

Canadian Guideline on Concussion in Sport

2nd edition

Canadian Guideline on Concussion in Sport

2nd edition

March 2024

Funding provided by:

Public Health Agency of Canada

The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada.

Suggested citation:

Parachute. (2024). Canadian Guideline on Concussion in Sport. (2nd edition)
parachute.ca/guideline

© Parachute – Leaders in Injury Prevention, 2024

Contents

Contributors	ii
Using this guideline	1
Purpose	1
Application to non-sport-related concussion	1
Who should use this guideline?	1
How to read this guideline	1
Considerations for athletes with disabilities	2
Role of clinical judgment	2
Key term definitions	2
Concussion Prevention	5
Primary concussion prevention	5
Secondary concussion prevention	6
Tertiary concussion prevention	6
Guideline Recommendations	8
1. Pre-season education	8
2. Head injury recognition	9
3. Onsite medical assessment	10
4. Medical assessment	11
5. Concussion management	12
6. Interdisciplinary concussion care	18
7. Return to sport	18
Canadian Sport Concussion Pathway	20
Guideline Development Process	21
Evidence	21
Knowledge user consultation	22
Future updates to this guideline	22
References	23

Contributors

Parachute project team

Stephanie Cowle, Director, Knowledge Translation

Pamela Fuselli, President and CEO

Claire Westmacott, Manager, Knowledge Translation and Programs

Original contributors to the 1st edition (2017)

Dr. Shelina Babul, BSc, PhD

Dr. Shannon Bauman, MD, CCFP (SEM), Dip. Sport Med

Dr. Michael Cusimano, MD, MHPE, FRCS, DABNS, PhD, FACS

Dr. Michael Ellis, BSc, MD, FRCSC

Dr. Carolyn Emery, BScPT, PhD

Dr. Pierre Frémont, MD, PhD, FCMF

Dr. Claude Goulet, PhD

Louise Logan, BA (Hons), JD

Dr. Alison Macpherson, PhD

Dr. Nick Reed, PhD, MScOT, OT Reg (Ont)

Dr. Kathryn Schneider, PT, PhD, DipManipPT

Dr. Ash Singhal, BSc, MSc, MD, FRCSC

Dr. Charles Tator, MD, PhD, FRCSC, FACS

Dr. Jack Taunton, MSc, MD, DIPL Sports Med (CASEM), FACSM

Dr. Michael Vassilyadi, MD, CM, MSc, FRCS (C), FACS, FAAP

Dr. Roger Zemek, MD, FRCPC

Additional review and input

Federal-Provincial/Territorial Work Group on Concussions in Sport

Dr. Alexander Lithopoulos, Co-ordinator, Living Concussion Guidelines: Guideline for Concussion & Prolonged Symptoms for Adults 18 Years of Age or Older

Dr. Jennifer Dawson, Guideline Developer, Living Guideline for Pediatric Concussion Care

Using this guideline

Purpose

This guideline covers the prevention, recognition, medical diagnosis and management of athletes who sustain a suspected concussion during a sport activity. It aims to ensure that athletes with a suspected concussion receive timely and appropriate care, and proper management to allow them to return to their sport. This guideline may not address every possible clinical scenario that can occur but is intended as a general overview that includes critical elements based on the latest evidence and current expert consensus.

Application to non-sport-related concussion

This guideline has been developed based on a review of the current scientific evidence and expert consensus on best practices for the evaluation and management of athletes in Canada who sustain a concussion during a sport activity. However, the management principles described in this guideline should also be applied to children, adolescents and adults who sustain a concussion outside of a sporting environment and are returning to activity (such as in school or in the workplace).

Certain terminology has been used to make this guideline as specific as possible and to reflect the 6th International Consensus Statement on Concussion in Sport. For further information on terminology used in this guideline, please see the “Key Term Definitions” section.

Who should use this guideline?

This guideline is intended for use by all people who have a role interacting with athletes inside and outside the context of school-based and non-school-based organized sports activity, including athletes, parents/caregivers, coaches, officials, teachers, trainers and licensed healthcare professionals.

How to read this guideline

This guideline addresses seven areas in the prevention, recognition, diagnosis and management of sport-related concussion:

1. Pre-season education
2. Head injury recognition

3. Onsite medical assessment
4. Medical assessment
5. Concussion management
6. Multidisciplinary concussion care
7. Return to sport

For each area, recommendations are provided, along with:

- ▶ **Who:** Who are the people that play a key role to implement the recommendations in this area.
- ▶ **Tool:** What are the key tools and documents people can use to implement the recommendations in this area. All tools are linked alongside this guideline on parachute.ca/guideline

Considerations for athletes with disabilities

There is a recognized gap in research evidence regarding the experiences, assessment and management of concussion in athletes with disabilities. Common assessment tools, such as the Sport Concussion Assessment Tool, have not been validated for use with individuals with disabilities.

The Concussion in Para Sport Group recommends that, for athletes with disabilities, concussions should be managed according to current guidelines, as able (Weiler et al., 2021). Care should be individualized, considering the athlete and the implications of their disability on assessment and management.

More detailed considerations and recommendations for the care of athletes participating in para sport are detailed in Concussion in para sport: the first position statement of the Concussion in Para Sport (CIPS) Group.

Role of clinical judgment

Several recommendations in this guideline are directed to licensed healthcare professionals with the aim of helping them make informed decisions about their patients. However, this guideline is not intended to take the place of clinical judgment in diagnosing and treating concussion. Healthcare professionals must make their own decisions about care after consultation with their patients, using their clinical judgment, knowledge and expertise.

Key term definitions

Adult athlete: An athlete or sport participant who is 18 years of age or older.

Athlete: Any individual participating in a sport activity, competing at any level of play. This term refers to all sport participants and players. The most appropriate term will vary across different sports and settings.

Child Sport Concussion Assessment Tool – 6th Edition (Child SCAT6): A standardized tool for evaluating concussions in individuals aged 8 to 12 years, designed for use by physicians and other licensed healthcare professionals. Published in 2023 by the Concussion in Sport Group, the Child SCAT6 replaces previous versions of the tool.

Concussion: A form of traumatic brain injury induced by biomechanical forces that result in signs and symptoms that typically resolve spontaneously within four weeks of injury (Patricios, Schneider et al., 2023).

Concussion Recognition Tool – 6th Edition (CRT6): A tool intended to be used by anyone for the identification of suspected concussion in children, youth and adults. Published in 2023 by the Concussion in Sport Group, the CRT6 replaces previous versions of the tool.

Document: A standardized written letter or form that can help facilitate communication.

Exercise: Any physical activity that requires bodily movement including resistance training as well as aerobic and anaerobic exercise or training.

Interdisciplinary concussion care: Co-ordinated care by licensed healthcare professionals from multiple disciplines, with direct and ongoing access to a physician with training and experience in concussion management.

Licensed healthcare professional: A healthcare provider who is licensed or certified by a provincial, territorial or national professional regulatory body to provide concussion-related healthcare services that fall within their licensed scope of practice. Examples include, but are not limited to, medical doctors, nurses, physiotherapists and athletic therapists.

Medical assessment: The evaluation of an individual by a licensed healthcare professional to determine the presence or absence of a medical condition or disorder, such as a concussion.

Persisting symptoms: Concussion symptoms that last longer than four weeks.

Recognition: The detection of an event (i.e., a suspected concussion) occurring during sport or a sport activity.

Return-to-School Strategy: A graduated stepwise strategy for the process of recovery and return to academic activities and the school environment after a concussion. The broader process of returning to cognitive activities is also commonly referred to as “return to learn”.

Return-to-Sport Strategy: A graduated stepwise strategy for the process of recovery and return to sport participation after a concussion. The broader process of returning to unstructured and structured physical activity is also commonly referred to as “return to play”.

Sport or sport activity: A school-based or non-school-based physical activity that can be played as an individual or a team, including games and practices.

Sport Concussion Assessment Tool – 6th Edition (SCAT6): A standardized tool for evaluating concussions in individuals aged 13 years or older, designed for use by physicians and licensed healthcare professionals. Published in 2023 by the Concussion in Sport Group, the SCAT6 replaces previous versions of the tool.

Tool: A standardized instrument or device that can be used to help recognize an event (i.e., a suspected concussion) or assess an individual with a suspected medical diagnosis (e.g., Sport Concussion Assessment Tool 6).

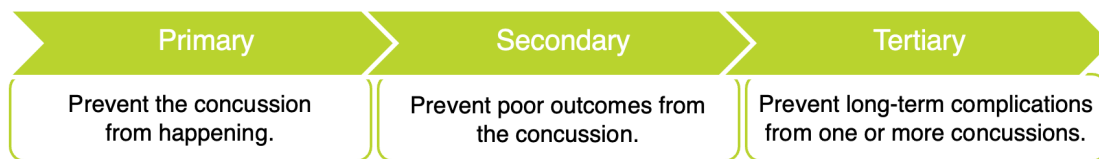
Treatment: An intervention provided by a licensed healthcare professional to address a diagnosed medical condition/disorder or its associated symptoms, such as physical therapy.

Youth or youth athlete: An athlete or sport participant who is less than 18 years of age.

Concussion Prevention

Concussion prevention is a fundamental and continuous practice in sport and physical activity. Prevention takes place at multiple, complementary levels: primary prevention works to prevent a concussion before it occurs; secondary prevention focuses on reducing the effects of a concussion if it occurs; and tertiary prevention involves the prevention of long-term complications from one or more concussions.

Levels of concussion prevention



Primary concussion prevention

The first step in primary prevention is understanding the issue in your specific context. Through data collection (surveillance), documentation and consulting published literature, identifying the following information for the specific sport or activity is important to know where to target prevention efforts and which solutions to choose. Ongoing data collection will also help you know if any changes you implement have the desired effect.

Considerations for understanding concussion in a sport or activity

Who is being affected by concussion injuries? There may be differences by age, sex and/or gender, position (e.g. goalie, catcher) or other factors.

How are concussions occurring? There may be specific drills, plays, skills, types of contact or other scenarios that are commonly present in the context of the injury.

When and where are concussions happening? For example, consider injury patterns during training or practice versus competition and gameplay.

When selecting solutions to implement, organizations should consider prevention from multiple perspectives. Changes can be made to:

- the participation environment
- equipment

- training and skill progression
- rules and policies (and their enforcement)
- sport and organizational culture

It is important to consider context- and sport-specific evidence, if available, before implementing new preventative strategies. Examples of primary prevention strategies shown by research evidence to prevent or reduce the risk of concussions include, but are not limited to:

- Policy disallowing bodychecking in child and adolescent ice hockey
- Strategies limiting contact practice (frequency and /or duration) in adolescent football
- Use of mouthguards in adolescent ice hockey
- Neuromuscular training warm-up programs in male rugby players (Eliason et al., 2023)

Implemented solutions should be tracked and evaluated to understand if they are working as intended, or adjustments need to be made. Education of all individuals with a role in the sport community is important to support the effectiveness of prevention efforts.

Secondary concussion prevention

If a concussion does occur, timely recognition and removal, proper assessment and appropriate management are linked to faster recovery and improved outcomes. Establishing and implementing evidence-informed concussion policies and protocols can help prevent poor outcomes resulting from delays or mismanagement. All organizations delivering sport and physical activity are encouraged to use the recommendations in this Guideline to establish and implement policies and practices that support safe removal and return to activities in the case of concussion.

Tertiary concussion prevention

Through primary and secondary prevention efforts, as described above, organizations can support the long-term participation and wellbeing of participants. Having policies in place to support best practice processes for concussion management may also help reduce recurrent concussions (Eliason et al., 2023).

In some cases, it may be in the best interest of the participant to discontinue their participation in sports that involve contact or collision. There are no objective factors to determine this decision; it is specific to the individual and should involve the

participant, their parent/guardian, if applicable, and licensed healthcare professionals (Patricios, Schneider et al., 2023).

Scientific understanding of serious long-term consequences of head trauma, such as neurodegenerative diseases and chronic traumatic encephalopathy (CTE), is still limited. Fortunately, at this point in time, such complications are considered to be rare and the current research does not show an increase in risk in amateur athletes.

Guideline Recommendations

1. Pre-season education

Despite recent increased attention focusing on concussion, there is a continued need to improve concussion education and awareness. Optimizing the prevention and management of concussion depends highly on annual education of all individuals with a role in the sport community (athletes, parents/caregivers, coaches, officials, teachers, trainers and licensed healthcare professionals) on evidence-informed approaches that can prevent concussion and more serious forms of head injury and help identify and manage an athlete with a suspected concussion.

Concussion education should include information on:

- the definition of concussion,
- possible mechanisms of injury,
- common signs and symptoms,
- steps that can be taken to prevent concussions and other injuries from occurring in sport (this should include reviewing the sport's code of conduct, if applicable),
- what to do when an athlete has suffered a suspected concussion or more serious head injury,
- what measures should be taken to ensure proper medical assessment including Return-to-School and Return-to-Sport Strategies, and
- Return-to-sport medical clearance requirements.

As an example, this education could be provided using an education sheet that is reviewed and signed by all individuals with a role in the sport community at the time of registration or before the beginning of each sport season to confirm that the key information has been received by all participants.

In addition to reviewing information on concussion, it is also important that all individuals with a role in the sport community understanding of the concussion protocol, policies and code of conduct (if applicable) for their sport and sport setting at the beginning of each season. For example, this can be accomplished through pre-season in-person orientation sessions for athletes, parents/caregivers, coaches and others.

- ▶ **Who:** Athletes, parents/caregivers, coaches, officials, teachers, trainers, licensed healthcare professionals
- ▶ **Tool:** Pre-season Concussion Education Sheet

2. Head injury recognition

Although the formal diagnosis of concussion should be made following a medical assessment, all individuals in the sport community, including athletes, parents/ caregivers, coaches, officials, teachers, trainers and licensed healthcare professionals, are responsible for the recognition and reporting of athletes with a suspected concussion. This is particularly important because many sport and recreation venues will not have access to on-site licensed healthcare professionals.

Suspected concussion

A concussion should be suspected if an athlete sustains an impact to the head, face, neck or body and:

- demonstrates one or more observable signs of a suspected concussion (as detailed in the Concussion Recognition Tool 6), OR
- reports one or more symptoms of suspected concussion (as detailed in the Concussion Recognition Tool 6).

This includes cases where the impact wasn't witnessed, but anyone witnesses the athlete exhibiting one or more observable signs of suspected concussion or the athlete reports one or more symptoms of suspected concussion to one of their peers, parents/ caregivers, coaches or teachers.

In all cases of suspected concussion, the athlete should be removed from the activity immediately and undergo medical assessment as soon as possible (See 3. Onsite medical assessment and 4. Medical assessment).

Delayed signs and symptoms

If an athlete is removed from play following an impact for cautionary reasons, but there are no observable signs or symptoms of a suspected concussion, then the athlete can be returned to play but should be monitored for delayed symptoms for up to 48 hours.

Red flag symptoms

In some cases, an athlete may show signs or symptoms that potentially indicate a more severe head or spine injury, including loss of consciousness, convulsions, worsening headaches, repeated vomiting or neck pain (see a detailed list in the Concussion Recognition Tool 6).

If an athlete demonstrates any red flags, a more severe head or spine injury should be suspected, principles of first aid should be followed and emergency medical assessment should be pursued (see 3a. Emergency medical assessment).

- ▶ **Who:** Athletes, parents/caregivers, coaches, officials, teachers, trainers and licensed healthcare professionals
- ▶ **Tool:** Concussion Recognition Tool – 6th Edition (CRT6)

3. Onsite medical assessment

Depending on the suspected severity of the injury and access to medical services, an initial assessment may be completed by emergency medical professionals or by an onsite licensed healthcare professional, where available.

In cases where any red flags are present, emergency medical assessment by emergency medical professionals should take place (see 3a below). If a more severe injury is not suspected, the athlete should undergo sideline medical assessment or medical assessment, depending on if there is a licensed healthcare professional present (see 3b below).

3a. Emergency medical assessment

If an athlete is suspected of sustaining a more severe head or spine injury, an ambulance should be called immediately to transfer the patient to the nearest emergency department for further medical assessment.

Coaches, parents/caregivers, trainers and officials should not make any effort to remove equipment or move the athlete and the athlete should not be left alone until the ambulance arrives. After the emergency medical services staff has completed the emergency medical assessment, the athlete should be transferred to the nearest hospital for medical assessment.

In the case of youth athletes, the athlete's parents or legal guardian should be contacted immediately to inform them of the injury. For adult athletes, their emergency contact person should be contacted if one has been provided.

- ▶ **Who:** Emergency medical professionals

3b. Sideline medical assessment

If an athlete is suspected of sustaining a concussion and there is no concern for a more serious head or spine injury (i.e., no red flags), the player should be immediately removed from the field of play.

Scenario 1: If a licensed healthcare professional is present

The athlete should be taken to a quiet area and undergo sideline medical assessment using the Sport Concussion Assessment Tool 6 (SCAT6) or the Child SCAT6.

The SCAT6 and Child SCAT6 are clinical tools that should only be used by a licensed healthcare professional who has training and experience using them. These tools can be used as part of the overall clinical assessment and screening for concussion. It is important to note that the results of SCAT6 and Child SCAT6 testing can be normal in the setting of acute concussion and that signs and symptoms may evolve over time. As such, these tools can be used by licensed healthcare professionals to document initial symptoms and neurological status but should not be used to make sideline return-to-sport decisions in youth athletes. Any youth athlete who is suspected of having sustained a concussion must not return to the game or practice and should be referred for medical assessment.

- ▶ **Who:** Licensed healthcare professionals
- ▶ **Tool:** Sport Concussion Assessment Tool – 6th Edition (SCAT6)
Child Sport Concussion Assessment Tool – 6th Edition (Child SCAT6)

Scenario 2: If there is no licensed healthcare professional present

An athlete with suspected concussion should be referred for medical assessment by a medical doctor or nurse practitioner as soon as possible.

4. Medical assessment

The medical assessment is responsible for determining whether the athlete has a diagnosed concussion or not. To provide comprehensive evaluation of athletes with a suspected concussion, the medical assessment must:

- rule out more serious forms of traumatic brain and spine injuries,
- rule out medical and neurological conditions that can present with concussion-like symptoms, and
- make the differential diagnosis of concussion based on findings of the clinical history and physical examination and the evidence-based use of adjunctive tests as indicated (e.g., CT scan).

Licensed healthcare professionals in Canada whose scope of practice matches these requirements are medical doctors and nurse practitioners. Medical doctors who can evaluate patients with a suspected concussion include pediatricians, family medicine physicians, sports medicine physicians, emergency department physicians, internal medicine physicians, physiatrists (rehabilitation physicians), neurologists and neurosurgeons.

In geographic regions of Canada with limited access to medical doctors and nurse practitioners (i.e., rural, remote or northern communities), a licensed healthcare professional, such as a nurse with pre-arranged access to a medical doctor or nurse practitioner, can facilitate this role.

Scope of practice for licensed healthcare professionals can vary by province and territory. Of note:

- In Manitoba, physician assistants can diagnose concussion.
- In Quebec, nurse practitioners cannot diagnose concussion. The role of physiotherapists in the assessment and management of concussion is specified.

[Learn more](#)

Athletes who are determined to have not sustained a concussion should be provided with a Medical Assessment Letter indicating a concussion has not been diagnosed. The athlete can return to school, work and sport activities without restriction.

Athletes diagnosed with a concussion should be provided with a Medical Assessment Letter indicating a concussion has been diagnosed. The athlete must follow a gradual return to activities, including school, work and sport activities (see 5. Concussion Management).

Because the Medical Assessment Letter contains personal health information, it is the responsibility of the athlete or their parent/legal guardian to provide this documentation to the athlete's coaches, teachers or employers. It is also important for the athlete or coach to provide this information to sport organization administrators who are responsible for injury reporting and concussion surveillance, where applicable.

- ▶ **Who:** Medical doctor, nurse practitioner, nurse
- ▶ **Tool:** Medical Assessment Letter

5. Concussion management

Athletes diagnosed with a concussion should be provided with education about the signs and symptoms of concussion, treatment/management of their symptoms, the risks of returning to sport without medical clearance and recommendations regarding a gradual return to school (if applicable) and sport activities.

Athletes diagnosed with a concussion are to be managed according to their Return-to-School (if applicable) and sport-specific Return-to-Sport Strategies under the supervision of a medical doctor or nurse practitioner. When available, athletes should

be encouraged to work with their team’s licensed healthcare professional to optimize progression through their sport-specific Return-to-Sport Strategy.

The stepwise progressions for Return-to-School and Return-to-Sport Strategies are outlined below. Note that these strategies begin at the same time, can happen concurrently and the first step of both is the same.

Return-to-School Strategy

The following is an outline of the Return-to-School Strategy that should be used to help students, parents/caregivers and teachers to partner in allowing the athlete to make a gradual return to school activities (Table 1). Every concussion is unique and, depending on the severity and type of the symptoms present, progression through the following steps will look different for each student-athlete. This tool is a recommendation and should not replace medical advice.

Medical clearance is not required to return to school, except for full participation in school-based sport and physical activity. Return to sport and physical activity should be guided by the Return-to-Sport Strategy.

Students do not need to be symptom-free to return to school and complete absence from school of more than one week is not recommended. It is common for a student’s symptoms to worsen slightly with activity. This is acceptable as they progress through steps so long as the symptom exacerbation is:

- **mild:** Symptoms worsen by only one to two points on a zero-to-10 scale, and
- **brief:** Symptoms settle back down to pre-activity levels within an hour.

If the student’s symptoms worsen more than this, they should pause and adapt activities as needed.

Sample 0-10 scale for describing symptom severity

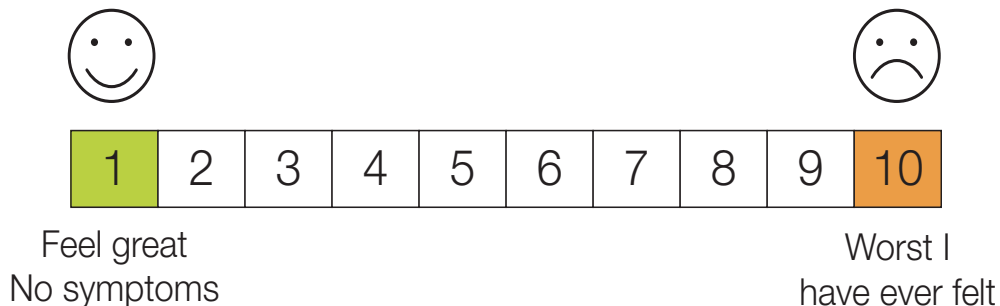


Table 1. Return-to-School Strategy: Graduated Approach

Step	Activity	Description	Goal of each step
1	Activities of daily living and relative rest (first 24 to 48 hours)	<ul style="list-style-type: none"> • Typical activities at home (e.g. preparing meals, social interactions, light walking) that do not result in more than mild and brief worsening of symptoms • Minimize screen time 	Gradual reintroduction of typical activities
After a maximum of 24 to 48 hours after injury, progress to step 2.			
2	School activities with encouragement to return to school (as tolerated)	<ul style="list-style-type: none"> • Homework, reading or other light cognitive activities at school or at home • Take breaks and adapt activities if they result in more than mild and brief worsening of symptoms • Gradually resume screen time, as tolerated 	Increase tolerance to cognitive work and connect socially with peers
If the student can tolerate school activities, progress to step 3.			
3	Part-time or full days at school with accommodations (as needed)	<ul style="list-style-type: none"> • Gradually reintroduce schoolwork • Build tolerance to the classroom and school environment over time. Part-time school days with access to breaks throughout the day and other accommodations may be required • Gradually reduce accommodations related to the concussion and increase workload 	Increase academic activities
If the student can tolerate full days without accommodations for concussion, progress to step 4.			
4	Return to school full-time	<ul style="list-style-type: none"> • Return to full days at school and academic activities, without accommodations related to the concussion • For return to sport and physical activity, including physical education class, refer to the Return-to-Sport Strategy 	Return to full academic activities
Return to school is complete.			

Table adapted from: Patricios, Schneider et al., 2023; Reed, Zemek et al., 2023

Sport-specific Return-to-Sport Strategy

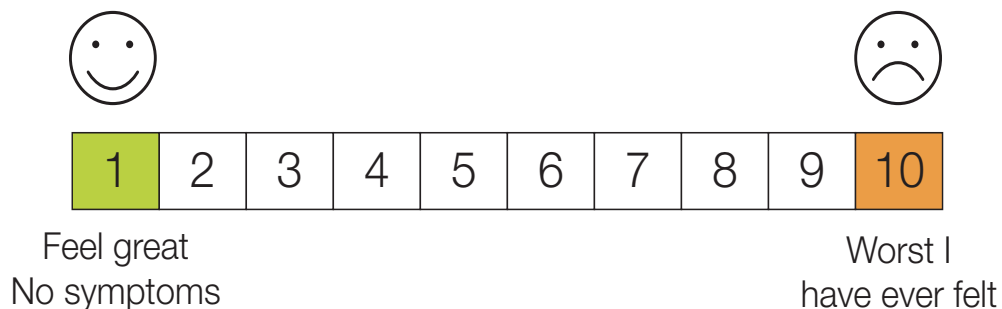
The following is an outline of the Return-to-Sport Strategy that should be used to help athletes, parents/caregivers, coaches, trainers, teachers and licensed health professionals to partner in allowing the athlete to make a gradual return to sport activities (Table 2). Activities should be tailored to create a sport-specific strategy that helps the athlete return to their respective sport. This tool is a guideline and should not replace medical advice; with direction from a healthcare professional, timelines and activities may vary.

The athlete should spend a minimum of 24 hours at each step before progressing on to the next. It is common for an athlete's symptoms to worsen slightly with activity. This is acceptable as they progress through steps 1 to 3 of return to sport, so long as symptom exacerbation is:

- **mild:** symptoms worsen by only one to two points on a zero-to-10 scale, and
- **brief:** symptoms settle back down to pre-activity levels within an hour.

If the athlete's symptoms worsen more than this, they should stop the activity and try resuming the next day at the same step.

Sample 0-10 scale for describing symptom severity



Before progressing to step 4 of the sport-specific Return-to-Sport Strategy, youth and adult athletes must:

- successfully complete all steps of the Return-to-School Strategy (if applicable), and
- provide their coach with a Medical Clearance Letter indicating they have been medically cleared to return to activities with risk of falling or contact.

If the athlete experiences concussion symptoms after medical clearance (i.e., during steps 4 to 6), they should return to step 3 to establish full resolution of symptoms. Medical clearance will be required again before progressing to step 4.

Table 2. Return-to-Sport Strategy: Graduated Approach

Step	Activity	Description	Goal of each step
1	Activities of daily living and relative rest (first 24 to 48 hours)	<ul style="list-style-type: none"> • Typical activities at home (e.g. preparing meals, social interactions, light walking) that do not result in more than mild and brief worsening of symptoms • Minimize screen time 	Gradual reintroduction of typical activities
After a maximum of 24 to 48 hours after injury, progress to step 2.			
2	2A: Light effort aerobic exercise	<ul style="list-style-type: none"> • Start with light aerobic exercise, such as stationary cycling and walking at a slow to medium pace • May begin light resistance training that does not result in more than mild and brief worsening of symptoms • Exercise up to approximately 55% of maximum heart rate • Take breaks and modify activities as needed 	Increase heart rate.
	2B: Moderate effort aerobic exercise	<ul style="list-style-type: none"> • Gradually increase tolerance and intensity of aerobic activities, such as stationary cycling and walking at a brisk pace • Exercise up to approximately 70% of maximum heart rate • Take breaks 	
If the athlete can tolerate moderate aerobic exercise, progress to step 3.			
3	Individual sport-specific activities, without risk of inadvertent head impact school with accommodations (as needed)	<ul style="list-style-type: none"> • Add sport-specific activities (e.g., running, changing direction, individual drills) • Perform activities individually and under supervision from a teacher, parent/caregiver or coach • Progress to where the athlete is free of concussion-related symptoms, even when exercising 	Increase the intensity of aerobic activities and introduce low-risk sport-specific movements

Medical clearance If the athlete has completed return to school (if applicable) and has been medically cleared, progress to step 4.			
4	Non-contact training drills and activities	<ul style="list-style-type: none"> Progress to exercises with no body contact at high intensity, including more challenging drills and activities (e.g., passing drills, multi-athlete training and practices) 	Resume usual intensity of exercise, co-ordination and activity-related cognitive skills.
If the athlete can tolerate usual intensity of activities with no return of symptoms, progress to step 5.			
5	Return to all non-competitive activities, full-contact practice and physical education activities	<ul style="list-style-type: none"> Progress to higher-risk activities including typical training activities, full-contact sport practices and physical education class activities Do not participate in competitive gameplay 	Return to activities that have a risk of falling or body contact, restore confidence and assess functional skills by coaching staff
If the athlete can tolerate non-competitive, high-risk activities, progress to step 6.			
6	Return to sport	<ul style="list-style-type: none"> Unrestricted sport and physical activity 	
Return to sport is complete.			

Table adapted from: Patricios, Schneider et al., 2023; Reed, Zemek et al., 2023

- ▶ **Who:** Medical doctor, nurse practitioner, licensed healthcare professionals
- ▶ **Tool:** Return-to-School Strategy
 Sport-specific Return-to Sport Strategy
 Medical Clearance Letter

6. Interdisciplinary concussion care

Most athletes who sustain a concussion while participating in sport will make a complete recovery and be able to return to full school without any concussion-related accommodations and full sport participation without restrictions within four weeks of injury. However, approximately 15 to 30 per cent of individuals will experience symptoms that last longer beyond this time frame.

Athletes who experience persisting symptoms (longer than four weeks) may benefit from referral to specialized interdisciplinary concussion care for assessment and care that addresses the athlete's individual symptoms and needs.

Care of persisting symptoms should follow the management recommendations in Canada's clinical practice guidelines:

- [Pediatric guidelines \(children and youth under 18\)](#)
- [Adult guidelines \(18 and older\)](#)

7. Return to sport

Athletes who have been determined to have not sustained a concussion and provide a Medical Assessment Letter indicating this can return to school, work and sport activities without restriction (see 4. Medical Assessment).

Athletes who have been diagnosed with a concussion can be considered for medical clearance to return to sport activities with risk of contact or fall once they have successfully completed:

- all steps of the Return-to-School Strategy (if applicable), and
- steps 1 to 3 of the sport-specific Return-to-Sport Strategy.

The final decision to medically clear an athlete to return to activity with risk of falls and contact should be based on the clinical judgment of the medical doctor or nurse practitioner, taking into account the athlete's past medical history, clinical history, physical examination findings and the results of other tests and clinical consultations where indicated (e.g., neuropsychological testing, diagnostic imaging).

To progress to step 4 of return to sport, the athlete must provide their coach with a Medical Clearance Letter that specifies that a medical doctor or nurse practitioner has personally evaluated the patient and has cleared the athlete to return to sport. In geographic regions of Canada with limited access to medical doctors (i.e. rural, remote or northern communities), a licensed healthcare professional (i.e. a nurse)

with pre-arranged access to a medical doctor or nurse practitioner can provide this documentation.

It is also important for the athlete or coach to provide this information to sport organization administrators who are responsible for injury reporting and concussion surveillance, where applicable.

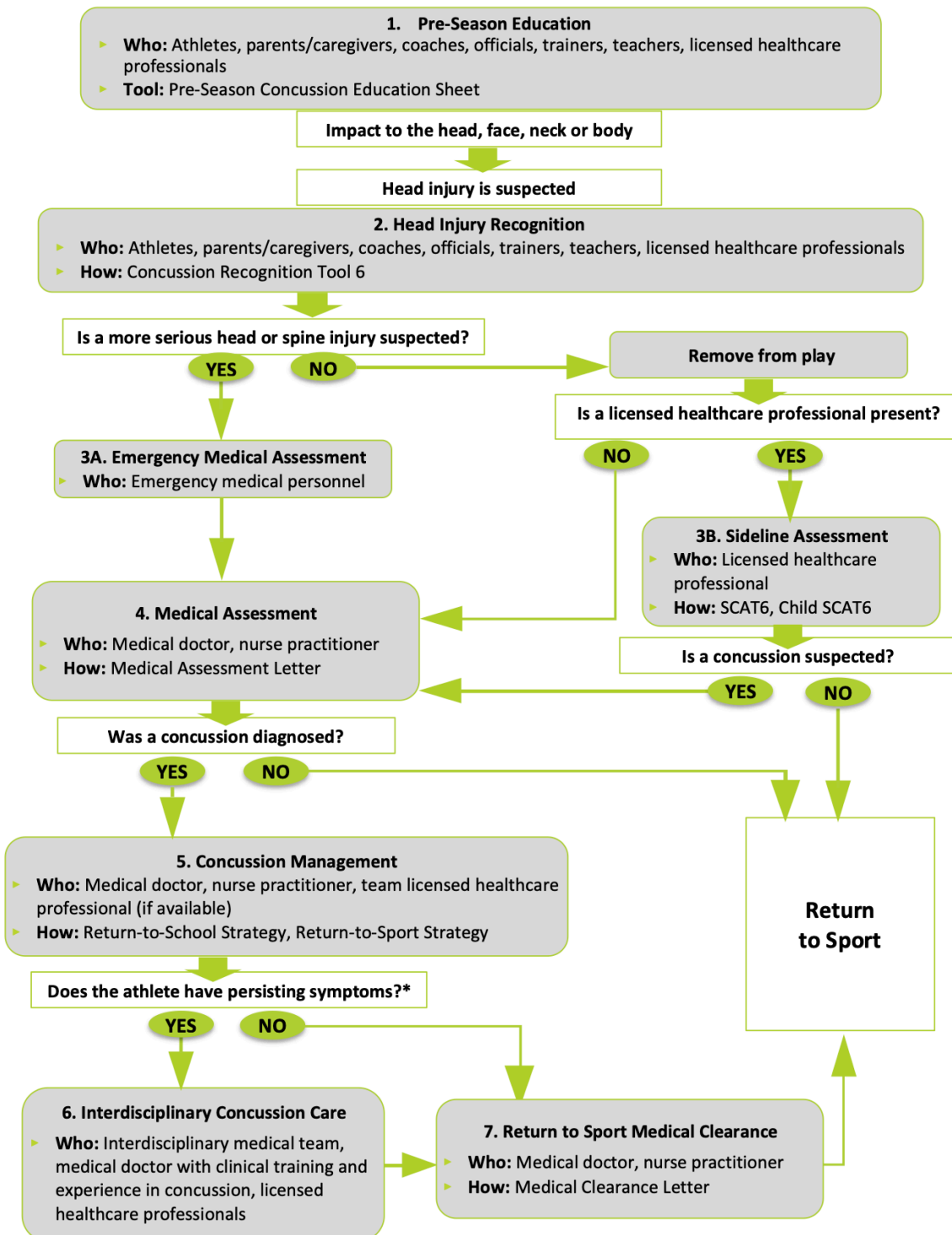
Athletes who have been provided with a Medical Clearance Letter may progress through steps 4, 5 and 6 of the sport-specific Return-to-Sport Strategy to gradually return to full, unrestricted sport activities. If the athlete experiences any new concussion-like symptoms during these steps, they should be instructed to stop the activity and return to step 3 to establish the full resolution of symptoms. Medical clearance is required again before progressing to step 4. This information should be provided to the appropriate people (e.g., coach, trainer, teacher).

If the athlete sustains a new suspected concussion, the recommendations of the Canadian Guideline on Concussion in Sport should be followed.

- ▶ **Who:** Medical doctor, nurse practitioner, nurse
- ▶ **Tool:** Medical Clearance Letter

Canadian Sport Concussion Pathway

The flowchart that follows is a visual representation of the decision-making pathway that reflects the recommendations in this guideline.



*Persisting symptoms: lasting longer than 4 weeks

Guideline Development Process

Evidence

This guideline was developed using the results of systematic evidence search and consensus process conducted external to the guideline's development.

The most current high quality scientific evidence addressing concussion in sport is reviewed roughly every four years by the Scientific Committee and Expert Panel of the International Consensus Conference on Concussion in Sport. The consensus process includes:

- Drafting, feedback and revision of systematic review questions by the Scientific Committee and Expert Panel
- Systematic reviews
- Submission and review of scientific abstracts to supplement the systematic reviews with the latest evidence
- Consensus meeting with public plenary lectures to address the review questions; closed Expert Panel meeting; and updating of tools (CRT, SCAT, Child SCAT)

The results of this process are subsequently published in the form of a consensus statement, systematic review articles and tools in the British Journal of Sports Medicine.

The 6th International Consensus Conference on Concussion in Sport was held October 27 to 30, 2022, in Amsterdam, the Netherlands. A new Consensus Statement on Concussion in Sport, 10 systematic reviews and updated tools (e.g., CRT6, SCAT6, Child SCAT6) were published in June 2023.

The full scope of evidence included in the Consensus Statement and systematic reviews is broader than the scope of this guideline. Selection of the recommendation areas and evidence to include in the guideline was determined by an expert committee and informed by Russell and colleagues' (2017) framework for youth sport concussion in Canada.

This guideline is further informed by the recommendations of the Living Guideline for Pediatric Concussion Care and Living Concussion Guidelines: Guideline for Concussion & Prolonged Symptoms for Adults 18 years of Age or Older, to ensure consistent application of evidence and expert consensus to the Canadian context. Each of those guidelines uses a methodology employing a literature search strategy and expert panel review by more than 40 concussion experts in Canada and the U.S.

Knowledge user consultation

A broad group of knowledge users was consulted throughout the guideline development process to ensure their views were considered. The following sectors and professions were included:

- Healthcare professionals including Athletic Therapy, Family Medicine, Neurosurgery, Occupational Therapy, Pediatrics, Physiotherapy, Sports Medicine
- Health and sport injury researchers
- National Sport Organizations
- National Multisport Service Organizations, including coaching and athlete associations
- Provincial, territorial and federal government departments
- Education sector

The first edition of the guideline was drafted by an expert committee based on evidence and practice-based expertise. A national in-person event was hosted by Parachute in May 2017, where the recommendations were presented to health, sport and government representatives for open discussion. Feedback received was incorporated into subsequent revisions of the document, which underwent ongoing review by the expert committee and Parachute's project team. External review by health, sport, government and education representatives was the final step for completion of the document.

Updates for the second edition were drafted by Parachute's project team based on national consultation results. Feedback on proposed changes was collected using an online survey form. Representatives from sport, health care, government, education, research and injury prevention submitted 25 responses. Project team members of the pediatric and adult clinical guidelines also reviewed proposed changes to ensure alignment.

Future updates to this guideline

At the time of its publication, this guideline reflects the most current high-quality evidence on concussion in sport. New scientific evidence and its impact on the areas of recommendation in this guideline will be considered as it emerges.

References

Eliason, P. H., Galarneau, J. M., Kolstad, A. T., Pankow, M. P., West, S. W., Bailey, S., Miutz, L., Black, A. M., Broglio, S. P., Davis, G. A., Hagel, B. E., Smirl, J. D., Stokes, K. A., Takagi, M., Tucker, R., Webborn, N., Zemek, R., Hayden, A., Schneider, K. J., & Emery, C. A. (2023). Prevention strategies and modifiable risk factors for sport-related concussions and head impacts: a systematic review and meta-analysis. *British journal of sports medicine*, 57(12), 749–761. <https://doi.org/10.1136/bjsports-2022-106656>

Marshall S., Lithopoulos A., Curran D., Fischer L., Velikonja D., & Bayley, M. (2023). Living Concussion Guidelines: Guideline for Concussion & Prolonged Symptoms for Adults 18 years of Age or Older. <https://concussionsontario.org>

Patricios, J. S., Schneider, K. J., Dvorak, J., Ahmed, O. H., Blauwet, C., Cantu, R. C., Davis, G. A., Echemendia, R. J., Makdissi, M., McNamee, M., Broglio, S., Emery, C. A., Feddermann-Demont, N., Fuller, G. W., Giza, C. C., Guskiewicz, K. M., Hainline, B., Iverson, G. L., Kutcher, J. S., Leddy, J. J., ... Meeuwisse, W. (2023). Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport- Amsterdam, October 2022. *British journal of sports medicine*, 57(11), 695–711. <https://doi.org/10.1136/bjsports-2023-106898>

Reed, N., Zemek, R., Dawson, J., Ledoux, AA., Provvidenza, C., Paniccia, M., Tataryn, Z., Sampson, M., Eady, K., Bourke, T., Dean, S., Seguin, R., Babul, S., Bauman, S., Bayley, M., Beauchamp, M., Carson, J., Cairncross, M., Dalton, K., DePompei, R., ... Yeates, K. (2023). Living Guideline for Pediatric Concussion Care. www.pedsconcussion.com. <https://doi.org/10.17605/OSF.IO/3VWN9>

Russell, K., Ellis, M. J., Bauman, S., & Tator, C. H. (2017). Legislation for Youth Sport Concussion in Canada: Review, Conceptual Framework, and Recommendations. *The Canadian journal of neurological sciences*. 44(3), 225–234. <https://doi.org/10.1017/cjn.2016.423>