

Vestibular/Ocular-Motor Screening (VOMS) for Concussion

Interpretation: This test is designed for use with subjects ages 9-40. When used with patients outside this age range, interpretation may vary. Abnormal findings or provocation of symptoms with any test may indicate dysfunction – and should trigger a referral to the appropriate health care professional for more detailed assessment and management.

Equipment: Tape measure (cm); Metronome; Target w/ 14-point font print or a discreet target.

1. Baseline Symptoms:

Instructions: “Rate the following on a scale of 0-10, with 0 being no symptoms and 10 being the worst imaginable symptoms:

- A. Current Headache
- B. Current Dizziness
- C. Current Nausea
- D. Current Fogginess”

Record: Baseline Headache, Dizziness, Nausea & Fogginess ratings on 0-10 scale prior to beginning screening

2. Smooth Pursuits: Test the ability to follow a slowly moving target.

Procedure: The patient and the examiner are seated. The examiner holds a fingertip at a distance of 3 ft. from the patient. The patient is instructed to maintain focus on the target as the examiner moves the target smoothly in the horizontal direction 1.5 ft. to the right and 1.5 ft. to the left of midline. One repetition is complete when the target moves back and forth to the starting position, and 2 repetitions are performed. The target should be moved at a rate requiring approximately 2 seconds to go fully from left to right and 2 seconds to go fully from right to left. The test is repeated with the examiner moving the target smoothly and slowly in the vertical direction 1.5 ft. above and 1.5 ft. below midline for 2 complete repetitions up and down. Again, the target should be moved at a rate requiring approximately 2 seconds to move the eyes fully upward and 2 seconds to move fully downward.

Instructions: “Follow this target with your eyes, without moving your head.”

After the test is completed, ask:

“Rate the following on a scale of 0-10:

- A. Current Headache
- B. Current Dizziness
- C. Current Nausea
- D. Current Fogginess”

Record: Headache, Dizziness, Nausea & Fogginess ratings after the test.

3. Horizontal Saccades: Test the ability of the eyes to move quickly between horizontal targets.

Procedure: The patient and the examiner are seated. The examiner holds two single points (fingertips) horizontally at a distance of 3 ft. from the patient, and 1.5 ft. to the right and 1.5 ft. to the left of midline so that the patient must gaze 30 degrees to left and 30 degrees to the right. Instruct the patient to move their eyes as quickly as possible from point to point. One repetition is complete when the eyes move back and forth to the starting position, and 10 repetitions are performed.

Instructions: “Look as quickly as you can from target to target, 10 times, without moving your head.” After 10 repetitions are completed, ask:

“Rate the following on a scale of 0-10:

- A. Current Headache
- B. Current Dizziness
- C. Current Nausea
- D. Current Fogginess”

Record: Headache, Dizziness, Nausea & Fogginess ratings after the test.

Vestibular/Ocular-Motor Screening (VOMS) for Concussion

4. Vertical Saccades: Test the ability of the eyes to move quickly between vertical targets.

Procedure: The patient and the examiner are seated. The examiner holds two single points (fingertips) held vertically at a distance of 3 ft. from the patient, and 1.5 feet above and 1.5 feet below midline so that the patient must gaze 30 degrees upward and 30 degrees downward. Instruct the patient to move their eyes as quickly as possible from point to point. One repetition is complete when the eyes move up and down to the starting position, and 10 repetitions are performed.

Instructions: “Look as quickly as you can from target to target, 10 times, without moving your head.” After 10 repetitions are completed, ask:

“Rate each of the following on a scale of 0-10:

- A. Current Headache
- B. Current Dizziness
- C. Current Nausea
- D. Current Fogginess”

Record: Headache, Dizziness, Nausea & Fogginess ratings after the test.

5. Convergence: Measure the ability to view a near target without double vision.

Procedure: The patient is seated and wearing corrective lenses (if needed). The examiner is seated front of the patient and observes their eye movement during this test. The patient focuses on the discreet target at arm’s length and slowly brings it toward the tip of their nose. The patient is instructed to stop moving the target when they see two distinct images or when the examiner observes an outward deviation of one eye. Blurring of the image is ignored. The distance in cm. between target and the tip of nose is measured and recorded. This is repeated a total of 3 times with measures recorded each repetition. Abnormal: Near Point of convergence ≥ 5 cm from the tip of the nose.

Instructions: “Focus on the target and bring it slowly toward you nose. Ignore any blurriness that occurs and stop when the target splits into two targets.”

When the patient reports double images, or when the examiner observes an outward deviation of one eye (whichever occurs first), the distance in cm. between the tip of the nose and the target are recorded. This measure is performed 3 times, with the distance recorded each time. After 3 measures, ask:

“Rate the following on a scale of 0-10

- A. Current Headache
- B. Current Dizziness
- C. Current Nausea
- D. Current Fogginess”

Record: Headache, Dizziness, Nausea & Fogginess ratings after the test.

6. Horizontal Vestibular-Ocular Reflex (VOR) Test: Assess the ability to stabilize vision as the head moves horizontally.

Procedure: The patient and the examiner are seated. The examiner holds a discreet target in front of the patient in midline at a distance of 3 ft. The patient is asked to rotate their head horizontally while maintaining focus on the target. The head is moved at an amplitude of 20 degrees to each side and a metronome is used to ensure the speed of rotation is maintained at 180 beats/minute (one beat in each direction). One repetition is complete when the head moves back and forth to the starting position, and 10 repetitions are performed.

Instructions: “Focus on the target while moving your head side to side, at the speed of this beat.” – demonstrate the speed and amount of motion required if needed. After 10 repetitions, wait for 10 seconds, then ask:

“Rate the following on a scale of 0-10

- A. Current Headache
- B. Current Dizziness

Vestibular/Ocular-Motor Screening (VOMS) for Concussion

- C. Current Nausea
- D. Current Fogginess”

Record: Headache, Dizziness, Nausea and Fogginess ratings 10 sec after the test is completed.

7. Vertical Vestibular-Ocular Reflex (VOR) Test: Assess the ability to stabilize vision as the head moves vertically.

Procedure: The patient and the examiner are seated. The examiner holds a discreet target in front of the patient in midline at a distance of 3 ft. The patient is asked to rotate their head vertically while maintaining focus on the target. The head is moved in an amplitude of 20 degrees up and 20 degrees down and a metronome is used to ensure the speed of movement is maintained at 180 beats/minute (one beat in each direction). One repetition is complete when the head moves up and down to the starting position, and 10 repetitions are performed.

Instructions: “**Focus on the target while moving your head up and down, at the speed of this beat.**” – demonstrate the speed and amount of motion required if needed. After 10 repetitions, wait for 10 seconds, then ask:

“**Rate the following on a scale of 0-10:**

- A. Current Headache
- B. Current Dizziness
- C. Current Nausea
- D. Current Fogginess”

Record: Headache, Dizziness, Nausea and Fogginess ratings 10 sec after the test is completed.

8. Visual Motion Sensitivity Test – Test visual motion sensitivity and the ability to inhibit vestibular-induced eye movements using vision.

Procedure: The patient stands with feet shoulder width apart, facing a busy area of the clinic. The examiner stands next to and slightly behind the patient, so that the patient is guarded but the movement can be performed freely. The patient holds arm outstretched and focuses on their thumb. Maintaining focus on their thumb, the patient rotates, together as a unit, their head, eyes and trunk at an amplitude of 80 degrees to the right and 80 degrees to the left. A metronome is used to ensure the speed of rotation is maintained at 50 beats/min (one beat in each direction). One repetition is complete when the trunk rotates back and forth to the starting position, and 5 repetitions are performed.

Instructions: “**Stand and hold your arm outstretched with your thumb up. Keep your head and eyes focused on your thumb, as you rotate your entire body side to side.**” Demonstrate the movement, speed and amplitude if necessary. After 5 repetitions, wait for 10 seconds, then ask:

“**Rate the following on a scale of 0-10:**

- A. Current Headache
- B. Current Dizziness
- C. Current Nausea
- D. Current Fogginess”

Record: Headache, Dizziness, Nausea & Fogginess ratings 10 sec after the test is completed.

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VOMS Test Item:	NT	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Total	Comments
PRE-TEST SYMPTOMS	X						
1. Smooth Pursuits (2x Horizontal & 2x Vertical)							
2. Saccades – Horizontal (10x)							
3. Saccades – Vertical (10x)							
4. Convergence (Near Point in cm) (3x)							NPC 1: ____ NPC 2: ____ NPC 3: ____ Avg NPC: ____
5. VOR – Horizontal (10x - 180 bpm)							
6. VOR – Vertical (10x - 180 bpm)							
7. Visual Motion Sensitivity (5x – 50 bpm)							
Tester:						Date:	
Subject ID:						Other:	

Abnormal findings:

- Symptom score totaling ≥ 2 on any individual VOMS item
- NPC ≥ 5 cm (average of 3 trials)