Primary care pathway: Persisting post-concussion symptoms (> 12 weeks post-injury)

Quick links: Pathway primer | Expanded details | Provider resources | Patient resources

1. Diagnosis

A history of traumatic brain injury and the presence of one or more of the following symptoms – headache, dizziness, fatigue, irritability, insomnia, difficulty in concentration, impairment of memory or intolerance of stress, emotion, or alcohol at least 1-month following injury
Symptom scales: The Rivermead Post-Concussion Symptoms Questionnaire (RPQ), Post-concussion symptom scale

If the patient is presenting for the first time, no matter how long ago the head injury was, start with the Acute concussion pathway

2. Assessment

Assessments and interventions for post-concussion symptoms should be based on the patients' reported symptoms.

Post-traumatic headaches (HA)

- Post-traumatic headaches are a secondary HA disorder whereby a patient can present with symptoms from different subtypes. Each type of HA has distinct history and physical exam features. Assess and classify which subtype(s) patient best fits and treat accordingly
Screening: ■ Tension-type HA
- Post-traumatic HA with migrainous features
- Cervicogenic HA
- Medication overuse HA
- Occipital neuralgia
- TMJ joint dysfunction

Visual disturbance

- Difficulty looking at screens, reading and/or focusing on busy environments.
Physical exam: ■ Convergence insufficiency, tracking difficulties, vestibular ocular motor screening (VOMS), photophobia

Cognitive changes

- Changes in memory, attention, working memory, executive function and/or word finding; fog
Screening: Saint Louis University Mental State

Balance/dizziness

- Dizziness with head movements, bending over and/or in busy environments, dizziness with neck pain.
Physical exam: Identify central/ cervicogenic/visual drivers for symptoms. Early referral to CBIP should be considered.

See Vertigo pathway

Sleep-wake disturbances

- Insomnia, hypersomnia, obstructive sleep apnea, poor sleep maintenance, poor sleep efficiency, early awakening, delayed sleep onset, alterations in circadian cycle
Screening:
- Sleep and concussion questionnaire

Exercise intolerance

- Symptom limiting exercise
Physical exam: ■ Resting and orthostatic heart rate and blood pressure, where possible Buffalo Concussion Bike or treadmill test

Fatigue

- Issues with problem solving, coping, physical tasks, cognitive tasks, motivation and/or mental health
Screening:
Fatigue Severity Scale, medications screening, mental health screening

Mental health

- Screen for any mental health difficulties
Screening:
- Depression – PHQ-9
- Anxiety – GAD-7
- PTSD – PCL-5
- Altered behavioural outcomes – MBI-C

Return to work/school

- Unable to return to previous levels of work or school due to persisting post-concussion symptoms
Physical exam: ■ Based on the persisting post-concussion symptoms

See concussion basics information for patients

See also concussion tools & resources for physicians

3. Consider specialist advice/referral

For sport or exercise-related head injuries and concussions:
- Call Specialist Link (Sports Medicine)
  - See Acute Sport Concussion Clinic (ASCC)
  - Or Innovative Sport Medicine Clinic Rapid Access Sport Injury Clinic
- If not a motor-vehicle accident, refer to Community Accessible Rehabilitation
- For MVA, see Automobile Collisions and Insurance
- Other resources in Expanded Details

Specialist Link

PATHWAY PRIMER: PERSISTING POST-CONCUSSION SYMPTOMS (>12 WEEKS POST-INJURY)

This refers to the management of persistent post-concussion symptoms (PPCS) in adults (ages 18+).

Approximately 450,000 Canadians suffer a mild traumatic brain injury each year.[1] The average time for recovery following a concussion is approximately 14-30 days. However, 10-30% of patients will experience symptoms which last beyond 1-month.[2,3] How long these symptoms can persist varies, with studies reporting ongoing symptoms from months and sometimes a year in some cases.[2,4–6] When symptoms are persisting >12 weeks post-injury, factors associated with prolonged concussion recovery include:[3,7–9]

Medical factors	Contextual factors
• History of previous brain injury or concussion • History of physical limitations • History of neurological or psychiatric problems • Skull fracture • Early onset of pain (particularly headache <24 hours) • Confounding effects of other health-related issues • Anxiety • High number of symptoms reported early post injury	• Injury sustained in a motor vehicle collision • Potential influence of secondary gain issues • Not returning or delay in returning to work • Being a student • Presence of life stressors at the time of injury • Age > 60 • Lack of social support • Lower education/ low social economic status • Female sex • Returning to a contact/risk of contact sporting activity

If symptoms persist beyond three months, referral for specialized assessment and/or interdisciplinary concussion services/clinics may be indicated. The Rehabilitation Advice Line can provide advice. Consider referral to the Calgary Brain Injury Program (CBIP) if symptoms are severe. Also, a referral to the Community Accessible Rehabilitation (CAR) for those with symptoms 1-12 months post-injury for concussion education may be helpful. CAR has the capacity to see all concussions if they occur between 1-12 months post injury, with the exceptions of motor vehicle collisions or WCB patients. The CAR Neuro referral form can be found on the Alberta Referral Directory. When completing the form, enter 'Post-Concussion Syndrome' under 'Diagnosis', select 'Other' and write 'Concussion Education' in the comment field as the reason for referral. Consider calling Specialist Link for advice.

This pathway was developed, reviewed and approved by specialty care and primary care physicians in the Calgary Zone.

EXPANDED DETAILS

1. Diagnosis

If symptoms persist beyond 12 weeks, a multimodal assessment inclusive of standardized and validated symptoms rating scales should be conducted.[10]

The diagnosis of Persistent Post-concussion Syndrome (PPCS) uses the International Classification of Diseases, 10th edition[11] which states that the syndrome occurs following head trauma and includes a variety of symptoms including:

- Headache
- Dizziness
- Fatigue
- Irritability
- Insomnia
- Difficulty in concentration
- Impairment of memory
- Intolerance of stress, emotion, or alcohol.

2. Assessment and intervention for post-concussion symptoms

Assessments and interventions for post-concussion symptoms should be based on the patients' reported symptoms. In post-concussion, the two most common symptoms are headache and dizziness.

Post-traumatic headache

Headaches are one of the most common persisting symptoms following a concussion. Post-traumatic headaches are defined as the onset of a headache within 7 days following concussion and are either acute (first 3-months of headache onset) or chronic (headache persists beyond 3-months). They are a secondary headache subtype with variable clinical features characteristic of different primary headache disorders (e.g., tension-type and migraine headaches). Diagnosis is based on the International Classification of Headache Disorders 3rd edition.

Assessment:

- Detailed history including any history of headaches and a family history of headaches or migraines.
  - Having the patient complete headache diaries such as the Canadian Migraine Tracker is advised to aid diagnosis and intervention.
  - This assessment, diagnosis and management for post-traumatic headaches may take several visits and may involve the multidisciplinary team.

Treatment:

Treatment should follow the primary headache category of best fit based on clinical presentation.

Headache type	History	Physical exam
Tension-type headaches[12-13] Primary: ICHD-3 Tension-type headache	• Typically bilateral, pressing or tightening in quality and mild to moderate intensity • At least 10 episodes of headache for 1-14 days on average occurring for >3-months • Lasting from 30 mins to 7 days • Not aggravated by routine physical activity	• Tenderness to palpation over the pericranial muscles, cervical paraspinals and trapezius muscles • Normal neurologic exam
Cervicogenic headaches Primary: ICHD-3 Cervicogenic Headaches	• Headache associated with neck pain and neck movements • Often unilateral headache • Pain starting at the neck and spreading to the oculofrontotemporal areas	• Pain on palpation over cervical paraspinals • +/- limited Cervical range of motion • Craniocervical flexion test • Symptomatic Joint Dysfunction • Cervical Flexion rotation test

Occipital Neuralgia Primary: ICHD-3 Occipital Neuralgia	• Headache starts posterior aspect of the head and refers around and over the top of head with associated sharp, shooting pain and neuropathic symptoms. • Unilateral or bilateral, recurring paroxysmal attacks which last from a few seconds to minutes	• Pain with palpation over the lesser and greater occipital nerves
Temporomandibular joint pain Primary: ICHD-3 Headache attributed to temporomandibular disorder	• Pain in jaw, neck muscles, face and/or shoulders, • Stiffness in the jaw, • Jaw clicking, • Can be associated with earaches, tooth pain, or facial allodynia	• Pain with palpation over the TMJ joints with associated clicking, pain with clenching and/or full opening, limited ROM, mandible deviation on opening
Medication overuse headache Primary: ICHD-3 Medication Overuse Headache	• Global mild headache and patient is taking as needed analgesics (acetaminophen, NSAIDs, etc.) >10/28 days for more than 3-months	Normal
Post traumatic headache with migrainous features Primary: ICHD-3 Migraine	• Headache often unilateral and associated with: ○ Photophobia ○ Phonophobia ○ Nausea and vomiting ○ triggered by stress, weather changes, light exertion • Attacks can last between 4-72 hours when untreated • Pulsating in quality	Normal See Specialist Link Headache and Migraine pathway for management

Non-pharmacological treatment of non-migrainous headache

Self-regulated strategies can be used in the treatment of all types of non-migrainous headaches. These include:

- Cold or hot to the back of the neck or head
- Stretching and self-massaging the head and/or neck and shoulders
- Breathing exercises
- Visualization or mindfulness
- Finding a quiet place
- Lying down
- Going outside to get fresh air

Lifestyle strategies that are beneficial for all types of non-migrainous headaches include:

- Education on sleep hygiene
- Regular meals (avoid skipping)
- Maintaining good hydration (4-6 drinks per day of water, juice etc.) avoiding caffeinated or diet soft-drinks
- Relaxation activities such as meditation, visualization, and yoga
- Exercise, encourage to meet Canadian physical activity guidelines

Additional non-pharmacological strategies specific to different headache types are shown in the table below.

Headache type	Strategy/treatment
Tension-type headaches	• Avoid alcohol and smoking

Cervicogenic headaches	• TENS • Cervicovestibular rehabilitation • Physiotherapy (deep neck flexor exercises, sensorimotor training, strengthening exercises, or cervical spine manipulation where indicated)
Occipital Neuralgia	• Heat pads • Massage therapy
Temporomandibular joint pain	• Mouth guards • Physical therapy for TMJ • Exercises to stretch and strengthen the jaw muscles • Trigger point injections • Consider referral to orthodontist

For non-pharmacological treatment of post traumatic headache with migrainous features, See Specialist Link Headache and Migraine pathway.

Pharmacological treatment of non-migrainous headache

Treatment	Headache type	Name	Usual dose
NSAIDs	**All headache types**	Ibuprofen	400-600mg, MAX: 3200mg daily
		Naproxen	Initial dose: 750mg daily, Titration: additional 250-500mg, MAX: 1250 mg daily
		Diclofenac	50mg, MAX: 100mg
Limit to no more than 15 days/month (Risk of medication overuse headaches)			
Over the counter medication	**All headache types** *Limit to no more than 15 days/month (Risk of medication overuse headaches)*	Acetaminophen	Regular strength: 650mg every 4-6 hours as needed, MAX: 3250mg daily Extra strength: 1000mg every 6 hours as needed, MAX: 300mg daily
		Acetaminophen/ aspirin/ Caffeine	MAX: 2 tablets once daily
		Aspirin	325-650mg every 4-6 hours as needed, MAX: 4000mg daily
Limit to no more than 10 days/month (Risk of medication overuse headaches)			
Prophylactic medication	**Tension-type Headache, Occipital Neuralgia, Cervicogenic headache, and Migraine**[12-13] See Specialist Link Headache and Migraine pathway *Consider in medication overuse headache to limit "as needed" medication to <10 x per month*	Amitriptyline	Initial: 10-25mg at bedtime, Titration: Increase weekly increments of 10-25mg, MAX: 80 mg daily (evidence in pain)
		Venlafaxine XR	Optimal dose 75-150mg po OD

Anti-convulsant medication	**Occipital Neuralgia**	Gabapentin	Initial: 100-300mg at bedtime, Titration: 100-300mg every 5 days as necessary/tolerated on a TID schedule, Max: 2400mg daily
		Topiramate	Initial: 25mg OD, Titration dose: increase weekly by 25mg daily, MAX: 100mg daily
		Valproate	Typical dose: once daily or delayed (2 divided doses daily) 500-1500mg/ day MAX: 1500mg/day
		Divalproex sodium products	Extended release: Initial: 500mg OD, Titrate: increase after 7 days to 100mg daily, Max: 100mg daily Immediate Release: Initial: 250mg twice daily, Titration: increase by 250mg per day every week, Max: 1000mg daily
Botulinum toxin injections	**Occipital Neuralgia**	If the patient fails two or more of oral prophylactic headache medications, then botulinum toxin injections may be indicated. A referral to a headache specialist could be considered. See Referral Sources section on Page 12	

If headaches are unresponsive to conventional treatments and remain inadequately controlled, consider calling Chronic Pain Centre (CPC) or Specialist Link (Neurology) for advice. Alternatively, make a referral to a neurologist, headache specialist or interdisciplinary concussion clinic. Non-AHS access to neurology can be through the following Centres: Alberta Neurologic Centre, Peak Medical, Calgary Neurology Clinic. Consider reviewing the Specialist Link Headache and Migraine pathway.

Balance/dizziness[14-18]

Assessment should include neurological and musculoskeletal exam which includes assessment of the cervical spine and the vestibular system (see SCOAT6 or Living Concussion Guidelines for examples). Early referral to Calgary Brain Injury Program (CBIP) and vestibular physiotherapy should be considered.

Type	Physical exam	Treatment
Benign paroxysmal positional vertigo (BPPV)	• Dix-Hallpike test – vertigo + characteristic nystagmus in test position • Symptoms which last for seconds to minutes associated with changes in head position, vertigo, light-headedness, nausea	• Canalith repositioning/Epley Manoeuvre to match affected canal • Vestibular Physiotherapy referral • Onward referral to vestibular rehabilitation[7,19]
Unilateral Peripheral vestibular hypofunction	• Head thrust test • Initial onset of vertigo that can last for hours and becomes lightheadedness and gradually improves over time • +/- Balance problems • Dizziness with faster head motions, while walking, driving or in busy environments • May occur concurrently with BPPV • +/- horizontal nystagmus with fixation removed, gaze away from affected side and with head shaking (if have access to Frenzel lenses), able to suppress with fixation	• Vestibular physiotherapy (gaze stabilization exercises, habituation, balance exercises etc.) • Vestibular rehabilitation

Cervicogenic dizziness	• The presence of dizziness and associated neck pain with movement or prolonged position – better with improvements in neck pain, worse with worse neck pain • Often occurs as a result of neck injury or whiplash-type injury • +/- Imbalance, unsteadiness, disorientation • +/- neck range of movement • Cervical neck torsion test	• Vestibular physiotherapy/ cervicovestibular therapy (craniocervical flexion exercises, +/- manual therapy, sensorimotor training, balance exercises)
Central vestibular dizziness	• Vertigo, unsteadiness and/or lightheadedness of variable duration • Severe symptoms may also include: ○ +/- Cranial nerve, cerebellar or long tract signs present ○ +/- Facial asymmetry ○ +/- Swallowing or speech problems ○ +/- Ataxia ○ +/- Pure vertical, torsional or mixed nystagmus and may be direction changing NOT suppressed by vision and does not follow Alexander's law ○ +/- Upper motor neuron signs • +/- Abnormal head thrust test ○ HiNTS Exam (Head Impulse, Nystagmus, Skew)	• *See* Specialist Link Vertigo pathway • For severe symptoms call RAAPID. • For non-urgent advice, call Specialist Link (Neurology). • Once medically screened for other more sinister causes – consider imaging or referral to specialist • Vestibular physiotherapy (balance, coordination, and cervical range of movement). Refer within 1-2 weeks of injury if vestibular issues identified. *See* Referral Sources section on Page 12
Vestibular migraine	• Minutes to 72 hours of vertigo +/- headache with or without aura • Motion sensitivity • Disequilibrium • +/- Current or previous history of migraine with or without aura • Negative vestibular exam but may have some positional nystagmus not consistent with BPPV or UVH	• Migraine management • Vestibular physiotherapy referral
Persistent postural perceptual dizziness	• One or more symptom of dizziness, unsteadiness, non-spinning vertigo present for 15/30 days for >3 months • Symptoms last for hours but may wax and wane in severity • Exacerbated by upright posture, active or passive motion pr exposure to moving visual stimuli or complex visual patterns	• Vestibular physiotherapy • Cognitive behavioural therapy
Consider alternative causes	• Autonomic dysfunction causing cardiovascular dysregulation • Pharmacology • Psychiatric disorder	• Exercise program • Medication review • Screen for depression, anxiety, PTSD

Fatigue[20]

- History: Issues with problem solving and coping, physical tasks, cognitive tasks and mental health.
- Screening:
  - Fatigue severity scale
  - Screen for sleep-wake disturbances
  - Screen for cognitive difficulties (SLUMS)
  - Metabolic screen

- Mental health Screen (PHQ-9, GAD-7)

- Treatment: Certain medications such as TCAs, anti-convulsants, benzodiazepines and opioids, can cause fatigue and current medications should be assessed.
  - Mindfulness-based stress reduction
  - Cognitive behavioural therapy
  - Blue-light therapy
  - Cognitive and physical activity pacing and planning
  - Sleep management strategies
  - Management of contributing factors e.g., affective disorder, sleep disorder, metabolic causes, electrolyte abnormality and nutritional status
  - Education on return to learn and return to work as indicated
  - Exercise (encourage to meet Canadian physical activity guidelines)
    If refractory fatigue persist consider referring to concussion specialist
  - If patient has debilitation fatigue still at one-year post-injury consider a referral to endocrinology for post-traumatic growth hormone deficiency[21] and consider referring to an endocrinologist or concussion specialist as evaluation of hypothalamic pituitary axis (HPA) may be warranted.[22]

Sleep-wake disturbances

- Sleep disturbances can significantly impact other functionally limiting symptoms such as pain, fatigue, mood disturbances and cognitive problems
- Insomnia, hypersomnia, obstructive sleep apnea, poor sleep maintenance, poor sleep efficiency, early awakening, delayed sleep onset, alterations in circadian cycle
- Screening: Sleep and concussion questionnaire
  - Medical conditions (e.g. sleep apnea)
  - Current medication use
  - Comorbid psychopathology
  - Unhealthy habits (lack of exercise, variable sleep-wake schedule, processed foods, sugars and alcohol)
  - Physical (menstrual cycle, comorbid physical and pain)
- Treatment:
  - Sleep hygiene education
  - Cognitive behavioural therapy
  - Self-management strategies
  - Melatonin
  - Magnesium and zinc supplementation
  - Acupuncture
  - Mindfulness-based stress reduction therapy
  - Exercise (meeting Canadian physical activity guidelines)

Mental health/suicidality

Mood changes with depression and irritability are said to be very common in patients with post-concussion syndrome. Similarly, anxiety is prevalent and may be attributed to the patient's intact insight of their cognitive deficits, under-

performance at work and fear of social situations. Experiencing a concussion is associated with a two-fold higher risk of suicide as well as a higher risk of suicide attempt and suicidal ideation.[23] Comorbid conditions such as depression or PTSD associated with persisting post-concussion symptoms should be treated concomitantly (mental health screening and intervention).

Depression

a) Screening: Patient health questionnaire-9 (PHQ-9)

b) Management:

- Follow specific depression guidelines (Canadian Network for Mood and Anxiety Treatments).
- Discuss what the patient feels might be contributing to the depression, if they have any preferences about starting treatments and if there are any medications they have previously tried.
- Review treatment between 2 and 4 weeks after initiation
  - If mild/ moderate, non-pharmacological interventions
  - If moderate/severe, consider a combination of non-pharmacological and pharmacological interventions

Non-pharmacological [7,24]	**Pharmacological**
• Cognitive Behavioural Therapy • Behavioural Activation Therapy • Mindfulness and meditation • Interpersonal psychotherapy • Exercise (meeting Canadian physical activity guidelines) • Counselling • Sleep hygiene	• When initiating treatment, be sure to also address psychosocial difficulties (e.g., ongoing domestic abuse, environmental issues etc.,) • Review all current medications including over-the-counter medications and supplements. Aim to minimize the impact of adverse effects on arousal, cognition, sleep and seizure threshold domains where TBI patients may already be compromised. • Start at the lowest effective dose and titrate slowly upwards as needed. Monitor response
Consider onward referrals to psychology, counseling, or psychiatry	*For extensive list on first line pharmacotherapy, cost, side effects and therapeutic considerations, see Appendix C: first-line anti-depressants from British Columbia guidelines* *For second- and third-line pharmacotherapy, see depression specific guidelines.*

Anxiety

a) Screening: General Anxiety Disorder -7

b) Management:

- Follow Specialist Link anxiety pathway

Post-traumatic Stress disorder

Screen for comorbid conditions such as depression or PTSD associated with persisting post-concussion symptoms.

a) Screening: The PTSD checklist for DSM-5
b) Management:

- **Score of 31-33 or higher** suggests that the patient may benefit from PTSD treatment.
- Clinical Practice Guideline for the Treatment of Posttraumatic Stress Disorder (PTSD) in Adults (2017)

Mild behavioural impairment

a) Screening: Mild behavioural impairment checklist (MBI-C)

b) Management:

Non-pharmacological [7,24]	Pharmacological
• Remove possible triggers e.g., caffeine, stimulants, nicotine, alcohol, cannabis, stress, dietary triggers • Sleep hygiene	• Referral to a psychiatrist or brain injury specialist for assessment • Cognitive behavioural therapy • Refer to community psychotherapy or counselling See Specialist Link Anxiety Pathway See Referral Sources section on Page 12

Suicidality

Suicide screening tool: Columbia-Suicide Severity Rating Scale

If indicated, patients should be screened for suicidal ideation. Based on the screening, patients should be referred to emergency or provided with appropriate resources

Visual disturbances

- Visual changes, photophobia, problems with reading (losing the place, reduced tolerance, headaches etc.), bumping into objects and walls.
- Screening/Physical Exam: Brief Vestibular Ocular Motor Screening (symptom reproduction) (VOMS)
  I. Smooth pursuits
  II. Horizontal and vertical saccades
  III. Near point of convergence distance
  IV. Visual motion sensitivity
    - Visual acuity
    - Extra-ocular motility
    - Pupils
    - Fundoscopy

Treatment:

- Early involvement of optometry or ophthalmology
- Vision rehabilitation for the treatment of persistent vision disorders[7,25]
- See Referral Sources section on Page 12

Cognitive changes

- History: Difficulties with attention/concentration, processing speed, learning or memory.
  - Brain fog is one of the most commonly reported experiences and seen as a key symptom of a concussion.
- Assessment: The Saint Louis University Mental Status exam
  - Scoring:
    27-30: Normal (25-30 less than high school education)
    21-26: Mild Neurocognitive Disorder (20-24 less than high school education)
    1-20: Dementia (1-19 less than high school education)
  - Assess pre-existing and comorbid conditions such as anxiety, mood disorder, post-traumatic stress disorder, attention-deficit/hyperactive disorder, sleep disturbances, fatigue and pain which may contribute to persistent cognitive symptoms.
- Treatment:

- If there is ongoing persistence and complexity of cognitive symptom presentation e.g., functionally limiting cognitive impairment, comorbidities potentially impacting optimal management, no ongoing cognitive improvement, then consider referral to a specialized program such as CAR, specialized health care providers (search on College of Physicians & Surgeons of Alberta website), or call Specialist Link (Neurology) for advice.
- If affecting return to work or school, consider reviewing, modifying and extending work/school accommodations
- Sub-symptom management and exposure: chose a meaningful task to the patient, establish a baseline tolerance and then use exposure to increase their tolerance to the activity.[26]

Exercise intolerance[27,28]

Inability to exercise to the level predicted for one's age and fitness due to symptom exacerbation.

- Screening/Physical Exam:
  - Reported limited tolerance for exercise
  - Resting and orthostatic heart rate and blood pressure
  - If facilities are available, or if referral to certified exercise physiologist or physiotherapist, consider administering the Buffalo concussion bike (BCBT) or treadmill test (BCTT). If referring, fill out ParMED-X
  - Rule out postural orthostatic tachycardia syndrome
- Treatment:
  - After determining sub-maximal symptom exacerbation threshold (BCBT or BCTT), prescribe 20 minutes/day on stationary bike at 80-90% of threshold heart rate achieved during test
  - Alternatively, if exercise testing is not available, begin at 50% of the age-appropriate maximum heart rate (220-age)
  - Stop exercise at the first sign of symptom exacerbation of >2/10 on VAS or after 20 mins at target heart rate
  - Increase target heart rate as tolerated by 5-10 beats per minute every one to two weeks.[27]

Return to work/school and physical activity

	Return to school	Return to work
Considerations	Persisting post-concussion symptoms can impact the student's ability to manage work in the classroom including: • Note-taking • Presentations • Homework • Assignments • Examinations • Additional voluntary activities	Medically unnecessary delays in returning to work should be avoided as this can have economic and psychosocial consequences Symptoms which may affect return to work include but are not limited to: • Fatigue • Reduced attention • Balance or vertigo • Photophobia • Headaches • Irritability, impulsivity and anxiety Review information on job demands and any restrictions, limitations or symptom triggers associated with the job

Management	• Education • Communicate any specific medical restrictions or limitations to the school or other stakeholders with appropriate consent	• Communicate any specific medical restrictions or limitations to the employer or other stakeholders with appropriate consent

3. Consider specialist advice/referral

- Call Specialist Link: Sports Medicine, for sport or exercise-related head injuries and concussions.
- Call Specialist Link: Neurology or Chronic Pain, for headache advice.
- If not a motor-vehicle accident and ≥ 1-month post-injury, refer to Community Accessible Rehabilitation.
- For sport or exercise-related head injuries and concussions, patients can also self-refer to the Acute Sport Concussion Clinic (ASCC) at the University of Calgary or to the Innovative Sport Medicine Clinic Rapid Access Sport Injury Clinic.

Below is a list of examples of resources in the Calgary zone based on the information available at the time of creation. This is not an exhaustive list and other referral resources may be available.

Publicly funded referral sources		
Resource	**When to refer**	**How to refer**
Calgary Brain Injury Program	Who you can see: Physicians and social work Who to refer: o Patients with persistent symptoms beyond 3 months post-injury not improving. o 18 years or older o For comprehensive clinical care through multidisciplinary team o For headache (non-primary symptom) o For post-concussion symptoms without headache	Fax referral/letter to the clinic 403-283-2526 For more information Phone: 403-944-4224 Online: https://www.albertahealthservices.ca/findhealth/Service.aspx?id=1796&serviceAtFacilityID=1046526#contentStart
Community Accessible Rehabilitation (CAR) **(AHS)**	Who you can see: Group concussion education, potential occupational therapy, psychology, physiotherapy Who to refer: o 18 years or older o Between 1-18 months post-injury o Demonstrates “rehab readiness” (medically stable, physically and cognitively able to participate in an active rehabilitation program, safe to participate in light to moderate intensity exercise, cognitive capacity to actively participate in a rehabilitation program, e.g., able to demonstrate carryover of new skills between sessions, appropriate behaviours and motivation to achieve rehabilitation goals) When not to refer: o Concussion/injury from motor vehicle accident o WCB related injury	Community Accessible Rehabilitation Neuro Referral form faxed to 403-943-0578 For inquiries or to discuss referral appropriateness, contact CAR Central Access and Triage (telephone: 403-943-0279).

Chronic Pain Centre	Who you can see: multidisciplinary team: physician, social work, physiotherapy, occupational therapy, pharmacy, psychology, kinesiology, group therapy and nursing Chronic post-traumatic headache following concussion Who to refer: ○ Complex chronic pain ○ 18 years of age or older ○ Reside in Alberta with a valid Alberta Health Care number ○ Have a primary care provider prepared to work closely with the treatment team and provide follow-up ○ Are in stable medical condition ○ Are cognitively capable of participating in assessment and treatment ○ Have symptoms greater than 2 years post-injury ○ Primary symptom is headache When not to refer: ○ Pregnancy ○ Mental health condition that would preclude participation in assessment and treatment ○ Untreated, unstable substance addiction ○ Active cancer diagnosis ○ Primary diagnosis of fibromyalgia	Referral form: https://www.albertahealthservices.ca/frm-21971.pdf Fax: 403-209-2954 Call: 403-943-9900
The Acute Sport Concussion Clinic (ASCC) at the University of Calgary Sport Medicine Centre or Innovative Sport Medicine Clinic	Who to refer (self-referral): ○ The injury occurred while participating in a sport or exercise activity. ○ Between the ages of 5 and 60 years ○ The injury occurred within the last six weeks Who you can see: sports-medicine physician, physiotherapy, athletic therapist When not to refer: ○ Concussion/injury from motor vehicle accident ○ WCB related injury	If injury occurred within 6 weeks of injury apply online: • ASCC: https://sport-med.ucalgary.ca/clinics/ascc • Innovative Sport Medicine Rapid Access Sport Injury Clinic: https://www.innovativesportmedicine.ca/ If injury occurred more than 7 weeks ago, referral should be made to the first available sport medicine physician via fax at: • ASCC Fax: 403-282-6170 • Innovative Sport Medicine Clinic Fax: 403-452-3757
Alberta Neurologic Centre	Who you can see: General neurology, physiatry, physiotherapy, nursing, occupational therapy Services: ○ Botox treatment and management ○ EMG and nerve conduction studies ○ Migraine assessment and management ○ Vestibular therapy	Fax the corresponding referral (see links below) to 587-747-5616 Expedited Migraine Referral EMG Referral General Neurology Referral Physiatry Referral Physiotherapy Referral Website: https://www.ancentre.ca
Benson Concussion	Who you can see: sport medicine physicians, athletic therapists, physiotherapists, vestibular, exercise physiology, neuro-optometry, sport nutrition, sport	Online self-referral questionnaire

Institute (Private)	psychology, neuropsychology, sport psychiatry, sport audiology Who to refer: ○ Ages 10-40 years ○ Suspected concussion sustained during a sport or recreation related activity ○ *Acute program:* concussive event sustained within the past 30 days ○ *Persistent concussion-like symptom program:* symptoms lasting > 30 days and < 6-months duration ○ Must have a family physician When not to refer: ○ Injured in a motor vehicle accident ○ Injured at work/ WCB ○ Injured from non-sport related mechanism (fall, assault etc.) ○ Associated post-traumatic intracranial/cerebral hemorrhage, orbital or basal skull fracture ○ Previous motor vehicle collision concussion/ traumatic brain injury without full recovery ○ Short-term or long-term disability related injury ○ Medical-legal related injury ○ Professional athletes currently under contract	Phone: 587-391-9840 Email: info@bconcussion.ca Fax: 587-441-8382 Website: https://bciconcussion.ca

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BACKGROUND

About this pathway

The pathway is designed for adult patients with persisting post-concussion symptoms (>12 weeks post-injury). It is not indicated for acute concussion or concussions in the pediatric/youth populations as this subpopulation may have unique considerations -- consider a Specialist Link call for advice on this population.

Authors and conflict of interest declaration

This pathway was developed by leveraging the collective knowledge, experience and expertise of several individuals. See a full list below. For more information, please email info@calgaryareapcns.ca.

- Monica Sargious MD CCFP FCFP
- Lori Montgomery MD CCFP FCFP CHE
- Chantel Debert MD MSc FRCPC CSCN
- Kathryn Schneider PT PhD DipManiPT
- Christina Campbell MSc
- Business support:
  - Melissa Worrell – Medical Writer, Calgary and Area Primary Care Networks
  - Keith Bradford – Director of Communications, Calgary and Area Primary Care Networks
  - Val Kiss – Project Manager, Alberta Health Services

Pathway review process, timelines

Primary care pathways undergo scheduled review every three years, or earlier if there is a clinically significant change in knowledge or practice. The next scheduled review is January, 2028. If you have any questions or concerns about this pathway, please email info@calgaryareapcns.ca with “Persistent post-concussion symptoms pathway” in the subject line.

Copyright information

DISCLAIMER

This pathway represents evidence-based best practice but does not override the individual responsibility of health care professionals to make decisions appropriate to their patients using their own clinical judgment given their patients’ specific clinical conditions, in consultation with patients/alternate decision makers. The pathway is not a substitute for clinical judgment or advice of a qualified health care professional. It is expected that all users will seek advice of other appropriately qualified and regulated health care providers with any issues transcending their specific knowledge, scope of regulated practice or professional competence.

PROVIDER RESOURCES

Advice options

- Non-urgent telephone advice connects family physicians, nurse practitioners and specialists in real time via a tele-advice line. Family physicians, nurse practitioners and specialists can request non-urgent advice (specialty specific) including chronic pain and sports medicine advice at specialistlink.ca or by calling 403-910-2551. Sports medicine is available from 8 a.m. to 5 p.m., while chronic pain closes at 3:45 p.m. They are both available Monday to Friday (excluding statutory holidays). Calls are returned within two (2) hours.

Diagnosis	
The Living Concussion Guidelines	https://concussionsontario.org/
2023 American Congress of Rehabilitation Medicine Diagnostic Criteria for Concussion	https://www.archives-pmr.org/article/S0003-9993(23)00297-6/fulltext
Living Concussion Guidelines: Management of Persistent Symptoms Following a Concussion	https://concussionsontario.org/sites/default/files/2023-04/algorithm-5-1_revised.pdf
AHS concussion tools & resources	https://www.albertahealthservices.ca/info/Page17877.aspx
Validated symptom rating scales	
The Rivermead post-concussion symptoms questionnaire (RPQ)	https://mississaugahalton.rehabcareontario.ca/Uploads/ContentDocuments/Rivermead_Post_ConcussionSymptoms_Questionnaire_(RPC)1.pdf
Post-concussion symptom scale in SCAT/SCOAT	https://impacttest.com/wp-content/uploads/Post-Concussion-Symptom-Scale.pdf
Alarm features (suicidal ideation)	
Columbia suicide severity rating scale	https://cssrs.columbia.edu/wp-content/uploads/C-SSRS_Pediatric-SLC_11.14.16.pdf
Distress Centre (24-hour support), 403-266-HELP (4357), text and online chat support also available	https://www.distresscentre.com/
Mental Health Help Line, Alberta-wide; 1-877-303-2642 (Toll free)	https://www.albertahealthservices.ca/findhealth/Service.aspx?id=6810&serviceAtFacilityID=1047134
AHS Access Mental Health – Calgary Zone; 403-943-1500	https://www.albertahealthservices.ca/findhealth/Service.aspx?serviceAtFacilityId=1019446#contentStart
Headache	
Headache diaries	https://concussionsontario.org/sites/default/files/2023-03/appendix-6-4.pdf
Sport Concussion Office Assessment Tool 6 (SCOAT6)	https://concussionphysio.com.au/wp-content/uploads/SCOAT6.pdf
Living concussion guideline algorithm for the assessment and management of post-traumatic headaches following mTBI	https://concussionsontario.org/sites/default/files/2023-03/algorithm-6-1.pdf
Core components for focused headache history	https://concussionsontario.org/sites/default/files/2023-03/table-6-1.png

Core components for neurological and musculoskeletal exam	https://concussionsontario.org/sites/default/files/2023-03/appendix-3-4.pdf
Self-regulated intervention and lifestyle strategies to minimize headache occurrence	https://concussionsontario.org/sites/default/files/2023-03/appendix-6-6.pdf
The International Classification of Headache Disorders (ICHD-III) criteria for persistent post-traumatic headache	https://ichd-3.org/5-headache-attributed-to-trauma-or-injury-to-the-head-andor-neck/5-2-persistent-headache-attributed-to-traumatic-injury-to-the-head/5-2-2-persistent-headache-attributed-to-mild-traumatic-injury-to-the-head/
Mental health	
MyHealth Alberta: Stress relief and relaxation	https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=af1003spec&lang=en-ca#af1004spec
Mindfulness apps: Headspace	https://www.headspace.com
Mindfulness apps: Calm	https://www.calm.com/
Canadian Mental Health Association: Alberta Division	https://alberta.cmha.ca/documents/depression/
Depression	
Canadian Network for Mood and Anxiety Treatments guidelines	https://www.canmat.org/sdm_downloads/2016-depression-guidelines/
Patient health questionnaire 9	https://www2.gov.bc.ca/assets/gov/health/practitioner-pro/bc-guidelines/depression_patient_health_questionnaire.pdf
Appendix C: first-line anti-depressants from British Columbia guidelines	https://www2.gov.bc.ca/assets/gov/health/practitioner-pro/bc-guidelines/depress_appc.pdf
Anxiety	
Generalized Anxiety Disorder-7	https://adaa.org/sites/default/files/GAD-7_Anxiety-updated_0.pdf
Specialist Link anxiety pathway	https://www.specialistlink.ca/assets/pdf/CZ_Anxiety_pathway.pdf
Post-traumatic Stress Disorder	
The PTSD checklist for DSM-5	https://www.ptsd.va.gov/professional/assessment/documents/PCL5_Standard_form.pdf
The Centre for Addiction and Mental Health: PTSD	https://www.camh.ca/en/health-info/mental-illness-and-addiction-index/posttraumatic-stress-disorder
MyHealth Alberta: Post-Traumatic Stress Disorder	https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=hw184188
Clinical Practice Guideline for the Treatment of Post-Traumatic Stress Disorder (PTSD) in Adults (2017)	https://www.apa.org/ptsd-guideline
Mild behavioural impairment	
Mild behavioural impairment checklist (MBI-C)	https://mbitest.org/
Cognitive impairment	
The Saint Louis University Mental Status exam	https://www.slu.edu/medicine/internal-medicine/geriatric-medicine/aging-successfully/pdfs/english-canada.pdf
Vestibular dysfunction	

Dix-Hallpike test	https://www.youtube.com/watch?v=7wMvTUPaNPo
Canalith repositioning/Epeley Manoeuvre	https://myhealth.alberta.ca/Health/aftercareinformation/pages/conditions.aspx?hwid=abk8813#:~:text=The%20doctor%20or%20physiotherapist%20will,the%20edge%20of%20the%20table.
Head thrust test	https://www.youtube.com/watch?v=DrA4ERU2aG8
Cervical neck torsion test	https://www.youtube.com/watch?v=oq3_9I9548M
HiNTs exam	https://sjrhem.ca/resident-clinical-pearl-hints-exam-in-acute-vestibular-syndrome/
Fatigue	
Fatigue severity scale	https://www.mercy.net/content/dam/mercy/en/pdf/fatigue-severity-scale-epworth-sleepiness-scale-questionaire.pdf
Sleep-wake disturbances	
Sleep and concussion questionnaire	https://concussionsontario.org/sites/default/files/2023-03/appendix-7-3.pdf
Visual disturbances	
Brief Vestibular Ocular Motor Screening (VOMS)	https://impacttest.com/wp-content/uploads/VOMS-Scorecard-and-Instructions.pdf
Exercise intolerance	
Canadian physical activity guidelines *Also for depression, fatigue, sleep-wake disturbances and return to work/ school/ physical activity*	https://healthydesign.city/wp-content/uploads/2021/06/CSEP_PAGuidelines_0-65plus_en.pdf
Buffalo concussion bike test (BCBT)	https://cdn-links.lww.com/permalink/jsm/a/jsm_2020_01_28_haider_19-313_sdc2.pdf
Buffalo concussion treadmill test (BCTT)	https://cdn-links.lww.com/permalink/jsm/a/jsm_2020_01_28_haider_19-313_sdc1.pdf
ParMED-X	https://www.kelowna.ca/sites/files/1/docs/parks-rec/parmed-x.pdf
Return to work/school/physical activity	
CattOnline Return to work *Also for cognitive impairment*	https://resources.cattonline.com/files/return-to-work-strategy
CattOnline Return to school *Also for cognitive impairment*	https://resources.cattonline.com/files/return-to-school-strategy
Cattonline Return to activity	https://cattonline.com/home

PATIENT RESOURCES

General Information	
The Living Concussion Guidelines	https://concussionsontario.org/
Manitoba Adult Concussion Network: Post-concussion education sheet	https://macn.ca/wp-content/uploads/2020/02/Post-concussion-information-sheet_MACN.pdf
Concussion basics – MyHealth.Alberta	https://myhealth.alberta.ca/Health/Pages/conditions.aspx?hwid=tp23364spec
Support for Suicidal Ideation	
Distress Centre, (24-hour support), 403-266-HELP (4357), text and online chat support also available	https://www.distresscentre.com/
Mental Health Help Line - Alberta-wide; 1-877-303-2642 (Toll free)	https://www.albertahealthservices.ca/findhealth/Service.aspx?id=6810&serviceAtFacilityID=1047134
AHS Access Mental Health – Calgary Zone; 403-943-1500	https://www.albertahealthservices.ca/findhealth/Service.aspx?serviceAtFacilityId=1019446#contentStart
Headache	
Headache diaries	https://concussionsontario.org/sites/default/files/2023-03/appendix-6-4.pdf
Self-regulated intervention and lifestyle strategies to minimize headache occurrence	https://concussionsontario.org/sites/default/files/2023-03/appendix-6-6.pdf
MyHealth Alberta: Headache management, sleep strategies	https://myhealth.alberta.ca/learning/modules/Sleep-Strategies
MyHealth Alberta: Managing headaches	https://myhealth.alberta.ca/health/pages/conditions.aspx?Hwid=tk2559
Mental Health	
MyHealth Alberta: Stress relief and relaxation	https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=af1003spec&lang=en-ca#af1004spec
Mindfulness apps: Headspace	https://www.headspace.com
Mindfulness apps: Calm	https://www.calm.com/
Canadian Mental Health Association: Alberta Division	https://alberta.cmha.ca/documents/depression/
Depression	
My Alberta Health: Depression	https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=hw30709
Mood Gym: CBT-based self-help tool for learning skills to manage depression and anxiety	https://www.moodgym.com.au/
Anxiety	
Anxiety Canada	https://www.anxietycanada.com/
My Alberta Health: Generalized Anxiety Disorder	https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=zd1045

Centre for Clinical interventions: Looking after yourself - anxiety	https://www.cci.health.wa.gov.au/Resources/Looking-After-Yourself/Anxiety
Help Guide anxiety information and handouts	https://www.helpguide.org/articles/anxiety/generalized-anxiety-disorder-gad.htm
Anxiety Canada: Mindfulness - mindful breathing	https://www.anxietycanada.com/articles/mindfulness-mindful-breathing/
Mindful Grounding using the 5-4-3-2-1-grounding technique	https://www.mondaycampaigns.org/destress-monday/unwind-monday-5-4-3-2-1-grounding-technique
Square/Box breathing: How to reduce stress through breathwork	https://blog.zencare.co/square-breathing
Post-Traumatic Stress Disorder	
The Centre for Addiction and Mental Health: PTSD	https://www.camh.ca/en/health-info/mental-illness-and-addiction-index/posttraumatic-stress-disorder
MyHealth Alberta: Post-Traumatic Stress Disorder	https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=hw184188
Cognitive impairment	
My Brain Pacer App *Also for Fatigue*	https://www.sjhc.london.on.ca/regional-acquired-brain-injury-outpatient-program/information-patients/mybrainpacer
St Joseph's Health Care: Memory and attention	https://www.sjhc.london.on.ca/regional-acquired-brain-injury-outpatient-program/patients/memory-and-attention
Vestibular dysfunction	
Balance problems after brain injury information	https://msktc.org/sites/default/files/lib/docs/Factsheets/TBI_Balance_Problems_and_TBI.pdf
MyHealth Alberta: Vertigo: Staying safe when you have balance problems	https://myhealth.alberta.ca/health/pages/conditions.aspx?Hwid=ug1172
MyHealth Alberta: Dizziness lightheadedness and vertigo	https://myhealth.alberta.ca/health/pages/conditions.aspx?hwid=dizzi&lang=en-ca#hw88500
Fatigue & sleep-wake disturbances	
Sleep hygiene program	https://concussionsontario.org/sites/default/files/2023-03/appendix-7-4.pdf
Behavioural recommendations for optimal sleep	https://concussionsontario.org/sites/default/files/2023-03/appendix-7-5.pdf
Recreating a time and place for sleep	https://concussionsontario.org/sites/default/files/2023-03/appendix-7-8.pdf
Limiting the time spent in bed to actual sleep time	https://concussionsontario.org/sites/default/files/2023-03/appendix-7-7.pdf
Visual disturbances	
St Joseph's Health Care: Vision	https://www.sjhc.london.on.ca/regional-acquired-brain-injury-outpatient-program/patients/vision
Exercise intolerance	

Canadian physical activity guidelines *Also for headache, depression, fatigue, sleep-wake disturbances and return to work/ school/ physical activity*	https://healthydesign.city/wp-content/uploads/2021/06/CSEP_PAGuidelines_0-65plus_en.pdf
Return to work/school/physical activity	
CattOnline Return to work *Also for cognitive impairment*	https://resources.cattonline.com/files/return-to-work-strategy
CattOnline Return to school *Also for cognitive impairment*	https://resources.cattonline.com/files/return-to-school-strategy
Cattonline Return to activity	https://cattonline.com/home