

## Concussion and Neurocognitive Assessment: PBL

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## Deepak Patel, MD, FACSM, FAAFP

Director of Sports Medicine, Rush-Copley Family Medicine Residency; Assistant Professor, Rush Medical College

A past AAFP FMX presenter, Dr. Patel practices family medicine and sports medicine in Aurora and Yorkville, IL and is medical director for Rush-Copley Sports Medicine. His specialty topics include musculoskeletal imaging, concussions, stress fractures, osteoarthritis, joint examinations, pediatric overuse injuries, knee pain, and exercise recommendations, as well as evidence-based medicine. He is a fellow of the American College of Sports Medicine. He says that staying current with medical advances and with evidence-based medicine is the most challenging aspect of family medicine.

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## Learning Objectives

1. Practice applying new knowledge and competencies gained from concussion and neurocognitive assessment sessions, and receive feedback from expert faculty.
2. Interact collaboratively with peers to solve complex and challenging case-study scenarios.
3. Develop problem-solving skills that promote effective reasoning to manage concussion and neurocognitive assessment within the context of professional practice.

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## Audience Engagement System

The diagram illustrates the audience engagement system through three steps:

- Step 1:** Home screen showing various app icons and a 'CME Events' section highlighted with a red arrow.
- Step 2:** A list of CME events. The event 'CME01 Adult Concussion Syndromes: Unchain My Heart' is selected, indicated by a red arrow.
- Step 3:** A detailed view of the selected event, showing the title 'CME01 Adult Concussion Syndromes: Unchain My Heart', the date 'Wednesday, Sep 17', and a 'View Details' button.

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## Chief Complaint

- 13 year old female head injury

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## HPI

- Struck on side of head by volleyball yesterday
- 6/10 headache
- Wasn't able to return to playing
- Increased headache remainder of school

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## Polling question

- What past medical history would raise your concern for prolonged concussion symptoms?

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## Answer

What past medical history would raise your concern for prolonged concussion symptoms?

- Prior concussion(s)
- Anxiety
- Depression
- Migraines

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## Polling question

What the most important evaluation for concussion, and why?

- A. Neurologic,
- B. Balance testing,
- C. Computer neuropsychologic,
- D. Imaging (CT, MRI)

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## Concussion PE

- Head and Neck (C-spine) exam
- Neuro exam
  - Cranial nerves, reflexes, gait, mental status, strength, sensation, coordination
  - Including cognitive assessment-Memory, concentration, etc.
  - Balance testing

McCroby P, Macerwiese WH, Aubrey M, et al. Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *Br J Sports Med*. 2013;47:250-258.  
Scorza, K, Raleigh, M, O'Connor, F. Current Concepts in Concussion: Evaluation and Management *Am Fam Physician*. 2012;85(2):123-132.  
Lear, A.; Hoang, M.; Sports Concussion: A Return-to-Play Guide. *J Fam Pract* 2012; 64 (6): 323-328

## Balance testing

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## Modified Balance Assessment (BESS)

- 20 sec/position, hands on hips and eyes closed :
- Double leg stance: feet together,
- Single leg stance: non-dominant foot (non kicking foot), the hip flexed 30°, knee flexed 45°
- Tandem Stance: non-dominant foot touching heel of dominant foot

Guskiewicz KM. Assessment of postural stability following sport-related concussion. Current Sports Medicine Reports. 2003;2:24-30.  
Hunt TN, Ferrara MS, Barnstein RA, Innummerger TA. The reliability of the modified Balance Error Scoring System. Clin J Sport Med. 2009;19(6):471-475.

## BESS Scoring

- An error when any of the following occur:
  - Hands off iliac crests
  - Opening the eyes
  - Step stumble or fall
  - Abd or flexion of hip >30°
  - Lifting the forefoot /heel off
  - Unable to return to test position >5 sec
- Each error is doubled
  - (2 errors= score of 4)
- Max error for any single position is 10
- Normal = <6 total



- <http://knowconcussion.org/wp-content/uploads/2011/06/BESS.pdf>
- [http://www.carolinashealthcare.org/documents/carolinasrehab/bess\\_manual .pdf](http://www.carolinashealthcare.org/documents/carolinasrehab/bess_manual.pdf)

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## SCAT 3:

<http://bjsm.bmj.com/content/47/5/259.full.pdf+html>

McCrory P, Meuwisse WH, Aubry M, et al. Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. Br J Sports Med. 2013;47:250-258.

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## Balance, coordination tests

- Pronator drift
- Finger to nose

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## Vestibular Oculomotor Screening (VOMS)

- Smooth Pursuit-
- Saccades (vertical and horizontal)
- Convergence
- Vestibular-Ocular Reflex test
  - Record- headache, dizziness, nausea, foginess

Mucha A, Collins MW, Elbin R, et al. A brief Vestibular/Ocular Motor Screening (VOMS) assessment to evaluate concussions: preliminary findings. *Am J Sports Med.* 2014;42(10):2479-2486

## VOMS-Smooth Pursuit

- fingertip 3 ft away, 1.5 ft to left and right
- repeat x 2 total
- Then up and down x 2
- Observe for nystagmus, delays, symptoms

Mucha A, Collins MW, Elbin R, et al. A brief Vestibular/Ocular Motor Screening (VOMS) assessment to evaluate concussions: preliminary findings. *Am J Sports Med.* 2014;42(10):2479-2486

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## VOMS- Saccades (vertical & horizontal)

- both fingertips apart, 3 ft away, 1.5 ft to left and right
- Ask pt to look quickly back and forth at fingers. X10
- Then up and down x 2
- Observe for nystagmus, delays, symptoms

Mucha A, Collins MW, Elbin R, et al. A brief Vestibular/Ocular Motor Screening (VOMS) assessment to evaluate concussions: preliminary findings. *Am J Sports Med.* 2014;42(10):2479-2486

## VOMS- Convergence

- 14 pt font at arm length, move slowly until seeing double
- Repeat x3
- + if >6cm from nose

Kontos et. al., Reliability and Associated Risk Factors for Performance on the Vestibular/Ocular Motor Screening (VOMS) Tool in Healthy Collegiate Athletes. *Am J Sports Med* March 15, 2016, doi: 10.1177/0363546516632754

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## VOMS-Vestibular-Ocular Reflex test

- 14 pt font, 3 ft away
- Metronome at 180 beats/min.
- Turn head 20 deg each side, repeat x10
- Then vertical

Kontos et. al., Reliability and Associated Risk Factors for Performance on the Vestibular/Ocular Motor Screening (VOMS) Tool in Healthy Collegiate Athletes. *Am J Sports Med* March 15, 2016, doi: 10.1177/0363546516632754

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## VOMS

- >2 increase provocation
- <https://nora.cc/images/documents/VOMS.pdf>

Kontos et. al., Reliability and Associated Risk Factors for Performance on the Vestibular/Ocular Motor Screening (VOMS) Tool in Healthy Collegiate Athletes. *Am J Sports Med* March 15, 2016, doi: 10.1177/0363546516632754

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<http://www.rushcopley.com/rcmg/find-a-doctor/profile/deepak-patel>

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## Resources

- SCAT 3: <http://bjsm.bmj.com/content/47/5/259.full.pdf+html>
- Child SCAT: <http://bjsm.bmj.com/content/47/5/263.full.pdf+html>
- Pocket CRT <http://bjsm.bmj.com/content/47/5/267.full.pdf+html>
- Ontario Neuro Trauma Foundation
- [http://onf.org/system/attachments/266/original/GUIDELINES\\_for\\_Diagnosing\\_and\\_Managing\\_Pediatric\\_Concussion\\_Recommendations\\_for\\_HCPs\\_v1.1.pdf](http://onf.org/system/attachments/266/original/GUIDELINES_for_Diagnosing_and_Managing_Pediatric_Concussion_Recommendations_for_HCPs_v1.1.pdf)
- AAFP: <http://www.aafp.org/patient-care/public-health/sports-medicine/concussions.html>
- CDC: <http://www.cdc.gov/headsup/providers/>

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## Associated Sessions

- Concussion and Neurocognitive Assessment: The Headaches and Confusions of Concussions
- Concussion and Neurocognitive Assessment: Ask the Expert

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[aafp.org/fmx-neurologic](http://aafp.org/fmx-neurologic)

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