

# Andrew's Institute Sports Medicine Lecture Series "Advanced Interpretation of the Vestibular/Ocular Motor Screen (VOMS) and On-Field Concussion Assessment" August Price, PsyD

### **Registration Information**

To receive CME credit, participants need to:

- Register
- View presentation
- Take guiz and obtain 80% (4 out of 5) to pass
- Complete evaluation
- Print certificate

Participants should take 60 minutes to complete the activity. Participants may work at their own pace.

#### **Teaching Methods**

This online enduring material uses the following teaching methods and media:

- Lecture (audio/videotaped)
- PowerPoint Presentation

### **Acknowledgements of Commercial Support**

There is no commercial/financial support for this activity.

# CME Enduring Material Description, Target Audience and Needs Statement

Sports medicine is an evolving discipline in which experience of a multigenerational factor can shed new information and knowledge on how to properly identify, manage and prevent common injury types seen in sports medicine today. This online educational enduring material is designed for physicians and clinical staff. Its purpose is to bridge the gap between the medical knowledge and current practice with evidence-based practice guidelines to achieve optimal patient outcomes through discussions and examinations of interesting, real world cases.

# **Objectives**

At the end of this online enduring material, participants should be able to:

- Review how to administer the Vestibular/Ocular Motor Screen (VOMS).
- Discuss objective and subjective interpretation of the VOMS.
- Discuss how to perform an on-field concussion assessment.

# For Further Study

- 1. American Academy of Neurological Surgeons (cited 1/19/18) http://www.aans.org/Patients/Neurosurgical-Conditions-and-Treatments/Concussion
- 2. Guskiewicz KM, Weaver NL, Padua DA, et al. Epidemiology of concussion in collegiate and high school football players. Am J Sport Med. 2000;28(5)643-50.
- 3. Guskiewicz KM, McCrea M, Marshall SW, et al. Cumulative effects associated with recurrent concussion in collegiate football players: the NCAA concussion study. JAMA. 2003;290(19):2549-55.
- 4. Shulz MR, Marshall SW, Mueller FO, et al. Incidence and risk

factors of concussion in high school athletes, North Carolina 1996-1999. Am J Epidemiol. 2004;160(10):937-44.

- 5. Iverson GL, Gaetz M, Lovell MR, et al. Cumulative effects of concussion in amateur athletes. Brain Inj. 2004;18(5):433-43.
- 6. Hollis SJ, Stevenson MR, McIntosh AS, et al. Incidence, risk, and protective factors of mild traumatic brain injury in a cohort of Australian nonprofessional male rugby players. Am J Sports Med. 2009;37(12):2328-33.
- 7. Gessel LM, Fields SK, Collins CL, et al. Concussions among United States high school and collegiate athletes. J Athl Train. 2007;42(4):495-503.
- 8. Lincoln AE, Caswell SV, Almquist JL, et al. Trends in concussion incidence in high school sports: a prospective 11-year study. Am J Sports Med. 2011;39(5):958-63.
- 9. Marshall SW, Guskiewicz KM, Shankar V, et al. Epidemiology of sports concussion in seven US high school and collegiate sports. Inj Epidemiol. 2015;2(1):13.
- 10. Covassin T, Moran R, Elbin RJ. Sex differences in reported concussion injury rates and time loss from participation: an update of the NCAA injury surveillance program from 2004-2005 through 2008-2009. J Athl Train. 2016;51(3):189-94.
- 11. Gordon KE, Dooley JM, Wood EP. Is migraine a risk factor for the development of concussion. Br J Sports Med. 2006;40(2):184-5.
- 12. Kontos AP, Elbin RJ, Fazio-Sumrock VC, et al. Incidence of sport-related concussion among youth football players aged 8-12 years. J Pediatr. 2013;41(7):717-20.
- 13. Dompier TP, Kerr ZY, Marshall SW, et al. Incidence of concussion during practice and games in youth, high school, and collegiate American football players. JAMA Pediatr. 2015;169(7):659-65.
- 14. Field M, Collins MW, Lovell MR, et al. Does age play a role in recovery from sports-related concussion? A comparison of high school and college athletes. J Pediatr. 2003;142(5):546-53.
- 15. Pellman EJ, Lovell MR, Viano DC, et al. Concussion in professional football: recovery of NFL and high school athletes assessed by computerized neuropsychological testing-part 12. Neurosurgery. 2006;58(2):263-74.
- 16. Covassin T, Elbin RJ, Harris W, et al. The role of sex and age in symptoms, neurocognitive performance, and postural stability in athletes after concussion. Am J Sports Med. 2012;40(6):1303-12.
- 17. Mihalik JP, Stump JE, Collins MW, et al. Posttraumatic migraine characteristics in athletes following sports-related concussion. J Neurosurg. 2005;23(1):14-20.
- 18. Lau BC, Lovell MR, Collins MW, et al. Neurocognitive and



# Andrew's Institute Sports Medicine Lecture Series "Advanced Interpretation of the Vestibular/Ocular Motor Screen (VOMS) and On-Field Concussion Assessment"

# August Price, PsyD

symptom predictors of recovery in high school athletes. Clin J Sports Med. 2009;19(3):216-21.

- 19. Collie A, McCrory P, Makdissi M. Does history of concussion affect current cognitive status? Br J Sports Med. 2006;40(6):550-1.
- 20. Slobounov S, Slobounov E, Sebastianelli W, et al. Differential rate of recovery in athletes after first and second concussion episodes. Neurosurgery. 2007;61(2):338-44.
- 21. Covassin T, Stearne D, Elbin RJ. Concussion history and post-concussion neurocognitive performance and symptoms in collegiate athletes. J Athl Train. 2008;43(2):119-24.
- 22. Lau BC, Kontos AP, Collins MW, et al. Which on-field signs/symptoms predict protracted recovery from sport-related concussion among high school football players. Am J Sports Med. 2011;39(11):2311-8.
- 23. Asplund CA, McKeag DB, Olsen CH. Sport-related concussion: factors associated with prolonged return to play. Clin J Sports Med. 2004;14(6):339-43.
- 24. Makdissi M, Darby D, Maruff P, et al. Natural history of concussion in sport: markers for severity and implications for management. Am J Sports Med. 2010;38(3):464-71.
- 25. Erlanger D, Kaushik T, Cantu R, et al. Symptom-based assessment of the severity of concussion. J Neurosurg. 2003;98(3):477-84.
- 26. Shaw N. The neurophysiology of concussion. Prog Neurobiol. 2002;67(4):281-344.
- 27. Giza CC, Hovda DA. The neurometabolic cascade of concussion. J Athl Train. 2001;36(3):228-235.
- 28. Russell FA, King R, Smillie SJ, et al. Calcitonin gene-related peptide: physiology and pathophysiology. Physiol Rev. 2014;94(4):1099-142.
- 29. Sufrinko A, McCallister-Deitrick J, Elbin RJ, et al. Family history of migraine associated with posttraumatic migraine symptoms following sport-related concussion. J Head Trauma Rehab. 2018;33(1):7-14.
- 30. Brodsky JR, Cusick BA, Zhou G. Evaluation and management of vestibular migraine in children: experience from a pediatric vestibular clinic. Eur J Paedtric Neurol. 2016;20(1):85-92.
- 31. Fife TD, Giza CC. Posttraumatic vertigo and dizziness. Semin Neurol. 2013;33(3):238-43.
- 32. Whitney SL, Marchetti GF, Pritcher M, et al. Gaze stabilization and gait performance in vestibular dysfunction. Gait Posture. 2009;29(2):194-8.
- 33. Bhattacharyya N, Baugh RF, Orvidas L, et al. Clinical practice guideline: benign paroxysmal positional vertigo. Otolaryngol Head

Neck Surg. 2008;139(5):47-81.

- 34. Pavlou M. The use of optokinetic stimulation in vestibular rehabilitation. J Neurol Phys Ther. 2010;34(2):105-10.
- 35. Mucha A, Collins MW, Elbin RJ, et al. A brief Vestibular Ocular Motor Screening (VOMS) assessment to evaluate concussions: preliminary findings. Am J Sports Med. 2014;42(10):100-8.
- 36. Kapoor N, Ciuffreda KJ. Vision disturbances following traumatic brain injury. Curr Treat Options Neurol. 2002;4(4):271-80.
- 37. Scheiman M, Gwiazda J, Li T. Non-surgical interventions for convergence insufficiency. Cochrane Database Sys Review. 2011;16(3).
- 38. Reddy CC, Collins MW, Lovell MR, et al. Efficacy of amantadine treatment on symptoms and neurocognitive performance among adolescents following sports-related concussion. J Head Trauma Rehabil. 2013;28(4)260-5.
- 39. Kinnaman KA, Mannix RC, Comstock RD, et al. Management strategies and medication use for treating pediatric patients concussions. Acta Paediatr. 2013;102(9):424-8.
- 40. Moser RS, Glatts C, Schatz P. Efficacy of immediate and delayed cognitive and physical rest for treatment of sports-related concussion. J Pediatr. 2012;161(5):922-6.
- 41. Brown NJ, Mannix RC, O'Brien MJ, et al. Effect of cognitive activity level on duration of post-concussion symptoms. Pediatrics. 2014;133(2):299-304.
- 42. Truss K, Godfrey C, Takagi M, et al. Trajectories and risk factors for post-traumatic stress symptoms following pediatric concussion. J Neurotrauma. 2017;34(14):2272-9.
- 43. Perrine K, Gibaldi JC. Somatization in post-concussion syndrome: a retrospective study. Cureus. 2016;8(8):743.
- 44. Kennedy E, Quinn D, Tumilty S, et al. Clinical characteristics and outcomes of the cervical spine in patients with persistent post-concussion symptoms: a rertrospective analysis. Musculoskelet Sci Pract. 2017;29:91-8.
- 45. Savage RC. The child's brain: Injury and development. Wake Forrest. Lash Publishing 1999.
- 46. Silverberg ND, Iverson GL. Is rest after concussion "the best medicine?" recommendations for activity resumption following concussion in athletes, civilians, and military service members. J Head Trauma Rehabil. 2013;28(4):250-9.
- 47. Leddy JJ, Sandhu H, Sodhi V, et al. Rehabilitation of concussion and post-concussion syndrome. Sports Health. 2012;4(2):147-54.
- 48. McCrory P, Meeuwise WH, Aubry M, et al. Consensus statement on concussion in sport: the 4th international conference on



# Andrew's Institute Sports Medicine Lecture Series "Advanced Interpretation of the Vestibular/Ocular Motor Screen (VOMS) and On-Field Concussion Assessment"

August Price, PsyD

concussion in sport, Zurich. November 2012. J Athl Train. 2013;48(4):554-75.

- 49. Wang KK, Yang Z, Zhu T, et al. An update on diagnostic and prognostic biomarkers for traumatic brain injury. Expert Rev Mol Diagn. 2018;18(2):165-180.
- 50. Collins MW, Kontos AP, Reynolds E, et al. A comprehensive, targeted approach to the clinical care of athletes following sports-related concussion. Knee Surg Sports Traumatol Arthoroscop. 2014;22(2):235-46.
- 51. Lichtenstein JD, Linnea KS, Maerlender AC. Patterns of referral in high school concussion management programs: a pilot study of consultants from different programs. Appl Neuropsychol Child. 2017;28:1-8.
- 52. Gordon KE, Do MT, Thompson W, et al. Concussion management by paediatricians: a national survey of paediatricians. Brain Inj. 2014;28(3):311-7.
- 53. Caskey RC, Nance ML. Management of pediatric mild traumatic brain injury. Adv Pediatr. 2014;61(1):271-86.
- 54. Sufrinko AM, Marchetti GF, Cohen PE, et al. Using acute performance on comprehensive neurocognitive, vestibular, and ocular motor assessment battery to predict recovery duration after sport-related concussion. Am J Sports Med. 2017;45(5):1187-94.
- 55. Collins MW, Womble MN. American pediatric surgical association journal of pediatric surgery lecture. J Pediatr Surg. 2017;52(1):16-21.
- 56. Pinto SM, Twichell MF, Henry LC. Predictors of pharmacological intervention in adolescents with protracted symptoms after sports-related concussion. PM R. 2017;9(9):847-55.

# Disclosure

In compliance with the Accreditation Council for Continuing Medical Education (ACCME) Standards for Integrity and Independence, all presenters, authors and planners must disclose to the participants of an educational activity any relevant financial relationships they may have with an ineligible company, (i.e., any entity whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients) related to the content of this CME activity.

The Course director, Troy Smurawa, MD, has no relevant financial relationships with an ineligible company related to the content of this CME activity.

The speaker, August Price, PsyD, has no relevant financial relationships with an ineligible company related to the content of this CME activity.

The CME planners and staff have no relevant financial relationships with an ineligible company related to the content of this CME activity.

All relevant financial relationships have been mitigated.

#### **Credit Designation Statement**

The Children's Health is accredited by the Texas Medical Association to provide continuing medical education for physicians.

The Children's Health designates this enduring material for a maximum of 1 AMA PRA Category 1 Credit™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

#### **Release and Termination Dates**

Original release date: September 12, 2022 Review date: September 8, 2022 Termination date: September 12, 2025

### **Hardware/Software Requirements**

Internet; Media Player; Audio

#### For more information or questions

CME: 214-456-5168 or CME@Childrens.com