

When symptoms do not resolve: What are our options for patients with concussive symptoms? Pearls for practice

Drs. Connie LeBrun & Terry De Freitas

Persistent Post-Concussive Syndrome (PPCS)

- Persistent symptoms lasting 3 months (90days) after a diagnosis of concussion
- Duration of 3 months currently in debate (considering >2 weeks for adults, >4 weeks for youth/children)
- Not a single pathophysiological entity: it is a term to describe a constellation of nonspecific symptoms
- Can present with a wide variance in patients, anywhere from 1.5-15% pediatric patients after sports related concussion (SRC) with another study reporting up to 20.3% at 30 days post-injury
- Often challenging for clinicians to distinguish between prolonged symptoms due to Persistent Post-Concussive Syndrome, or the manifestation of premorbid conditions such as depression, migraines, etc.

General criteria:

- A physical hit or concussive force (mild traumatic brain injury) with immediate symptoms (does not need to be directly to head)
- Core resulting symptoms impacting functioning/quality of life: headaches, balance issues, dizziness, fatigue, sleep disturbances, light/noise sensitivity, visual changes, mood disturbances
- Symptoms persist beyond expected recovery for weeks to months
- Refractory symptoms are not better explained by another etiology

Predictors/Risk Factors of Persistent Post-Concussive Syndrome (PPCS)

- | |
|--|
| • Female Sex |
| • Headache on presentation at Emergency |
| • Personal or family history of anxiety, depression or other psychiatric illness |
| • Under influence of drugs or alcohol at time of injury |
| • Injury occurred via bike or motor vehicle accident |
| • Sensations of numbness or tingling |
| • Delayed symptom onset (3hrs or more post-injury) |

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Red Flags at Acute Injury - Review patient examination and consider other differentials

- | |
|---|
| • Double vision |
| • Neck pain or tenderness |
| • Severe or worsening headache |
| • Weakness, tingling, or burning sensation in extremities |
| • Loss of consciousness, or deteriorating conscious state |
| • Vomiting |
| • Seizures or convulsions |
| • Increased restlessness, agitation, or combativeness |

Clinical Matrix Variety of Persistent Post-Concussive Symptoms

Somatic symptoms	Cognitive symptoms	Emotional symptoms
Headaches (tension, migraine, etc.)	Concentration difficulties	Irritability
Occipital neuralgia	Decreased attention	Anxiety
Dizziness/vertigo, vestibular dysfunction	Impaired memory	Depression
Fatigue	Reduced processing speed	Emotional lability
Sleep: Insomnia or hypersomnia	"Brain fog"	
Photophobia		
Phonophobia		
Tinnitus		
Autonomic nervous system dysfunction		

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General Concussion Management Tips:

- Allot 30 minutes for a first appointment with a patient coming to see you for a suspected concussion (acute or chronic)
- Patients should be re-checked and followed on a weekly/regular basis. Before evaluation by the family physician, the symptoms self-report section of the SCAT5 should be completed to help monitor progress
- Importance of serial assessment of symptoms via SCAT5
- Remember to also treat/address parents of patients
- May need to make accommodations for work/school, including testing, note-taking, work-load reduction, breaks, extra time, environmental noise/lights, anti-blue-light screen etc.
- Promote sleep hygiene, identify symptom triggers, prioritize treatment to address symptoms they find most functionally limiting
- Sub-symptom threshold exercise might be of benefit
- Involve physiotherapists, PCN kinesiologists aimed at cervical spine or vestibular dysfunction

In Clinic Assessment and Physical Exam (As Tolerated) Should Include:

- History of symptoms, clarification of data points
- Orthostatic vital signs
- Neck range of motion
- Assessment of neck trigger points
- Signs that may warrant x-rays (i.e.. mid-line tenderness)
- Craniocervical flexion test
- Neck flexor endurance
- Neurology exam including cranial nerves, funduscopy, strength, sensation and reflexes
- Current functioning assessment for work and recreational activities
- Discussion of goals for functioning, return to work/school/play
- **SCAT5 or ImPACT test**
- Documentation and repetition in follow-up visits!

Immediate Post-Concussion Assessment Test (ImPACT) Neuropsychology Assessment Tool

- Used extensively in professional and amateur sports
- FDA cleared online tool for evaluating baseline and post-injury testing
- Needs to be purchased online, with some training to interpret results



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Vestibular Ocular Motor Screening test (VOMS) – More for patients with prolonged symptoms

- Brief 5-6 minute exam that is clinically relevant and diagnostic of abnormalities
- Indicates when to refer to multidisciplinary clinic or to vestibular physiotherapy
- Great sensitivity and specificity: Abnormal or symptomatic VOMS are present in up to 69% of adolescents after concussion and may be associated with prolonged recovery
- Abnormal smooth pursuits, repetitive saccades (complaints of blurred vision, headache and dizziness)
- Vestibulo-ocular reflex (VOR)
- Near-point convergence (NPC, binocular vision)
- Abnormal accommodation (monocular vision)

Other Easy tests in the Office:

- Head impulse thrust (HIT) test -> demonstrates abnormalities of the VOR
- Neck ROM -> look for limitations side to side, up and down
- Neck muscle endurance
- Walk and talk test (turning head side to side while walking)
- Tandem gait forwards and backwards (do eyes open, then eyes closed) can do instead of BESS

Referring a Patient with PPCS

4 characteristics of a good concussion clinic: <https://casem-acmse.org/wp-content/uploads/2018/06/CCES-PUB-CCC-4Qs-E-FINAL.pdf>

1. Does the clinic have a medical doctor?
2. Does the clinic have a team of licensed health care professionals?
3. Does the clinic follow the most up to date standards of care for managing a concussion?
4. What tools, tests and recommendations is the clinic using?

Ideal care team for acute concussion include:

- Athletic therapist
- Physiotherapist
- Team doctor



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Edmonton and Area: Team based PPCS Care Options include:

- Glen Sather Sports Medicine Clinic: includes all the above <https://www.ualberta.ca/glen-sather-clinic/index.html>
- Brain Care Center: includes access to physicians <https://www.braincarecentre.com/>
- Body Restoration: includes access to psychiatry <https://bodyrestoration.ca/>
- Isaac Physiotherapy: collaborates with neurology and sports medicine <https://isaacphysio.com/>
- Life Mark Physiotherapy: includes visiting MDs <https://www.lifemark.ca>

Other Persistent Post-Concussive Syndrome (PPCS) Assessment Tools:

- MIDAS Headache score
- Neck disability index score
- Dizziness handicap inventory:
- Anxiety and Depression DASS-22 scale
- SCAT5 or child SCAT5
- ImPACT test
- Latest guidelines from October 2022 Consensus conference not yet published, may be adjusting tools

Conclusion:

- Be on the lookout for persistent post-concussion symptoms in your patients. Are they ready to go back to school/work/play? Use the [return to school/sport strategy document](#) by Parachute.
- Watch for red flags in the acute stage and be aware of predictors for Persistent Post-Concussive Syndrome (PPCS)
- Include questions about sleep, mood, cognitive symptoms, anxiety as a patient is recovering from acute concussion
- Reassess for vestibular-ocular and cognitive symptoms as a patient is recovering from concussion
- Know your community resources and how to access them
- Build a team of experts to collaborate with assessing and treating patients with concussion



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Links and Resources:

- SCAT5: <https://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf>
- Vestibular/Ocular-Motor Screening test (VOMS) Demonstration: <https://www.natafoundation.org/wp-content/uploads/VOMS-Infographic.pdf>
- Vestibular/Ocular-Motor Screening test (VOMS) Scoring and Tracking: <https://blog.summit-education.com/wp-content/uploads/VOMS-explicit-directions.pdf>
- MIDAS Headache score: <https://headaches.org/wp-content/uploads/2018/02/MIDAS.pdf>
- Neck disability index score: https://www.wcbask.com/sites/default/files/2020-10/neck.disability.index_.pdf
- Dizziness handicap inventory: <https://southampton.stonybrookmedicine.edu/sites/default/files/Dizziness%20Hanicap%20Inventory%20-%20English.pdf>
- Anxiety and Depression DASS-22 scale: <https://maic.qld.gov.au/wp-content/uploads/2016/07/DASS-21.pdf>
- Dr Mike Evans. For Patients: Concussions 101 <https://www.youtube.com/watch?v=zCCD52Pty4A>
- Dr Mike Evans. For Patients: Concussions: What are They? https://www.youtube.com/watch?v=_55YmblG9YM

Papers and References for Further Reading:

- Lagacé-Legendre, C. et al. Persistent Post concussion Symptoms: An Expert Consensus-Based Definition Using the Delphi Method. J Head Trauma Rehabilitation 2020, Vol 36(2) Pages 96-102 <https://pubmed.ncbi.nlm.nih.gov/32826417/>
- Leddy, JL. et al. Active Rehabilitation of Concussion and Post concussion Syndrome. Phys Med Rehabil Clin N. Am27(2016)437-454 <https://pubmed.ncbi.nlm.nih.gov/27154855/>
- Varner, C. et al. LO90: Predictors of post-concussion syndrome in adults with acute mild traumatic brain injury presenting to the emergency department: a secondary analysis of a randomized controlled trial. <https://www.cambridge.org/core/journals/canadian-journal-of-emergency-medicine/article/lo90-predictors-of-postconcussion-syndrome-in-adults-with-acute-mild-traumatic-brain-injury-presenting-to-the-emergency-department-a-secondary-analysis-of-a-randomized-controlled-trial/0B189ABD04FC955674F13C5815E8189A>
- Morgan, CD. et al. Predictors of post concussion syndrome after sports-related concussion in young athletes: a matched case-control study. <https://thejns.org/pediatrics/view/journals/j-neurosurg-pediatr/15/6/article-p589.xml>
- Mucha, A. et al. A Brief Vestibular/Ocular Motor Screening (VOMS) assessment to evaluate concussions: preliminary findings. <https://pubmed.ncbi.nlm.nih.gov/25106780/>
- Beasley, M., & Master, C. (2021). The Bare Bones of Concussion: What the Sideline Orthopedic Surgeon Needs to Know: Current Concept Review. Journal of the Pediatric Orthopedic Society of North America, 3(4). <https://www.jposna.org/index.php/jposna/article/view/320/266>