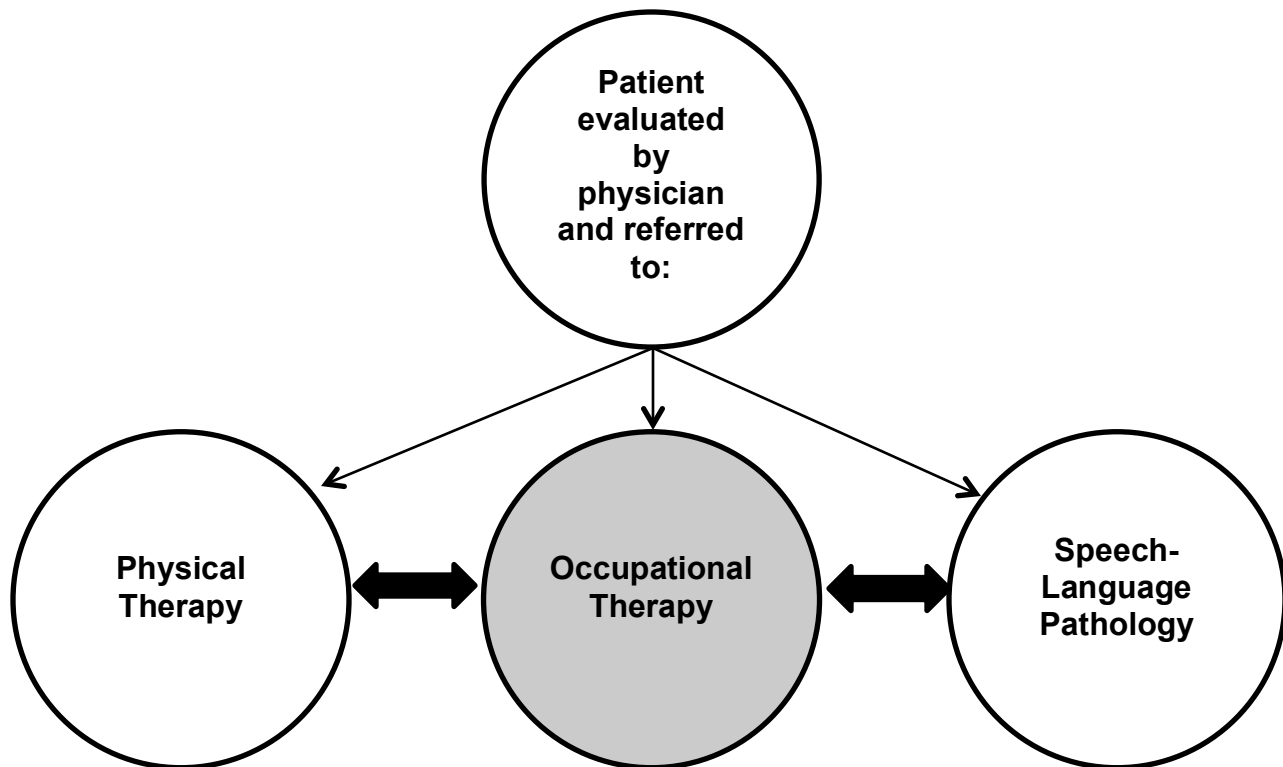


# POSTCONCUSSIVE SYNDROME (PCS) CLINICAL PRACTICE GUIDELINE: OCCUPATIONAL THERAPY

## Disclaimer

Progression is time and criterion-based, dependent on soft tissue healing, patient demographics and clinician evaluation. Contact Ohio State Sports Medicine at 614-293-2385 if questions arise.



## Background

The Centers for Disease Control and Prevention (CDC) defines a concussion as a type of mild traumatic brain injury (TBI) caused by a bump, blow, or jolt to the head. Concussions can also occur from a fall or a blow to the body that causes the head and brain to move quickly back and forth.<sup>6</sup> Most people with a concussion recover quickly and fully. But for some people, symptoms can last for days, weeks, or longer. Persistent symptoms are referred to as post-concussive syndrome (PCS). A definition of PCS is provided by the World Health Organization's International Classification of Diseases (ICD-10), including 3 or more of the following: headache, dizziness, fatigue, irritability, insomnia, concentration difficulty or memory difficulty. In general, recovery may be slower among older adults, young children, and teens. Those who have had a concussion in the past are also at risk of having another one and may find that it takes longer to recover if they have another concussion.<sup>6</sup> Lingering symptoms of a concussion typically fall into four categories (1) physical, (2) cognitive, (3) emotional/mood, (4) sleep.<sup>6</sup> Individuals with post-concussive symptoms often have difficulty transitioning back to activities such as work, school, and play.<sup>11</sup> The role of occupational therapists (OT) is to address performance skills and patterns to promote return to engagement in meaningful and purposeful activities.<sup>4</sup>

## Evaluation

<b>Client History and Occupational Profile</b> <sup>2,4</sup>	<ul style="list-style-type: none"><li>• Relevant information: Age, date of injury, mechanism of injury, symptoms at time of injury and present, did client lose consciousness, was post-traumatic amnesia present, number and impact of previous concussions, other past-medical history including medical co-morbidities and psychosocial client factors</li><li>• Comparison of prior level of function and current level of function: ADL, IADL, school, work, and/or sport, and other meaningful interests</li><li>• Current symptom ratings: Concussion Grading Scale (CGS), Refer to Appendix A</li></ul>
<b>Physical</b>	<p>Symptoms associated with PCS may include headache, blurry or double vision, nausea, dizziness, sensitivity to noise or light, balance problems, fatigue or low energy<sup>6</sup></p> <ul style="list-style-type: none"><li>• OT screening of UE ROM, strength, coordination, sensation, and posture.</li><li>• If neck or balance issues are present, collaboration with PT is recommended. See PT CPG.</li><li>• Vision – Oculomotor function<sup>11</sup><ul style="list-style-type: none"><li>○ Research has identified objective findings that show difference in saccadic eye movements, smooth pursuits and tracking in control group vs PCS group<sup>16</sup></li><li>○ Assess through observation as well as standardized assessments</li><li>○ Standardized assessments to consider<ul style="list-style-type: none"><li>▪ Developmental Eye Movement Test* (DEM)<sup>14,25</sup></li><li>▪ King-Devick Assessment<sup>*,13</sup></li><li>▪ NSUCO Saccades Testing<sup>*,19</sup></li><li>▪ NSUCO Pursuits Testing<sup>*,19</sup></li><li>▪ *See Visual Screening CPG for additional details</li></ul></li></ul></li><li>• Vision – Convergence and Accommodation<ul style="list-style-type: none"><li>○ Changes in accommodation and convergence have been identified in individuals with PCS<sup>22</sup></li><li>○ Assess through questionnaire and standardized assessments<ul style="list-style-type: none"><li>▪ Convergence Insufficiency Symptom Survey (CISS)<sup>24</sup><ul style="list-style-type: none"><li>• Scores &gt;21 can indicate impairment, recommend referral to optometrist</li></ul></li><li>▪ Near point of convergence<sup>*,23,26</sup></li><li>▪ Amplitude of accommodation<sup>*,27</sup></li><li>▪ *See Visual Screening CPG for additional details</li></ul></li><li>○ Occupational therapists can work collaboratively with optometrists to improve near focus, convergence, and accommodative function<sup>11</sup></li></ul></li><li>• Sensory Processing<ul style="list-style-type: none"><li>○ Assess through interview and questionnaire<ul style="list-style-type: none"><li>▪ Interview may include asking about screen time tolerance, light and sound sensitivities</li><li>▪ Adult Sensory Profile<sup>5</sup></li></ul></li></ul></li><li>• Vestibular Function<ul style="list-style-type: none"><li>○ Assess through screening and questionnaire<ul style="list-style-type: none"><li>▪ The Vestibular Disorders Activities of Daily Living Scale<sup>7</sup></li><li>▪ The Vestibular Activities and Participation Measure<sup>1,21</sup></li><li>▪ VOR, VOR cancellation, Head Impact Testing (HIT). See PT CPG.</li><li>▪ Recommend collaboration with Physical Therapy in this area</li></ul></li></ul></li></ul>



<b>Cognitive</b>	<p>Symptoms may include difficulty thinking clearly, feeling slowed down, difficulty concentrating, or difficulty remembering new information<sup>6</sup></p> <ul style="list-style-type: none"> <li>• Work collaboratively with speech-language pathologists to address cognitive deficits, with overarching goal of improving occupational performance<sup>4</sup></li> <li>• SLP to focus on standardized testing and remediation of deficits of executive functioning, memory, cognitive endurance<sup>4</sup></li> <li>• OTs and SLPs collaborate on return to school or work plans and accommodations<sup>4</sup></li> <li>• May also seek input from physicians and rehabilitation psychologists as part of collaborative treatment team</li> <li>• Montreal Cognitive Assessment (MoCA), if not completed by SLP, is a standardized assessment that can be utilized to measure cognitive skills. See SLP CPG.</li> </ul>
<b>Emotional</b>	<p>Symptoms following concussion may include irritability, sadness, nervousness, or an overall feeling of being more emotional<sup>6</sup></p> <ul style="list-style-type: none"> <li>• Symptoms may be identified with utilization of CGS questionnaire or through discussion</li> <li>• Research suggests mindfulness is key to occupational engagement and may enhance health and well-being<sup>10</sup></li> <li>• May also seek input regarding emotional health from physicians, rehabilitation psychologists, and social workers as part of collaborative treatment team</li> </ul>
<b>Sleep</b>	<p>Symptoms may include trouble falling asleep or sleeping more or less than usual<sup>6</sup></p> <ul style="list-style-type: none"> <li>• Symptoms may be identified with utilization of CGS questionnaire or through discussion</li> <li>• It could be the case that sleep disturbances are secondary to other symptoms such as depression or anxiety. Management strategies should take this potential interaction of symptoms into account.<sup>20</sup></li> </ul>

## Intervention

<p><b>Physical Symptoms</b></p>	<ul style="list-style-type: none"> <li>• Vision – treatment interventions may include teaching compensatory strategies to address difficulties with light sensitivity or visual tracking.<sup>11</sup> A rehabilitative approach would involve working in collaboration with optometrists and/or ophthalmologists to address impairments in oculomotor function, binocular vision and accommodation. See neurovision CPG for additional detail.</li> <li>• Sensory Processing – treatment intervention includes recommendations of environmental adaptations to modify reactions to sensory stimulation.<sup>11</sup></li> <li>• Fatigue Management – education on energy conservation strategies including planning, prioritizing, and pacing during ADL/IADL completion. Fatigue coping strategies can be found in <a href="#">Appendix 12.3</a> of cited article, pg 96.<sup>20</sup></li> </ul>
<p><b>Emotional Symptoms</b></p>	<ul style="list-style-type: none"> <li>• Training in mindfulness-based techniques and goal directed techniques to help manage the emotional and physical symptoms of PCS and improve participation in daily activities and occupation<sup>8,15</sup></li> <li>• Mindfulness-based techniques include             <ul style="list-style-type: none"> <li>○ Stress reduction techniques<sup>3</sup></li> <li>○ Relaxation techniques<sup>18,20</sup></li> </ul> </li> <li>• When individuals anticipate that activities will provoke autonomic symptoms of dizziness or headache, relaxation techniques can be implemented to prolong the ability to engage in a functional task<sup>4</sup></li> <li>• May also benefit from mindfulness and relaxation techniques during OT treatment sessions to increase tolerance for therapeutic activity<sup>4</sup></li> <li>• Goal directed interventions include: symptom management, assertiveness training, and guided return to engagement in meaningful occupations<sup>4</sup> <ul style="list-style-type: none"> <li>○ Assertiveness training can be vital following “invisible injury,” such as concussion, to empower individuals to ask for accommodations needed for successful return to school or work<sup>9</sup></li> </ul> </li> </ul>
<p><b>Cognitive Symptoms</b></p>	<ul style="list-style-type: none"> <li>• Executive function – remediating executive function skills affecting daily routines<sup>17</sup></li> <li>• Establishing healthy routines             <ul style="list-style-type: none"> <li>○ Strategies may include taking breaks and utilizing organizational tools</li> <li>○ Aim to assist in completion of daily routine while minimizing symptoms</li> </ul> </li> <li>• Work in collaboration with SLP to address cognitive deficits</li> </ul>
<p><b>Sleep Symptoms</b></p>	<ul style="list-style-type: none"> <li>• Provide education on the role of sleep in recovery<sup>4</sup></li> <li>• Facilitate healthy daily routines and sleep habits<sup>12</sup> <ul style="list-style-type: none"> <li>○ Plan rest breaks</li> <li>○ Make environmental modifications</li> <li>○ Manage symptoms</li> <li>○ Sleep hygiene advice (<a href="#">Appendix 7.1</a>, pg 82)<sup>20</sup></li> </ul> </li> <li>• Other strategies             <ul style="list-style-type: none"> <li>○ Gradually reducing daytime naps, while increasing physical activity to promote a return to nighttime sleeping</li> <li>○ Environmental modifications may include<sup>4</sup> <ul style="list-style-type: none"> <li>▪ Limiting screen usage in bed</li> <li>▪ Use of light-blocking curtains</li> <li>▪ Blue-light filters for electronic devices</li> </ul> </li> </ul> </li> </ul>

**Occupational Performance**

Planning for return to school and work should occur in collaboration with treatment team, including physician, psychologist, SLP, PT and OT.

**Return to school<sup>11</sup>**

- Research suggests the importance of returning individuals to structured activities, including school, as soon as possible to establish general sense of improved well-being and restore a consistent routine.

Modifications for visual difficulties:

- Using a line guide or tinted transparency when reading to help with visual tracking or reduce glare
- May benefit from larger print or access to lesson notes ahead of time

Modifications for general sensory sensitivity, including decreased tolerance for crowds and visual motion:

- Allow student to change classes ahead of time
- Provide alternative to eating lunch in a busy cafeteria

Modifications at the college level:

- Recommend accommodations such as preprinted notes, increased test time, use of recording devices for taking notes
- Compensatory strategies for visual tracking when reading
- Line guide, glare reduction transparencies, reducing screen brightness
- Social activities recommendations
- Therapists can assist in identifying activities that are less stimulating, therefore less likely to provoke symptoms
- Avoid studying or eating lunch with a large group of peers, and meet with small groups in less stimulating environments

**Return to work<sup>11</sup>**

- Recommendation for initial period of rest, followed by graduated return to work if one's job permits
- Therapists can work with patients and their employers on strategies to help manage symptoms
  - Creating modified workstations
  - Using anti-glare computer screens
  - Implementing frequent rest breaks



# Appendix A: Ohio State Concussion Grading Scale

Circle the number in each row that best describes the way you have been feeling relative to the symptom. Patient Name \_\_\_\_\_

Symptom	None	Mild	Moderate	Severe			
Headache	0	1	2	3	4	5	6
“Pressure in Head”	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or Vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred Vision	0	1	2	3	4	5	6
Balance Problems	0	1	2	3	4	5	6
Sensitivity to Light	0	1	2	3	4	5	6
Sensitivity to Noise	0	1	2	3	4	5	6
Feeling Slowed Down	0	1	2	3	4	5	6
Feeling Like “In a Fog”	0	1	2	3	4	5	6
Don’t Feel Right	0	1	2	3	4	5	6
Difficulty Concentrating	0	1	2	3	4	5	6
Difficulty Remembering	0	1	2	3	4	5	6
Fatigue or Low Energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
Trouble Falling Asleep	0	1	2	3	4	5	6
More Emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Sleeping More Than Usual	0	1	2	3	4	5	6
Sleeping Less Than Usual	0	1	2	3	4	5	6
Difficulty Sleeping Soundly	0	1	2	3	4	5	6
ringing in Ears	0	1	2	3	4	5	6
Numbness or Tingling	0	1	2	3	4	5	6

- Over the past week, my sleeping pattern has changed. \_\_\_\_\_  Yes  No *If NO, skip to #2*
  - Have you been taking naps during the middle of the day? \_\_\_\_\_  Yes  No
  - Are you waking during the night? \_\_\_\_\_  Yes  No
- Over the past week, my participation in **work** or **school** has been \_\_\_\_\_ % of what it would be normally.
- Over the past week, my participation in **physical activity** (sports, working out, etc.) has been \_\_\_\_\_ % of what it would be normally.
- Do you feel like you are putting more effort into maintaining schoolwork/grades and/or work productivity? (Circle corresponding number below)

0	1	2	3	4	5	6
No More Effort			A Lot More Effort			

- Please indicate the type of visual changes you are experiencing:  
 Eye Fatigue  Double Vision  Blurry Vision  Other \_\_\_\_\_  n/a
- Do your symptoms get **WORSE** with **physical activity**? \_\_\_\_\_  Yes  No
- Do your symptoms get **WORSE** with **thinking/cognitive activity**? \_\_\_\_\_  Yes  No
- Do your symptoms **IMPROVE** with **physical rest**? \_\_\_\_\_  Yes  No
- Do your symptoms **IMPROVE** with **thinking/cognitive rest**? \_\_\_\_\_  Yes  No



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## References

1. Alghwiri, A. et al. (2012). The development and validation of the Vestibular Activities and Participation Measure. *Archives of Physical Medicine and Rehabilitation*, 93, 1822-31.
2. American Occupational Therapy Association. (2014). Occupational therapy practice framework: Domain and process (3rd ed.). *American Journal of Occupational Therapy*, 68(Suppl. 1), S1– S48.
3. Azulay, J., Smart, C.M., Mott, T., & Cicerone, K.D. (2013). A pilot study examining the effect of mindfulness-based stress reduction on symptoms of chronic mild traumatic brain injury/postconcussive syndrome. *Journal of Head Trauma Rehabilitation*, 28, 323-331.
4. Brayton-Chung, A. et al. (2016). Action: The role of occupational therapy in concussion rehabilitation. *OT Practice*, 11-21-2016, 9-12.
5. Brown, C., Tollefson, N., Dunn, W., Cromwell, R., & Fillion, D. (2001). The Adult Sensory Profile: Measuring patterns of sensory processing. *American Journal of Occupational Therapy*, 55, 75-82.
6. Centers for Disease Control and Prevention. (2017). *Traumatic brain injury & concussion*. Retrieved from <http://www.cdc.gov/traumaticbraininjury/index.html>
7. Cohen, H. (2014). Use of the Vestibular Disorders Activities of Daily Living Scale to describe functional limitations in patients with vestibular disorders. *Journal of Vestibular Research*, 24, 33-38.
8. Doig, E., Fleming, J., Kulpers, P., Cornwell, P., & Khan, A. (2011) Goal-directed outpatient rehabilitation following TBI: A pilot study of programme effectiveness and comparison of outcomes in home and day hospital settings. *Brain Injury*, 25, 1114-1125.
9. Donker-Cools, B.H.P.M., Daams, J.G., Wind, H., & Frings-Dresen, M.H.W. (2016). Effective return-to-work interventions after acquired brain injury: A systematic review. *Brain Injury*, 30, 113-131.
10. Elliot, M.L. (2011). Being mindful about mindfulness: An invitation to extend occupational engagement into the growing mindfulness discourse. *Journal of Occupational Science*, 18, 366-376
11. Finn, C. & Waskiewicz, M. (2015). The role of occupational therapy in managing Post-Concussive Syndrome, published by the American Occupational Therapy Association, Inc., Physical Disabilities Special Interest Section Quarterly, 38(1), 1-4.
12. Fung, C., Wiseman-Hakes, C., Stergiou-Kita, M., Nguyen, M., & Colantonia, A. (2013). Time to wake up: Bridging the gap between theory and practice for sleep in occupational therapy. *British Journal of Occupational Therapy*, 76, 384-386.
13. Galetta, K.M., et al. (2011). The King-Devick test and sports-related concussion: study of a rapid visual screening tool in a collegiate cohort. *Journal of the Neurological Sciences*, 309, 34-39.
14. Garzia, R. et al. (1990). A new visual-verbal saccade test: The Developmental Eye Movement test (DEM). *Journal of the American Optometric Association*, 61(2), 124-135.
15. Hardison, M.E., & Roll, S. C. (2016). Mindfulness interventions in physical rehabilitation: A scoping review. *American Journal of Occupational Therapy*, 70, 7003290030p1-7003290030p9. <http://dx.doi.org/10.5014/ajot.2016.018069>
16. Heitger, M. et al. (2009). Impaired eye movements in post-concussion syndrome indicate suboptimal brain function beyond the influence of depression, malingering, or intellectual ability. *Brain*, 132; 2850-2870.
17. Kennedy, M.R.T., Coelho, C., Turkstra, L., Yivisaker, M., Moore Sohlberg, M., Yorkston, K., & Kan, P. (2008). Intervention for executive functions after traumatic brain injury: A systematic review, meta-analysis, and clinical recommendations. *Neuropsychological rehabilitation*, 18, 257-299.
18. Lazar, S.W., Bush, G., Gollub, R.L., Fricchione, G.L., Khalasa, G., & Benson, H. (2000). Functional brain mapping of the relaxation response and meditation. *Neuroreport*, 11, 1581-1585
19. Maples WC. NSUCO Oculomotor test. Santa Ana, CA: Optometric Extension Program. 1995.
20. Marshall S, Bayley M, McCullagh S, Velikonja D, Berrigan L. Clinical practice guidelines for mild traumatic brain injury and persistent symptoms. *Can Fam Physician*. 2012; 58: 257-267. [http://onf.org/system/attachments/60/original/Guidelines\\_for\\_Mild\\_Traumatic\\_Brain\\_Injury\\_and\\_Persistent\\_Symptoms.pdf](http://onf.org/system/attachments/60/original/Guidelines_for_Mild_Traumatic_Brain_Injury_and_Persistent_Symptoms.pdf)
21. Mueller, M. et al. (2015). Subscales of the Vestibular Activities and Participation questionnaire could be applied across cultures. *Journal of Clinical Epidemiology*, 68, 211-219.
22. Poltavski, D.V., & Biberdorf, D. (2014). Screening for lifetime concussion in athletes: Importance of oculomotor measures. *Brain Injury*, 28, 475-485.
23. Radomski, M. et al. (2014) Composition of a vision screen for service members with Traumatic Brain Injury: Consensus using a modified nominal technique. *American Journal of Occupational Therapy*, July/August 2014, Vol. 68, 422-429.
24. Rouse, M et al. (The CITT Investigator Group). (2009) Validity of the CISS: A confirmatory study. *Optom Vis Sci*, 86(4), 357-63.
25. Richman, J.E. & Garzia, R. P. (2015). The Developmental Eye Movement test, version 2.5. South Bend, IN: Bernell.
26. Scheiman, M. et al. (2003). Nearpoint of Convergence: Test procedure, target selection, and normative data. *Optometry and Vision Science*, 80(3), 214-225.
27. Scheiman, M. et al. (2011). Understanding and Managing vision deficits: A guide for occupational therapists (3<sup>rd</sup> ed). Thorofare, NJ: Slack.



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