference: McCrory P, Meeuwisse WJ, Johnston K et al. Consensus Statement on Concussion in Sport: The 3rd International Conference on Concussion in Sport Held in Zurich, Nov 2008. Journal of Athletic Training 2009; 44(4):434-448. © CanChild, McMaster University

Concussion Facts

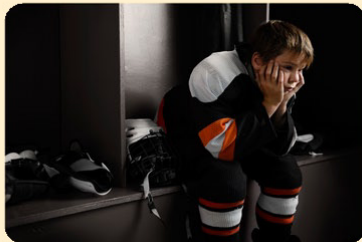
The **biggest risk** is going back to play before the brain heals and getting another concussion!

Higher risk of prolonged recovery with:

- Multiple concussions
- History of learning or behaviour problems
- History of migraines
- Symptoms of amnesia, foginess or dizziness

Percentage of children who are symptom free in:

- 15 days=25%
- 26 days=50%
- 45 days=75%
- 92 days=90%



**WHEN IN DOUBT
SIT THEM OUT**

**WHEN THEY'RE OKAY
RETURN TO PLAY**



CONCUSSION

A concussion, also known as a mild traumatic brain injury (MTBI), changes the way the brain functions. An MTBI can be caused by a direct or indirect hit, blow or force to the head or body.

SYMPTOMS OF CONCUSSION

- Sleep disturbances or drowsiness
- Headache
- Nausea and vomiting
- Poor balance or coordination
- Dizziness
- Visual problems
- Sensitivity to light or noise
- Mentally foggy
- Difficulty concentrating/ remembering
- Irritability
- Sadness
- Nervousness

Symptoms should be evaluated daily to show healing and recovery

RED FLAG SYMPTOMS

If any of the following symptoms develop, go to the emergency department/seek further investigation immediately:

- Increased drowsiness or cannot be awakened
- Headaches worsen or neck pain
- Persistent vomiting
- Pupils are unequal in size
- Seizures
- Confusion or short-term memory loss
- Blurred/double vision, slurred speech or loss of motor function
- Change in behaviour (irritability, agitation or aggression)



For more information, please visit www.canchild.ca



Tool 0.5a: ACE Post-Concussion Gradual Return to School
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 0.5a: ACE Post-Concussion Gradual Return to School



ACE Post-Concussion Gradual Return to School



Stage	Description	Activity Level	Criteria to Move to Next Stage	Date Criteria Met
0	No return, at home	Day 1 - Maintain low level cognitive and physical activity. No prolonged concentration. Cognitive Readiness Challenge: As symptoms improve, try reading or math challenge task for 10-30 minutes; assess for symptom increase.	To Move To Stage 1: (1) Student can sustain concentration for 30 minutes before significant symptom exacerbation, AND (2) Symptoms reduce or disappear with cognitive rest breaks* allowing return to activity.	
1	Return to School, Partial Day (1-3 hours)	Attend 1-3 classes, intersperse rest breaks. No tests or homework. Minimal expectations for productivity.	To Move To Stage 2: Symptom status improving, tolerates 4-5 hours of activity; 2-3 cognitive rest breaks built into school day.	
2	Full Day, Maximal Supports (required throughout day)	Attend most classes, with 2-3 rest breaks (20-30'), no tests. Minimal HW ($\leq 60'$). Minimal-moderate expectations for productivity.	To Move To Stage 3: Symptom number & severity improving, needs 1-2 cognitive rest breaks built into school day.	
3	Return to Full Day, Moderate Supports (provided in response to symptoms during day)	Attend all classes with 1-2 rest breaks (20-30'); begin quizzes. Moderate HW (60-90') Moderate expectations for productivity. Design schedule for make-up work.	To Move To Stage 4: Continued symptom improvement, needs no more than 1 cognitive rest break per day	
4	Return to Full Day, Minimal Supports (Monitor final recovery)	Attend all classes with 0-1 rest breaks (20-30'); begin modified tests (breaks, extra time). HW (90+) Moderate- maximum expectations for productivity.	To Move To Stage 5: No active symptoms, no exertional effects across the full school day.	
5	Full Return, No Supports Needed	Full class schedule, no rest breaks. Max. expectations for productivity. Begin to address make-up work.	N/A	

*Cognitive rest break: a period during which the student refrains from academic or other cognitively demanding activities, including schoolwork, reading, TV/games, conversation. May involve a short nap or relaxation with eyes closed in a quiet setting.

G. Gioia (v1.2014)

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Tool 0.5b: CanChild Return to School Guidelines for Children and Youth
Guidelines for Diagnosing and Managing Pediatric Concussion


Tool 0.5b: CanChild Return to School Guidelines for Children and Youth

**CONCUSSION
MANAGEMENT**

**Return to School
Guidelines for
Children & Youth**

A concussion is a
brain injury and must
be taken seriously!

 **CanChild**
Centre for Childhood Disability Research

 **McMaster
University**

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Tool 0.5b: CanChild Return to School Guidelines for Children and Youth
Guidelines for Diagnosing and Managing Pediatric Concussion

Return to School Guidelines

These stages are designed to strike a balance between the importance of returning to school and brain recovery. Work with your school to put these recommendations into place.

STAGE 1: Brain Rest - NO SCHOOL

- No school for at least one week
- Lots of cognitive rest (NO TV, video games, texting, reading)
- When symptom free, move to STAGE 2

If symptoms persist past 2 weeks, move to STAGE 2

STAGE 2: Getting Ready to Go Back

- Begin gentle activity guided by symptoms (walking, 15 minutes of screen time twice daily, begin reading).
- When symptom free, move to STAGE 3

If symptoms persist, stay in this stage for a maximum of 2 weeks and discuss moving to STAGE 3 with your physician or brain injury clinician

STAGE 3: Back to School/Modified Academics

- This stage may last for days or months depending on rate of recovery
- Go to bed early and get lots of sleep. Have a quiet retreat space in school
- Academic Modifications:
 - Timetable/attendance: Start by going for one hour, half days or every other day
 - Curriculum: Attend less stressful classes, no tests, homework in 15 minute blocks up to a maximum of 45 minutes daily
 - Environment: Preferential seating, avoid music class, gym class, cafeteria, taking the bus, carrying heavy books
 - Activities: Limit screen/TV time into 15 minute blocks for up to 1 hour daily
- When symptom free, move to STAGE 4

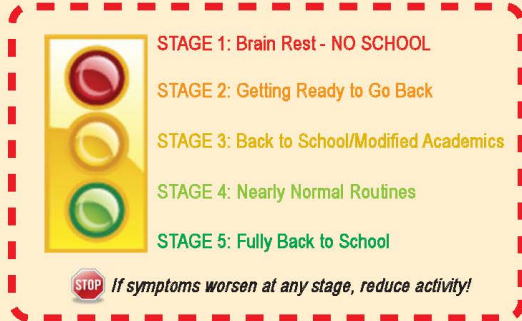
If symptoms persist past 4 weeks → A recovery Individualized Education Plan (IEP) may be needed

STAGE 4: Nearly Normal Routines

- Back to full days of school, but can do less than 5 days a week if needed
- Complete as much homework as possible and a maximum of 1 test per week
- When symptom free, move to STAGE 5

STAGE 5: Fully Back to School

- Gradual return to normal routines including attendance, homework, tests and extracurricular activities



Important Notes

- **Anxiety** can be high after a brain injury. Many children worry about school failure and need reassurance about the temporary accommodations.
- **Depression** is common during recovery from a brain injury, especially when the child is unable to be active. This may make symptoms worse or prolong recovery.

Talk with the child about these issues and offer encouragement and support.

Also see the McMaster Return to Activity Guidelines

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Concussion Facts

The biggest risk is going back to play before the brain heals and getting another concussion!

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SYMPTOMS OF CONCUSSION

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Symptoms should be evaluated daily to show healing and recovery

RED FLAG SYMPTOMS

If any of the following symptoms develop, go to the emergency department/seek further investigation immediately:

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- Seizures
- Confusion or short-term memory loss
- Blurred/double vision, slurred speech or loss of motor function
- Change in behaviour (irritability, agitation or aggression)



For more information, please visit www.canchild.ca



Tool 0.6: CanChild Activity Suggestions for Recovery Stages After Concussion
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 0.6: CanChild Activity Suggestions for Recovery Stages After Concussion



Activity Suggestions for Recovery Stages After Concussion

Toddler (0-4)	Child (5-10)	
<p>Stage 1 - Rest</p> <ul style="list-style-type: none"> • Crafts: colouring, drawing • Nap in favourite spot • Parents can read stories • Watch fish in an aquarium <p>Stage 2 - Light Activity</p> <ul style="list-style-type: none"> • Bird watching • Crafts: painting • Play in the Sand • Play blocks, dolls, cars or small toys • Supervised walking or crawling <p>Stage 3 – Sport-specific Activity</p> <ul style="list-style-type: none"> • Crawling • Walking <p>Stage 4- Non-Contact Practice</p> <ul style="list-style-type: none"> • Dance lessons • Swim lessons 	<p>Stage 1 - Rest</p> <ul style="list-style-type: none"> • Basic board games (i.e. not monopoly) • Crafts: making bracelets, necklaces • Light gardening • Singing • Stargazing • Talk on phone • Talk to friends/family <p>Stage 2- Light Activity</p> <ul style="list-style-type: none"> • Challenging board games • Helping cook and bake • Listen to quiet music (no headphones) • Magazines • Puzzles • Billiards • Bocce ball/ Lawn bowling • Croquette • Fishing • Flying kite • Freestyle swimming • Frisbee • Helping cook and bake • Light jogging • Playing Catch • Walking 	<p>Stage 3 – Sport-Specific Activity</p> <ul style="list-style-type: none"> • Ipad applications (no gaming) • Word searches • Air hockey or foosball • Biking • Dribbling, keep-ups and stickhandling • Golf • Light badminton • Ping pong • Skating • Sprinklers and splash pads • Tag • Tai chi/karate (non-contact) • Wii or Xbox Kinect games <p>Stage 4 – Non-contact Practice</p> <ul style="list-style-type: none"> • Baseball/cricket • Basketball • Dance • Field hockey • Figure skating (no jumps) • Hockey drills • Soccer without heading • Slide and swing at playground • Squash • Tennis • Volleyball (no diving)

WARNING: Preform activities ONLY if symptom free. If the symptoms appear during activity, STOP immediately.

Use suggestions in conjunction with CanChild concussion guidelines available at:
http://www.canchild.ca/en/ourresearch/mild_traumatic_brain_injury_concussion_education.asp

Tool 0.6: CanChild Activity Suggestions for Recovery Stages After Concussion
Guidelines for Diagnosing and Managing Pediatric Concussion



Activity Suggestions for Recovery Stages After Concussion

Teenager (11+)

Stage 1 - Rest

- Cellphone (no texting only calling)
- Crafts: molding clay
- Friends visit (one at a time)
- Knitting and quilting
- Listen to Audiobooks
- Meditation
- Nap
- Photography
- Scrapbooking

Stage 2 –Light Activity

- Cooking and baking
- Crafts: origami, sculpting
- Go to the beach
- Listen to quiet music (no headphones)
- Magazines
- Poetry
- Puzzles
- Re-read familiar books
- Archery
- Billiards
- Camping
- Croquette
- Darts
- Fishing
- Freestyle Swimming
- Lawn bowling
- Light Jogging
- Playing catch
- Stationary cycling
- Walking
- Yoga (no hot yoga)

Stage 3 - Sport-specific Activity

- Crosswords
- Shopping at mall
- Sudoku
- Air hockey or foosball
- Biking
- Calisthenics (stability exercises)
- Curling
- Dribbling, keep-ups and stickhandling
- Golf
- Hiking/orienteering
- Light badminton
- Ping Pong
- Running
- Skating
- Snorkeling
- Tai chi/Karate
- Wii or Xbox Kinect games
- Volleyball (keep ups)
- Windsurfing

Stage 4- Non-contact Practice

- Aerobics and plyometrics
- Baseball/Cricket
- Basketball
- Canoeing/kayaking
- Dance and Cheer (no stunts)
- Figure Skating (no jumping)
- Football Drills
- Hockey Drills
- Light Weight Training
- Mountain/rock climbing
- Non-Contact Soccer (no heading)
- Pilates
- Shadow boxing
- Squash or Tennis
- Track and Field
- Volleyball (no diving)

WARNING: Preform activities ONLY if symptom free. If the symptoms appear during activity, STOP immediately.

Use suggestions in conjunction with CanChild concussion guidelines available at:
http://www.canchild.ca/en/ourresearch/mild_traumatic_brain_injury_concussion_education.asp

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Tool 0.7: Ontario Ministry of Education School Board Policies for Concussion
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 0.7: Ontario Ministry of Education School Board Policies for Concussion



Ministry of Education

**Policy/Program
Memorandum
No. 158**

Date of Issue: March 19, 2014

Effective: Until revoked or modified

Subject: SCHOOL BOARD POLICIES ON CONCUSSION

Application: Directors of Education
Supervisory Officers and Secretary-Treasurers of School Authorities
Principals of Elementary Schools
Principals of Secondary Schools
Principals of Provincial and Demonstration Schools

INTRODUCTION

The Ministry of Education expects all school boards¹ in Ontario to develop and maintain a policy on concussion. The purpose of this memorandum is to provide direction to school boards on the development and implementation of their policy. This memorandum outlines the ministry's expectations regarding the components of a board's policy on concussion. The components include strategies to develop awareness of the seriousness of concussions; strategies for the prevention and identification of concussions; management procedures for diagnosed concussions; and training for board and school staff.

This memorandum applies to all publicly funded elementary and secondary schools, including extended-day programs operated by school boards for full-day kindergarten. However, this memorandum does not apply to licensed child-care providers, including those operating on the premises of publicly funded schools.

CONTEXT

The Ministry of Education is committed to promoting awareness of safety in schools and recognizes that the health and safety of students are essential preconditions for effective learning. All partners in education, including the Ministry of Education, other Ontario ministries, school boards, administrators, educators, school staff, students, parents, school volunteers, and community-based organizations, have important roles to play in promoting student health and safety and in fostering and maintaining healthy and safe environments in which students can learn.

Research demonstrates that a concussion can have a significant impact on a student – cognitively, physically, emotionally, and socially. The implementation of a policy on concussion in each school board is therefore another important step in creating healthier schools in Ontario. It also reinforces the knowledge, skills, and attitudes regarding injury prevention that are developed through the various subjects and disciplines in the Ontario curriculum.

1. In this memorandum, *school board(s)* and *board(s)* refer to district school boards and school authorities.

It is very important to students' long-term health and academic success that individuals in schools have information on appropriate strategies to minimize risk of concussion, steps to follow if they suspect that a student may have a concussion, and effective management procedures to guide students' return to learning and physical activity after a diagnosed concussion.

In partnership with the Ministry of Education, the Ministry of Health and Long-Term Care, the Ministry of Tourism, Culture and Sport, medical professionals, sport and recreation organizations, health organizations, and educational organizations, the Ontario Physical and Health Education Association has released a concussion protocol as part of the Ontario Physical Education Safety Guidelines (available at <http://safety.ophea.net>). The protocol, which is based on current research evidence and knowledge, contains information on concussion prevention, symptoms and signs of a concussion, initial response procedures for a suspected concussion, and management procedures for a diagnosed concussion, including a plan to help a student return to learning and to physical activity.

The Ministry of Education considers the concussion protocol outlined in the Ontario Physical Education Safety Guidelines to be the minimum standard.

DEFINITION AND DIAGNOSIS OF *CONCUSSION*

Concussion is the term for a clinical diagnosis that is made by a medical doctor or a nurse practitioner. The definition of *concussion* given below is adapted from the definition provided in the concussion protocol in the Ontario Physical Education Safety Guidelines.

A concussion:

- is a brain injury that causes changes in the way in which the brain functions and that can lead to symptoms that can be physical (e.g., headache, dizziness), cognitive (e.g., difficulty in concentrating or remembering), emotional/behavioural (e.g., depression, irritability), and/or related to sleep (e.g., drowsiness, difficulty in falling asleep);
- may be caused either by a direct blow to the head, face, or neck or by a blow to the body that transmits a force to the head that causes the brain to move rapidly within the skull;
- can occur even if there has been no loss of consciousness (in fact most concussions occur without a loss of consciousness);
- cannot normally be seen by means of medical imaging tests, such as X-rays, standard computed tomography (CT) scans, or magnetic resonance imaging (MRI) scans.

It should also be noted that injuries that result from a concussion may lead to “second impact syndrome”, which is a rare condition that causes rapid and severe brain swelling and often catastrophic results, if an individual suffers a second concussion before he or she is free from symptoms sustained from the first concussion.

Since concussions can only be diagnosed by a medical doctor or a nurse practitioner, educators, school staff, or volunteers cannot make the diagnosis of concussion.

DEVELOPMENT OF THE SCHOOL BOARD POLICY ON CONCUSSION

When developing their policy on concussion, school boards are encouraged to consult with school staff, students, parents, teacher federations, education support staff unions, and other education partners, as appropriate.

The roles and responsibilities of administrators, educators, school staff, students, parents, and school volunteers should be clearly articulated throughout the policy.

Each school board's policy on concussion is expected to contain, at a minimum, the following components:

Development of Awareness. The school board policy should include strategies for sharing information on the seriousness of concussions, and on concussion prevention, identification, and management, with students, parents, board employees, administrators, educators, school staff, volunteers, doctors and nurse practitioners, and community-based organizations. The policy should also contain provisions for making connections with the curriculum, where relevant. In addition, the policy should include strategies for sharing information with organizations that use the school facilities, such as community sports organizations and licensed child-care providers operating in schools of the board.

Prevention. The policy should include strategies for preventing and minimizing the risk of sustaining concussions (and other head injuries) in schools and at off-site school events.

Identification. The policy should include the following:

- information on the safe removal of an injured student from activity (for example, initial emergency response strategies following a blow to a student's head, face, or neck, or a blow to a student's body that transmits a force to the student's head)
- initial concussion-assessment strategies (for example, use of common symptoms and signs of a concussion)
- steps to take following an initial assessment

Management Procedures for a Diagnosed Concussion. Information should be included on the development of an individualized and gradual "return to learning and/or return to physical activity" plan for every student with a diagnosed concussion. There is no preset formula for developing strategies to assist a student with a concussion to return to learning activities, since the recovery process will vary for each student. If a student who is recovering from a concussion is experiencing long-term difficulties that begin to affect his or her learning, the school board should follow established processes for identifying and documenting instructional approaches and resources that may be required for responding to the student's ongoing learning needs (for example, individualized classroom accommodations).

Training. The policy should also include strategies for providing regular and ongoing training on concussion awareness, prevention, identification, and management to relevant school board employees and school volunteers. When developing these strategies, school boards should consider basing the timing and intensity of training on staff roles and responsibilities.

IMPLEMENTATION

School boards should fully implement their policy on concussion as soon as possible, but are expected to have their concussion policy fully implemented no later than January 30, 2015.

School boards should ensure that a process is in place to support ongoing implementation and compliance with the board policy at the school level.

SCHOOL BOARD REPORTING

In accordance with paragraph 27.1 of subsection 8(1) of the Education Act, school boards will be required to report to the Ministry of Education upon implementation and, upon request thereafter, on their activities to achieve the expectations outlined in this memorandum.

SUPPORT FOR BOARDS

The Ontario government has established a web portal with key partners, which is available at www.ontario.ca/concussions. This web portal has been developed to provide reliable, evidence-based information on preventing, identifying, and managing concussions to parents, children and youth, educators, coaches, athletes, and health care providers.

In accordance with Ontario Public Health Standards, boards of health are required to work with community partners on the development and implementation of healthy policies and programs and on the creation or enhancement of safe and supportive environments. School boards are encouraged to consult with their local board of health as they develop and implement their concussion policy.

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Tool 1.1: SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+ Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 1.1: SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+

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SCAT3™

Sport Concussion Assessment Tool – 3rd Edition

For use by medical professionals only



Name: _____ Date/Time of Injury: _____ Examiner: _____
Date of Assessment: _____

What is the SCAT3?¹

The SCAT3 is a standardized tool for evaluating injured athletes for concussion and can be used in athletes aged from 13 years and older. It supersedes the original SCAT and the SCAT2 published in 2005 and 2009, respectively². For younger persons, ages 12 and under, please use the Child SCAT3. The SCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool¹. Preseason baseline testing with the SCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the SCAT3 are provided on page 3. If you are not familiar with the SCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision or any reproduction in a digital form requires approval by the Concussion in Sport Group.

NOTE: The diagnosis of a concussion is a clinical judgment, ideally made by a medical professional. The SCAT3 should not be used solely to make, or exclude, the diagnosis of concussion in the absence of clinical judgement. An athlete may have a concussion even if their SCAT3 is "normal".

What is a concussion?

A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific signs and/or symptoms (some examples listed below) and most often does not involve loss of consciousness. Concussion should be suspected in the presence of **any one or more** of the following:

- Symptoms (e.g., headache), or
- Physical signs (e.g., unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour (e.g., change in personality).

SIDELINE ASSESSMENT

Indications for Emergency Management

NOTE: A hit to the head can sometimes be associated with a more serious brain injury. Any of the following warrants consideration of activating emergency procedures and urgent transportation to the nearest hospital.

- Glasgow Coma score less than 15
- Deteriorating mental status
- Potential spinal injury
- Progressive, worsening symptoms or new neurologic signs

Potential signs of concussion?

If any of the following signs are observed after a direct or indirect blow to the head, the athlete should stop participation, be evaluated by a medical professional and **should not be permitted to return to sport the same day** if a concussion is suspected.

Any loss of consciousness?	<input type="checkbox"/> Y	<input type="checkbox"/> N
"If so, how long?" _____		
Balance or motor incoordination (stumbles, slow/laboured movements, etc.)?	<input type="checkbox"/> Y	<input type="checkbox"/> N
Disorientation or confusion (inability to respond appropriately to questions)?	<input type="checkbox"/> Y	<input type="checkbox"/> N
Loss of memory:	<input type="checkbox"/> Y	<input type="checkbox"/> N
"If so, how long?" _____		
"Before or after the injury?" _____		
Blank or vacant look:	<input type="checkbox"/> Y	<input type="checkbox"/> N
Visible facial injury in combination with any of the above:	<input type="checkbox"/> Y	<input type="checkbox"/> N

1 Glasgow coma scale (GCS)

Best eye response (E)	
No eye opening	1
Eye opening in response to pain	2
Eye opening to speech	3
Eyes opening spontaneously	4
Best verbal response (V)	
No verbal response	1
Incomprehensible sounds	2
Inappropriate words	3
Confused	4
Oriented	5
Best motor response (M)	
No motor response	1
Extension to pain	2
Abnormal flexion to pain	3
Flexion/Withdrawal to pain	4
Localizes to pain	5
Obeys commands	6
Glasgow Coma score (E + V + M)	of 15

GCS should be recorded for all athletes in case of subsequent deterioration.

2 Maddocks Score³

"I am going to ask you a few questions, please listen carefully and give your best effort."

Modified Maddocks questions (1 point for each correct answer)

What venue are we at today?	0	1
Which half is it now?	0	1
Who scored last in this match?	0	1
What team did you play last week/game?	0	1
Did your team win the last game?	0	1
Maddocks score	of 5	

Maddocks score is validated for sideline diagnosis of concussion only and is not used for serial testing.

Notes: Mechanism of Injury ("tell me what happened?"):

Any athlete with a suspected concussion should be REMOVED FROM PLAY, medically assessed, monitored for deterioration (i.e., should not be left alone) and should not drive a motor vehicle until cleared to do so by a medical professional. No athlete diagnosed with concussion should be returned to sports participation on the day of injury.

Tool 1.1: SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+ Guidelines for Diagnosing and Managing Pediatric Concussion

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BACKGROUND

Name: _____ Date: _____
 Examiner: _____
 Sport/team/school: _____ Date/time of injury: _____
 Age: _____ Gender: M F
 Years of education completed: _____
 Dominant hand: right left neither
 How many concussions do you think you have had in the past? _____
 When was the most recent concussion? _____
 How long was your recovery from the most recent concussion? _____
 Have you ever been hospitalized or had medical imaging done for a head injury? Y N
 Have you ever been diagnosed with headaches or migraines? Y N
 Do you have a learning disability, dyslexia, ADD/ADHD? Y N
 Have you ever been diagnosed with depression, anxiety or other psychiatric disorder? Y N
 Has anyone in your family ever been diagnosed with any of these problems? Y N
 Are you on any medications? If yes, please list: Y N

SCAT3 to be done in resting state. Best done 10 or more minutes post exercise.

SYMPTOM EVALUATION

3 How do you feel?

"You should score yourself on the following symptoms, based on how you feel now".

	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
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	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
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	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
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Trouble falling asleep	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

Total number of symptoms (Maximum possible 22) _____

Symptom severity score (Maximum possible 132) _____

Do the symptoms get worse with physical activity? Y N

Do the symptoms get worse with mental activity? Y N

self rated self rated and clinician monitored
 clinician interview self rated with parent input

Overall rating: If you know the athlete well prior to the injury, how different is the athlete acting compared to his/her usual self?

Please circle one response:

no different very different unsure N/A

Scoring on the SCAT3 should not be used as a stand-alone method to diagnose concussion, measure recovery or make decisions about an athlete's readiness to return to competition after concussion. Since signs and symptoms may evolve over time, it is important to consider repeat evaluation in the acute assessment of concussion.

COGNITIVE & PHYSICAL EVALUATION

4 Cognitive assessment

Standardized Assessment of Concussion (SAC)⁴

Orientation (1 point for each correct answer)

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1

Orientation score _____ of 5

Immediate memory

List	Trial 1	Trial 2	Trial 3	Alternative word list					
elbow	0	1	0	1	0	1	candle	baby	finger
apple	0	1	0	1	0	1	paper	monkey	penny
carpet	0	1	0	1	0	1	sugar	perfume	blanket
saddle	0	1	0	1	0	1	sandwich	sunset	lemon
bubble	0	1	0	1	0	1	wagon	iron	insect

Total _____

Immediate memory score total _____ of 15

Concentration: Digits Backward

List	Trial 1	Alternative digit list			
4-9-3	0	1	6-2-9	5-2-6	4-1-5
3-8-1-4	0	1	3-2-7-9	1-7-9-5	4-9-6-8
6-2-9-7-1	0	1	1-5-2-8-6	3-8-5-2-7	6-1-8-4-3
7-1-8-4-6-2	0	1	5-3-9-1-4-8	8-3-1-9-6-4	7-2-4-8-5-6

Total of 4 _____

Concentration: Month in Reverse Order (1 pt. for entire sequence correct)

Dec-Nov-Oct-Sept-Aug-Jul-Jun-May-Apr-Mar-Feb-Jan 0 1

Concentration score _____ of 5

5 Neck Examination:

Range of motion: _____ Tenderness: _____ Upper and lower limb sensation & strength: _____

Findings: _____

6 Balance examination

Do one or both of the following tests.

Footwear (shoes, barefoot, braces, tape, etc.) _____

Modified Balance Error Scoring System (BESS) testing⁵

Which foot was tested (i.e. which is the non-dominant foot) Left Right

Testing surface (hard floor, field, etc.) _____

Condition

Double leg stance: _____ Errors

Single leg stance (non-dominant foot): _____ Errors

Tandem stance (non-dominant foot at back): _____ Errors

And/Or

Tandem gait^{6,7}

Time (best of 4 trials): _____ seconds

7 Coordination examination

Upper limb coordination

Which arm was tested: Left Right

Coordination score _____ of 1

8 SAC Delayed Recall⁴

Delayed recall score _____ of 5

Tool 1.1: SCAT3 Sport Concussion Assessment Tool for Athletes aged 13+

Guidelines for Diagnosing and Managing Pediatric Concussion

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INSTRUCTIONS

Words in *italics* throughout the SCAT3 are the instructions given to the athlete by the tester.

Symptom Scale

"You should score yourself on the following symptoms, based on how you feel now".

To be completed by the athlete. In situations where the symptom scale is being completed after exercise, it should still be done in a resting state, at least 10 minutes post exercise.

For total number of symptoms, maximum possible is 22.

For Symptom severity score, add all scores in table, maximum possible is 22x6=132.

SAC⁴

Immediate Memory

"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order."

Trials 2 & 3:

"I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before."

Complete all 3 trials regardless of score on trial 1 & 2. Read the words at a rate of one per second. **Score 1 pt. for each correct response.** Total score equals sum across all 3 trials. Do not inform the athlete that delayed recall will be tested.

Concentration

Digits backward

"I am going to read you a string of numbers and when I am done, you repeat them back to me backwards, in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7."

If correct, go to next string length. If incorrect, read trial 2. **One point possible for each string length.** Stop after incorrect on both trials. The digits should be read at the rate of one per second.

Months in reverse order

"Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November ... Go ahead"

1 pt. for entire sequence correct

Delayed Recall

The delayed recall should be performed after completion of the Balance and Coordination Examination.

"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."

Score 1 pt. for each correct response

Balance Examination

Modified Balance Error Scoring System (BESS) testing⁵

This balance testing is based on a modified version of the Balance Error Scoring System (BESS)⁵. A stopwatch or watch with a second hand is required for this testing.

"I am now going to test your balance. Please take your shoes off, roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of three twenty second tests with different stances."

(a) Double leg stance:

"The first stance is standing with your feet together with your hands on your hips and with your eyes closed. You should try to maintain stability in that position for 20 seconds. I will be counting the number of times you move out of this position. I will start timing when you are set and have closed your eyes."

(b) Single leg stance:

"If you were to kick a ball, which foot would you use? [This will be the dominant foot] Now stand on your non-dominant foot. The dominant leg should be held in approximately 30 degrees of hip flexion and 45 degrees of knee flexion. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

(c) Tandem stance:

"Now stand heel-to-toe with your non-dominant foot in back. Your weight should be evenly distributed across both feet. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

Balance testing – types of errors

1. Hands lifted off iliac crest
2. Opening eyes
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
6. Remaining out of test position > 5 sec

Each of the 20-second trials is scored by counting the errors, or deviations from the proper stance, accumulated by the athlete. The examiner will begin counting errors only after the individual has assumed the proper start position. **The modified BESS is calculated by adding one error point for each error during the three 20-second tests. The maximum total number of errors for any single condition is 10.** If a athlete commits multiple errors simultaneously, only one error is recorded but the athlete should quickly return to the testing position, and counting should resume once subject is set. Subjects that are unable to maintain the testing procedure for a minimum of **five seconds** at the start are assigned the highest possible score, ten, for that testing condition.

OPTION: For further assessment, the same 3 stances can be performed on a surface of medium density foam (e.g., approximately 50cm x 40cm x 6cm).

Tandem Gait^{6,7}

Participants are instructed to stand with their feet together behind a starting line (the test is best done with footwear removed). Then, they walk in a forward direction as quickly and as accurately as possible along a 38mm wide (sports tape), 3 meter line with an alternate foot heel-to-toe gait ensuring that they approximate their heel and toe on each step. Once they cross the end of the 3m line, they turn 180 degrees and return to the starting point using the same gait. A total of 4 trials are done and the best time is retained. Athletes should complete the test in 14 seconds. Athletes fail the test if they step off the line, have a separation between their heel and toe, or if they touch or grab the examiner or an object. In this case, the time is not recorded and the trial repeated, if appropriate.

Coordination Examination

Upper limb coordination

Finger-to-nose (FTN) task:

"I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended), pointing in front of you. When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose, and then return to the starting position, as quickly and as accurately as possible."

Scoring: 5 correct repetitions in < 4 seconds = 1

Note for testers: Athletes fail the test if they do not touch their nose, do not fully extend their elbow or do not perform five repetitions. **Failure should be scored as 0.**

References & Footnotes

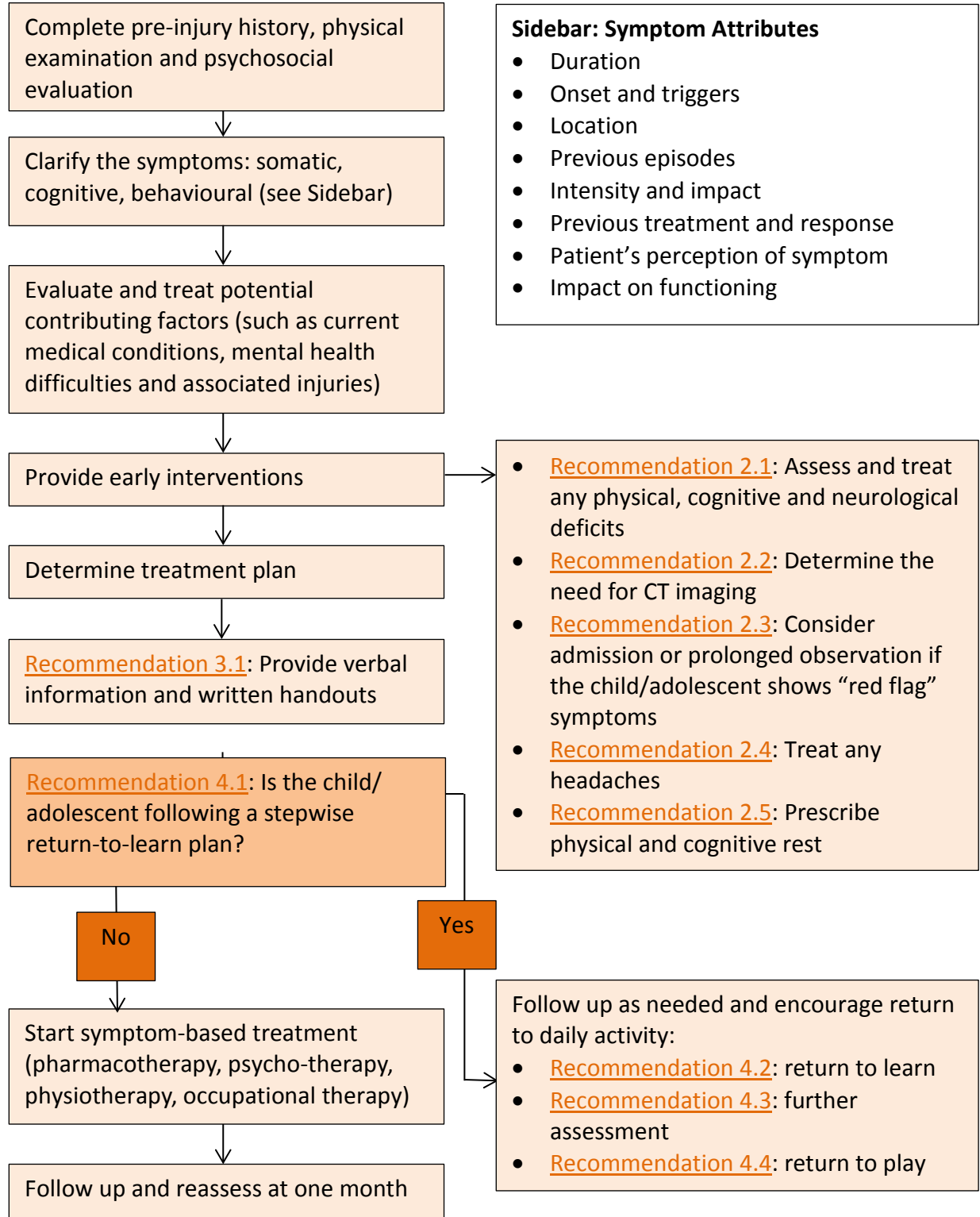
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Tool 2.1: Management of Acute Symptoms Algorithm

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.1: Management of Acute Symptoms Algorithm



Adapted from Department of Veterans Affairs, Department of Defense. VA/DoD clinical practice guideline for management of concussion/mild traumatic brain injury (mTBI). Washington (DC): Department of Veteran Affairs, Department of Defense; 2009 Apr. 112 p.

Tool 2.2: Acute Concussion Evaluation (ACE)

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.2: Acute Concussion Evaluation (ACE)

ACUTE CONCUSSION EVALUATION (ACE) PHYSICIAN/CLINICIAN OFFICE VERSION

Gerard Gioia, PhD¹ & Micky Collins, PhD²
¹Children's National Medical Center
²University of Pittsburgh Medical Center

Patient Name: _____	
DOB: _____	Age: _____
Date: _____	ID/MR# _____

A. Injury Characteristics Date/Time of Injury _____ Reporter: <input type="checkbox"/> Patient <input type="checkbox"/> Parent <input type="checkbox"/> Spouse <input type="checkbox"/> Other _____	
1. Injury Description _____	
1a. Is there evidence of a forcible blow to the head (direct or indirect)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
1b. Is there evidence of intracranial injury or skull fracture? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
1c. Location of Impact: <input type="checkbox"/> Frontal <input type="checkbox"/> Lt Temporal <input type="checkbox"/> Rt Temporal <input type="checkbox"/> Lt Parietal <input type="checkbox"/> Rt Parietal <input type="checkbox"/> Occipital <input type="checkbox"/> Neck <input type="checkbox"/> Indirect Force	
2. Cause: <input type="checkbox"/> MVC <input type="checkbox"/> Pedestrian-MVC <input type="checkbox"/> Fall <input type="checkbox"/> Assault <input type="checkbox"/> Sports (specify) _____ Other _____	
3. Amnesia Before (Retrograde) Are there any events just BEFORE the injury that you/ person has no memory of (even brief)? <input type="checkbox"/> Yes <input type="checkbox"/> No Duration _____	
4. Amnesia After (Anterograde) Are there any events just AFTER the injury that you/ person has no memory of (even brief)? <input type="checkbox"/> Yes <input type="checkbox"/> No Duration _____	
5. Loss of Consciousness: Did you/ person lose consciousness? <input type="checkbox"/> Yes <input type="checkbox"/> No Duration _____	
6. EARLY SIGNS: <input type="checkbox"/> Appears dazed or stunned <input type="checkbox"/> Is confused about events <input type="checkbox"/> Answers questions slowly <input type="checkbox"/> Repeats Questions <input type="checkbox"/> Forgetful (recent info)	
7. Seizures: Were seizures observed? No <input type="checkbox"/> Yes <input type="checkbox"/> Detail _____	

B. Symptom Check List* Since the injury, has the person experienced any of these symptoms any more than usual today or in the past day? Indicate presence of each symptom (0=No, 1=Yes). *Lovell & Collins, 1998 JHTR					
PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)	
Headache	0 1	Feeling mentally foggy	0 1	Drowsiness	0 1
Nausea	0 1	Feeling slowed down	0 1	Sleeping less than usual	0 1 N/A
Vomiting	0 1	Difficulty concentrating	0 1	Sleeping more than usual	0 1 N/A
Balance problems	0 1	Difficulty remembering	0 1	Trouble falling asleep	0 1 N/A
Dizziness	0 1	COGNITIVE Total (0-4) _____		SLEEP Total (0-4) _____	
Visual problems	0 1	EMOTIONAL (4)		Exertion: Do these symptoms <u>worsen</u> with: Physical Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Cognitive Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Overall Rating: How <u>different</u> is the person acting compared to his/her usual self? (circle) Normal 0 1 2 3 4 5 6 Very Different	
Fatigue	0 1	Irritability	0 1		
Sensitivity to light	0 1	Sadness	0 1		
Sensitivity to noise	0 1	More emotional	0 1		
Numbness/Tingling	0 1	Nervousness	0 1		
PHYSICAL Total (0-10) _____		EMOTIONAL Total (0-4) _____			
(Add Physical, Cognitive, Emotion, Sleep totals)			Total Symptom Score (0-22) _____		

C. Risk Factors for Protracted Recovery (check all that apply)			
Concussion History? Y ___ N ___ Previous # 1 2 3 4 5 6+	<input checked="" type="checkbox"/> Headache History? Y ___ N ___ Prior treatment for headache	<input checked="" type="checkbox"/> Developmental History Learning disabilities	<input checked="" type="checkbox"/> Psychiatric History Anxiety
Longest symptom duration Days ___ Weeks ___ Months ___ Years ___	History of migraine headache ___ Personal ___ Family	Attention-Deficit/ Hyperactivity Disorder	Depression Sleep disorder
If multiple concussions, less force caused reinjury? Yes ___ No ___		Other developmental disorder _____	Other psychiatric disorder _____
List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) _____			

D. RED FLAGS for acute emergency management: Refer to the emergency department with sudden onset of any of the following:			
* Headaches that worsen	* Looks very drowsy/ can't be awakened	* Can't recognize people or places	* Neck pain
* Seizures	* Repeated vomiting	* Increasing confusion or irritability	* Unusual behavioral change
* Focal neurologic signs	* Slurred speech	* Weakness or numbness in arms/legs	* Change in state of consciousness

E. Diagnosis (ICD): Concussion w/o LOC 850.0 Concussion w/ LOC 850.1 Concussion (Unspecified) 850.9 Other (854) _____
 No diagnosis

F. Follow-Up Action Plan Complete ACE Care Plan and provide copy to patient/family.	
<input type="checkbox"/> No Follow-Up Needed	
<input type="checkbox"/> Physician/Clinician Office Monitoring: Date of next follow-up _____	
<input type="checkbox"/> Referral:	
<input type="checkbox"/> Neuropsychological Testing	
<input type="checkbox"/> Physician: Neurosurgery _____ Neurology _____ Sports Medicine _____ Physiatrist _____ Psychiatrist _____ Other _____	
<input type="checkbox"/> Emergency Department	

ACE Completed by: _____ © Copyright G. Gioia & M. Collins, 2006
This form is part of the "Heads Up: Brain Injury In Your Practice" tool kit developed by the Centers for Disease Control and Prevention (CDC).

Tool 2.2: Acute Concussion Evaluation (ACE) Guidelines for Diagnosing and Managing Pediatric Concussion

A concussion (or mild traumatic brain injury (MTBI)) is a complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces secondary to direct or indirect forces to the head. Disturbance of brain function is related to neurometabolic dysfunction, rather than structural injury, and is typically associated with normal structural neuroimaging findings (i.e., CT scan, MRI). Concussion may or may not involve a loss of consciousness (LOC). Concussion results in a constellation of physical, cognitive, emotional, and sleep-related symptoms. Symptoms may last from several minutes to days, weeks, months or even longer in some cases.

ACE Instructions

The ACE is intended to provide an evidence-based clinical protocol to conduct an initial evaluation and diagnosis of patients (both children and adults) with known or suspected MTBI. The research evidence documenting the importance of these components in the evaluation of an MTBI is provided in the reference list.

A. Injury Characteristics:

1. Obtain **description of the injury** – how injury occurred, type of force, location on the head or body (if force transmitted to head). Different biomechanics of injury may result in differential symptom patterns (e.g., occipital blow may result in visual changes, balance difficulties).
2. Indicate the **cause of injury**. Greater forces associated with the trauma are likely to result in more severe presentation of symptoms.
- 3/4. **Amnesia:** Amnesia is defined as the failure to form new memories. Determine whether amnesia has occurred and attempt to determine length of time of memory dysfunction – **before** (retrograde) and **after** (anterograde) injury. Even seconds to minutes of memory loss can be predictive of outcome. Recent research has indicated that amnesia may be up to 4-10 times more predictive of symptoms and cognitive deficits following concussion than is LOC (less than 1 minute).¹
5. **Loss of consciousness (LOC)** – If occurs, determine length of LOC.
6. **Early signs.** If present, ask the individuals who know the patient (parent, spouse, friend, etc) about specific signs of the concussion that may have been observed. These signs are typically observed early after the injury.
7. Inquire whether **seizures** were observed or not.

B. Symptom Checklist:²

1. Ask patient (and/or parent, if child) to report presence of the four categories of symptoms since injury. It is important to assess all listed symptoms as different parts of the brain control different functions. One or all symptoms may be present depending upon mechanisms of injury.³ Record "1" for Yes or "0" for No for their presence or absence, respectively.
2. For all symptoms, indicate presence of symptoms as experienced within the past 24 hours. Since symptoms can be present pre-morbidly/at baseline (e.g., inattention, headaches, sleep, sadness), it is important to assess **change** from their usual presentation.
3. **Scoring:** Sum total **number** of symptoms present per area, and sum all four areas into Total Symptom Score (score range 0-22). (Note: most sleep symptoms are only applicable after a night has passed since the injury. Drowsiness may be present on the day of injury.) If symptoms are new and present, there is no lower limit symptom score. Any **score > 0** indicates **positive symptom** history.
4. **Exertion:** Inquire whether any symptoms worsen with physical (e.g., running, climbing stairs, bike riding) and/or cognitive (e.g., academic studies, multi-tasking at work, reading or other tasks requiring focused concentration) exertion. Clinicians should be aware that symptoms will typically worsen or re-emerge with exertion, indicating incomplete recovery. Over-exertion may protract recovery.
5. **Overall Rating:** Determine how different the person is acting from their usual self. Circle "0" (Normal) to "6" (Very Different).

C. Risk Factors for Protracted Recovery:

Assess the following risk factors as possible complicating factors in the recovery process.

1. **Concussion history:** Assess the number and date(s) of prior concussions, the duration of symptoms for each injury, and whether less biomechanical force resulted in re-injury. Research indicates that cognitive and symptom effects of concussion may be cumulative, especially if there is minimal duration of time between injuries and less biomechanical force results in subsequent concussion (which may indicate incomplete recovery from initial trauma).⁴⁻⁸
2. **Headache history:** Assess personal and/or family history of diagnosis/treatment for headaches. Research indicates headache (migraine in particular) can result in protracted recovery from concussion.⁹⁻¹¹
3. **Developmental history:** Assess history of learning disabilities, Attention-Deficit/Hyperactivity Disorder or other developmental disorders. Research indicates that there is the possibility of a longer period of recovery with these conditions.¹²
4. **Psychiatric history:** Assess for history of depression/mood disorder, anxiety, and/or sleep disorder.¹³⁻¹⁶

D. Red Flags:

The patient should be carefully observed over the first 24-48 hours for these serious signs. Red flags are to be assessed as **possible signs of deteriorating neurological functioning**. Any positive report should prompt strong consideration of referral for emergency medical evaluation (e.g. CT Scan to rule out intracranial bleed or other structural pathology).¹⁷

E. Diagnosis:

The following ICD diagnostic codes may be applicable.

- 850.0 (Concussion, with no loss of consciousness)** – Positive injury description with evidence of forcible direct/ indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); no evidence of LOC (A5), skull fracture or intracranial injury (A1b).
- 850.1 (Concussion, with brief loss of consciousness < 1 hour)** – Positive injury description with evidence of forcible direct/ indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); positive evidence of LOC (A5), skull fracture or intracranial injury (A1b).
- 850.9 (Concussion, unspecified)** – Positive injury description with evidence of forcible direct/ indirect blow to the head (A1a); plus evidence of active symptoms (B) of any type and number related to the trauma (Total Symptom Score >0); unclear/unknown injury details; unclear evidence of LOC (A5), no skull fracture or intracranial injury.

Other Diagnoses – If the patient presents with a positive injury description and associated symptoms, but additional evidence of intracranial injury (A 1b) such as from neuroimaging, a moderate TBI and the diagnostic category of 854 (Intracranial injury) should be considered.

F. Follow-Up Action Plan:

Develop a follow-up plan of action for symptomatic patients. The physician/clinician may decide to (1) monitor the patient in the office or (2) refer them to a specialist. Serial evaluation of the concussion is critical as symptoms may resolve, worsen, or ebb and flow depending upon many factors (e.g., cognitive/physical exertion, comorbidities). Referral to a specialist can be particularly valuable to help manage certain aspects of the patient's condition. (Physician/Clinician should also complete the ACE Care Plan included in this tool kit.)

1. **Physician/Clinician serial monitoring** – Particularly appropriate if number and severity of symptoms are steadily decreasing over time and/or fully resolve within 3-5 days. If steady reduction is not evident, referral to a specialist is warranted.
2. **Referral to a specialist** – Appropriate if symptom reduction is not evident in 3-5 days, or sooner if symptom profile is concerning in type/severity.
 - **Neuropsychological Testing** can provide valuable information to help assess a patient's brain function and impairment and assist with treatment planning, such as return to play decisions.
 - **Physician Evaluation** is particularly relevant for medical evaluation and management of concussion. It is also critical for evaluating and managing focal neurologic, sensory, vestibular, and motor concerns. It may be useful for medication management (e.g., headaches, sleep disturbance, depression) if post-concussive problems persist.

Reproduced with permission from Gerard Gioia, PhD, et al.

Tool 2.3: Modifiers for Concussion
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.3: Modifiers for Concussion

<i>Factors</i>	<i>Modifier</i>
Symptoms	<ul style="list-style-type: none"> • Number • Duration (more than 10 days) • Severity
Signs	Prolonged loss of consciousness (more than 1 min), amnesia
Sequelae	Concussive convulsions
Temporal	<ul style="list-style-type: none"> • Frequency (repeated concussions over time) • Timing (injuries close together in time) • “Recency” (recent concussion/TBI)
Threshold	Repeated concussions with progressively less impact force or slower recovery after each successive concussion
Co- and Pre-morbidities	<ul style="list-style-type: none"> • Cervical strain/whiplash-associated disorder • Chronic fatigue • Chronic pain syndrome • Depression or other mental health disorders • Learning disabilities and attention-deficit hyperactive disorder • Major depressive disorder • Malingering • Migraine • Pain • Post-traumatic headache • Primary sleep disorder; for example, obstructive sleep apnea • Somatoform disorder/factitious disorder • Substance abuse or polypharmacy
Medication	Psychoactive drugs, anticoagulants
Behaviour	Dangerous style of play
Sport	<ul style="list-style-type: none"> • High-risk activity • Contact and collision sport • High sporting level

Adapted from McCrory P, Meeuwisse WH, Aubry M, et al. Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. British Journal of Sport Medicine. 2013;47(5):250-8.

Reproduced with permission from BMJ Publishing Group Ltd.

Tool 2.4: Neurologic and Musculoskeletal Exam

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.4: Neurologic and Musculoskeletal Exam

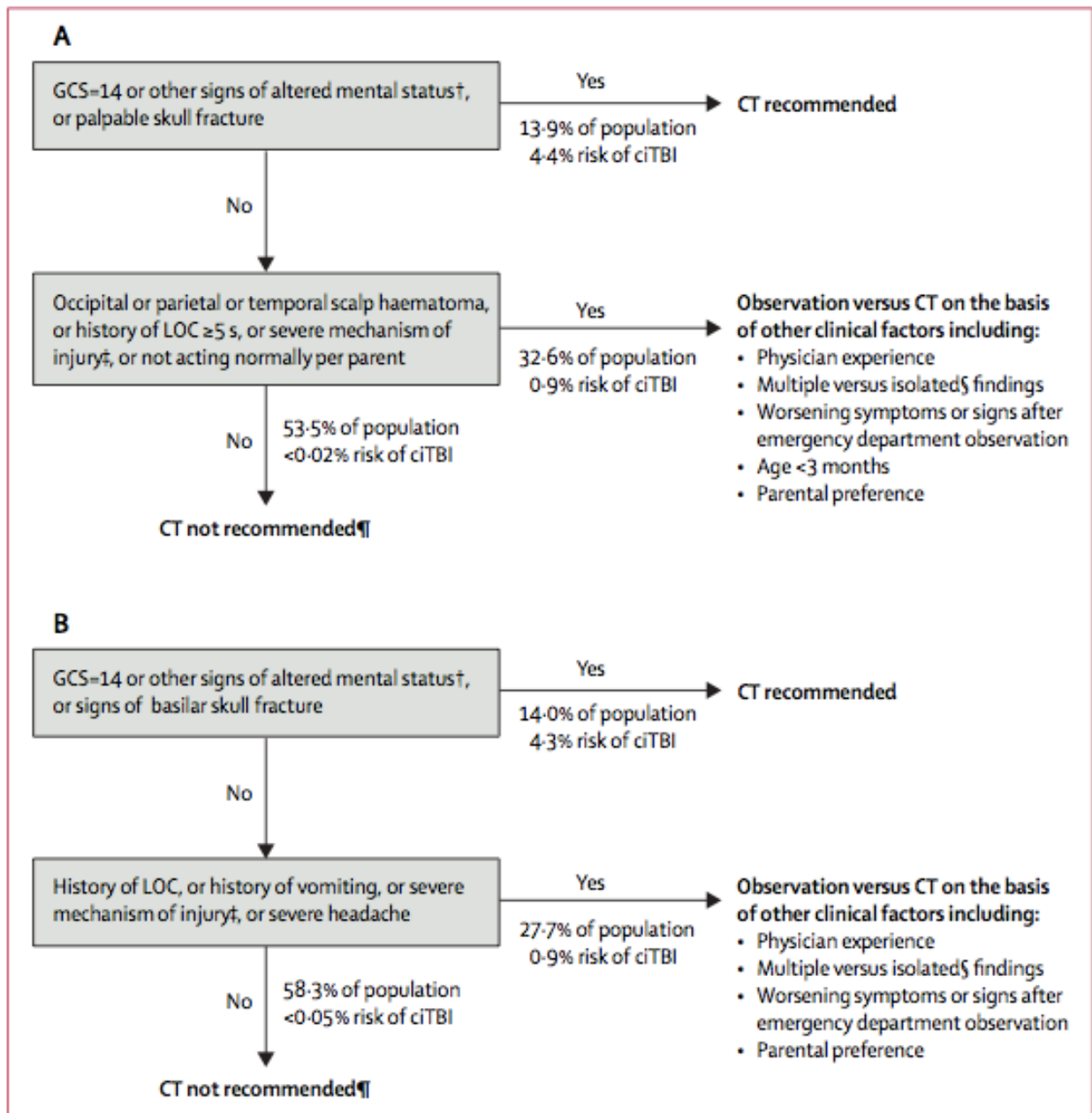
Perform a neurologic exam and musculoskeletal exam including cervical spine examination:

- Examine the head/scalp for swelling, ecchymosis, tenderness, numbness or stepoffs.
- Look for battle sign, raccoon eyes, rhinorrhea, otorrhea, hemotympanum.
- Examine the cervical spine for range of motion and focal areas of tenderness, spasm, hypertonicity.
- Examine the temporo-mandibular joint (TMJ) for range of opening, tenderness, dislocation.
- Apply [Recommendation 5.4c\(i\)](#) on assessing for cognitive difficulties.
- Examine the cranial nerves for check for vision dysfunction:
 - cranial nerve 2 (assess visual fields to confrontation and symmetry and reactivity of pupils; ensure there is no optic edema);
 - cranial nerves 3, 4, 6 (check for abnormalities in eye movements, diplopia, nystagmus);
 - cranial nerve 7 (check the muscles of facial expression).
- Conduct a motor screen to check for drift in the pronator, asymmetrical weakness and symmetry of reflexes.
- Conduct a sensory exam to check that bilateral tactile stimuli are not extinct.
- Assess coordination by evaluating Romberg, finger-to-nose movements, gait and tandem gait.
- Refer for appropriate imaging and to an appropriate specialist if you find any focal abnormalities.

Adapted from "Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)." Reproduced with permission from the Ontario Neurotrauma Foundation.

Tool 2.5: PECARN Management Algorithm for Children After Head Trauma
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.5: PECARN Management Algorithm for Children After Head Trauma

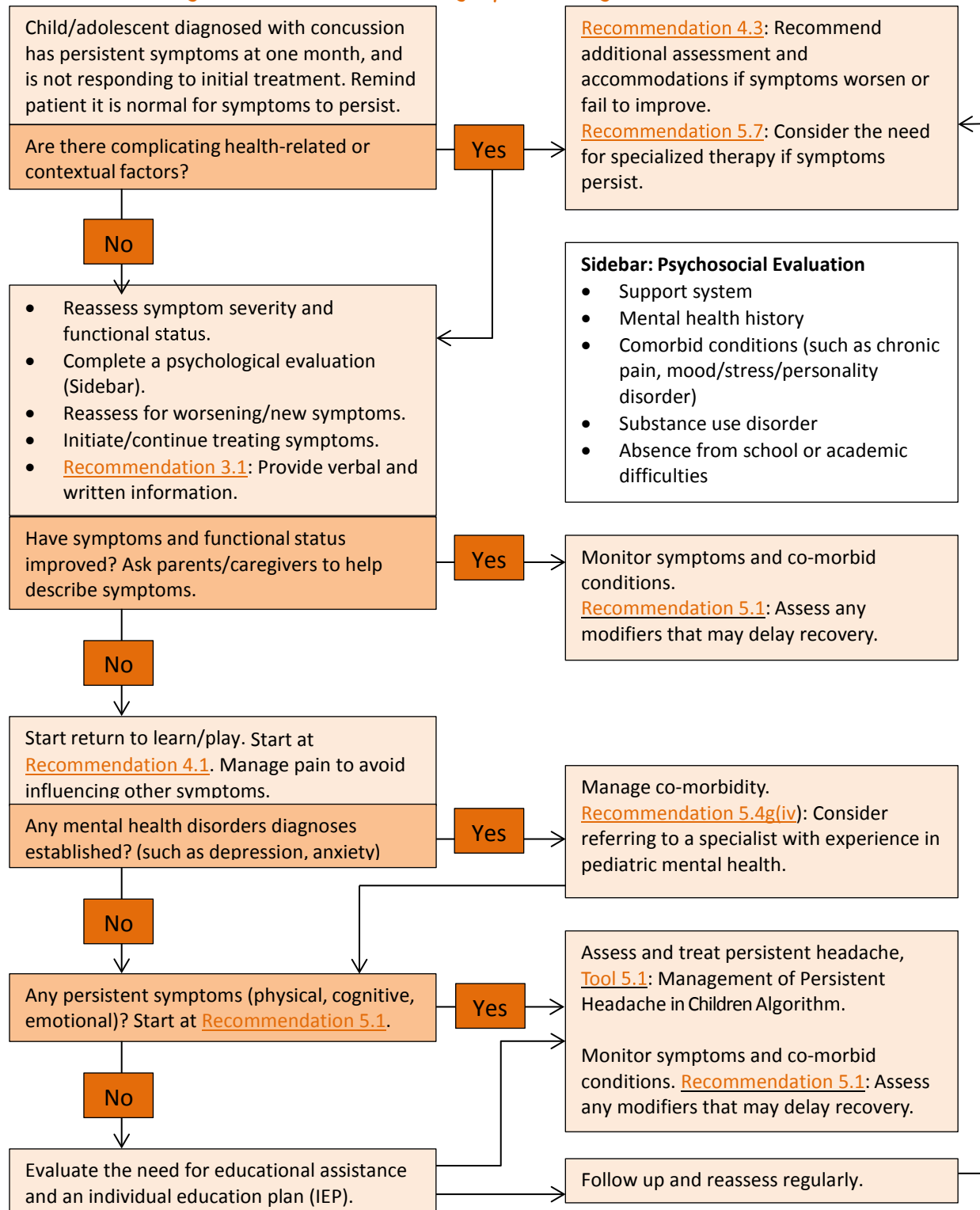


Kuppermann N, Holmes JF, Dayan PS, Hoyle JD Jr, Atabaki SM, Holubkov R, Nadel FM, Monroe D, Stanley RM, Borgianni DA, Badawy MK, Schunk JE, Quayle KS, Mahajan P, Lichenstein R, Lillis KA, Tunik MG, Jacobs ES, Callahan JM, Gorelick MH, Glass TF, Lee LK, Bachman MC, Cooper A, Powell EC, Gerardi MJ, Melville KA, Muizelaar JP, Wisner DH, Zupan SJ, Dean JM, Wootton-Gorges SL; Pediatric Emergency Care Applied Research Network (PECARN). Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *Lancet*. 2009 Oct 3;374(9696):1160-70. Epub 2009 Sep 14. PubMed PMID: 19758692. Reproduced with permission from Elsevier.

Tool 2.6: Management of Persistent Symptoms Algorithm

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.6: Management of Persistent Symptoms Algorithm



Adapted from Department of Veterans Affairs, Department of Defense. VA/DoD clinical practice guideline for management of concussion/mild traumatic brain injury (mTBI). Washington (DC): Department of Veteran Affairs, Department of Defense; 2009 Apr. 112 p.

Tool 2.7: HEADS-ED Tool for Monitoring Pediatric Mental Health in the ED
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.7: HEADS-ED Tool for Monitoring Pediatric Mental Health in the ED



HEADS-ED

Patient Profile



	0 No action needed	1 Needs action but not immediate	2 Needs immediate action
H ome <i>Example: How does your family get along with each other?</i>	<input type="radio"/> Supportive	<input type="radio"/> Conflicts	<input type="radio"/> Chaotic / dysfunctional
E ducation <i>Example: How is your school attendance? How are your grades?</i>	<input type="radio"/> On track	<input type="radio"/> Grades dropping / absenteeism	<input type="radio"/> Failing / not attending school
A ctivities <i>Example: What are your relationships like with your friends?</i>	<input type="radio"/> No change	<input type="radio"/> Reduced / peer conflicts	<input type="radio"/> Fully withdrawn / significant peer conflicts
D rugs & alcohol <i>Example: How often are you using drugs or alcohol?</i>	<input type="radio"/> None or infrequent	<input type="radio"/> Occasional	<input type="radio"/> Frequent / daily
S uicidality <i>Example: Do you have any thoughts of wanting to kill yourself?</i>	<input type="radio"/> No thoughts	<input type="radio"/> Ideation	<input type="radio"/> Plan or gesture
E motions, behaviours, thought disturbance <i>Example: How have you been feeling lately?</i>	<input type="radio"/> Mildly anxious / sad / acting out	<input type="radio"/> Moderately anxious / sad / acting out	<input type="radio"/> Significantly distressed / unable to function / out of control / bizarre thoughts
D ischarge resources <i>Example: Do you have any help or are you waiting to receive help (counselling etc)?</i>	<input type="radio"/> Ongoing / well connected	<input type="radio"/> Some / not meeting needs	<input type="radio"/> None / on waitlist / non-compliant

Notes:

Form No. 6076A, January 2013

Cappelli, M., Gray, C., Zemek, R., Cloutier, P., Kennedy, A., Glennie, J. E., ... Lyons, J. S. (2012). The HEADS-ED: a rapid mental health screening tool for pediatric patients in the emergency department. *Pediatrics*, 130(2), e321–7. doi:10.1542/peds.2011-3798

Reproduced with permission from the American Academy of Pediatrics.

Tool 2.8: Assessment of Children and Adolescents with Headache

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.8: Assessing Headache in Children and Adolescents

General Headache Questions

- Do you have more than one type of headache? If so, describe them.
- When did the headache start?
- How long does the headache last?
- Describe the pain? What does the headache feel like?
- Is the pain mild, moderate or severe?
 - How painful is the headache on a scale of 1 to 10: 1 being very mild pain and 10 being the worst pain (**this question is age-dependent**).
- Where does it hurt exactly?
- Does the pain start in one place, then spread?
- How often do you get headaches?
- Do you have any symptoms immediately before the headache or pain starts?
- Do you have any of the following symptoms with the headache?
 - Nausea, vomiting, change in vision?
 - Weakness, tingling or pins-and-needles in your arms or legs?
 - Neck pain or stiffness?
 - Dizziness? If yes, do you feel like the room is spinning or moving? Or do *you* feel like you are moving or spinning?
- Does anything trigger your headaches (examples: skipped meals, poor sleep, stress, bright lights or loud sounds)?
- Does anything make the headache better?
- Does anything make the headache worse?
- Are your headaches getting more painful and more frequent? Less painful and less frequent? Or staying about the same?

Red Flags

- Do the headaches wake you up at night?
- Do you get headaches first thing in the morning?
- Does the headache get worse if you change position (example: stand up or sit down)?
- Does straining make the headache worse?

Functional Impact of headaches

- [Tool 5.3](#): pedMIDAS Headache Severity Tool for Children aged 4-18.

Management

- What do you do to treat your headache?
- What medications do you use to treat the headache?
 - For each medication, how much do you take? What do you use it for? What effect does it have?
 - If you only take the medication for headache, how often do you use it?
 - If you take the medication daily to prevent headaches, how long have you been taking it for?

Tool 2.8: Assessment of Children and Adolescents with Headache

Guidelines for Diagnosing and Managing Pediatric Concussion

Other information

- Do you have a previous history of headaches?
 - If so, what was the diagnosis of these headaches?
 - Please describe these headaches.
 - Are these different than your current headaches?
- Is there a family history of headaches?

Reproduced from permission from Ryan Hung, MD (Neurology, Pediatrics), Holland Bloorview Kids Rehabilitation Hospital.

Tool 2.9: Algorithm for the management of the pediatric patient ≥ 2 years with minor head trauma

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 2.9: Algorithm for the management of the pediatric patient ≥ 2 years with minor head trauma

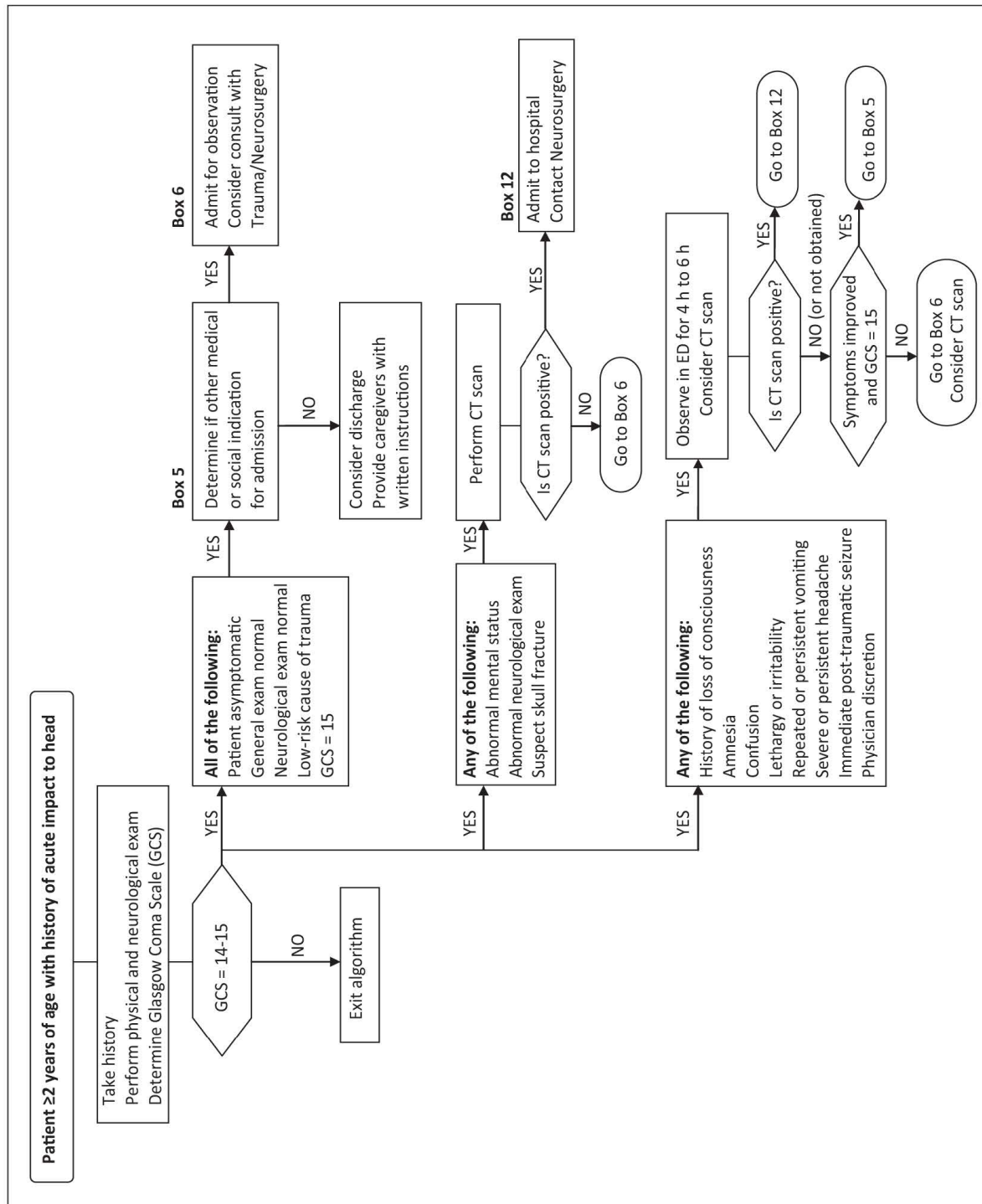


Figure 1) Algorithm for the management of the paediatric patient ≥ 2 years of age with minor head trauma. CT Computed tomography; ED Emergency department

Source: Catherine A. Farrell, Canadian Paediatric Society, Acute Care Committee. "Management of the paediatric patient with acute head trauma". Paediatrics & Child Health 2013;18(5):253-8. With permission.

Tool 3.1: Template Letter of Accommodation from Physician to School

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 3.1: Template Letter of Accommodation from Physician to School

Dear (teacher's name)

_____ (student's name) was diagnosed with a concussion on _____ (date). We take this opportunity to let you know what to expect during the recovery period.

Children/adolescents recover from concussion at varying rates. It can take several weeks—sometimes a lot longer—for the brain to heal. Immediately after the concussion, it is essential for the brain to rest. Heavy concentration, memorization, studying, etc. can slow the brain's healing process. Cognitive fatigue is also a major concern.

Please identify a “point person” within the school environment (example: guidance counsellor, home room teacher, vice principal, etc.) who can help the student implement a return-to-learn plan, communicate it to teachers/school staff involved in the student's activities, and modify it as needed.

Please follow these accommodations (physician to strike through those not needed) until the student is symptom-free:

- No:
 - physical activity other than walking;
 - tests or major assignments;
- Provide
 - hard copies of notes and other course content;
 - rest periods during the day as needed;
 - extra time to return assignments;
- Limit/avoid:
 - school work;
 - watching movies in dark room;
 - computer work;
 - loud noises;
 - school assemblies;
 - gym class
 - sports/activities with risk of contact (soccer, dodgeball, football, etc.).

Please be aware of signs and symptoms the student may display:

- decreased short term memory;
- decreased attention span;
- slower processing speed;
- irritability;

Tool 3.1: Template Letter of Accommodation from Physician to School

Guidelines for Diagnosing and Managing Pediatric Concussion

- fatigue;
- severe headaches;
- photo/audio sensitivity.

In the classroom, these signs might present as difficulty paying attention, difficulty following lessons, difficulty in noisy/busy classrooms and environments.

The parents and family physician will monitor the recovery and inform the school as accommodations need to be added/removed to support the student's recovery.

Thank you for your help and understanding.

Thank you,

Parent's Name/Phone #:

Physician's Name/Phone #:

Adapted with permission from the authors: Sinclair Elder AJ, Kadel R, O'Keefe EK. Headin' for Healin' Teacher's Letter. Colorado Springs, CO: University of Colorado, Colorado

Tool 3.2: Strategies to Promote Good Sleep and Alertness

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 3.2: Strategies to Promote Good Sleep and Alertness

Healthy Habits

Make sure the child/adolescent:

- maintains the same bed and wake times every day throughout the year (including summer). Try to maintain them throughout the weekend as well; however, if this is not possible, try to keep them within one hour of weekday bed and wake times.
- has a fixed bed time routine: a warm bath about one hour before bed may help to facilitate sleep. (Note: taking a warm bath too close to bed time may raise body temperature, which can delay sleep.)
- turns off the computer and electronic devices including cell phones, at least 30 minutes before bed time.
- takes naps based on the amount of time post-concussion and the severity of daytime sleepiness (not on fatigue). In the first few hours/days after concussion, increased sleep and need for naps are a natural part of the recovery process and should not be limited. Consult a physician or emergency department if the child/adolescent is not easily awoken in the first few hours or days after concussion. After this acute period, those who have night-time sleep issues should avoid naps to promote night-time sleep and gradual return to activity.
- limits naps to once a day, ideally before 3 pm and for 30 minutes maximum, if he/she is very sleepy during the day and cannot avoid them.
- naps in bed, not in another room or in front of the TV, etc.

Nutrition, Exercise and Lifestyle

Make sure the child/adolescent:

- avoids caffeine (coffee, tea, chocolate, some over-the-counter medications) within 4-6 hours of bed time.
- avoids energy drinks and alcohol altogether.
- avoids eating heavy meals late in the evening.
- avoids sugar four hours before bed time. Try a bed time snack containing proteins.
- has enough magnesium, iron and Vitamin B in his/her diet. Adequate vitamin and mineral intake is important to help the body produce melatonin, which promotes sleep.
- does 30-60 minutes of vigorous exercise a day, when tolerated and medically indicated, and at least two hours before bed time. Exercise during the two hours before bed time can delay sleep while regular exercise earlier in the day can promote sleep.
- gets some natural light during the day, especially in the morning.
- gets 15-30 minutes of quiet time after periods of cognitive activity, if he/she has significant cognitive fatigue (not sleepiness) during the day. Ideally, quiet time should be in an environment with natural light and no electronic devices. This can also promote night time sleep.
- avoids loud music with a strong beat before bed time in favour of music that promotes relaxation—if he/she is used to listening to music before bed.

Tool 3.2: Strategies to Promote Good Sleep and Alertness

Guidelines for Diagnosing and Managing Pediatric Concussion

Sleeping Environment

Make sure the child/adolescent

- has a dark, cool and comfortable sleeping area.
- removes all sources of light in the bedroom while sleeping.
- opens the curtains and has natural light immediately upon waking.
- keeps the bedroom clean, tidy and quiet. Neutral or natural sounds can help to block out distracting sounds.
- reserves the bed and bedroom for sleep, and does other activities (reading, watching TV, using internet, playing games) in another room. Ideally, there should be no electronic equipment in the bedroom. If this is unavoidable, make sure that all computers, tablets, cell phones, etc. are turned off or in “sleep” mode.
- turns any digital clocks with numbers that light up away from the bed during sleep.

Adapted with permission from the authors: Catherine Wiseman-Hakes (Holland Bloorview Kids Rehabilitation Hospital, Toronto, and U of Toronto), Marie-Christine Ouellet (U Laval) and Simon Beaulieu-Bonneau (U Laval).

Tool 4.1: OPHEA Documentation for a Diagnosed Concussion – Return to Learn/Return to Physical Activity Plan

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 4.1: OPHEA Documentation for a Diagnosed Concussion – Return to Learn/Return to Physical Activity Plan

Ontario Physical Education Safety Guidelines

Elementary - Curricular September 2013

Appendix C-4 - Documentation for a Diagnosed Concussion - Return to Learn/Return to Physical Activity Plan

Appendix C-4

Documentation for a Diagnosed Concussion - Return to Learn/Return to Physical Activity Plan

This form is to be used by parents/guardians to communicate their child's/ward's progress through the plan and is to be used with "[Appendix C-1 - Concussion Management Procedures: Return to Learn and Return to Physical Activity](#)".

The Return to Learn/Return to Physical Activity Plan is a combined approach. Step 2a - Return to Learn must be completed prior to the student returning to physical activity. Each step must take a minimum of 24 hours (Note: Step 2b - Return to Learn and Step 2 - Return to Physical Activity occur concurrently).

Step 1 - Return to Learn/Return to Physical Activity

- *Completed at home.*
- *Cognitive Rest - includes limiting activities that require concentration and attention (e.g., reading, texting, television, computer, video/electronic games).*
- *Physical Rest - includes restricting recreational/leisure and competitive physical activities.*

My child/ward has completed Step 1 of the Return to Learn/Return to Physical Activity Plan (cognitive and physical rest at home) and his/her **symptoms have shown improvement**. My child/ward will proceed to Step 2a - Return to Learn.

My child/ward has completed Step 1 of the Return to Learn/Return to Physical Activity Plan (cognitive and physical rest at home) and is **symptom free**. My child/ward will proceed directly to Step 2b - Return to Learn and Step 2 - Return to Physical Activity.

Parent/Guardian signature: _____

Date: _____

Comments:

Tool 4.1: OPHEA Documentation for a Diagnosed Concussion – Return to Learn/Return to Physical Activity Plan

Guidelines for Diagnosing and Managing Pediatric Concussion

Ontario Physical Education Safety Guidelines

Elementary - Curricular September 2013

Appendix C-4 - Documentation for a Diagnosed Concussion - Return to Learn/Return to Physical Activity Plan

If at any time during the following steps symptoms return, please refer to the “Return of Symptoms” section on page 4 of this form.

Step 2a - Return to Learn

- *Student returns to school.*
- *Requires individualized classroom strategies and/or approaches which gradually increase cognitive activity.*
- *Physical rest- includes restricting recreational/leisure and competitive physical activities.*

- My child/ward has been receiving individualized classroom strategies and/or approaches and is **symptom free**. My child/ward will proceed to Step 2b - Return to Learn and Step 2 - Return to Physical Activity.

Parent/Guardian signature: _____

Date: _____

Comments:

Step 2b - Return to Learn

- *Student returns to regular learning activities at school.*

Step 2 - Return to Physical Activity

- *Student can participate in individual light aerobic physical activity only.*
- *Student continues with regular learning activities.*

- My child/ward is symptom free after participating in light aerobic physical activity. My child/ward will proceed to Step 3 - Return to Physical Activity.
- Appendix C-4 will be returned to the teacher to record progress through Steps 3 and 4.

Parent/Guardian signature: _____

Date: _____

Comments:

Tool 4.1: OPHEA Documentation for a Diagnosed Concussion – Return to Learn/Return to Physical Activity Plan

Guidelines for Diagnosing and Managing Pediatric Concussion

Ontario Physical Education Safety Guidelines

Elementary - Curricular September 2013

Appendix C-4 - Documentation for a Diagnosed Concussion - Return to Learn/Return to Physical Activity Plan

Step 3 - Return to Physical Activity

- *Student may begin individual sport-specific physical activity only.*

Step 4 - Return to Physical Activity

- *Student may begin activities where there is no body contact (e.g., dance, badminton); light resistance/weight training; non-contact practice; and non-contact sport-specific drills.*
- Student has successfully completed Steps 3 and 4 and is symptom free.
- Appendix C-4 will be returned to parent/guardian to obtain medical doctor/nurse practitioner diagnosis and signature.

Teacher signature: _____

Medical Examination

- I, _____ (medical doctor/nurse practitioner name) have examined _____ (student name) and confirm he/she continues to be symptom free and is able to return to regular physical education class/intramural activities/interschool activities in non-contact sports and full training/practices for contact sports.

Medical Doctor/Nurse Practitioner Signature: _____

Date: _____

Comments:

Step 5 - Return to Physical Activity

- *Student may resume regular physical education/intramural activities/interschool activities in non-contact sports and full training/practices for contact sports.*

Step 6 - Return to Physical Activity

- *Student may resume full participation in contact sports with no restrictions.*

Tool 4.1: OPHEA Documentation for a Diagnosed Concussion – Return to Learn/Return to Physical Activity Plan

Guidelines for Diagnosing and Managing Pediatric Concussion

Ontario Physical Education Safety Guidelines

Elementary - Curricular September 2013

Appendix C-4 - Documentation for a Diagnosed Concussion - Return to Learn/Return to Physical Activity Plan

Return of Symptoms

- My child/ward has experienced a return of concussion signs and/or symptoms and has been examined by a medical doctor/nurse practitioner, who has advised a return to:
- Step _____ of the Return to Learn/Return to Physical Activity Plan

Parent/Guardian signature: _____

Date: _____

Comments:

Tool 4.2: Template Letter of Accommodation from School to Parents/Caregivers

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 4.2: Template Letter of Accommodation from School to Parents/Caregivers

Dear (parents' names)

We are happy to hear that your child is feeling well enough to start to the return-to-learn process after his/her concussion. To make sure teachers and staff are prepared, we would like your insight on the following symptoms. Please check the answers that best fit your child.

Fatigue

My child tires easily has the normal amount of energy.

My child has the most energy in the morning afternoon evening.

Behaviour

My child is easily frustrated isn't easily frustrated.

My child has been acting the same different compared to before concussion.

Memory

My child's memory seems fine impaired.

Cognition

My child seems to be able to understand complex thoughts and ideas. Yes No

My child is able to read for less than ½ hour ½ to 1 hour more than 1 hour.

My child can handle different technologies (example: TV, computers). Yes No

My child can complete some homework. Yes No

Stamina

My child makes it through a day without a period of rest. Yes No

Social

My child is becoming isolated or has different friends than before the concussion. Yes No

My child can handle noisy/busy environments. Yes No

Awareness

My child feels like there is nothing wrong with him/her after the concussion. Yes No

My child understands that there have been changes and would like help. Yes No

Please elaborate on any other changes you've noticed in your child. We want to be ready to support your child's return-to-learn process and make accommodations to ensure success.

Sincerely,

(school contact person's name)

Telephone/email _____

Reproduced with permission from Vermont's Student Athletes and Concussion: Return to Learn and Return to Play Toolkit, www.biavt.org.

Tool 4.3: Academic Accommodations for Concussed Students
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 4.3: Academic Accommodations for Concussed Students

<i>Persistent Symptom</i>	<i>Effect of attending school</i>	<i>Accommodation</i>
Headache	Difficulty concentrating	Frequent breaks, quiet area, hydration
Fatigue	Decreased attention, concentration	Frequent breaks, shortened day, only certain classes
Photophobia/ phonophobia	Worsening symptoms (headache)	Sunglasses, ear plugs or headphones, avoid noisy areas (cafeterias, assemblies, sport events, music class), limit computer work
Anxiety	Decreased attention or concentration, overexertion to avoid falling behind	Reassurance and support from teachers about accommodations, reduced workload
Difficulty concentrating	Limited focus on school work	Shorter assignments, decreased workload, frequent breaks, having someone read aloud, more time to complete assignments and tests, quiet area to complete work
Difficulty remembering	Difficulty retaining new information, remembering instructions, accessing learned information	Written instructions, smaller amounts to learn, repetition

Adapted with permission from the author: Laura K Purcell; Canadian Paediatric Society, Healthy Active Living and Sports Medicine Committee. "Sport-related concussion: Evaluation and management". Paediatr Child Health 2014;19(3):153-8.

Tool 4.4: Returning to School-based Activities After Concussion Care Plan

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 4.4: Returning to School-based Activities After Concussion Care Plan

Holland Bloorview

Kids Rehabilitation Hospital

Client Name: _____
Health Record No: _____
Date of Birth: _____

General Care Plan:

- Orange:** Preparing to return to school – gentle activity at home (e.g., light walking, begin reading, minimal screen time of 15 minutes twice per day etc.)
- Yellow:** Back to school with modified schedule – gradual progression of time spent at school (e.g., 1 hour of class time to start and progress to half day/every other day; attend less stressful classes etc.)
- Green:** Back to school with full schedule – attend all classes every day

Additional School Support Recommendations:

- Contact person at school who can be responsible for relaying information between student/student's family and teachers, and who can assist in scaling back/modifying school supports as needed
- Extra check-in meetings provided with teachers/guidance counselors in order to monitor progress and determine the need for more/less supports and modifications
- No homework
- Overall class work/homework load reduced with gradual resumption as per the student's ability to handle increased demands and extra time provided (homework and class work load be prioritized collaboratively between the student and school personnel)
- No testing
- Testing completed in a quiet, distraction free environment with extra time provided in order to allow for cognitive rest breaks; no more than one test per day
- Student not asked to do all missed work, and extra help given to get student caught back up
- Excused from class for 'rest breaks' in a quiet room to avoid physical and cognitive exertion and to manage increased symptoms (regularly scheduled and/or when symptoms increase)
- Preferential seating provided to allow for decreased distractions and closer teacher monitoring (e.g. closer to teacher/board, away from window, away from door, away from disruptive classmates etc.)
- Access to a model peer's or teacher's notes allowed and/or access to pre-printed class notes to help with planning and attention
- Avoid attending and participating in physical education and band/music activities (these classes can be used as rest breaks)
- Eat lunch in a quiet, distraction free area with 2-3 friends
- Avoid carrying heavy textbooks. To avoid extraneous physical exertion, have an extra copy of class textbooks in classes to limit need to carry books to and from school/classes

All recommended supports/accommodations are **to be used on an as needed basis and can be modified as per the student's ability to better handle the cognitive and physical demands of the school environment (improved post-concussion symptoms). Continued communication between the school, the student and the student's family is encouraged to best meet the needs of the student and to develop a plan for successful return to school-based activities.

Other comments: _____

Completed by: _____ Date: _____

Reproduced with permission from Nick Reed, Holland Bloorview.

Tool 4.5: Return-to-school Information and Strategies

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 4.5: Return-to-school Information and Strategies

Holland Bloorview

Kids Rehabilitation Hospital

- Concussion (also known as mild traumatic brain injury) and related symptoms can result in difficulties returning to school for many students.
- Trying to complete school work and learn before the brain has recovered from a concussion “overuses” the brain at a time when it needs all its energy to recover. The brain needs proper rest to recover from a concussion.
- Limiting exertion (physical and mental) until post-concussive symptoms have resolved and then gradually increasing activity as tolerated (no symptoms reappear) is highly recommended.
- Most students will have difficulty with concentration, memory and processing speed – all can negatively affect how one learns and perform at school.
- When returning to school, modifications can be made in order to limit physical and mental exertion and allow the student to best return to full school activities and performance.

Common Post-concussive Symptoms

Physical	Thinking (Cognitive)	Behavioural or Emotional
<ul style="list-style-type: none"> • Headaches • Sick to stomach or vomiting • Dizziness or balance problems • Low energy or being run down • Trouble with vision/seeing • Bothered by light or noise • Sleeping problems 	<ul style="list-style-type: none"> • Slowed thinking • Trouble paying attention • Difficulty remembering • Acting like "in a fog" • Easily confused • School performance worsens 	<ul style="list-style-type: none"> • Irritability or grouchiness • Easily upset or frustrated • Nervousness • Sadness • Acting without thinking • Any other personality change

Modified from: http://www.thechildrenshospital.org/conditions/rehab/concussion/school_staff.aspx

What can be done to help with the return-to-school process?

Before returning to school

- The student should not return to school until post-concussive symptoms have cleared (e.g. headaches, nausea etc.) or they begin to tolerate extended periods of thinking and activity.
- Students should limit reading, using computers, playing video games and texting, if these activities worsen symptoms.
- Students should not exercise or take part in sports or gym class until a health care professional has evaluated and cleared them.
- Walking or taking the bus to school (avoid noise, busy environments and exercise)—have parents drive the student to school if possible.
- Once symptoms have cleared/improved, students can begin brief periods of reading or studying. If symptoms return, they should stop the activity and rest. They can return to school for gradually increasing periods of time when they can tolerate a couple of hours of thinking.

Tool 4.5: Return-to-school Information and Strategies

Guidelines for Diagnosing and Managing Pediatric Concussion

On returning to school

- It is important that the student has a contact person at the school who can relay information from the student, student's family and the student's health care team related to the student's injury (e.g. severity, necessary accommodations etc.) to the student's course teachers. This can be a school guidance counsellor or nurse (if available). Students should check in with this contact person at the school daily in order to scale back or change school modifications as required.
- If students experience post-concussive symptoms (e.g. headache, nausea, dizziness etc.) while in the classroom, they should go to the nurses office to rest and skip the next period of class. If symptoms occur again in the next period, after resting, they should return home.
- If a student can only handle attending classes part-time, an effort should be made to attend core classes over non-core classes and to avoid missing the same classes repeatedly.

Test Taking

- If a student attempts to write a test while suffering from post-concussive symptoms, their symptoms may worsen, recovery may be extended and their performance on the test will not be a true measure of what they know.
- Strategies:
 - If possible, tests may be delayed until the student is no longer experiencing post-concussive symptoms
 - Test taking should be spaced out and limited to no more than one test per day to avoid over exertion of the brain and reduce cognitively demanding tasks
 - Students can be provided extra time to complete the test
 - Tests can be written in a separate room free of distraction

Assignments and Homework

- If possible, due dates for assignments and homework can be flexible, where extra time to complete tasks may be provided
- Pre-printed copies of class notes can help the student who has difficulty planning or paying attention after their concussion
- Access to a model peer's notes or teacher's note can be helpful
- Some students may benefit from peer support, tutoring or private meetings with the classroom teacher for help with school work, organization and test preparation

Physical Activity/Gym Class

- All physical activity should be avoided initially
- Student are to complete a medically supervised gradual return-to-play protocol and obtain medical clearance from their primary provider prior to returning to physical activity

Summary of General and Specific Return-to-School Supports

Possible General Support	Possible Specific Classroom-based Supports
--------------------------	--

Tool 4.5: Return-to-school Information and Strategies

Guidelines for Diagnosing and Managing Pediatric Concussion

<ul style="list-style-type: none">• Re-integration into school occurs gradually (e.g., student returns part-time before building up to a full schedule)• Student not asked to do all missed work, and extra help given to get student caught back up• Extra check-in meetings provided with teacher• Rest time or breaks provided during the day• Overall homework and class work load reduced• Cognitively demanding in-school tasks reduced (e.g., no more than one test each day)	<ul style="list-style-type: none">• Tests put off until recovery complete• Extra time given to complete tests• Flexibility allowed for assignment due dates• Preferential seating provided to allow for closer teacher monitoring and decreased distractions• Access to a model peer's or teacher's notes allowed
---	---

Modified from: http://www.thechildrenshospital.org/conditions/rehab/concussion/school_staff.aspx

References:

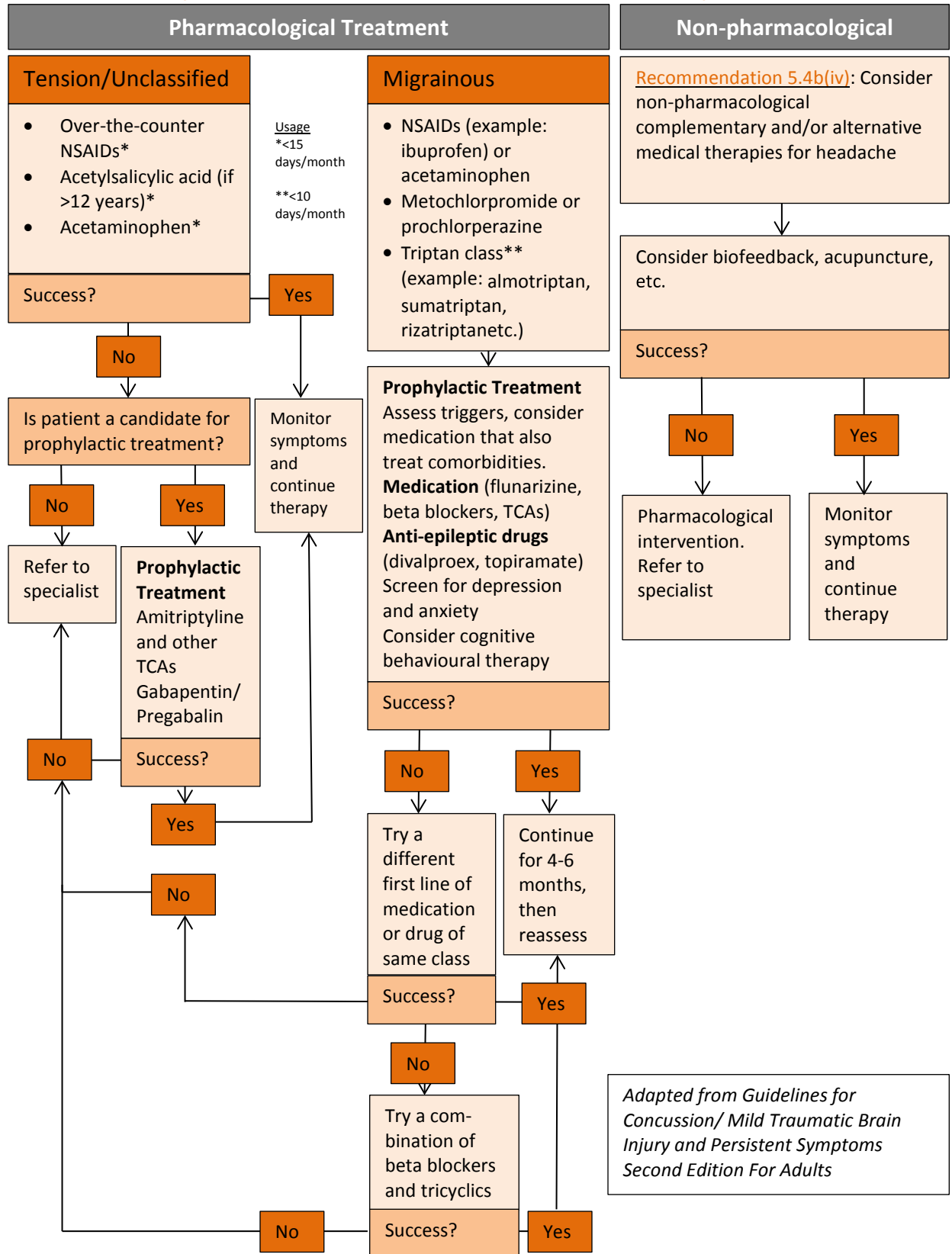
1. Lee MA, Perriello VA. Adolescent concussions--management guidelines for schools. *Conn Med.* 2009;73(3):171-173.
2. Kirkwood MW, Yeates KO, Wilson PE. Pediatric sport-related concussion: a review of the clinical management of an oft-neglected population. *Pediatrics.* 2006;117(4):1359-1371.

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Tool 5.1: Management of Persistent Headache in Children Algorithm

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.1: Management of Persistent Headache in Children Algorithm



Tool 5.2: Diagnostic Criteria for Headaches
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.2: Diagnostic Criteria for Headaches

1.1 Migraine Without Aura

2.2 Frequent Episodic Tension-type Headache

4.7 Primary stabbing headache

5.1 Acute Headache Attributed to Traumatic Injury to the Head

5.1.2 Acute Post-traumatic Headache Attributed to Mild Traumatic Injury to the Head

5.2 Persistent Headache Attributed to Traumatic Injury to the Head

5.2.1 Persistent Headache Attributed to Mild Traumatic Injury to the Head

8.2 Medication-overuse Headache

13.4 Occipital Neuralgia

1.1 Migraine Without Aura

Diagnostic Criteria

- A. At least five attacks fulfilling criteria B–D.
- B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated).
- C. Headache has at least two of the following four characteristics:
 - unilateral location;
 - pulsating quality;
 - moderate or severe pain intensity;
 - aggravation by or causing avoidance of routine physical activity (e.g. walking or climbing stairs).
- D. During headache at least one of the following:
 - nausea and/or vomiting;
 - photophobia and phonophobia.
- E. Not better accounted for by another ICHD-3 diagnosis.

2.2 Frequent Episodic Tension-type Headache

Diagnostic Criteria

- A. At least 10 episodes of headache occurring on 1-14 days per month on average for >3 months (12 and <180 days per year) and fulfilling criteria B-D.
- B. Lasting from 30 minutes to 7 days.
- C. At least two of the following four characteristics:
 - bilateral location;
 - pressing or tightening (non-pulsating) quality;
 - mild or moderate intensity;
 - not aggravated by routine physical activity such as walking or climbing stairs.
- D. Both of the following:
 - no nausea or vomiting;
 - no more than one of photophobia or phonophobia.
- E. Not better accounted for by another ICHD-3 diagnosis.

4.7 Primary stabbing headache

Diagnostic Criteria

- A. Head pain occurring spontaneously as a single stab or series of stabs and fulfilling criteria B–D.

Tool 5.2: Diagnostic Criteria for Headaches

Guidelines for Diagnosing and Managing Pediatric Concussion

- B. Each stab lasts for up to a few seconds.
- C. Stabs recur with irregular frequency, from one to many per day.
- D. No cranial autonomic symptoms.
- E. Not better accounted for by another ICHD-3 diagnosis

5.1 Acute Headache Attributed to Traumatic Injury to the Head

Diagnostic Criteria

- A. Any headache fulfilling criteria C and D.
- B. Traumatic injury to the head has occurred.
- C. Headache is reported to have developed within 7 days after one of the following:
 - the injury to the head;
 - regaining of consciousness following the injury to the head;
 - discontinuation of medication(s) that impair ability to sense or report headache following the injury to the head.
- D. Either of the following:
 - headache has resolved within 3 months after the injury to the head;
 - headache has not yet resolved but 3 months have not yet passed since the injury to the head.
- E. Not better accounted for by another ICHD-3 diagnosis.

5.1.2 Acute Post-traumatic Headache Attributed to Mild Traumatic Injury to the Head

Diagnostic Criteria

- Headache fulfilling criteria for 5.1 Acute headache attributed to traumatic injury to the head.
- Injury to the head fulfilling both of the following:
 - associated with none of the following:
 - loss of consciousness for > 30 minutes;
 - Glasgow Coma Scale (GCS) score < 13;
 - post-traumatic amnesia lasting > 24 hours;
 - altered level of awareness for > 24 hours e) imaging evidence of a traumatic head injury such as intracranial haemorrhage and/or brain contusion.
 - associated, immediately following the head injury, with one or more of the following symptoms and/or signs:
 - transient confusion, disorientation or impaired consciousness;
 - loss of memory for events immediately before or after the head injury;
 - two or more other symptoms suggestive of mild traumatic brain injury: nausea, vomiting, visual disturbances, dizziness and/or vertigo, impaired memory and/or concentration.

5.2 Persistent Headache Attributed to Traumatic Injury to the Head

Diagnostic Criteria

- A. Any headache fulfilling criteria C and D.
- B. Traumatic injury to the head¹ has occurred.

Tool 5.2: Diagnostic Criteria for Headaches

Guidelines for Diagnosing and Managing Pediatric Concussion

- C. Headache is reported to have developed within 7 days after one of the following:
 - the injury to the head;
 - regaining of consciousness following the injury to the head;
 - discontinuation of medication(s) that impair ability to sense or report headache following the injury to the head.
- D. Headache persists for > 3 months after the injury to the head.
- E. Not better accounted for by another ICHD-3 diagnosis.

5.2.1 Persistent Headache Attributed to Mild Traumatic Injury to the Head

Diagnostic Criteria

- Headache fulfilling criteria for 5.2 Persistent headache attributed to traumatic injury to the head.
- Head injury fulfilling both of the following:
 - associated with none of the following:
 - loss of consciousness for > 30 minutes;
 - Glasgow Coma Scale (GCS) score < 13;
 - post-traumatic amnesia lasting > 24 hours;
 - altered level of awareness for > 24 hours;
 - imaging evidence of a traumatic head injury such as intracranial haemorrhage and/or brain contusion.
 - associated, immediately following the head injury, with one or more of the following symptoms and/or signs:
 - transient confusion, disorientation or impaired consciousness;
 - loss of memory for events immediately before or after the head injury;
 - two or more other symptoms suggestive of mild traumatic brain injury: nausea, vomiting, visual disturbances, dizziness and/or vertigo, impaired memory and/or concentration.

8.2 Medication-overuse Headache

Diagnostic Criteria

- Headache occurring on 15 days per month in a patient with a pre-existing headache disorder.
- Regular overuse for > 3 months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache.
- Not better accounted for by another ICHD-3 diagnosis.

13.4 Occipital Neuralgia

Diagnostic Criteria

- A. Unilateral or bilateral pain fulfilling criteria B-E.
- B. Pain is located in the distribution of the greater, lesser and/or third occipital nerves.
- C. Pain has two of the following three characteristics:
 - recurring in paroxysmal attacks lasting from a few seconds to minutes;
 - severe intensity;
 - shooting, stabbing or sharp in quality.

Tool 5.2: Diagnostic Criteria for Headaches
Guidelines for Diagnosing and Managing Pediatric Concussion

- D. Pain is associated with both of the following:
 - dysaesthesia and/or allodynia apparent during innocuous stimulation of the scalp and/or hair
 - either or both of the following:
 - tenderness over the affected nerve branches;
 - trigger points at the emergence of the greater occipital nerve or in the area of distribution of C2.
- E. Pain is eased temporarily by local anaesthetic block of the affected nerve.
- F. Not better accounted for by another ICHD-3 diagnosis.

Cephalgia 33(9) 629–808. International Headache Society 2013, adapted with permission from SAGE Publications Ltd.

Tool 5.3: pedMIDAS Headache Severity Tool for Children aged 4-18

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.3: pedMIDAS Headache Severity Tool for Children aged 4-18

PedMIDAS

Headache Disability.

The following questions try to assess how much the headaches are affecting day-to-day activity. Your answers should be based on the last three months. There are no “right” or “wrong” answers so please put down your best guess.

1. How many full school days of school were missed in the last 3 months due to headaches? _____

2. How many partial days of school were missed in the last 3 months due to headaches (do not include full days counted in the first question)? _____

3. How many days in the last 3 months did you function at less than half your ability in school because of a headache (do not include days counted in the first two questions)? _____

4. How many days were you not able to do things at home (i.e., chores, homework, etc.) due to a headache? _____

5. How many days did you not participate in other activities due to headaches (i.e., play, go out, sports, etc.)? _____

6. How many days did you participate in these activities, but functioned at less than half your ability (do not include days counted in the 5th question)? _____

Total PedMIDAS Score _____

Headache Frequency _____

Headache Severity _____

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<i>PedMIDAS Score Range</i>	<i>Disability Grade</i>
0 to 10	Little to none
11 to 30	Mild
31 to 50	Moderate
Greater than 50	Severe

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Tool 5.4: Dix-Hallpike Manoeuvre and Particle Repositioning Manoeuvre
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.4: Dix-Hallpike Manoeuvre and Particle Repositioning Manoeuvre

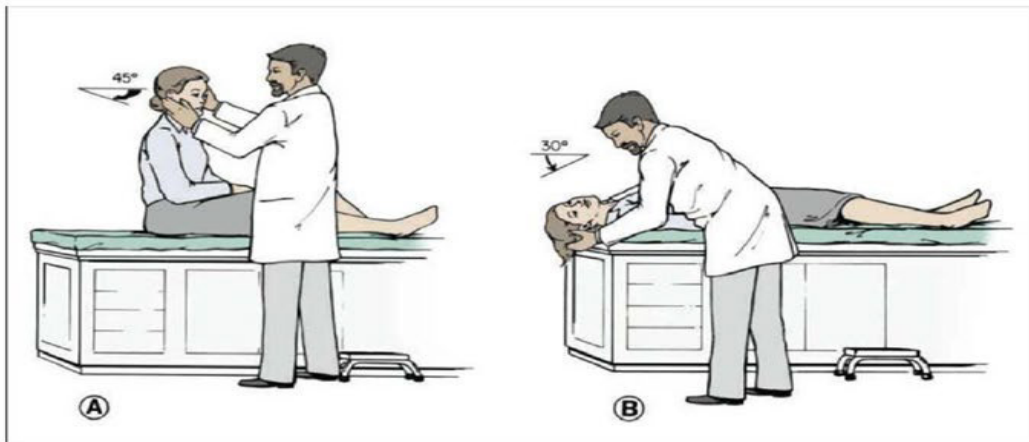


Fig. 6: Dix-Hallpike manoeuvre (right ear). The patient is seated and positioned so that the patient's head will extend over the top edge of the table when supine. The head is turned 45° toward the ear being tested (position A). The patient is quickly lowered into the supine position with the head extending about 30° below the horizontal (position B). The patient's head is held in this position and the examiner observes the patient's eyes for nystagmus. In this case with the right side being tested, the physician should expect to see a fast-phase counter-clockwise nystagmus. To complete the manoeuvre, the patient is returned to the seated position (position A) and the eyes are observed for reversal nystagmus, in this case a fast-phase clockwise nystagmus.

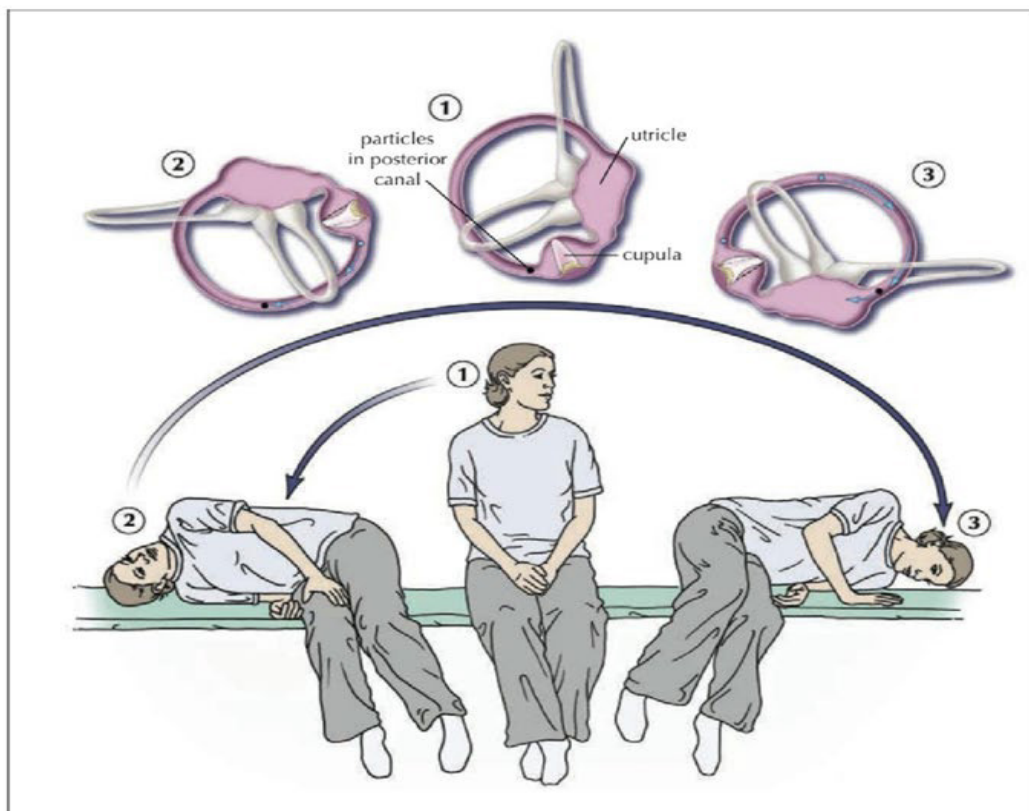


Fig. 7: Liberatory manoeuvre of Semont (right ear). The top panel shows the effect of the manoeuvre on the labyrinth as viewed from the front and the induced movement of the canaliths (from blue to black). This manoeuvre relies on inertia, so that the transition from position 2 to 3 must be made very quickly.

Reprinted from Parnes LS, Agrawal SK, Atlas J. Diagnosis and management of benign paroxysmal positional vertigo (BPPV). Canadian Medical Association Journal. 2003;169:681-693, Figure 6 & 7. © Canadian Medical Association 2003. This work is protected by copyright and the making of this copy was with the permission of the Canadian Medical Association Journal (www.cmaj.ca) and Access Copyright. Any alteration of its content or further copying in any form whatsoever is strictly prohibited unless otherwise permitted by law..

Tool 5.5: Initial Assessment of Cognitive Visual Impairment in Children

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.5: Initial Assessment of Cognitive Visual Impairment in Children

- Does your child have difficulty walking down stairs?
- Does your child have difficulty seeing things which are moving quickly, such as small animals?
- Does your child have difficulty seeing something which is pointed out in the distance?
- Does your child have difficulty locating an item of clothing in a pile of clothes?
- Does your child find copying words or drawings time-consuming and difficult?

Adapted from Pediatric Ophthalmology and Strabismus by Creig S. Hoyt and David Taylor 4th edition, with permission from Elsevier.

Tool 5.6: Approved Medications for Pediatric Indications
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.6: Approved Medications for Pediatric Indications†

<i>Drug</i>	<i>Health Canada approval</i>	<i>FDA approval</i>	<i>Dosage#</i>
Ibuprofen	Pediatric patients for mild to moderate pain. Antipyretic	Pediatric patients for inflammatory disorders. Mild to moderate pain, and pain for ages ≥ 6 months.	5–10 mg/kg/dose orally every 6–8h as needed (maximum 600 mg/dose or 40 mg/kg/day)
Naproxen	Children ≥ 2 years of age: 1) osteoarthritis, ankylosing spondylitis, juvenile rheumatoid arthritis 2) aches/pains and mild to moderate pain due to sprains/strains 3) primary dysmenorrhea	> 2 years of age for analgesia, inflammatory disease	5 mg/kg/dose orally q8–12h as needed Orally every 12h as needed, maximum 500 mg/dose, 1,000 mg/day) (usual adult dose: 250–500 mg)
Acetaminophen	Treatment of mild/moderate pain and fever. All ages	All ages for mild to moderate pain and fever	10–15 mg/kg/dose orally/rectal suppository every 4h as needed (maximum 75 mg/kg/day or 4,000 mg/day)
Acetylsalicylic Acid	Fever/pain, reduction of platelet aggregation No age restrictions specified	Pain, fever, inflammation, Kawasaki disease. No age restrictions specified	Juvenile rheumatoid arthritis: 60–100 mg/kg/day Antithrombotic: 3–5 mg/kg/day
Amitriptyline	None	None	Chronic pain: 0.1 mg/kg, increase as needed to 0.5–2 mg/kg
Gabapentin/ Pregabalin	Gabapentin: None Pregabalin: None	> 12 years for partial seizures, 3–12 years for treatment of partial seizures	2–5 mg/kg/dose orally three times a day (initial dosing) (maximum 60 mg/kg/day to a maximum of 3,600 mg/day)
Metoclopramide	Pediatric patients for delayed gastric emptying associated with subacute/chronic gastritis or following vagotomy, pyloroplasty and other surgical procedures. Small bowel intubation. Diagnostic radiology. Preoperatively to reduce narcotic induced postop vomiting	Patients for intubation of small intestine, gastro-esophageal reflux, postoperational nausea and vomiting, chemotherapy induced emesis.	0.1-0.2 mg/kg/dose orally/IV every 6–8h as needed (initial maximum 10 mg/dose)
Prochlorperazine	≥ 2 years for 1) psychotic episodes 2) nausea and vomiting due to chemoreceptor trigger zone stimulation 3) relief of excessive anxiety	≥ 2 years or children > 9 kg for nonsurgical nausea and vomiting, ≥ 2 years for psychosis	Antiemetic: 0.4 mg/kg/day Psychosis: 2.5 mg orally increase as needed to 20 mg/day

Tool 5.6: Approved Medications for Pediatric Indications
Guidelines for Diagnosing and Managing Pediatric Concussion

<i>Drug</i>	<i>Health Canada approval</i>	<i>FDA approval</i>	<i>Dosage#</i>
Triptan (example: rizatriptan, sumatriptan)	None	Sumatriptan: None Rizatriptan: > 6 years of age	Rizatriptan: ≤ 40 kg: 5 mg/24 hours, ≥ 40 kg 10 mg/24 hours
Beta blockers– Propranolol	Propranolol: No age specified for patients for hypertension/arrhythmias, migraine prophylaxis, thyrotoxicosis. None for concussions	None. Adult-approved indications only: hypertension, migraine prophylaxis, arrhythmias	Hypertension: 0.5–4 mg/kg/day
Valproic Acid	Yes. Children and adults for epilepsy	Yes. Children and adults for epilepsy	15 mg/kg/day increasing each week as needed up to 30–60 mg/kg/day divided three to four times per day.
Topiramate	Monotherapy for the treatment of adults and children 6 years and older with newly diagnosed epilepsy. Adjunct therapy for adults and children 2 years and older with epilepsy who are not controlled satisfactorily with conventional therapy.	Anti-convulsant (≥ 2 years) Prevention of migraine headaches (≥ 12 years)	<u>2</u> –16 yrs: initial dose: 1-3 mg/k/day orally, increase every 1-2weeks by 1-3 mg/kg/day divided twice per day. Maintenance dose 5–9 mg/kg/day divided twice per day. ≥ 17 yrs. 50 mg daily. Increase each week by 50 mg/day. Max dose 600 mg/day
Trazodone and Zopiclone	Trazodone: None Zopiclone: None	Trazodone: None Zopiclone: None	
Magnesium Oxide	Classified as a natural health product. For hypomagnesemia/dietary supplement. No age restrictions.	Magnesium supplement. No age restriction.	20–40 mg/kg/day
Melatonin	None	None	0.5–3 mg every night at bedtime (Max. 12 mg)
Zinc	Zinc is in multivitamin/mineral supplements, which are approved by Health Canada.	Treatment and prevention of zinc deficiency states.	Recommended dietary allowance: infants 5 mg/day, 1–10 yrs:10 mg/day, > 11 years: 12–15 mg/day
Fluoxetine	None	Major depressive disorder (≥8 years) Obsessive compulsive disorder (≥ 7 years)	Major depressive disorder: 10–20 mg/day Obsessive compulsive disorder: 10–30 mg/day. Up to 60 mg/day in higher weight children/adolescents
Sertraline	None	Obsessive compulsive disorder (≥ 6 years)	6–12 years: 25 mg daily, increase as needed to max of 200 mg/day. 13–17 years: 50 mg/day, increase as needed to 200 mg

Tool 5.6: Approved Medications for Pediatric Indications
Guidelines for Diagnosing and Managing Pediatric Concussion

<i>Drug</i>	<i>Health Canada approval</i>	<i>FDA approval</i>	<i>Dosage#</i>
Fluvoxamine	None	Obsessive compulsive disorder (≥ 8 years)	8–17 years: 25 mg daily, increase as needed to max of 200 mg in 8-11 years and 300 mg/day in adolescents
Paroxetine	None	None	
Citalopram	None	None	
Escitalopram	None	Major depressive disorder (≥ 12 years; acute and maintenance treatment)	10 mg daily, increase as needed to max of 20 mg

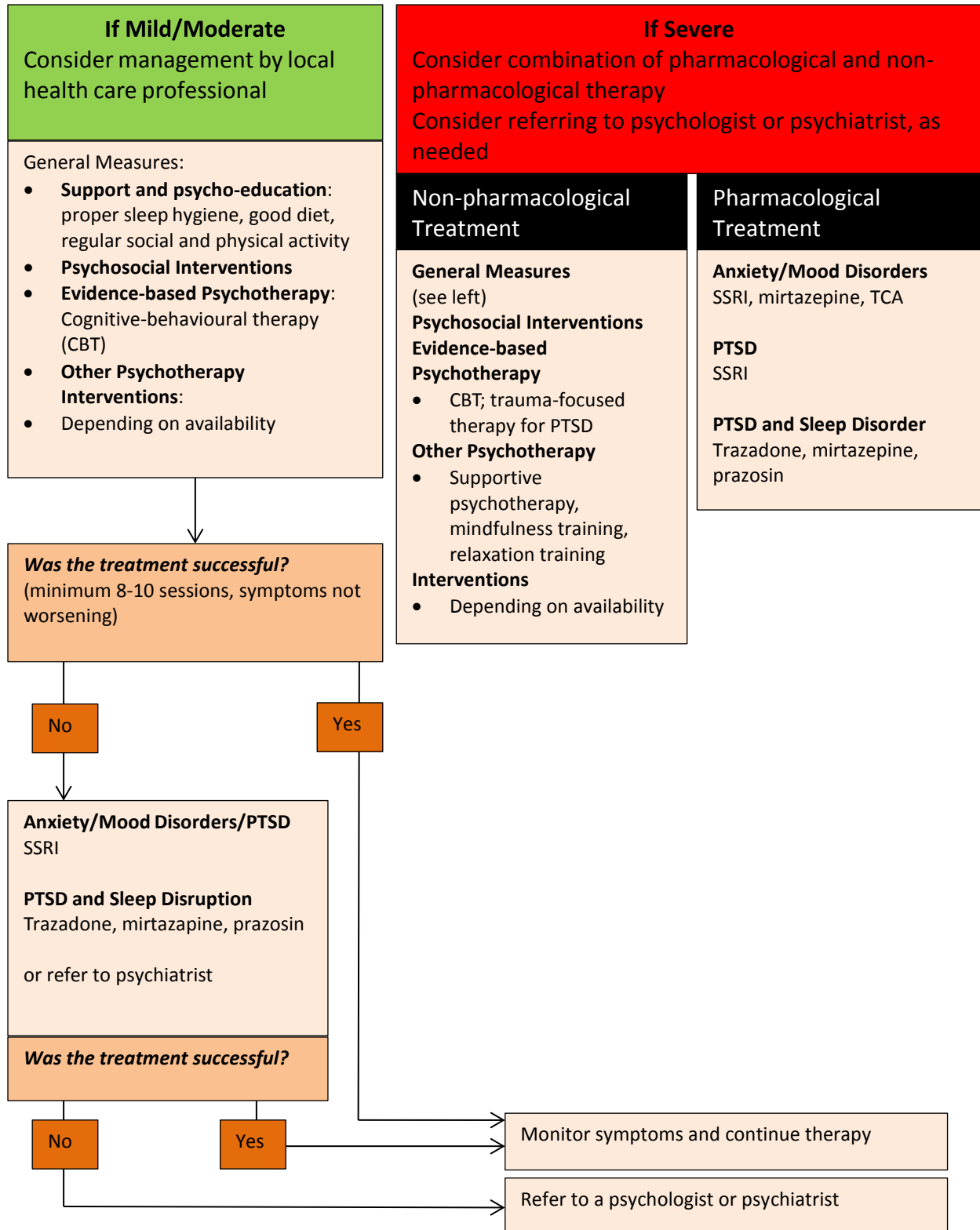
† Use clinical judgment and discretion at all times when prescribing medication.

Dosages from Sick Kids 2013/2014 Drug Handbook and Formulary, Lexicomp Pediatric Dosage Handbook 19th Edition, CHEO Pediatric Doses of Commonly Prescribed Medications 2011

Tool 5.7: Management of Persistent Mental Health Disorders Algorithm

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.7: Management of Persistent Mental Health Disorders Algorithm



Adapted from Guidelines for Concussion/Mild Traumatic Brain Injury and Persistent Symptoms, Second Edition

Tool 5.8: Mood and Feelings Questionnaire, Child Self-Report
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.8: Mood and Feelings Questionnaire, Child Self-Report

Child Self-Report

MOOD AND FEELINGS QUESTIONNAIRE: Short Version

This form is about how you might have been feeling or acting **recently**.

For each question, please check (✓) how you have been feeling or acting ***in the past two weeks***.

If a sentence was not true about you, check NOT TRUE.

If a sentence was only sometimes true, check SOMETIMES.

If a sentence was true about you most of the time, check TRUE.

Score the MFQ as follows:

NOT TRUE = 0

SOMETIMES = 1

TRUE = 2

To code, please use a checkmark (✓) for each statement.	NOT TRUE	SOME TIMES	TRUE
1. I felt miserable or unhappy.			
2. I didn't enjoy anything at all.			
3. I felt so tired I just sat around and did nothing.			
4. I was very restless.			
5. I felt I was no good anymore.			
6. I cried a lot.			
7. I found it hard to think properly or concentrate.			
8. I hated myself.			
9. I was a bad person.			
10. I felt lonely.			
11. I thought nobody really loved me.			
12. I thought I could never be as good as other kids.			
13. I did everything wrong.			

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Tool 5.9: Mood and Feelings Questionnaire, Parent Report on Child
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.9: Mood and Feelings Questionnaire, Parent Report on Child

Parent Report on Child

MOOD AND FEELINGS QUESTIONNAIRE: Short Version

This form is about how your child might have been feeling or acting **recently**.

For each question, please check (✓) how s/he has been feeling or acting ***in the past two weeks***.

If a sentence was not true about your child, check NOT TRUE.

If a sentence was only sometimes true, check SOMETIMES.

If a sentence was true about your child most of the time, check TRUE.

Score the MFQ as follows:

NOT TRUE = 0

SOMETIMES = 1

TRUE = 2

To code, please use a checkmark (✓) for each statement.	NOT TRUE	SOME TIMES	TRUE
1. S/he felt miserable or unhappy.			
2. S/he didn't enjoy anything at all.			
3. S/he felt so tired that s/he just sat around and did nothing.			
4. S/he was very restless.			
5. S/he felt s/he was no good anymore.			
6. S/he cried a lot.			
7. S/he found it hard to think properly or concentrate.			
8. S/he hated him/herself.			
9. S/he felt s/he was a bad person.			
10. S/he felt lonely.			
11. S/he thought nobody really loved him/her.			
12. S/he thought s/he could never be as good as other kids.			
13. S/he felt s/he did everything wrong.			

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Tool 5.10: Screen for Child Anxiety Related Disorders (SCARED)

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.10: Screen for Child Anxiety Related Disorders (SCARED)

Screen for Child Anxiety Related Disorders (SCARED)

CHILD Version—Page 1 of 2 (to be filled out by the CHILD)

Developed by Boris Birmaher, M.D., Suneeta Khetarpal, M.D., Marlane Cully, M.Ed., David Brent, M.D., and Sandra McKenzie, Ph.D., Western Psychiatric Institute and Clinic, University of Pittsburgh (*October, 1995*). *E-mail:* birmaherb@upmc.edu

See: Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(10), 1230–6.

Name: _____ Date: _____

Directions:

Below is a list of sentences that describe how people feel. Read each phrase and decide if it is “Not True or Hardly Ever True” or “Somewhat True or Sometimes True” or “Very True or Often True” for you. Then, for each sentence, fill in one circle that corresponds to the response that seems to describe you *for the last 3 months*.

	0 Not True or Hardly Ever True	1 Somewhat True or Sometimes True	2 Very True or Often True	
1. When I feel frightened, it is hard to breathe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
2. I get headaches when I am at school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SH
3. I don't like to be with people I don't know well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SC
4. I get scared if I sleep away from home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP
5. I worry about other people liking me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
6. When I get frightened, I feel like passing out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
7. I am nervous.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
8. I follow my mother or father wherever they go.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP
9. People tell me that I look nervous.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
10. I feel nervous with people I don't know well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SC
11. I get stomachaches at school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SH
12. When I get frightened, I feel like I am going crazy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
13. I worry about sleeping alone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP
14. I worry about being as good as other kids.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
15. When I get frightened, I feel like things are not real.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
16. I have nightmares about something bad happening to my parents.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP
17. I worry about going to school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SH
18. When I get frightened, my heart beats fast.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
19. I get shaky.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
20. I have nightmares about something bad happening to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP

Tool 5.10: Screen for Child Anxiety Related Disorders (SCARED)

Guidelines for Diagnosing and Managing Pediatric Concussion

Screen for Child Anxiety Related Disorders (SCARED)

CHILD Version—Page 2 of 2 (to be filled out by the CHILD)

	0 Not True or Hardly Ever True	1 Somewhat True or Sometimes True	2 Very True or Often True	
21. I worry about things working out for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
22. When I get frightened, I sweat a lot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
23. I am a worrier.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
24. I get really frightened for no reason at all.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
25. I am afraid to be alone in the house.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP
26. It is hard for me to talk with people I don't know well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SC
27. When I get frightened, I feel like I am choking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
28. People tell me that I worry too much.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
29. I don't like to be away from my family.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP
30. I am afraid of having anxiety (or panic) attacks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
31. I worry that something bad might happen to my parents.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SP
32. I feel shy with people I don't know well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SC
33. I worry about what is going to happen in the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
34. When I get frightened, I feel like throwing up.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
35. I worry about how well I do things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
36. I am scared to go to school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SH
37. I worry about things that have already happened.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	GD
38. When I get frightened, I feel dizzy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	PN
39. I feel nervous when I am with other children or adults and I have to do something while they watch me (for example: read aloud, speak, play a game, play a sport).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SC
40. I feel nervous when I am going to parties, dances, or any place where there will be people that I don't know well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SC
41. I am shy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SC

SCORING:

A total score of ≥ 25 may indicate the presence of an **Anxiety Disorder**. Scores higher than 30 are more specific. **TOTAL =**

A score of **7** for items 1, 6, 9, 12, 15, 18, 19, 22, 24, 27, 30, 34, 38 may indicate **Panic Disorder** or **Significant Somatic Symptoms**. **PN =**

A score of **9** for items 5, 7, 14, 21, 23, 28, 33, 35, 37 may indicate **Generalized Anxiety Disorder**. **GD =**

A score of **5** for items 4, 8, 13, 16, 20, 25, 29, 31 may indicate **Separation Anxiety SOC**. **SP =**

A score of **8** for items 3, 10, 26, 32, 39, 40, 41 may indicate **Social Anxiety Disorder**. **SC =**

A score of **3** for items 2, 11, 17, 36 may indicate **Significant School Avoidance**. **SH =**

For children ages 8 to 11, it is recommended that the clinician explain all questions, or have the child answer the questionnaire sitting with an adult in case they have any questions.

The SCARED is available at no cost at www.wpic.pitt.edu/research_under_tools_and_assessments, or at www.pediatric_bipolar.pitt.edu/instruments.

March 27, 2012

Adapted with permission from Boris Birmaher, M.D., Suneeta Khetarpal, M.D., Marlane Cully, M.Ed., David Brent, M.D., and Sandra McKenzie, Ph.D., Western Psychiatric Institute and Clinic, University of Pittsburgh (October, 1995). E-mail: birmaherb@upmc.edu.

Tool 5.12: General Considerations Regarding Pharmacotherapy

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.11: Screening Questions for Persistent Cognitive Problems

Instructions: We would like to know if you (your child) is/are having any of these problems since their injury. Next, we would like to know if these problems were present before the injury. Then, if there is a problem, tell us how much of a problem this has been.

Problem Area: Is the child/adolescent having problems ____?	Is this a problem for the child/adolescent <u>now</u> ? If yes, how much?	Was this a problem <i>before</i> the concussion? If yes, how much?
1. Paying attention/ concentrating	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
2. Short-term memory (example: forgetting what you were just told)	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
3. Learning new information (example: school material)	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
4. Recalling learned information from memory	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
5. Organizing work or materials	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
School performance		
6. Reading	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
7. Math	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
8. Writing	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe
9. Declining grades	No/Yes Mild/Moderate/Severe	No/Yes Mild/Moderate/Severe

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Tool 5.12: General Considerations Regarding Pharmacotherapy

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.12: General Considerations Regarding Pharmacotherapy

- Address significant psycho-social difficulties (for example, major family/caregiver conflict, other environmental issues) before starting treatment.
- Review current medications, including over-the-counter medicines and supplements, before starting treatment. If possible, minimize or withdraw agents that may exacerbate or maintain symptoms.
- Change only one medication at a time.
- Target drug therapy to specific symptoms (example: dysphoria, anxiety, mood swings, irritability, fatigue, sleep, headache and pain), and monitor during the course of treatment.
- Choose therapies that minimize the impact of adverse effects on awakening, cognition, sleep and motor coordination, as well as on seizure threshold-domains in which children/adolescents with concussion may already be compromised.
- Start at the lowest effective dose and titrate slowly upwards, monitoring tolerability and clinical response, and also aiming for adequate dose and duration. Treatment often fails because either are insufficient. At times, you may have to prescribe the maximum tolerated doses.
- Aim to use a single agent to alleviate several symptoms. However, as individual symptoms may not show a coupled response to treatment, you may have to try a combination of strategies.
- Offer limited quantities of medications to those at a higher risk of suicide.
- Continue successful pharmacotherapy for at least six months, preferably 9 to 12 months for SSRIs, before tapering off on a trial basis.
- Use a specific SSRI as first-line treatment for mood and anxiety syndromes. Avoid using benzodiazepines as first-line therapy for anxiety.
- Follow up regularly.

Adapted from Silver JM, Arciniegas DB, Yudovsky SC. Psychopharmacology. In: Silver JM, Arciniegas DB, Yudovsky SC, eds. Adapted with permission from the Textbook of Traumatic Brain Injury, (Copyright ©2005). American Psychiatric Association. All Rights Reserved.

Tool 5.13: Post-concussion Symptom Inventory for Children aged 5-7
Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.13: Post-concussion Symptom Inventory for Children aged 5-7



Post-Concussion Assessment 1 2 3 4 5 6

Post-Concussion Symptom Inventory for Children (PCSI-C)
Version 5-7 Years Pre and Post-Injury (Interview Form)

Name: _____

Today's date: _____

Birthdate: _____

Age: ____ Grade: _____

Instructions: We would like to know if you have had any of these symptoms before your injury. Next, we would like to know if these symptoms have changed after your injury.

I am going to ask you to tell me about your symptom at two points in time - Before the Injury and Yesterday / Today. Interviewer: Please circle only one answer.

0 = No 1 = A little 2 = A lot		Before the Injury/ Pre-Injury			Current Symptoms /Yesterday and Today		
1	Have you had headaches? Has your head hurt?	0	1	2	0	1	2
2	Have you felt sick to your stomach or like you were going to throw up?	0	1	2	0	1	2
3	Have you felt like you might fall when you walk, run or stand?	0	1	2	0	1	2
4	Have you felt dizzy? (like things around you were spinning or moving)	0	1	2	0	1	2
5	Have you felt more tired <u>than usual</u> ?	0	1	2	0	1	2
6	Have bright lights bothered you <u>more than usual</u> ? (like when you were in the sunlight, when you looked at lights, or watched TV)	0	1	2	0	1	2
7	Have loud noises bothered you <u>more than usual</u> ? (like when people were talking, when you heard sounds, watched TV, or listened to loud music)	0	1	2	0	1	2
8	Have you felt grumpy? (like you were in a bad mood)	0	1	2	0	1	2
9	Have you felt sad?	0	1	2	0	1	2
10	Have you felt nervous or worried?	0	1	2	0	1	2
11	Has it been hard for you to pay attention to what you are doing? (like homework or chores, listening to someone, or playing a game)	0	1	2	0	1	2
12	Has it been hard for you to remember things? (like things you heard or saw or places you have gone)	0	1	2	0	1	2
13	Have things looked fuzzy or blurry?	0	1	2	0	1	2
14	Do you feel "different" <u>than usual</u> ?				0	1	2

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Tool 5.14: Post-concussion Symptom Inventory for Children aged 8-12

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.14: Post-concussion Symptom Inventory for Children aged 8-12



Post-Concussion Assessment 1 2 3 4 5 6

Post-Concussion Symptom Inventory for Children (PCSI-C) Version 8 to 12

Name: _____ **Today's date:** _____ **Birthdate:** _____ **Age** _____ **Grade:** _____

Instructions: We would like to know if you have had any of these symptoms before your injury. Next, we would like to know if these symptoms have changed after your injury. Please rate the symptom at two points in time- Before the Injury/Pre-Injury and Current Symptoms/Yesterday and Today.

Please **answer all the items** the best that you can. Do not skip any items. Circle the number to tell us how much of a problem this symptom has been for you.

0 = No		1 = A little		2 = A lot		Before the Injury/Pre-Injury			Current Symptoms/ Yesterday and Today		
1	Have you had headaches? Has your head hurt?	0	1	2	0	1	2	0	1	2	
2	Have you felt sick to your stomach or nauseous?	0	1	2	0	1	2	0	1	2	
3	Have you had any balance problems or have you felt like you might fall when you walk, run or stand?	0	1	2	0	1	2	0	1	2	
4	Have you felt dizzy? (like things around you were spinning or moving)	0	1	2	0	1	2	0	1	2	
5	Have you felt more tired than usual?	0	1	2	0	1	2	0	1	2	
6	Have you felt more drowsy or sleepy than usual?	0	1	2	0	1	2	0	1	2	
7	Have bright lights bothered you more than usual? (like when you were in the sunlight, when you looked at lights, or watched TV)	0	1	2	0	1	2	0	1	2	
8	Have loud noises bothered you more than usual? (like when people were talking, when you heard sounds, watched TV, or listened to loud music)	0	1	2	0	1	2	0	1	2	
9	Have you felt grumpy or irritable? (like you were in a bad mood)	0	1	2	0	1	2	0	1	2	
10	Have you felt sad?	0	1	2	0	1	2	0	1	2	
11	Have you felt nervous or worried?	0	1	2	0	1	2	0	1	2	
12	Have you felt like you are moving more slowly?	0	1	2	0	1	2	0	1	2	
13	Have you felt like you are thinking more slowly?	0	1	2	0	1	2	0	1	2	
14	Has it been hard to think clearly?	0	1	2	0	1	2	0	1	2	
15	Has it been hard for you to pay attention to what you are doing? (like homework or chores, listening to someone, or playing a game)	0	1	2	0	1	2	0	1	2	
16	Has it been hard for you to remember things? (like things you heard or saw, or places you have gone)	0	1	2	0	1	2	0	1	2	
17	Have things looked blurry?	0	1	2	0	1	2	0	1	2	
18	Do you feel "different" than usual?							0	1	2	

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Tool 5.15: Post-concussion Symptom Inventory Self-assessment, ages 13-18

Guidelines for Diagnosing and Managing Pediatric Concussion

Tool 5.15: Post-concussion Symptom Inventory Self-assessment, ages 13-18



Post-Concussion Symptom Inventory (PCSI) Self-Report Assessment Form Pre and Post-Injury Report Ages 13-18



Patient Name: _____

Today's date: _____

Birthdate: _____

Age: _____

Instructions: We would like to know if you have had any of these symptoms before your injury. Next, we would like to know if these symptoms have changed after your injury. Please rate the symptom at two points in time- Before the Injury/Pre-Injury and Currently.

Please answer all the items the best that you can. Do not skip any items. Circle the number to tell us how much of a problem this symptom has been for you.

0 = Not a problem 3 = Moderate problem 6 = Severe problem

		Before the Injury/ Pre-Injury		Current Symptoms/ Yesterday and Today
1	Headache	0 1 2 3 4 5 6		0 1 2 3 4 5 6
2	Nausea	0 1 2 3 4 5 6		0 1 2 3 4 5 6
3	Balance problems	0 1 2 3 4 5 6		0 1 2 3 4 5 6
4	Dizziness	0 1 2 3 4 5 6		0 1 2 3 4 5 6
5	Fatigue	0 1 2 3 4 5 6		0 1 2 3 4 5 6
6	Drowsiness	0 1 2 3 4 5 6		0 1 2 3 4 5 6
7	Sensitivity to light	0 1 2 3 4 5 6		0 1 2 3 4 5 6
8	Sensitivity to noise	0 1 2 3 4 5 6		0 1 2 3 4 5 6
9	Irritability	0 1 2 3 4 5 6		0 1 2 3 4 5 6
10	Sadness	0 1 2 3 4 5 6		0 1 2 3 4 5 6
11	Nervousness	0 1 2 3 4 5 6		0 1 2 3 4 5 6
12	Feeling more emotional	0 1 2 3 4 5 6		0 1 2 3 4 5 6
13	Feeling slowed down	0 1 2 3 4 5 6		0 1 2 3 4 5 6
14	Feeling mentally "foggy"	0 1 2 3 4 5 6		0 1 2 3 4 5 6
15	Difficulty concentrating	0 1 2 3 4 5 6		0 1 2 3 4 5 6
16	Difficulty remembering	0 1 2 3 4 5 6		0 1 2 3 4 5 6
17	Visual problems (double vision, blurring)	0 1 2 3 4 5 6		0 1 2 3 4 5 6
18	Get confused with directions or tasks	0 1 2 3 4 5 6		0 1 2 3 4 5 6
19	Move in a clumsy manner	0 1 2 3 4 5 6		0 1 2 3 4 5 6
20	Answer questions more slowly than usual	0 1 2 3 4 5 6		0 1 2 3 4 5 6
21	In general, to what degree do you feel "differently" than before the injury (not feeling like yourself)?	No Difference 0 1 2 3 4 Major Difference Circle your rating with "0" indicating "Normal" (No Difference) and "4" indicating "Very Different" (Major Difference)		

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