Neurotrauma Care Pathways

CANADIAN CLINICAL PRACTICE GUIDELINE FOR THE REHABILITATION OF ADULTS WITH MODERATE TO SEVERE TBI

ONTARIO PHYSIOTHERAPY ASSOCIATION

Suspecting a concussion? The role of physiotherapy in getting the right care at the right time

Wednesday, Nov 1, 2023, 12-1pm

Neurotrauma Care Pathways Team

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UHN Toronto Rehabilitation Institute – The KITE Research Institute

PedsConcussion – Living Guideline for Pediatric Concussion Care

Living Concussion Guidelines

Institut national d'excellence en santé et en services sociaux Québec

Ontario Ministry of Health & Long Term Care

Land Acknowledgement

We acknowledge that we are on the traditional territory of many Indigenous nations. For myself in Toronto these include the lands of the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples. Today, the meeting place of Toronto is still the home to many Indigenous peoples from across Turtle Island and we are grateful to have the opportunity to work and learn on this territory.

In this Land Acknowledgment, we recognize and respect Indigenous Peoples as traditional stewards of this land and the enduring relationship that exists between Indigenous Peoples and their traditional territories.We recognize the importance of reflecting on what occurred in the past as an important step to reconciliation with our Indigenous communities and other communities that have experienced hardship as part of our colonial past.

We also recognize the challenges and discrimination that can exist in the healthcare system towards persons with Indigenous Background. As system planners and healthcare providers, it is our responsibility to identify and implement mechanisms to provide equitable and culturally sensitive care.

PRESENTATION OBJECTIVES

Key objectives for this presentation are to:

1. Understand the purpose of a Care Pathway and Clinical Practice Guideline (CPG)

2. Discuss the Guideline's updated recommendations and resources and how they relate to the Care Pathway.

3. Explore navigation and application of Pathways and CPG using case examples.

Neurotrauma Care Pathways

If you or a family member sustains a brain or spinal cord injury, the best possible care may **NOT** be at your local hospital or rehab center…

You or your family member will be discharged from formal acute and inpatient rehab care back into the community….

- hopefully back to the community you came from
- hopefully to a setting that suits you and your needs
- hopefully with resources and support for you to continue your rehab and recovery over the rest of your life

All care and supports should be appropriate for who you are as an individual – respecting your background, your values and your preferences

SCOPE OF THE PROBLEM

How many people sustain a TBI every year in Ontario?

Concussion: 164,000 - about 20% will have persisting symptoms: 32,800

Complex mild: 2,500

Moderate to severe: 3,500

TOTAL: 170,000 new injuries a year
Approximately 38,800 with ongoing needs

How do people get injured?

Concussion: **30% Fall**; 3% MVC; Sport 5%; Unspecified 41%

Complex mild: **66% Fall**; 9% MVC

Moderate to severe: **71% Fall**; 11% MVC

Data used with permission from the 2024 TBI Report Card.
Data obtained from administrative data bases by ICES.

SCOPE OF THE PROBLEM

How many people with a moderate to severe TBI receive inpatient rehabilitation?

Specialized brain injury rehab: 9%
Mixed Neuro rehab: 4%
General rehab: 5%

TOTAL: 18%

How many people have follow-up with primary care after discharge from acute care and no inpatient rehabilitation?

within 30 days of discharge - 44%;
within 90 days of discharge - an additional 16%

How many get rehab from Home and Community Care after discharge from either acute care or inpatient rehab

Physiotherapy 20%;
Occupational Therapy 21%
SLP or SW 0.7%

Data used with permission from the 2024 TBI Report Card.
Data obtained from administrative data bases by ICES.

INTRODUCTION

Neurotrauma Care Pathways

PedsConcussion — Living Guideline for Pediatric Concussion Care

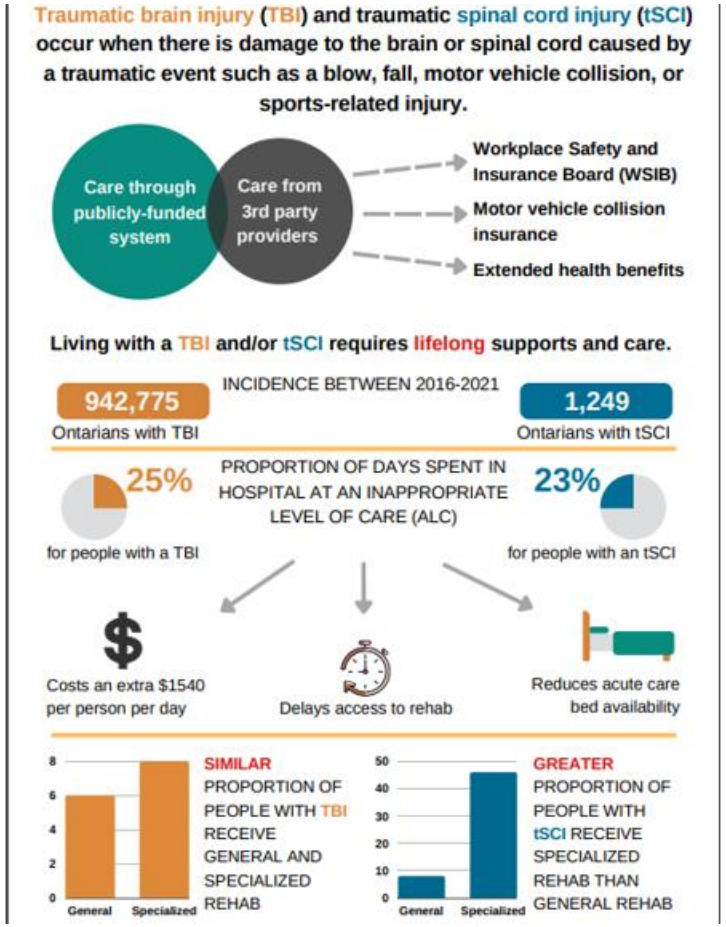
Living Concussion Guidelines

- The Neurotrauma Care Pathways Project is funded by the Ministry of Health to develop evidence-based Ideal Care Pathways for **concussion**, **moderate-to-severe TBI**, and **traumatic spinal cord injury**

- Care Pathways organize building blocks of care at each stage of the care continuum, and Clinical Practice Guidelines provides the clinical details

- The living Canadian TBI Guideline was designed to provide evidence-based recommendations for the rehabilitation of adults having sustained a moderate to severe TBI

CURRENT STATE EVALUATION



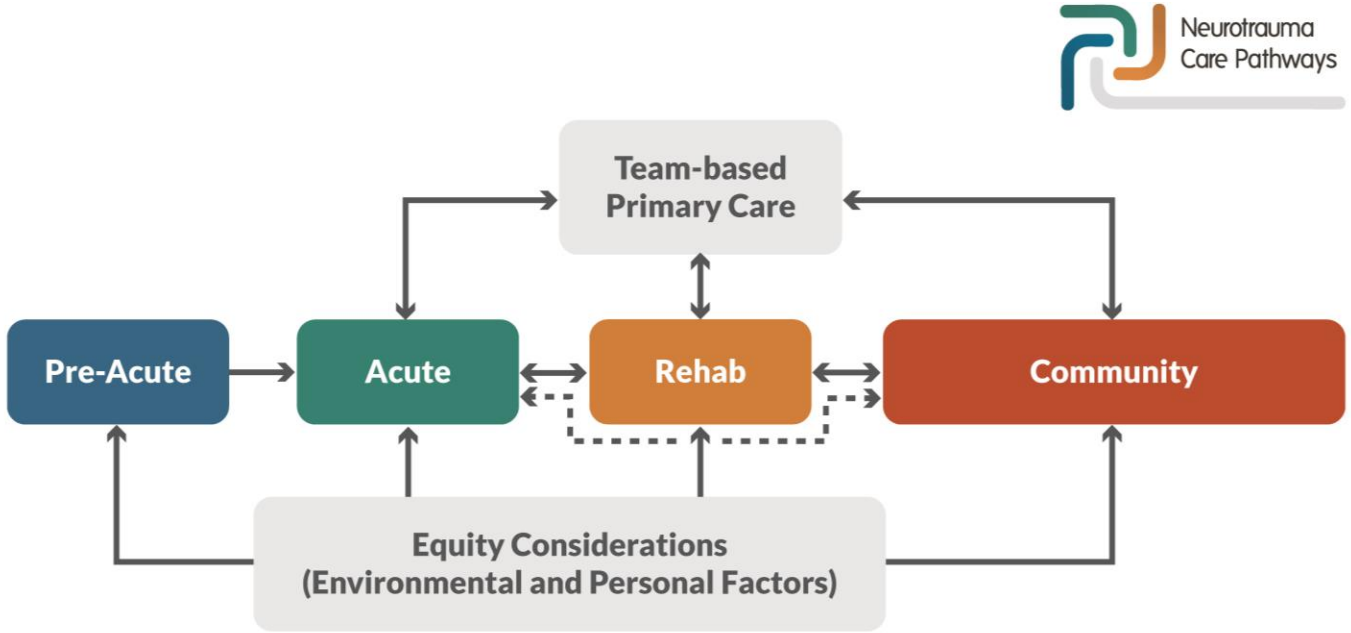
PROVINCIAL TRAUMATIC BRAIN INJURY (TBI) REPORT CARD

The Provincial TBI Report Card Working Group, formerly an initiative of the Ontario Neurotrauma Foundation, collaborates with IC/ES to produce annual Provincial TBI Report Cards using administrative data. The goal of these Reports is to provide a snapshot of TBI care across the province using evidence-based quality indicators.

https://kite-uhn.com/brain-injury/en/prov-tbi-report-card

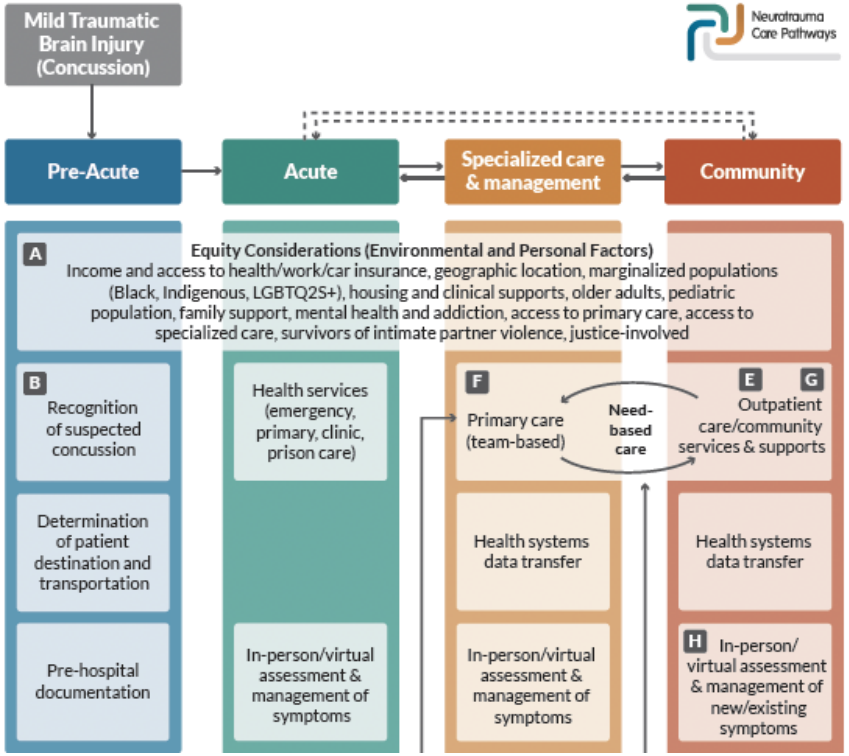
NEUROTRAUMA CARE PATHWAYS

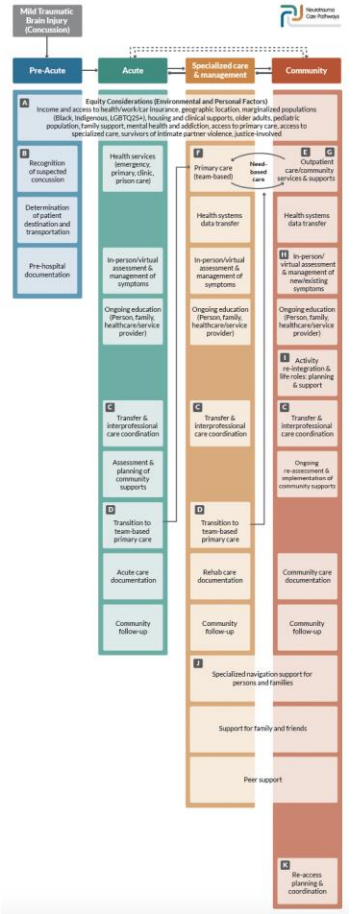
- Over 200 key partners have been engaged; particularly persons with lived experience
- Each care stage contains building blocks (key elements of care), which are linked to existing evidence-based CPGs.



CARE PATHWAYS

The gaps between current and ideal practices can be eliminated through implementation of the building blocks and companion quality indicators by health care providers and system planners.





QUALITY INDICATORS

- Each Ideal Care Pathways building block of care includes
  - the definition and technical specifications of the Quality Indicator to evaluate the care stage
  - the status/feasibility of using the Quality Indicator
- Some building blocks contain multiple Quality Indicators that evaluate different aspects of that stage

Indicator Type	Equity	Pre-Acute	Acute	Rehab	Community	Total
Core set	3	1	7	4	7	22
Must-have	2	0	3	4	8	17
Should-have	3	0	12	3	2	20
Nice-to-have	3	1	2	1	1	8
Total	11	2	24	12	18	67

Acute Data

Ongoing education (Person, family, healthcare/service provider)

Indicator: Proportion of a) patients and b) informal caregivers (e.g., family members) who, while receiving acute care, receive injury-specific education regarding prognosis, treatment options, management, and community supports

- **Status/Feasibility:** To implement in 2025 or beyond. This indicator is currently of low feasibility because there is no province-wide standardized infrastructure to systematically collect this data. Education and resource data in acute care may only be available in physician discharge notes or electronic medical records (EMR), which currently cannot be extracted systematically.

Specialized care & management Data

Primary care (team-based)

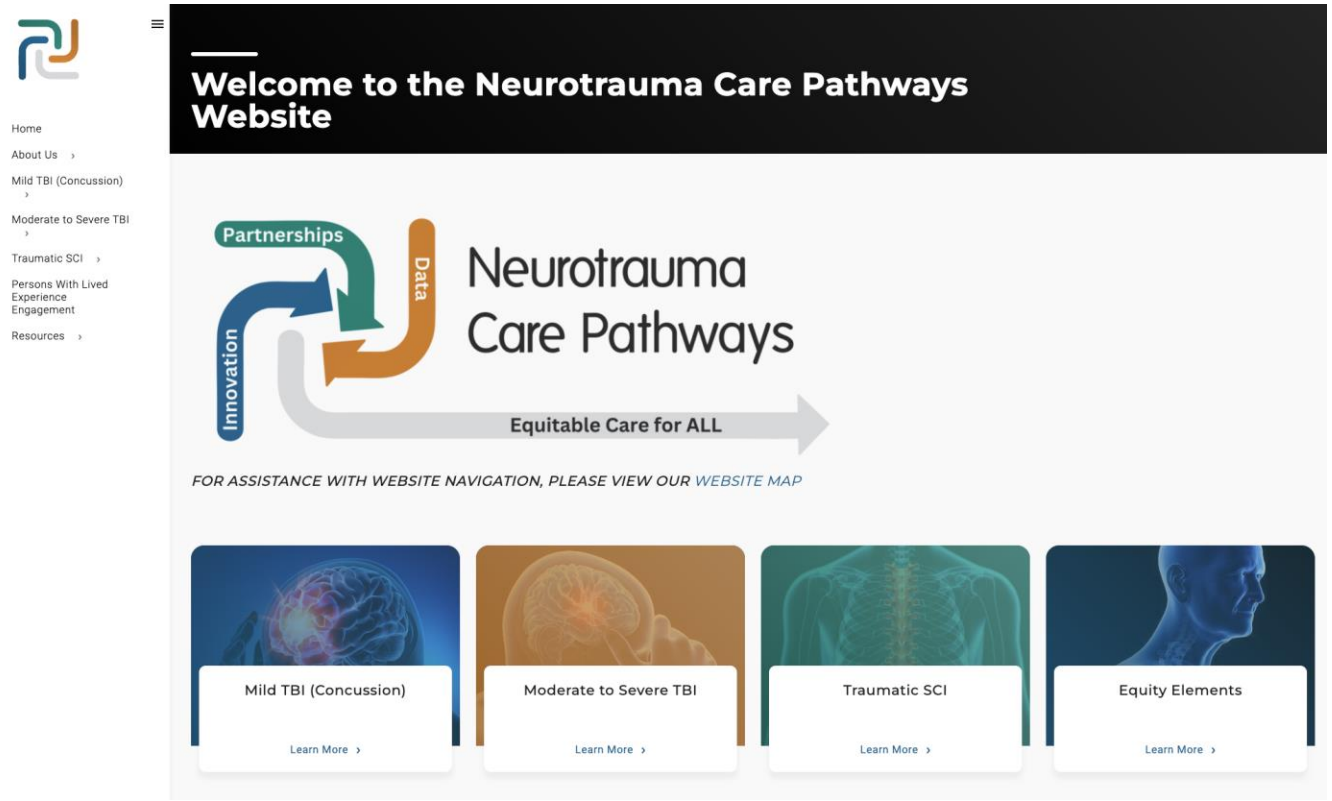
Indicator: Proportion of patients with persisting post-concussion symptoms (lasting over 90 days) who are referred from primary care to specialized, interprofessional concussion care within 90 days of injury/first visit

- **Status/Feasibility:** To implement in 2025 or beyond. There is currently no existing infrastructure to collect this type of data systematically and across the province.

CARE PATHWAYS WEBSITE

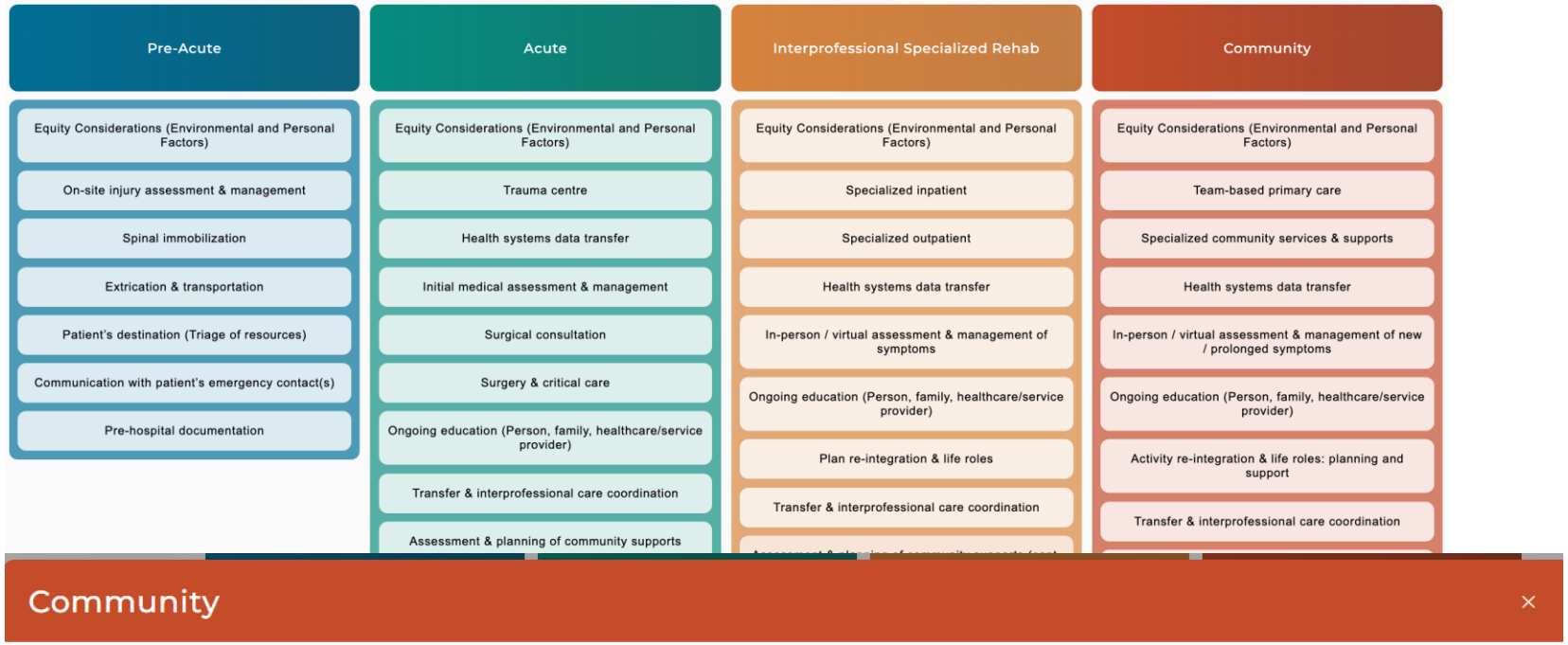
Neurotrauma Care Pathways Interactive Website:

https://www.neurotraumapathways.ca



HOW TO USE THE PATHWAY

- Individualizing the Pathways ›
- Mild TBI (Concussion) ⌄
- Moderate to Severe TBI ⌄
- Traumatic SCI ⌄
- Project Activities ⌄
- Resources ›
- About Us ⌄



Community

In-person / virtual assessment & management of new / prolonged symptoms

Assessment, treatment, and management strategies provided during community living should be assessed by standardized outcome measures. Re-assessment and evaluation should occur frequently as injury status changes (e.g., changes related to ageing). The results of community assessments may indicate necessary re-entry into acute care or rehabilitation for management. Re-assessment should include determining any changes to the patient's decision-making and mental capacity and should follow consent procedures based on jurisdiction regulations. Some brain injury sequelae may require ongoing reassessment in the community, as well as subsequent management of long-term sequelae and needs. It is important that community supports (rehabilitative and/or supportive) are consistent with the person's goals, interests, age, and injury status/progression. It is important that healthcare providers ensure that the provided, coordinated, and planned care be person-oriented and be designed to meet the needs of the person with brain injury, particularly those needs articulated by the person with brain injury. The person with brain injury should be encouraged and supported to safely engage in activities on their own, allowing them to capitalize on the skills and strategies provided during formal rehabilitation sessions. This includes, but is not limited to, tasks of therapeutic value targeting deficits through meaningful activities in the community.

TARGET AUDIENCES

- **Care Pathways:**
  - *Primary:* Healthcare providers, clinical managers and system planners who can implement building blocks of care and companion quality indicators to eliminate gaps between current and ideal practices
  - *Secondary:* Persons with lived experience and their families/caregivers
- **Clinical Practice Guidelines**:
  - *Primary:* Clinicians, primary care providers and family health teams who may not specialize in working with individuals with brain injury, and/or who may not be up to date on current evidence and best care practices for working with patients with brain injury of any severity
  - *Secondary:* Persons with lived experience and their families/caregivers

INTRODUCTION TO GUIDELINES

CANADIAN
CLINICAL PRACTICE GUIDELINE
FOR THE REHABILITATION OF ADULTS
WITH MODERATE TO SEVERE TBI

LIVING
CONCUSSION
GUIDELINES

PedsConcussion
LIVING GUIDELINE FOR
PEDIATRIC CONCUSSION CARE

Can-SCIP Guideline
Canadian Spinal Cord Injury Practice Guideline

- The Canadian TBI Guideline, Can-SCIP Guideline, and Living Concussion Guidelines were designed to provide evidence-based recommendations for the rehabilitation of adults having sustained a moderate to severe TBI, concussion/mTBI, or tSCI

UHN Toronto Rehabilitation Institute
The KITE Research Institute

Institut national d'excellence en santé et en services sociaux
Québec

The Ottawa Hospital

Ontario
Ministry of Health & Long Term Care

PRAXIS
Spinal Cord Institute

IMPORTANT LIVING WEBSITE LINKS

Neurotrauma Care Pathways:

https://www.neurotraumapathways.ca/

Living Concussion Guidelines for Adults:

Peds Concussion Guideline:

http://www.braininjuryguidelines.org/

Canadian TBI Guideline:

Can-SCIP Guidelines:

https://kite-uhn.com/can-scip

NEXT STEPS

- **Pathways Project:**
  - Continue to focus on implementation and system evaluation
    - Pilot implementation projects in each Ontario Health Region
    - Report Cards and System Reports
    - Collaboration with publicly and insurance/fee for service funders
  - Continue to engage key partners, particularly PWLE, to ensure priorities and gaps are being addressed
- **Knowledge Mobilization**
  - ➢ Regulated healthcare professionals, system planners, clinical managers and funders
  - ➢ Brain injury and spinal cord injury organizations

CONCUSSION GUIDELINES

SCAN THE QR CODE:

LIVING
CONCUSSION
GUIDELINES

CONCUSSIONSONTARIO.ORG

BACKGROUND

- Concussion can result in disabling symptoms, and an unfortunate minority also experience prolonged symptoms
- Early recognition and diagnosis of concussion and proper treatment are needed to optimize outcomes (e.g., faster recovery)
- Clinicians and patients require up-to-date guidance on diagnosis and treatment
- Concussion research is being published rapidly, therefore, a guideline for the management of concussion in adults that is updated continuously is needed to inform end users of the latest important research and clinical developments

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METHODS

- A systematic review is being conducted to provide supporting evidence (May 2017 and later)
- Searches are conducted approximately every 6 months
- Includes English peer reviewed studies related to assessment or treatment of adult concussion
- Over 40 concussion experts from across North America have volunteered to examine the literature and participate in virtual meetings and online consensus surveys to produce recommendations

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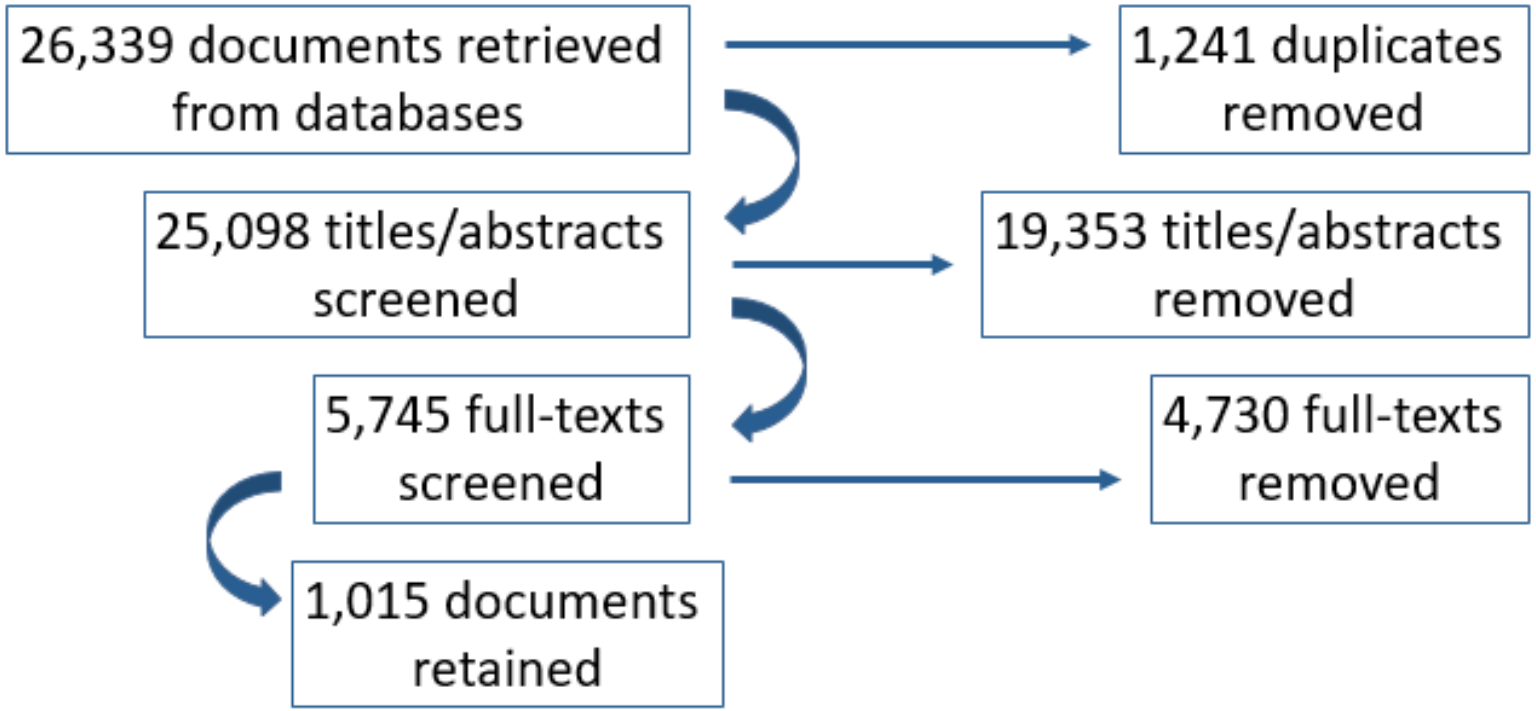
MAY 2017-END OF OCTOBER 2022



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SCOPE AND PURPOSE OF GUIDELINE

Scope

The present guideline is appropriate for use with adults (18 years of age and older) who have experienced a concussion.

This Guideline is targeted toward healthcare professionals providing service to individuals who have experienced concussion, including:

- primary care providers (family physicians, nurse practitioners)
- neurologists
- physiatrists
- psychiatrists
- psychologists
- occupational therapists
- speech-language pathologists
- physiotherapists
- chiropractors
- optometrists
- ophthalmologists
- social workers
- counselors

What is our *Purpose*?

The purpose of this clinical practice guideline is to improve patient care by creating a framework that can be implemented by healthcare professionals to effectively identify and treat individuals who manifest prolonged symptoms following concussion.

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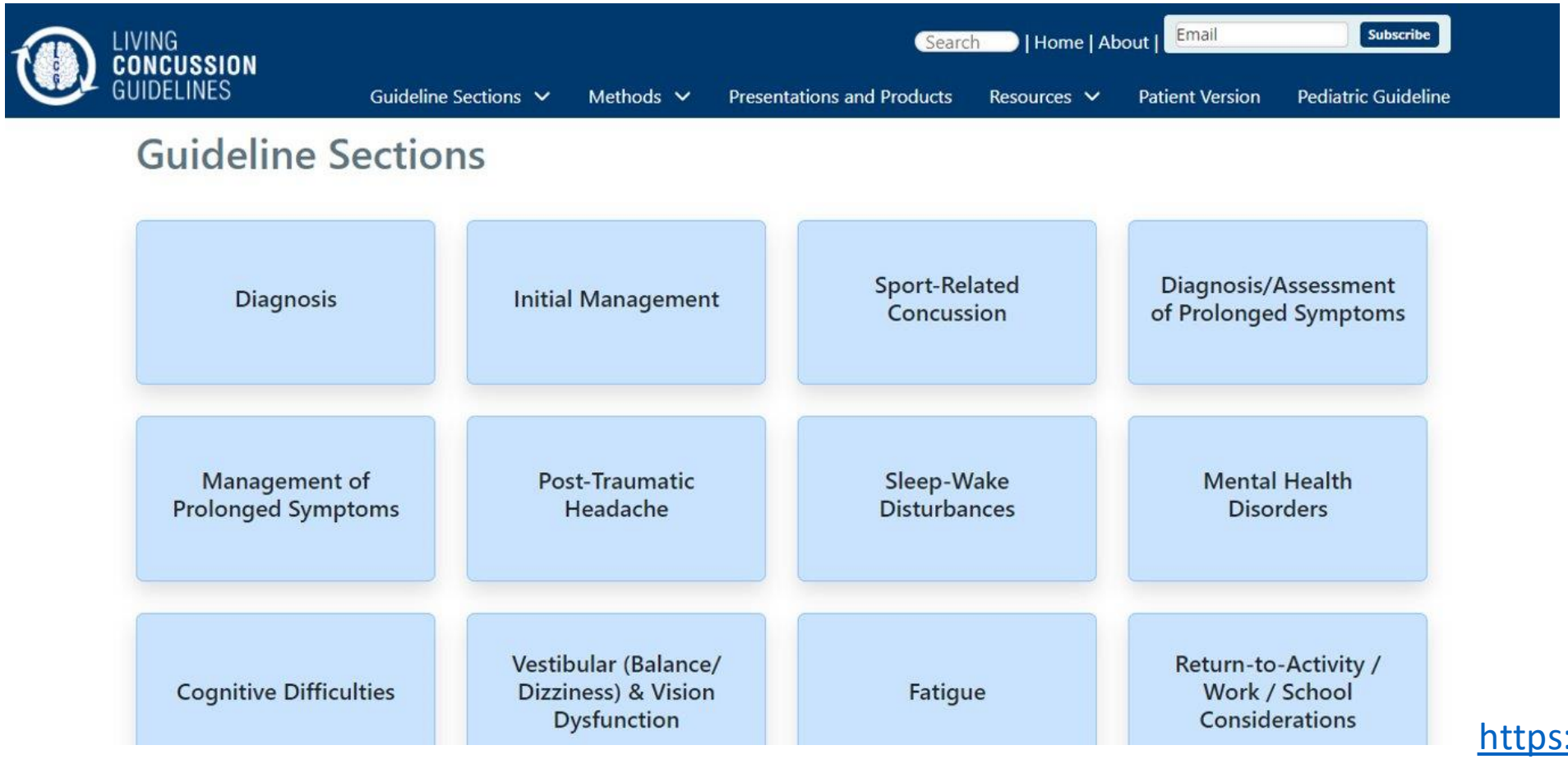

Living Concussion Guidelines for Adults:

https://concussionsontario.org/

USING THE WEBSITE

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Guideline Sections | Methods | Presentations and Products | Resources | Patient Version | Pediatric Guideline

Diagnosis

Diagnosis of concussion is the first critical step in successful management leading to improved outcomes and prevention of further injury. The Living Concussion Guidelines adheres to the 2023 American Congress of Rehabilitation Medicine (ACRM) diagnostic criteria for concussion or uncomplicated mTBI (i.e., mTBI with no neuroimaging abnormality present).[1] The full article can be accessed here. Click here to view a visual representation of the ACRM diagnostic criteria taken from the article, and here to view a visual representation of clinical signs, acute symptoms, and lab findings.

The purpose of the initial medical assessment is to establish the diagnosis of concussion by ruling out other conditions with similar symptom profiles such as more severe forms of TBI, cervical spine injuries and medical and neurological conditions.[2] The need for neuroimaging should also be determined using the Canadian CT Head Rule (Figure 1.1).[3,4] Symptoms should be formally documented at the time of the initial assessment for the purpose of subsequent comparative analysis in the event of prolonged symptoms. Blood-based biomarkers[5] are still considered investigational and therefore are not recommended for use in diagnosing/assessing patients in the ED or PCP's office.

Once a diagnosis of concussion is established, Primary Care Provider's (PCP's) should provide patients and their support person with written, verbal and/or pictorial education

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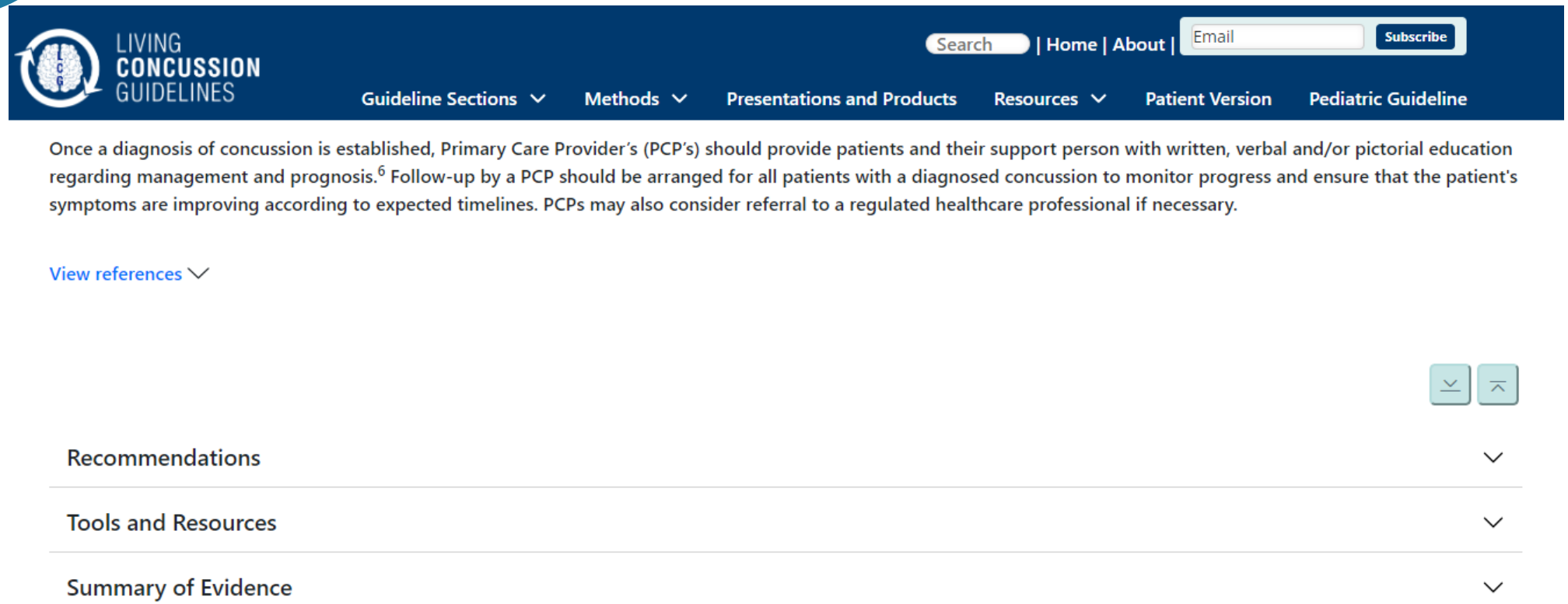

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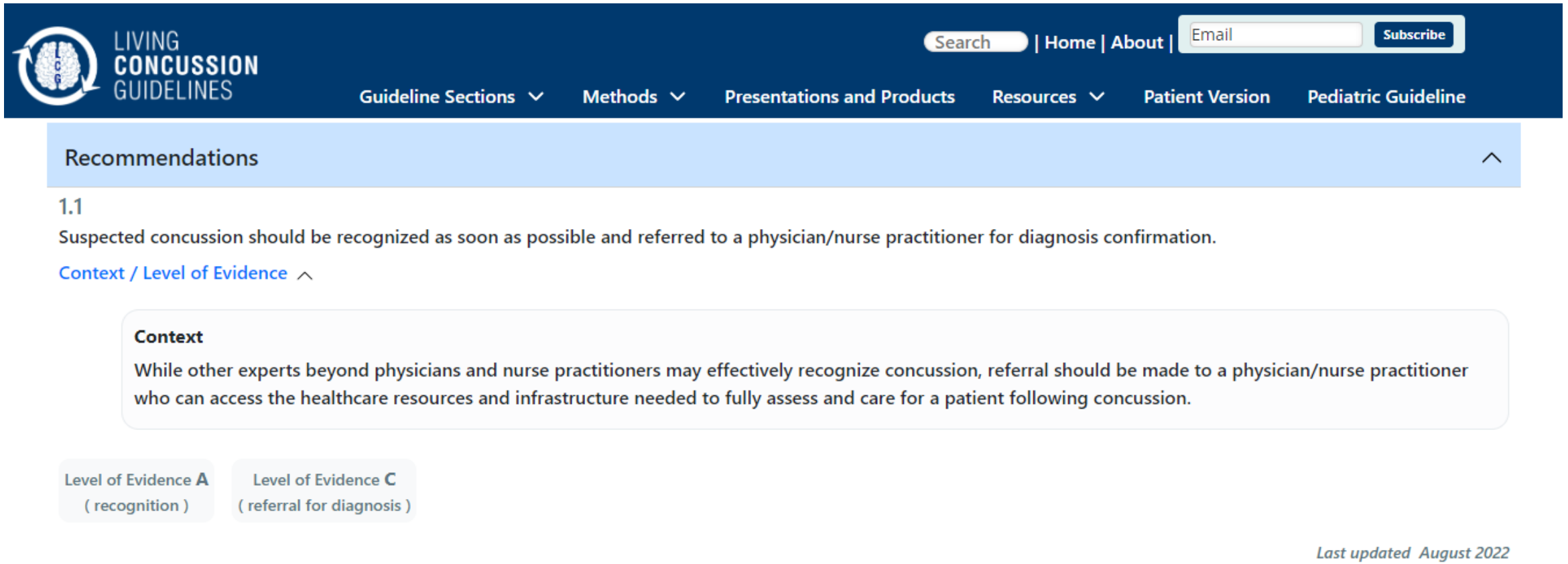

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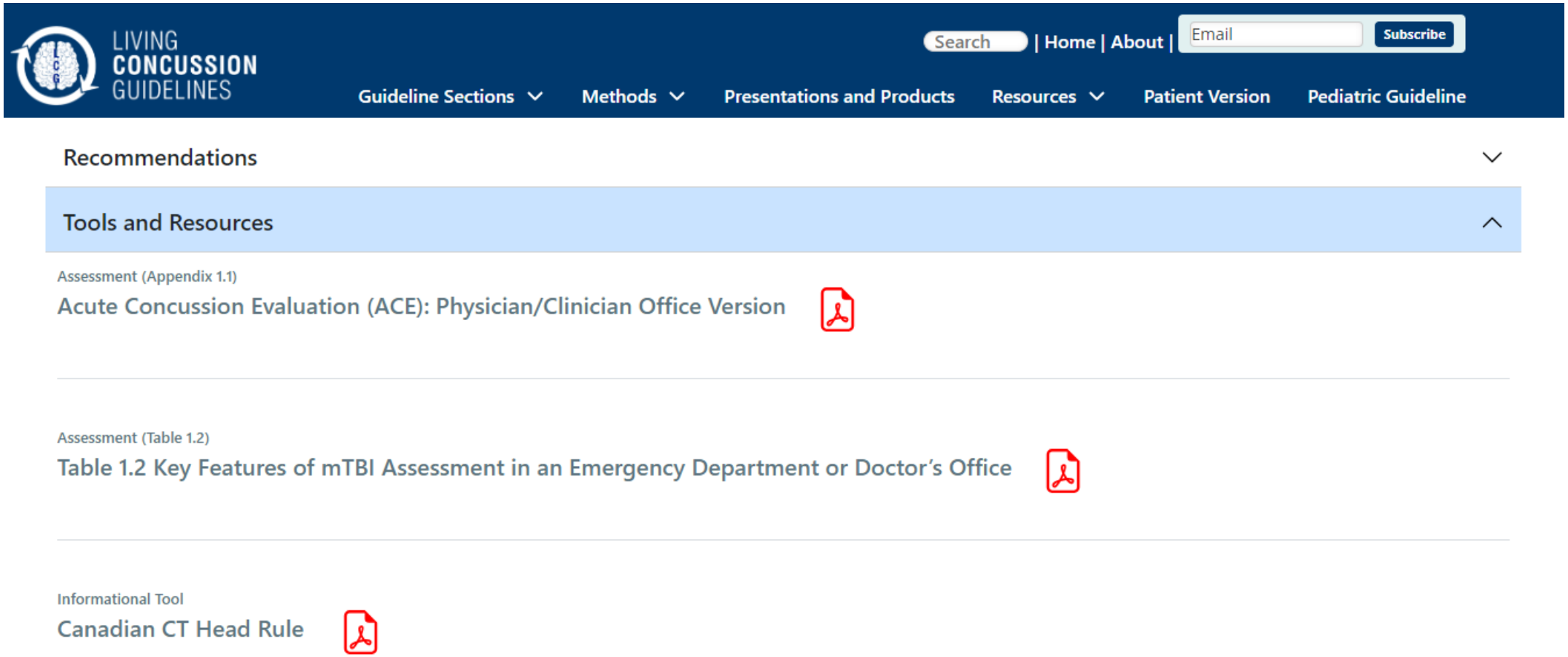

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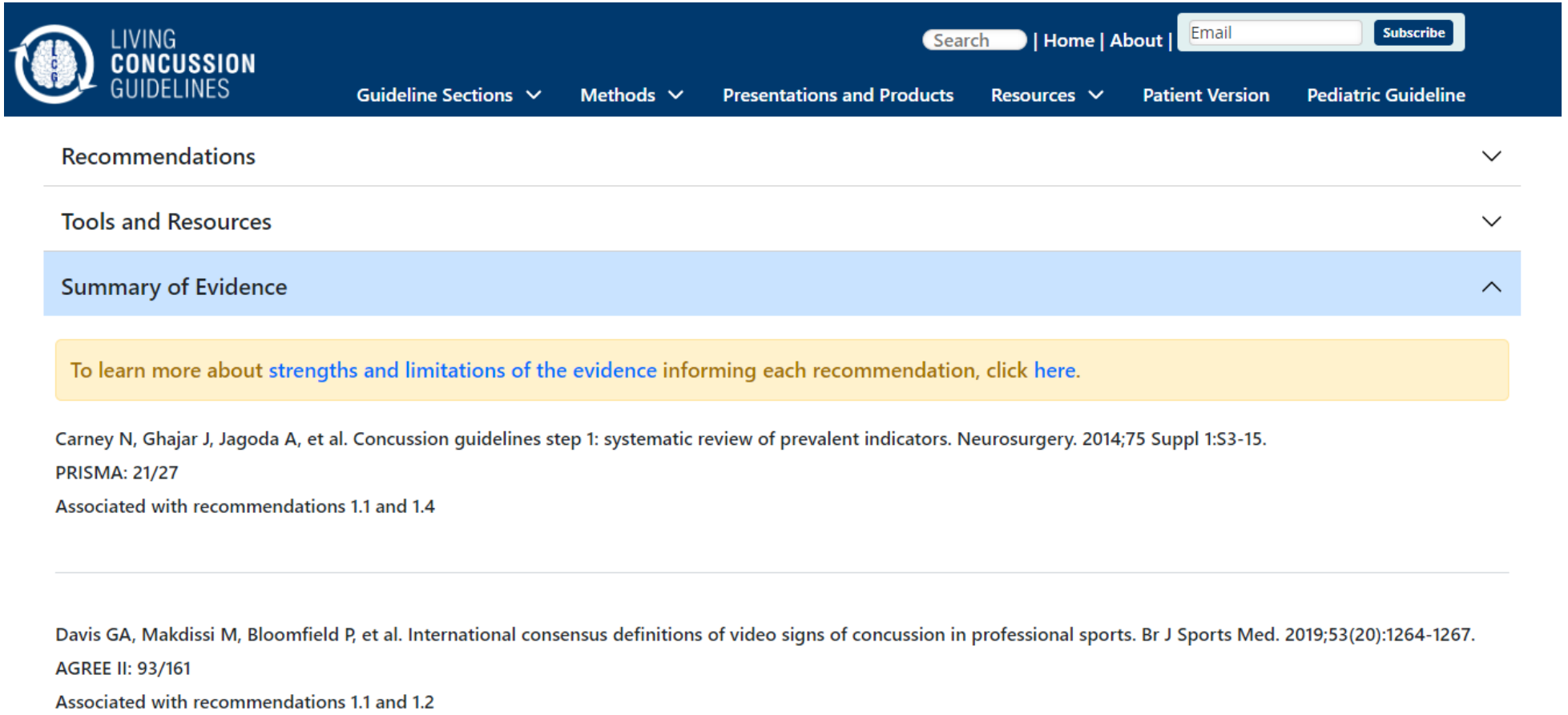

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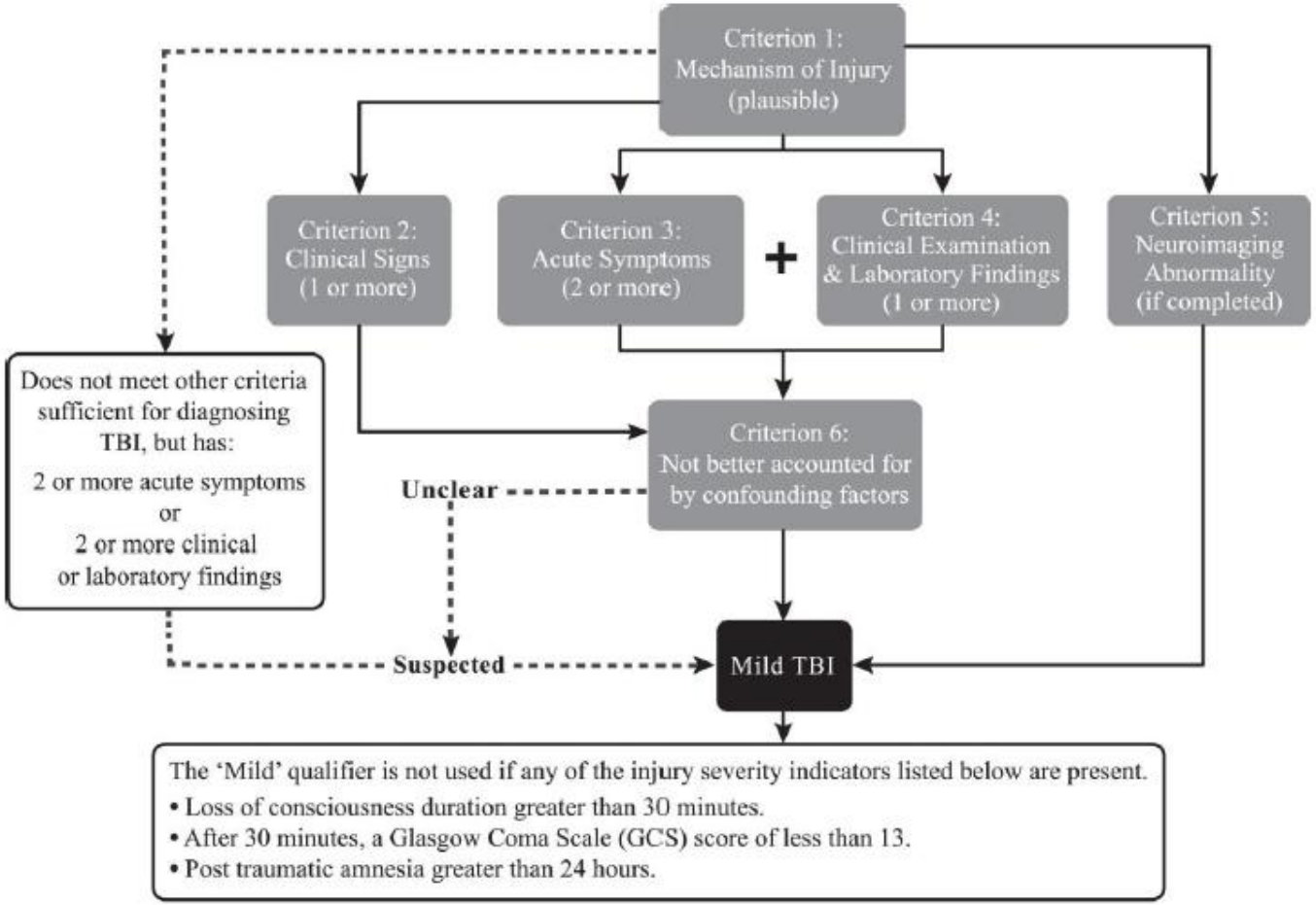
ACRM DIAGNOSTIC CRITERIA

Diagnosis

Diagnosis of concussion is the first critical step in successful management leading to improved outcomes and prevention of further injury. The Living Concussion Guidelines adheres to the 2023 American Congress of Rehabilitation Medicine (ACRM) diagnostic criteria for concussion or uncomplicated mTBI (i.e., mTBI with no neuroimaging abnormality present).[1] The full article can be accessed here. Click here to view a visual representation of the ACRM diagnostic criteria taken from the article, and here to view a visual representation of clinical signs, acute symptoms, and lab findings.

Silverberg et al. Arch Phys Med Rehabil. 2023 Aug;104(8):1343-1355. doi: 10.1016/j.apmr.2023.03.036
https://www.archives-pmr.org/article/S0003-9993(23)00297-6/fulltext

ACRM DIAGNOSTIC CRITERIA



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ACRM DIAGNOSTIC CRITERIA

Clinical Signs

i. Loss of consciousness immediately following injury.
ii. Alteration of mental status immediately following the injury evidenced by:
- reduced responsiveness or inappropriate responses to external stimuli
- slowness to respond to questions/instructions
- agitated behavior
- inability to follow two-part commands
- disorientation to time, place or situation

iii. Complete or partial amnesia for events immediately following the injury. If post-traumatic amnesia cannot be reliably assessed, retrograde amnesia can be used as a replacement for this criterion.
iv. Other acute neurological sign(s)

Clinical signs can be observed (e.g., patients repeatedly asking 'what happened' to cause their injury) or elicited (e.g., assessing orientation in a mental status examination).

Symptoms are subjective feelings of a change in health.

Acute Symptoms

i. Feeling confused, feeling disoriented, and/or feeling dazed.
ii. Physical symptoms: headache, nausea, dizziness, balance problems, vision problems, sensitivity to light, and/or sensitivity to noise.
iii. Cognitive symptoms: feeling slowed down, mental fog, difficulty concentrating, and/or memory problems.
iv. Emotional symptoms: uncharacteristic emotional lability and/or irritability.

Lab Findings

i. Cognitive impairment
ii. Balance impairment
iii. Oculomotor impairment or symptom provocation in response to vestibular-oculomotor challenge
iv. Elevated blood biomarker(s) indicative of intracranial injury.

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SPORT SECTION

Given that the current guideline is not specific to sport-related injuries, the information and guidance included herein for acute and subacute management is limited. Thus, readers interested in further guidance on the assessment and management of concussion in this specific patient population should consult the latest Consensus Statement on Concussion in Sport: the Fifth International Conference on Concussion in Sport held in Berlin, October 2016, the Concussion Management Guidelines for Certified Athletic Therapists in Quebec, or the Canadian Guideline on Concussion in Sport. Many sports organizations also formally provide specific guidance and recommendations that are unique to their sport and parallel the principles of existing guidelines; this information can provide further clarity and assistance when making decisions about how to proceed with progressive return to an activity/sport.

*This section will be updated soon to reflect the new Consensus Statement on Concussion in Sport: the Sixth International Conference on Concussion in Sport held in Amsterdam, October 2022.

View references

Patricios JS, Schneider KJ, Dvorak J, *et al* Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport–Amsterdam, October 2022 *British Journal of Sports Medicine* 2023;**57:**695-711. https://bjsm.bmj.com/content/57/11/695

RESOURCES

Patient Version

The following information and resources were taken from the 3rd edition of the guidelines. Tl

The Patient Version of the *Guidelines for Concussion/mTBI and Prolonged Symptoms* is desigr
communication between provider and patient easier. The sections include the most common

We would like to thank all the patients and people living with persistent symptoms who p

Please give us your feedback on the information and the tools.

1) Diagnosis and Assessment of Concussion/mTBI

2) Initial Management of Concussion/mTBI

3) Sport-related Concussion/mTBI

4) General Recommendations Regarding Diagnosis / Assessment of Prolonged Symptoms

5) General Recommendations Regarding Management of Prolonged Sypmtoms

6) Post-Traumatic Headache

7) Sleep-Wake Disturbances

8) Mental Health Disorders / Problems

9) Cognitive Difficulties

10) Vestibular Problems and Vision Dysfunction

11) Fatigue

12a) Return-to-Activity - School Considerations

Concussion Toolkits

Toolkit A

- Concussion Resources for Patients & Families

Toolkit B

- ER HCP Key Messages
- Risk Factors and Red Flags

Toolkit C

- ONF Concussion Symptom Checklist

Standards for Concussion Clinics

Individuals with suspected concussion should be assessed by a qualified practitioner able to make a diagnostic decision (i.e., physician, nurse practitioner, or neuropsychologist).

Read More »

Concussion clinics should provide patients with comprehensive post-concussion care, including the following core functions and services: (1) diagnosis and medical treatment decisions; (2) physical treatment; (3) cognitive, function, and emotional support; (4) coordination of care; and, (5) education.

Read More »

Post-concussion care and concussion clinics should have direct and ongoing access to a physician with experience in concussion management.

Read More »

Concussion clinic teams should clearly define each other's roles and professional scopes of practice.

Read More »

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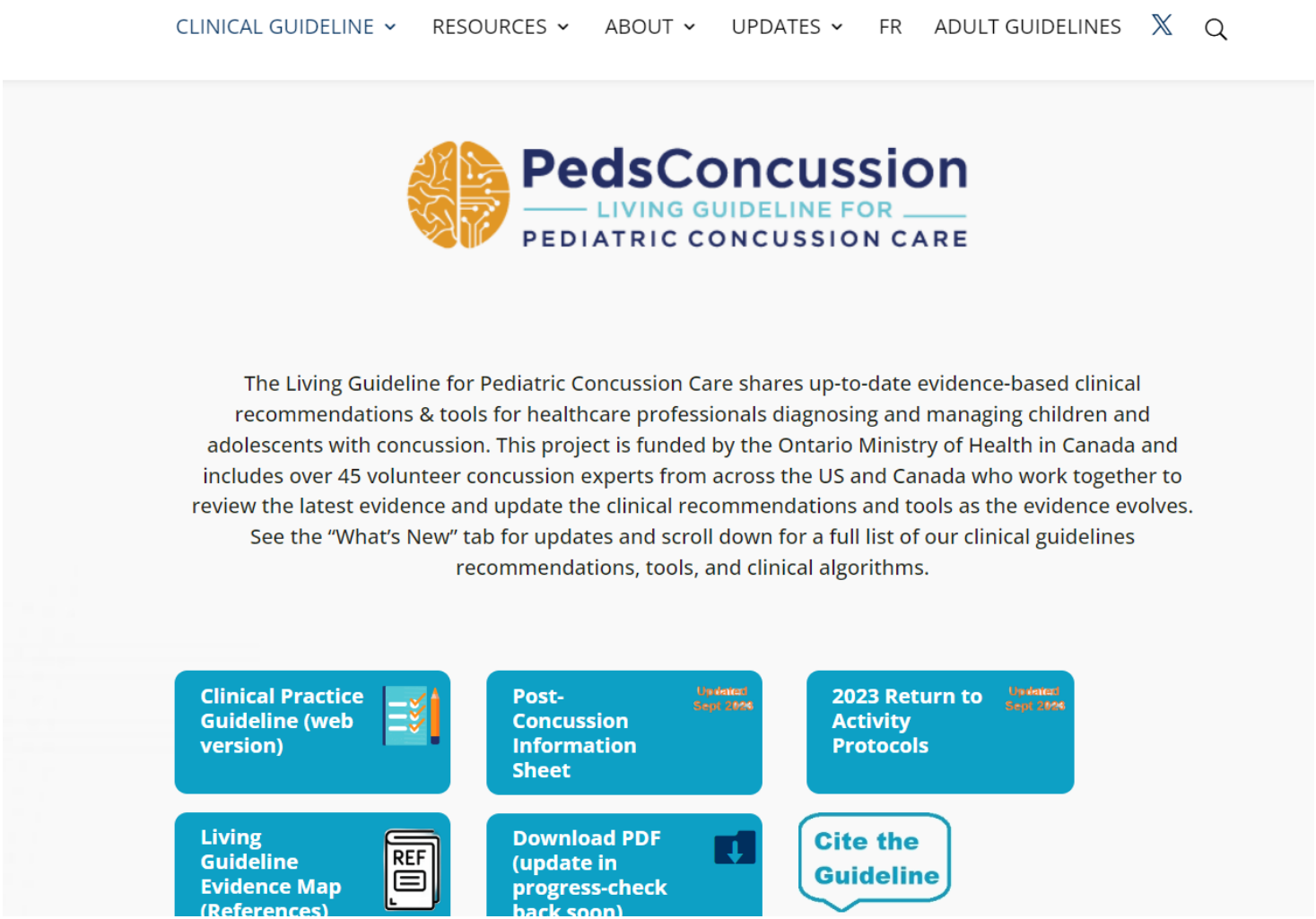

Pediatric Concussion Guideline:

https://pedsconcussion.com/

CASE EXAMPLE 1

Patient Profile

- **Name:** Emily
- **Age:** 16
- **Sport:** Soccer
- **Injury Date:** 5 days ago
- **Injury Mechanism:** Collision with an opposing player during a soccer match

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PEDIATRIC CONCUSSION CARE

Section A:

Concussion Recognition and Directing to Care

Sport Concussion Considerations

CASE EXAMPLE 1

Five days post-concussion, Emily and her parents sought consultation with a physiotherapist. Emily's soccer coach is also actively engaged in her recovery process.

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Emily presented with the following symptoms:

- **Headache:** Emily reported a persistent headache since the injury, worse on the left side temporal region and behind her left eye.
- **Dizziness:** She experienced dizziness upon standing or moving quickly, and in the car.
- **Nausea:** Occasional bouts of nausea and feeling queasy.
- **Sensitivity to Light and Noise:** She found it uncomfortable to be in bright or noisy environments.
- **Difficulty Concentrating:** Emily found it challenging to focus on schoolwork and conversations.

Section B:

Headache

Cognition

Vision, Vestibular, and Oculomotor Function

CASE EXAMPLE 1

Assessment

The PT conducts a thorough physical and neurological examination to evaluate Emily's symptoms.

Section A:

Recommendation 1.4

Concussion should be suspected and diagnosed as soon as possible to maintain health and improve outcomes……It is important to note that some patients may experience a delayed onset of concussion symptoms.

CASE EXAMPLE 1

Comprehensive Medical and Subjective History

- Prognostic indicators
- Patient demographics
- Symptoms, severity
- Mechanism of injury
- Other health, mental health issues
- Allergies, medications
- Who else is on team – coach, guidance counsellor etc.

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Section A: Initial Medical Assessment and Management

Some relevant Guideline sections:

2.1

Physicians or nurse practitioners should perform a comprehensive medical assessment on all children/adolescents with a suspected concussion or with acute head or spine trauma.

- Sport Concussion Assessment Tool 6 (SCAT6 13+yrs and Child SCAT6 8-12yrs) (Updated Sept 2023)

2.1a

Take a comprehensive clinical history.

CASE EXAMPLE 1

Physical Examination and Outcome Measures

- Vital signs
- Cervical spine assessment
- VOMs and vestibular assessment
- BCTT
- Balance
  - Modified BESS
- Patient reported outcome measures
  - Rivermead
  - PCSI?

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PEDIATRIC CONCUSSION CARE

Section A: Initial Medical Assessment and Management

Some relevant Guideline sections:

2.1b

Perform a comprehensive physical examination.

- Vital signs (resting heart rate and blood pressure).
- A cervical spine examination (palpation, range of motion, provocative cervical spine tests) (Tool 2.1: Physical examination).

3.1b

Examine the child/adolescent and perform a focused physical examination.

- An examination of vestibular, visual, and oculomotor systems (e.g., Vestibular Ocular Motor Screening Tool (VOMS) or Visio-vestibular examination (VVE))

CASE EXAMPLE 1

Education:

- About concussion
- Check in with family doc
- Treatment plan, recovery plan
  - Sleep hygiene
  - Hydration, symptom threshold
- Return to school, sport, prognosis
- Next steps

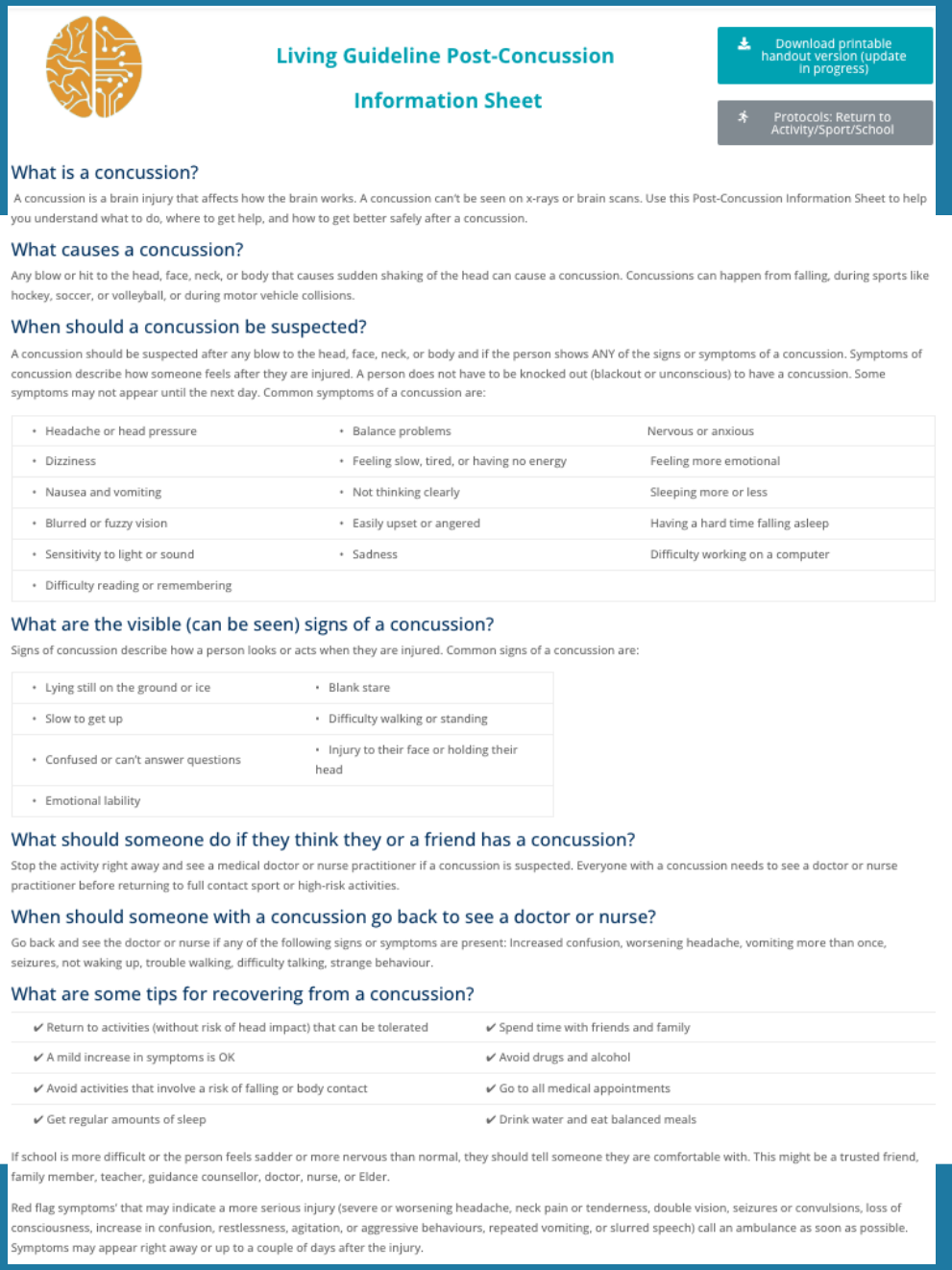
Section A:

Return-to-School and Work

Medical Clearance for Full-Contact Sports or High-Risk Activity

Section B:

Sleep



Living Guideline Post-Concussion Information Sheet

Download printable handout version (update in progress)

Protocols: Return to Activity/Sport/School

What is a concussion?

A concussion is a brain injury that affects how the brain works. A concussion can't be seen on x-rays or brain scans. Use this Post-Concussion Information Sheet to help you understand what to do, where to get help, and how to get better safely after a concussion.

What causes a concussion?

Any blow or hit to the head, face, neck, or body that causes sudden shaking of the head can cause a concussion. Concussions can happen from falling, during sports like hockey, soccer, or volleyball, or during motor vehicle collisions.

When should a concussion be suspected?

A concussion should be suspected after any blow to the head, face, neck, or body and if the person shows ANY of the signs or symptoms of a concussion. Symptoms of concussion describe how someone feels after they are injured. A person does not have to be knocked out (blackout or unconscious) to have a concussion. Some symptoms may not appear until the next day. Common symptoms of a concussion are:

• Headache or head pressure	• Balance problems	Nervous or anxious
• Dizziness	• Feeling slow, tired, or having no energy	Feeling more emotional
• Nausea and vomiting	• Not thinking clearly	Sleeping more or less
• Blurred or fuzzy vision	• Easily upset or angered	Having a hard time falling asleep
• Sensitivity to light or sound	• Sadness	Difficulty working on a computer
• Difficulty reading or remembering		

What are the visible (can be seen) signs of a concussion?

Signs of concussion describe how a person looks or acts when they are injured. Common signs of a concussion are:

• Lying still on the ground or ice	• Blank stare
• Slow to get up	• Difficulty walking or standing
• Confused or can't answer questions	• Injury to their face or holding their head
• Emotional lability	

What should someone do if they think they or a friend has a concussion?

Stop the activity right away and see a medical doctor or nurse practitioner if a concussion is suspected. Everyone with a concussion needs to see a doctor or nurse practitioner before returning to full contact sport or high-risk activities.

When should someone with a concussion go back to see a doctor or nurse?

Go back and see the doctor or nurse if any of the following signs or symptoms are present: Increased confusion, worsening headache, vomiting more than once, seizures, not waking up, trouble walking, difficulty talking, strange behaviour.

What are some tips for recovering from a concussion?

✔ Return to activities (without risk of head impact) that can be tolerated	✔ Spend time with friends and family
✔ A mild increase in symptoms is OK	✔ Avoid drugs and alcohol
✔ Avoid activities that involve a risk of falling or body contact	✔ Go to all medical appointments
✔ Get regular amounts of sleep	✔ Drink water and eat balanced meals

If school is more difficult or the person feels sadder or more nervous than normal, they should tell someone they are comfortable with. This might be a trusted friend, family member, teacher, guidance counsellor, doctor, nurse, or Elder.

Red flag symptoms' that may indicate a more serious injury (severe or worsening headache, neck pain or tenderness, double vision, seizures or convulsions, loss of consciousness, increase in confusion, restlessness, agitation, or aggressive behaviours, repeated vomiting, or slurred speech) call an ambulance as soon as possible. Symptoms may appear right away or up to a couple of days after the injury.

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CASE EXAMPLE 1

Medical Clearance for Full-Contact Sports or High-Risk Activity

Treatment

- Continued education
- Manual therapy to the neck
- Balance retraining
- Vestibular rehab
- Home exercise progression
  - Neck
  - Cardiovascular
- Return to school
- Return to sport
- Communication with coach, parents

Return-to-School and Work

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Living Guideline Return to School/Learn Protocol

Step	Activity	Examples of activities
1	**Activities of daily living and relative rest*** (Maximum of 24-48 hours)	Activities at home such as social interactions and light walking that do not result in more than mild and brief** exacerbation (worsening) of concussion symptoms. Minimize screentime.
2	**School activities with encouragement to return to school as soon as possible (as tolerated)**	Reading or other cognitive activities at school or at home. Goal: Increase tolerance to cognitive work, and connect socially with peers. Take breaks and adapt activities if concussion symptom exacerbation (worsening) is more than mild and brief**. Clearance from your doctor is not required to return to low-risk in-person or at-home school activities. **A complete absence from the school environment for more than one week is not generally recommended.**
3	**Part-time or full days at school with academic accommodations if needed**	Gradual reintroduction of school work. May require partial school days with access to breaks throughout the day, or with academic accommodations to tolerate the classroom or school environment. Gradually reduce accommodations and increase workload until full days without concussion-related accommodations are tolerated.
4	**Return to school full-time.** No academic accommodations (related to concussion)	Return to full days at school and academic activities without requiring concussion-related accommodations. Medical clearance is NOT required to return to school.

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Living Guideline Return to Activity/Sport Protocol

Step	Activity	Examples of activities
1	**Activities of daily living and relative rest*** (Maximum of 24-48 hours)	Activities at home such as social interactions and light walking that do not result in more than mild and brief** exacerbation (worsening) of concussion symptoms. Minimize screentime.
2	**Aerobic exercise** **Step 2A:** Light effort (up to approx 55% of maximum heart rate) **Step 2B:** Moderate effort (up to approx 70% of maximum heart rate)	Start with stationary cycling or walking at slow to medium pace. Take a break and modify activities as needed with the aim of gradually increasing tolerance and the intensity of aerobic activities. Light resistance training that does not result in more than mild and brief** exacerbation (worsening) of concussion symptoms. **Goal: increase the heart rate.**
3	**Individual sport-specific activities that do not have a risk of inadvertent head impact**	Sport-specific training away from the team sport environment (e.g., running, change of direction, and/or individual training drills and individual gym class activities that do not have a risk of head impact and are supervised by a teacher or coach). **Goal: Increase the intensity of aerobic activities and introduce low-risk sport-specific movements and changing of directions.**
	Medical clearance and a full return to school are required to progress to Step 4	
4	**Non-contact training drills and activities**	Exercise to high intensity including more challenging training drills and activities (e.g., passing drills, multiplayer training, high-intensity exercises, supervised non-contact gym class activities, and practices without body contact). **Goal: Resume usual intensity of exercise, coordination, and activity-related cognitive skills**
5	**Return to all non-competitive activities, all gym class activities, and full-contact practices**	Participate in higher-risk activities including normal training activities, all school gym-class activities, and full-contact sports practices and scrimmages. Avoid competitive gameplay. **Goal: return to activities that have a risk of falling or body contact, restore game-play confidence, and have coaches assess functional skills.**
6	**Return to sport**	Normal, unrestricted competitive gameplay, school gym class, and physical activities

CASE EXAMPLE 2

Patient Profile

- **Name:** Bob
- **Age:** 66
- **Injury Date:** 1 day ago
- **Injury Mechanism:** Fell down the stairs at home
- **Concussion Symptoms:** Headache, dizziness, fatigue

LIVING CONCUSSION GUIDELINES

Diagnosis

Post-Traumatic Headache

Fatigue

Vestibular (Balance/ Dizziness) & Vision Dysfunction

CASE EXAMPLE 2

Assessment

The PT conducts a thorough physical and neurological examination to evaluate Bob's symptoms.

Recommendations

1.1

Suspected concussion should be recognized as soon as possible and referred to a physician/nurse practitioner for diagnosis confirmation.

Context / Level of Evidence

Context

While other experts beyond physicians and nurse practitioners may effectively recognize concussion, referral should be made to a physician/nurse practitioner who can access the healthcare resources and infrastructure needed to fully assess and care for a patient following concussion.

Level of Evidence **A** (recognition)

Level of Evidence **C** (referral for diagnosis)

Last updated August 2022

CASE EXAMPLE 2

Physical Examination and Outcome Measures

- Vital signs
- Cervical spine assessment
- VOMs and vestibular assessment
- BCTT
- Balance
  - Modified BESS
- Patient reported outcome measures
  - Rivermead
  - PCSI?

Comprehensive Medical and Subjective History

- Prognostic indicators
- Patient demographics
- Symptoms, severity
- Mechanism of injury
- Other health, mental health issues
- Allergies, medications

Assessment (Appendix 1.5)

The Rivermead Post Concussion Symptoms Questionnaire

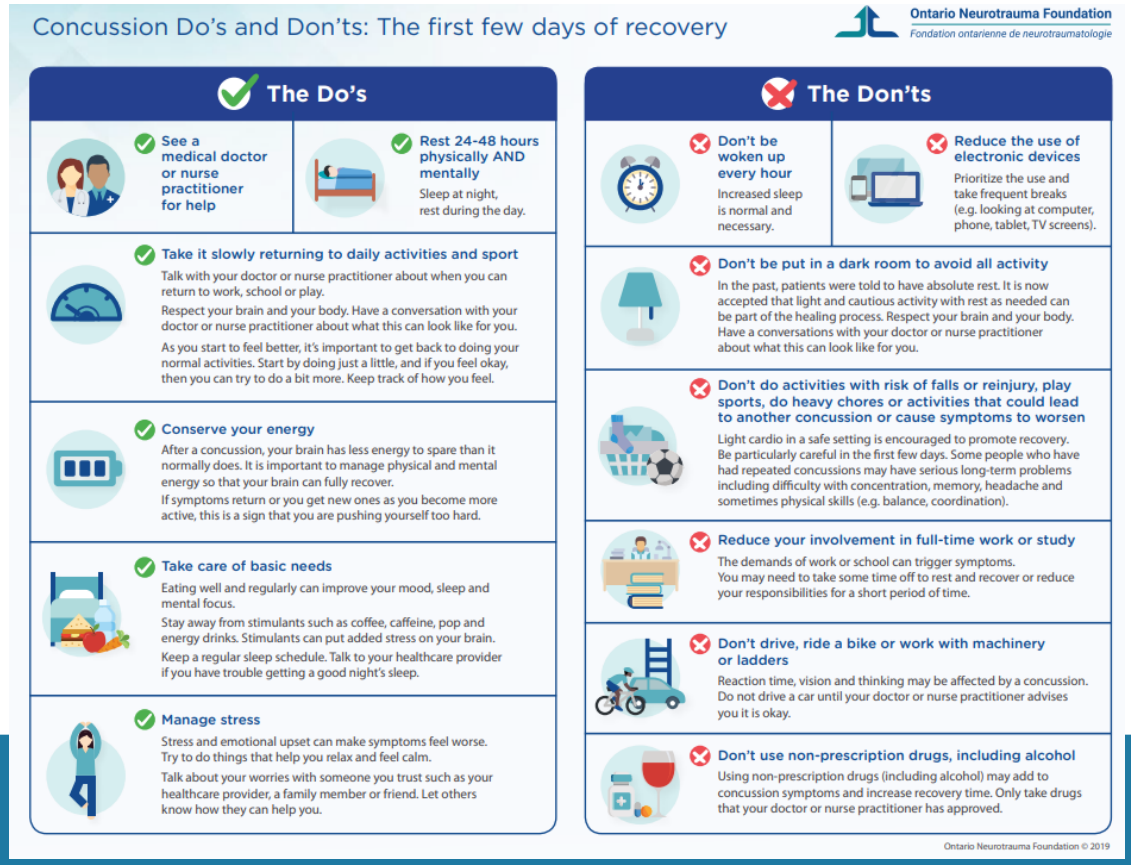
CASE EXAMPLE 2

Education:

- About concussion
  - Recovery time
- Symptom threshold
- Next steps, follow up

LIVING CONCUSSION GUIDELINES

Initial Management



Concussion Do's and Don'ts: The first few days of recovery

Ontario Neurotrauma Foundation
Fondation ontarienne de neurotraumatologie

The Do's

See a medical doctor or nurse practitioner for help

Rest 24-48 hours physically AND mentally
Sleep at night, rest during the day.

Take it slowly returning to daily activities and sport
Talk with your doctor or nurse practitioner about when you can return to work, school or play.
Respect your brain and your body. Have a conversation with your doctor or nurse practitioner about what this can look like for you.
As you start to feel better, it's important to get back to doing your normal activities. Start by doing just a little, and if you feel okay, then you can try to do a bit more. Keep track of how you feel.

Conserve your energy
After a concussion, your brain has less energy to spare than it normally does. It is important to manage physical and mental energy so that your brain can fully recover.
If symptoms return or you get new ones as you become more active, this is a sign that you are pushing yourself too hard.

Take care of basic needs
Eating well and regularly can improve your mood, sleep and mental focus.
Stay away from stimulants such as coffee, caffeine, pop and energy drinks. Stimulants can put added stress on your brain.
Keep a regular sleep schedule. Talk to your healthcare provider if you have trouble getting a good night's sleep.

Manage stress
Stress and emotional upset can make symptoms feel worse. Try to do things that help you relax and feel calm.
Talk about your worries with someone you trust such as your healthcare provider, a family member or friend. Let others know how they can help you.

The Don'ts

Don't be woken up every hour
Increased sleep is normal and necessary.

Reduce the use of electronic devices
Prioritize the use and take frequent breaks (e.g. looking at computer, phone, tablet, TV screens).

Don't be put in a dark room to avoid all activity
In the past, patients were told to have absolute rest. It is now accepted that light and cautious activity with rest as needed can be part of the healing process. Respect your brain and your body. Have a conversations with your doctor or nurse practitioner about what this can look like for you.

Don't do activities with risk of falls or reinjury, play sports, do heavy chores or activities that could lead to another concussion or cause symptoms to worsen
Light cardio in a safe setting is encouraged to promote recovery. Be particularly careful in the first few days. Some people who have had repeated concussions may have serious long-term problems including difficulty with concentration, memory, headache and sometimes physical skills (e.g. balance, coordination).

Reduce your involvement in full-time work or study
The demands of work or school can trigger symptoms. You may need to take some time off to rest and recover or reduce your responsibilities for a short period of time.

Don't drive, ride a bike or work with machinery or ladders
Reaction time, vision and thinking may be affected by a concussion. Do not drive a car until your doctor or nurse practitioner advises you it is okay.

Don't use non-prescription drugs, including alcohol
Using non-prescription drugs (including alcohol) may add to concussion symptoms and increase recovery time. Only take drugs that your doctor or nurse practitioner has approved.

CASE EXAMPLE 2

You see Bob again 4 weeks later, and he reports that he stills has a headache, and feels very out of breath when he has to go upstairs. The headache is not consistent, but worse when at his computer or driving. He is back to work, and all his activities of daily living. He is very fearful of falling again and is avoiding stairs when possible.

LIVING CONCUSSION GUIDELINES

Return-to-Activity / Work / School Considerations

Post-Traumatic Headache

Diagnosis/Assessment of Prolonged Symptoms

CASE EXAMPLE 2

Subjective History

•Current activities, medications, sleep, etc.
•Headache history
• Frequency, duration, location, intensity, alleviating factors

Objective History

- Neurological exam
- MSK exam (neck)
- BCTT

LIVING CONCUSSION GUIDELINES

Diagnosis/Assessment of Prolonged Symptoms

Appendix 3.3
Buffalo Concussion Treadmill Testing

Table 1.1
Risk Factors Influencing Recovery Post mTBI

CASE EXAMPLE 2

LIVING CONCUSSION GUIDELINES

Management of Prolonged Symptoms

Post-Traumatic Headache

Return-to-Activity / Work / School Considerations

Treatment

- Advise on non-pharma treatment for headaches
- Headache diary
- Cervical spine manual therapy
- Lifestyle modifications
- Reassurance
- Cardiovascular rehab
- Referral to psych. for fear avoidance behaviors
- Discuss treatment plan

Recommendation 8.1

[….]Disturbances in mood, cognition, and behaviour, can be commonly experienced following injury and may signal the presence of a mental health disorder. Pre-existing mental health conditions and symptoms with post-injury onset have been found to be predictive of prolonged post-concussive symptomatology. Thus, primary care providers should identify and treat changes in mood to facilitate recovery of post-concussive symptoms.

KEY TAKEAWAYS

- **Evidence-based** Care Pathways and Living Clinical Practice Guidelines and companion resources are easily accessible
- Importance of timely comprehensive individualized assessment with validated evidence-based tools
- Value of providing **education to patients (and families)** above symptom management, treatment and prognosis
- **Team-based care** is necessary with clear ways of evaluating the effectiveness of the treatment
- Importance of **effective care coordination** so patients can be seen by specialists and other clinicians with needed information at hand for timely and appropriate treatment decision-making; it is critical that **primary care be engaged** (where possible)

Neurotrauma Care Pathways

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ONTARIO PHYSIOTHERAPY ASSOCIATION

THANK YOU

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Neurotrauma Care Pathways

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Ontario
Ministry of Health & Long Term Care