

# Virtual Concussion Exam Training Manual

Funded by Foundation for Advancing Family Medicine and CMA Foundation

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# Introduction



## WHAT IS CONCUSSION?

Concussion is a mild traumatic brain injury (mTBI), a condition that can cause **physical**, **cognitive**, **sleep**, and **emotional** symptoms.

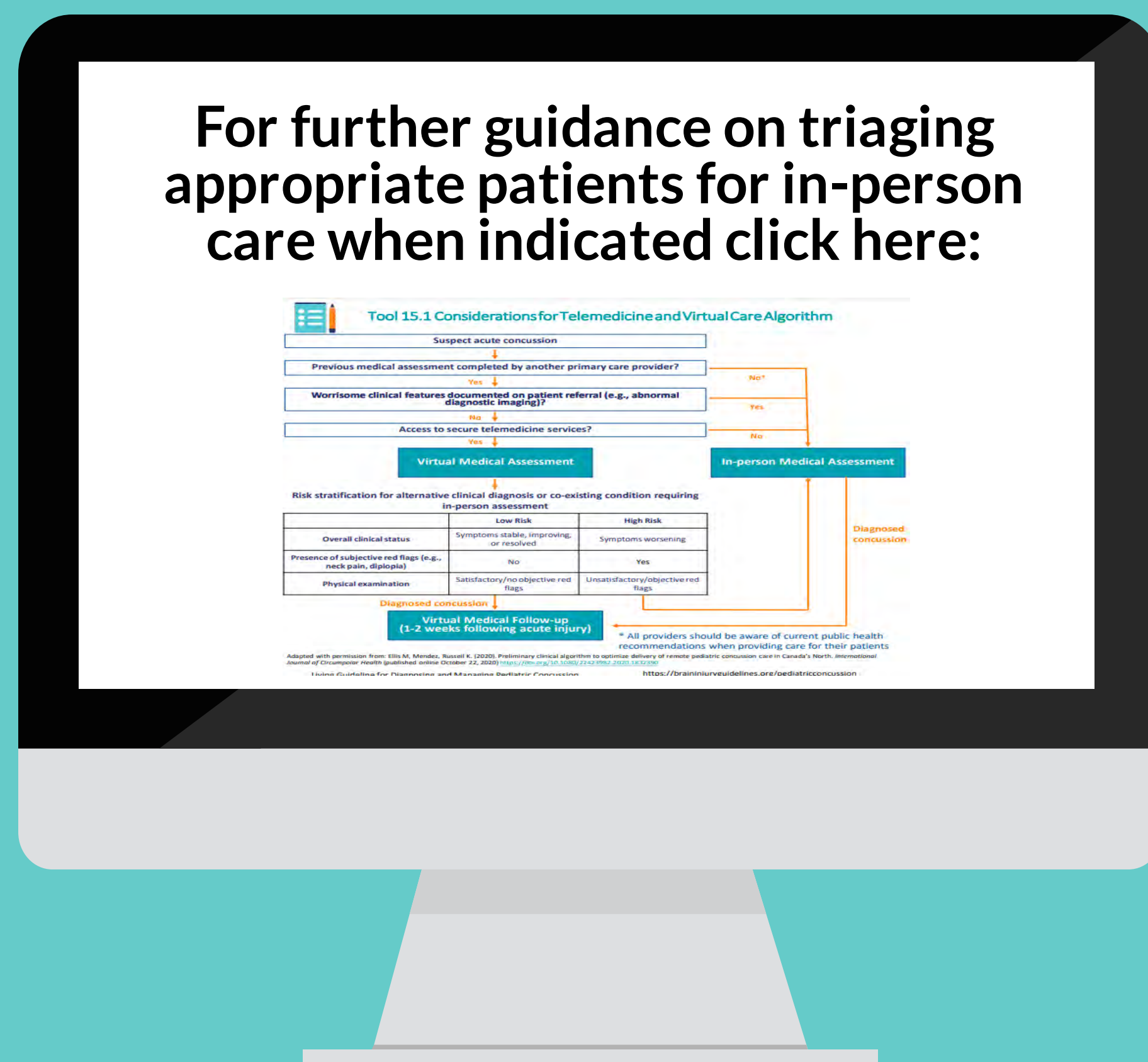


Best practice guidelines recommend conducting a comprehensive medical assessment, including a detailed history and physical examination, to diagnose concussion and rule-out a more severe diagnosis. [1,2](#)

The assessment and examination help identify co-existing injuries that may impair recovery if not addressed, such as neck muscle strain or whiplash injuries and can identify risk factors for prolonged recovery.

## WHEN IS VIRTUAL CARE APPROPRIATE?

Virtual concussion care may be appropriate when a patient cannot be seen in person or has already had an in-person assessment and needs follow-up. A virtual examination is not as complete as an in-person assessment and is not appropriate for the initial assessment of patients at high risk of intracranial injury or with multi-system trauma (e.g., high energy mechanism of injury). These higher risk patients should be examined in-person by an appropriate health care provider prior to virtual assessment. A virtual concussion examination may be appropriate for lower-risk patients with symptoms that are stable or improving and higher-risk patients that have been assessed in-person to exclude serious intracranial pathology. Health care providers must judge the appropriateness of a virtual examination for every encounter.



## ABOUT THIS MANUAL:

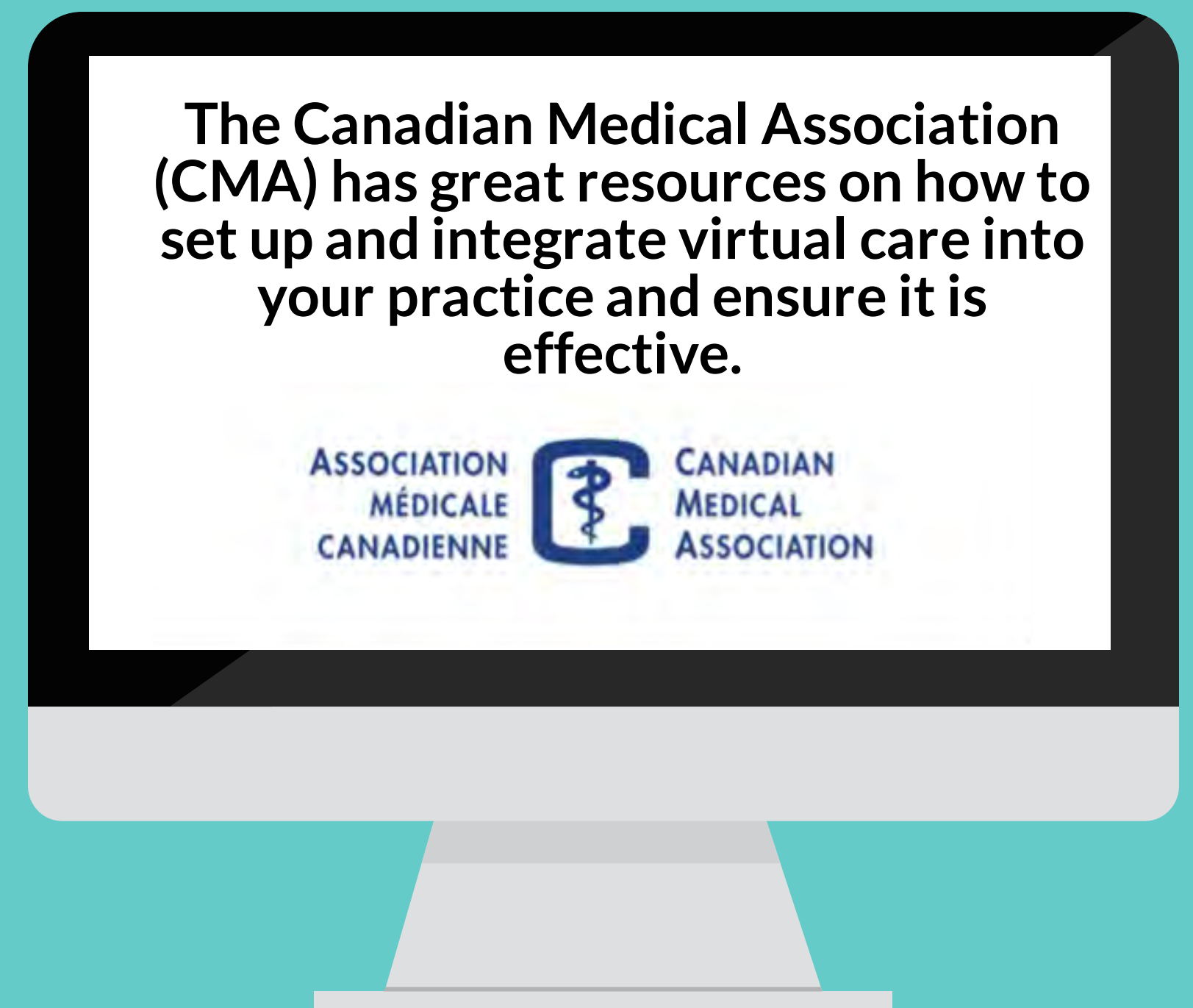
This manual describes how to conduct a virtual concussion examination (VCE). When the only injury is a concussion, the majority of the objective exam will be normal. Most of the expected findings are subjective and this manual highlights some common or significant concussion findings and provides links to guidelines for management of these findings. A key purpose of a concussion exam is to identify any other more serious conditions through abnormal exam findings to initiate appropriate management. A VCE cannot provide certain important elements of a concussion assessment including funduscopy, orthostatic vitals, dynamic gait, cardiovascular and respiratory examination. These additional elements require an in-person assessment and may aid in confirming the diagnosis, identifying other injuries or co-morbidities or influence treatment decisions. This manual is not intended for use by people who have sustained or are suspected of having sustained a concussion/mTBI for self-diagnosis or treatment.

# Complete In-Person Concussion Exam vs. Virtual Concussion Exam

	COMPLETE IN-PERSON EXAM	VIRTUAL CONCUSSION EXAM
1. Complete and thorough history	✓	✓
2. Physical Exam		
a. Orthostatic Vitals	✓	✗
b. Neck and Sub-Occipital Region	✓	✓
c. Face and Jaw	✓	✓
d. Cranial Nerves	✓	✓
e. Vestibular Ocular Motor Screening	✓	✓
f. Cardiovascular/Respiratory	✓	✗
g. Coordination, Upper Extremity Gross and Sensorimotor	✓	✓
h. Positional Sensitivity	✓	✓
i. Lower Extremity Gross Motor and Sensorimotor	✓	✓
j. Gait	✓	✗
3. Rule out other injuries and conditions including additional neurologic exam as indicated	✓	✓
4. Determine need for neuroimaging or further medical assessment	✓	✓
5. Diagnosis	✓	✓
6. Recommend recovery/management plan	✓	✓

# General Considerations for Virtual Examinations

-  Ensure sufficient lighting
-  Shut off computer and phone notifications
-  Minimize backlighting
-  Have a neutral background
-  Consider using headphones









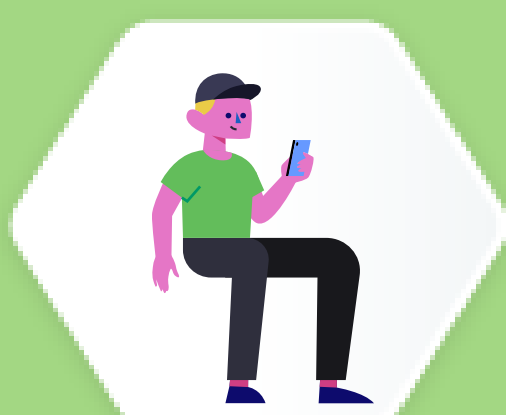
 Note that video conferencing software often mirrors your image on your screen, but your patient will see the correct image and you will see the patient's correct image.

## Items Required by Patient

- Computer, tablet, or smartphone with camera
- Flashlight or cellphone with a flashlight
- Bed, couch, or nearby chair
- If possible, have a family member or friend nearby to hold the camera when needed or provide safety if the patient has significant balance issues

## Estimated Examination Times

Full Virtual Examination: 15 minutes and 30 seconds

-  Neck and Sub-Occipital Region  
4 minutes
-  Face and Jaw  
1 minute and 30 seconds
-  Cranial Nerve  
2 minutes and 45 seconds
-  Vestibular Ocular Motor Screening (VOMS)  
4 minutes
-  Coordination, Upper Extremity Gross and Sensorimotor  
4 minutes
-  Positional Sensitivity  
1 minute
-  Lower Extremity Gross Motor and Sensorimotor  
2 minutes and 15 seconds

# Virtual Neck and Suboccipital Region Examination

Average completion time:  
4 minutes



## OVERVIEW

This examination assesses neck range of motion (ROM) and screens for focal tenderness along the neck and suboccipital region. Patients are guided through active ROM exercises and self-palpation of the cervical musculature and bony structures.

Instruct the patient to begin with the Active Flexion-Rotation Test by performing neck flexion, extension, lateral flexion, and rotation. Next the patient will be guided through palpation to report any focal tenderness. First the neck musculature will be assessed, starting at the trapezius muscles, moving up the para-cervical muscles to the nuchal ridges, and then along the occipital ridges. Lastly, instruct the patient to palpate the bony structures of the cervical spine, starting at the occipital protuberance and moving down the spinous process to the T1 spinous process. This requires the patient to actively rotate sides.

## PHRASING: NECK & SUBOCCIPITAL EXAMINATION

“I am going to look at the range of motion of your neck, which is how well your neck is moving and if it is sore. For this I need you to sit up and angle your camera down so I can see the top of your shoulders and chest.”

“First, I want you to look down to the floor and then look up to the ceiling and tell me if you feel any discomfort or any new symptoms when you do that.”

“Now, I want you to look as far as you can to the right side and then all the way over as far as you can to the left side and tell me if you feel anything.”

“Now I want you to tilt your head to your right shoulder and then up and tilt your head to your left shoulder, as far as you can. Tell me if you feel anything.”

“Now I want you to start with your left hand on your right shoulder and palpate or push on the outside of your shoulder going up toward your neck feeling along the soft part behind your collarbone all the way up your neck. Tell me if you reach any part that is sore. Make sure you are applying enough pressure so you feel you are pushing through your skin and into the muscle”

“Now, I want you to do the same thing with the other shoulder. Take your right hand and palpate your left shoulder, palpate the soft muscle all the way up and tell me if anything is sore.”

“Now, I want you to take your right hand and push on the back of your head right where it meets your neck at the very bottom of your skull. Is that sore? Does it cause a headache like pain?”

“Now, take your hand right down the centre of your neck starting right at the bottom of your skull and going right down the centre of your neck, where you'll feel the bony bumps. Is anything sore there?”

“Now, I'm going to have you flex your neck by bringing your chin down to your chest; then turn your head to the right side. Is it sore?”

“Finally, I want you to flex your neck again and bring your chin to your chest and then turn your head to the left side. Is that sore?”

**JUMP TO PHRASING**  
Face and Jaw  
Examination



## ADDITIONAL RESOURCES



Physiotherapists with advanced orthopaedic training (FCAMPT certified) can be found in the searchable directory for the Canadian Academy of Manipulative Physiotherapy



**CAMPT**  
CERTIFIED



## ABNORMAL FINDINGS

### Virtual Neck and Suboccipital Examination

- Look for any indication of restricted range of motion or any pain with palpation of the spine or muscles reported by the patient.
- Note fear avoidance behaviours or hesitancy to move when the patient is asked to demonstrate neck movements.
- Some patients may report worsening symptom exacerbation (e.g., dizziness or worsening headache) during active range of motion of the neck.

## TAKE ACTION ON ABNORMAL FINDINGS

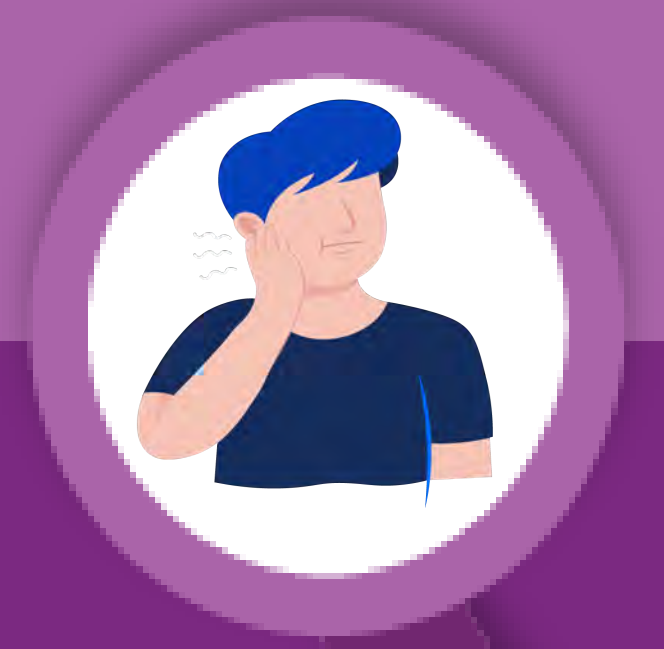
### Virtual Neck and Suboccipital Examination

- If the patient reports tenderness to palpation of the c-spine, or neck rotation  $<45$  degrees left or right, then refer to emergency department for further assessment<sup>3</sup> if indicated based on acuity/mechanism of injury (or neck rotation  $<45$  degrees left or right, then refer to emergency department for further assessment<sup>3</sup>) or consider an in-person visit or a referral for a cervical spine x-ray.
- If other abnormal neck findings are identified, then consider referring to a physiotherapist with concussion expertise.

# Virtual Face and Jaw Examination



Average completion time:  
1 minute and 30 seconds



## OVERVIEW

This examination assesses the cranium, face, and jaw. This exam includes palpation of the cranium including pericranial musculature, palpation of the face including over the sinuses, a jaw and temporomandibular joint (TMJ) assessment, and palpation of the masticatory muscles (masseters and temporalis).



## PHRASING: FACE AND JAW EXAMINATION

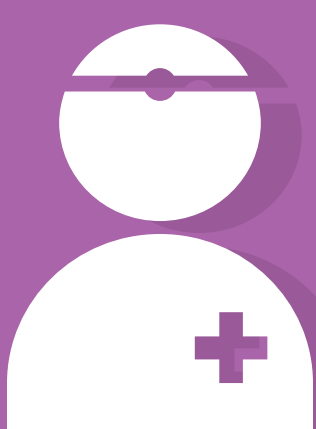
“Now I am going to examine your head and face. For this assessment I need to be able to see your head and your face in the middle of your screen so make sure you are looking straight at your camera directly in front of you, not off at an angle. I'm going to tell you what I want you to do and show you and then have you do it.”

“First I want you to place your fingers on your forehead right in the centre and push on your head all the way around both sides until you get to the very back of your skull and tell me if you feel any discomfort while you do that.”

“Now gently press your fingers under your eyes while moving out towards your cheekbones and then down along your jaw like I'm doing all the way to your chin. Tell me if you feel any pain.”

“Now, looking at the camera I want you to slowly open and close your mouth. Now push lightly on your jaw hinge just in front of the bottom of your ears and open and close your jaw. Do you feel any pain or clicking?”

**JUMP TO PHRASING**  
Cranial Nerve  
Examination





## ABNORMAL FINDINGS

### Virtual Face and Jaw Examination



- Look for any indication of asymmetrical decreased sensation across the branches of CN V reported by the patient.
- Tenderness over the TMJ region, asymmetrical or incomplete opening or pain or click with opening suggesting TMJ dysfunction.

## TAKE ACTION ON ABNORMAL FINDINGS

### Virtual Face and Jaw Examination



- If abnormal TMJ findings are found, then consider referring to either a physiotherapist with concussion expertise or to a dentist/TMJ specialist.

# Virtual Cranial Nerve Examination (CN II, III, IV, VI)



Average completion time:  
2 minutes and 45 seconds



## OVERVIEW



This examination assesses CN II-IV and VI-XII using standard cranial nerve testing procedures. Modifications are instituted for CN II and XI. For CN II (optic), the Cover-Uncover test tests the pupillary response. For CN XI, symmetry of shoulder shrug will be observed. (CN VIII is assessed during balance testing and could also be assessed during the history by asking about any recent changes in hearing.)

## PHRASING: CRANIAL NERVE EXAM (CN II, III, IV, VI)

“Now, I am going to observe your cranial nerves. To do this (you have to take your glasses off and) you need a cell phone with a flashlight or a regular flashlight.”

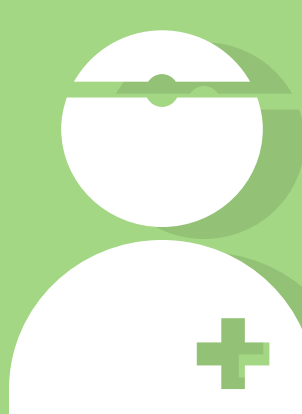
“I want you to bring your eyes a few inches away from your camera staring at it. Now take the light and shine it right at your eyes. Now close your eyes for three seconds and keep the light shining on them then open them. ( repeat if necessary)

“Now, close your eyes and then open them and keep that light shining. Do it again, close your eyes count to 3 and open them.”

“Now, I want you to move just your right eye up to the camera and I want you to cover it. Keep that light on. Keep the right eye focused and now uncover it.”

“Now move your left eye to the camera and cover it. Keep that light on. Keep the left eye focused and uncover it.”

“Now, I want you to move your head away from the camera and follow your thumb just with your eyes without moving your head. You are going to move your thumb first starting at about 2:00 o'clock just above and off to the side of your camera with your arm a little bent at your elbow and just look at your thumb with your eyes. Now, move your thumb straight down and follow the motions I show you as though you're making a capitol H keeping your eyes on your thumb. Did you have any symptoms doing this? Did you have any double vision while doing this?”



**JUMP TO PHRASING**  
Cranial Nerve VII  
Examination



## ABNORMAL FINDINGS

### Abnormal Eye Movements: (CN III, IV, VI)

- It is not uncommon to have tracking anomalies acutely and even sub-acutely (2-4 weeks) following concussion including saccadic smooth pursuit and subjective worsening of symptoms with eye movements such as dizziness and headache.
- Look for pupillary asymmetry of size or reactivity to light.
- Look for any indication of abnormal alignment of the eyes in the primary position or any restriction in eye movement during testing.
- Other findings to look for include nystagmus, abnormal eye range of motion, disconjugate eye movement and double vision.

## TAKE ACTION ON ABNORMAL FINDINGS

### Abnormal Eye Movements: (CN III, IV, VI)

- Focal cranial nerve palsies may require assessment by neurology and/or urgent structural head CT/MRI imaging.
- If tracking anomalies exist, consider referring for vestibular therapy, especially if these persist beyond 4 weeks.

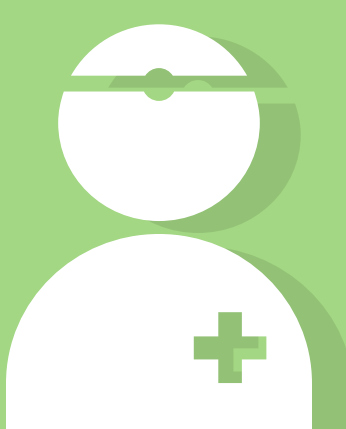
## Virtual Cranial Nerve Examination (CN VII)

### PHRASING: CRANIAL NERVE EXAM (CN VII)

“Now, I want you to look at the camera and give me a big smile showing your teeth. Now, I want you to puff out your cheeks. Now, I want you to wrinkle your forehead by raising your eyebrows. Now, close your eyes tightly. Finally, bring your mouth right up to the camera and hold your flashlight just beside and below your camera shining into the back of your throat and open your mouth and say ahhhhh.”

### JUMP TO PHRASING

Glossopharyngeal and  
Hypoglossal Nerve (CN IX, XII)





## ABNORMAL FINDINGS

### Asymmetry: (CN VII, IX, XII)

- Look for any indication of facial asymmetry at rest as well as during testing.

## TAKE ACTION ON ABNORMAL FINDINGS

### Asymmetry: (CN VII, IX, XII)

- Acute onset facial asymmetry following an injury may be an indication of intracranial involvement. Consider urgent referral to neurology or to the emergency department.

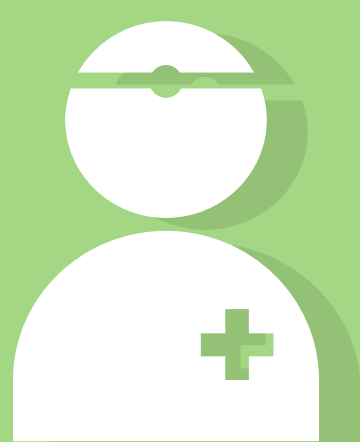


## PHRASING: GLOSSOPHARYNGEAL AND HYPOGLOSSAL NERVES (CN IX, XII)

“Now, come forward to the camera so that I can see your neck. Lift your chin a little bit and swallow.”

“Now, sit back and shrug your shoulders up.”

“Finally, stick out your tongue and move it side to side.”



**JUMP TO PHRASING**  
Vestibular Ocular Motor  
Screening Examination



## ABNORMAL FINDINGS

### Asymmetry: Glossopharyngeal and Hypoglossal Nerve (CN IX, XII)

- Look for any indication of asymmetry.

## TAKE ACTION ON ABNORMAL FINDINGS

### Asymmetry: Glossopharyngeal and Hypoglossal Nerve (CN IX, XII)

- Acute onset facial asymmetry following an injury may be an indication of intracranial involvement. Consider urgent referral to neurology or to the emergency department.



# Virtual Vestibular Ocular Motor Screening (VOMS) Exam



Average completion time:  
4 minutes



## OVERVIEW

The VOMS is a concussion screening test that assesses for dysfunction in the neurological systems that integrate balance, vision, and movement. This exam consists of smooth pursuits, saccades, convergence, and the vestibular-ocular reflex (VOR). It should only be done virtually if the patient did not have an abnormal C-Spine exam. The examiner will first instruct the patient on how to perform these movements and then observe as the patient performs the tests and reports any subjective symptoms. Symptoms common in concussion include worsening of dizziness, nausea, headache, or foginess. Patients are asked to rate their symptoms at rest if present. Then each test is performed, and the patient reports any changes. If symptoms have worsened during one test then wait, if possible, for symptoms to return to baseline before initiating the next test.



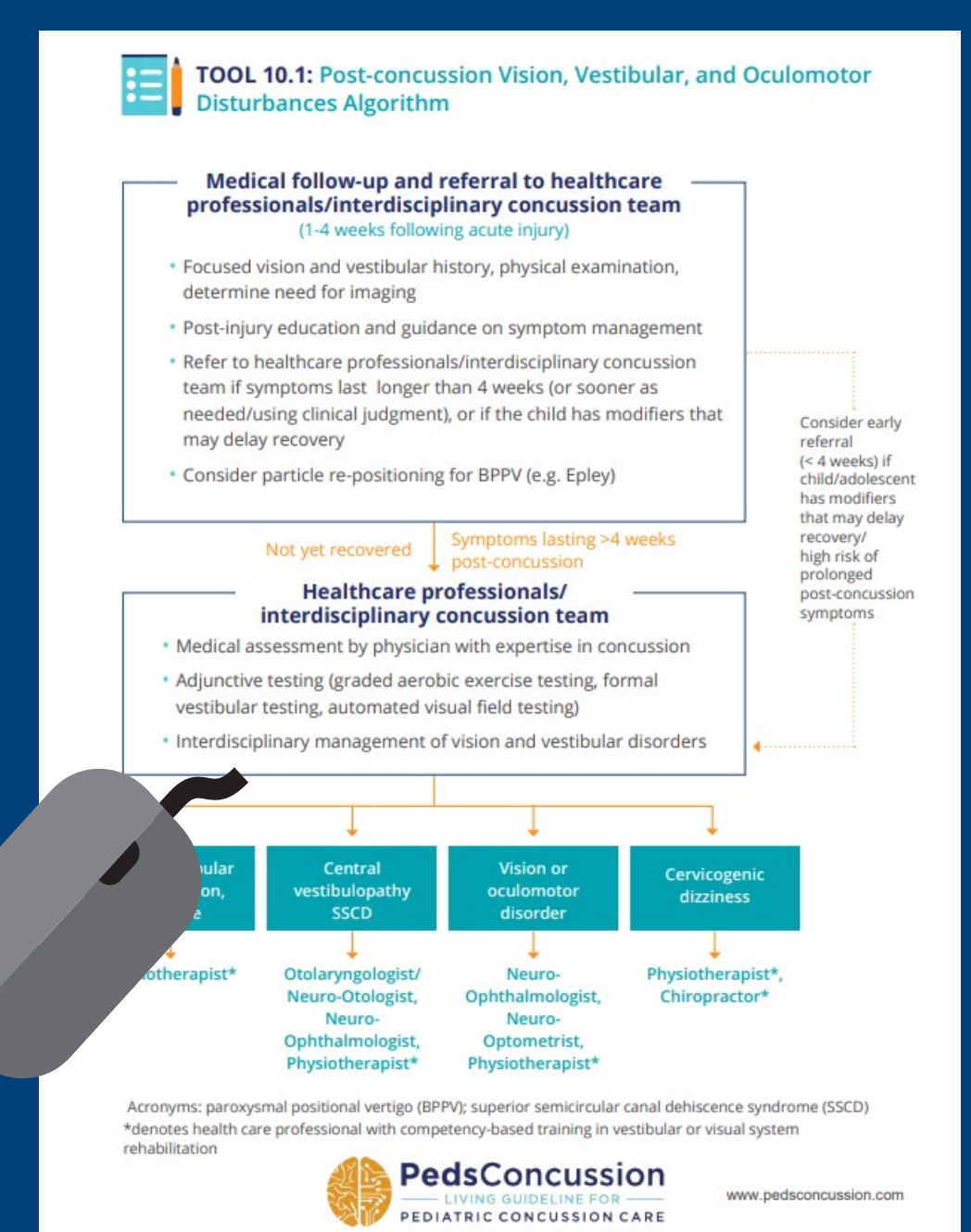
## ADDITIONAL RESOURCES

Description of the VOMS and its clinical importance:



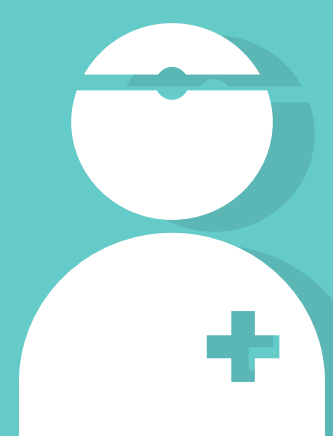
Anne Mucha, D., Collins, M. W., Elbin, R., Furman, J. M., & Kontos, A. P. (2014). A brief Vestibular/Ocular Motor Screening (VOMS) assessment to evaluate concussions. *Am J Sports Med*, 42(10), 2479-2486.

For pediatrics:  
Post-Concussion Vision, Vestibular, and Oculomotor Disturbances Algorithm:

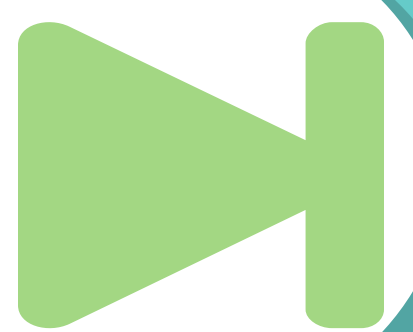


## PHRASING: VOMS SMOOTH PURSUIT MOVEMENTS

- “Before we begin, do you have any dizziness, nausea, fogginess or headache? If yes please rate each rate on a scale for 0 (none) to 10 (severe).”
- “Now, I am going to ask you to move your eyes in different directions and after each test I want you to tell me if you feel any new symptoms or worsened symptoms compared to before the test and rate them on a scale for 0 (none) to 10 (severe).”
- “The first thing I want you to do is hold your thumb right in front of your nose, about 18 inches away – your arm bent a little at the elbow, and I want you to look at your thumb without moving your head and follow your thumb. Move your thumb side to side just beyond your shoulders on either side taking about two seconds to go each direction. Follow it with your eyes twice from left to right then back and again left to right then back.”
  - o “Do you feel any new symptoms or worsened symptoms compared to before the test? Rate them on a scale for 0 (none) to 10 (severe).”
- “Now, I want you to move your thumb in front of your nose and go up and down just above your head and then down to just below your lungs. Take about two seconds to go each direction, up and down and again up and down.”
  - o “Do you feel any new symptoms or worsened symptoms compared to before the test? Rate them on a scale for 0 (none) to 10 (severe).”



**JUMP TO PHRASING**  
VOMS Saccades Examination



### ABNORMAL FINDINGS

#### VOMS Smooth Pursuit Movements

- Common abnormal findings in concussion include saccadic movements during smooth pursuit (i.e., jerking), corrective saccades (catch-up or back-up), and worsening of concussion-like symptoms during the assessment (e.g., new or worsening headache, dizziness, etc.).

### TAKE ACTION ON ABNORMAL FINDINGS

#### VOMS Smooth Pursuit Movements

- If vestibular-ocular testing abnormalities demonstrate abnormal findings or symptom exacerbation, refer to a physiotherapist, or other health care provider including optometrist with vestibular therapy expertise, especially if eye findings persist beyond one month and are functionally limiting.
- Consider further neurological assessment if nystagmus, loss of conjugate gaze, and/or loss of visual fixation are present.

## PHRASING: VOMS SACCADES

“Now, I want you to take your index fingers on both hands and hold them up just beyond your shoulder width, about 18 inches in front of you- arm with elbow a little bent. Without moving your head, I want you to look back and forth to your fingers, with both eyes at the same time, as fast as you can 20 times. Did that make you feel anything?”

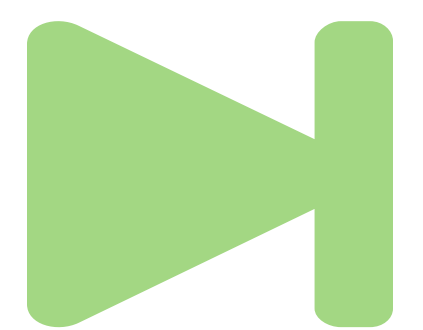
- o “Do you feel any new symptoms or worsened symptoms compared to before the test? Rate them on a scale for 0 (none) to 10 (severe).”

“Now, I want you to do the same thing with your fingers 18 inches in front of you just above your head and at just below your lungs. Without moving your head, look up and down so that you're looking at your fingers back and forth back and forth as fast as you can twenty times.”

- o “Do you feel any new symptoms or worsened symptoms compared to before the test? Rate them on a scale for 0 (none) to 10 (severe).”



**JUMP TO PHRASING**  
VOMS Vestibulo-Ocular  
Reflex Examination



## ABNORMAL FINDINGS

### VOMS Saccades

- Common abnormal findings in concussion include slow initiation of saccades, slow saccades or hypometric saccades (not quite reaching the target with gaze).
- Look for provocation or worsening of concussion-like symptoms.

## TAKE ACTION ON ABNORMAL FINDINGS

### VOMS Saccades

- If vestibular-ocular testing abnormalities demonstrate abnormal findings or symptom exacerbation, refer to a physiotherapist, or other health care provider including optometrist with vestibular therapy expertise, especially if eye findings persist beyond one month.



## PHRASING: VESTIBULO-OCULAR REFLEX

“Now, I want you to focus directly on my nose and move your head side to side quickly ten times while continually looking at my nose. Did that give you any new symptoms or make your dizziness or headache worse?”

- o “Do you feel any new symptoms or worsened symptoms compared to before the test? Rate them on a scale for 0 (none) to 10 (severe).”

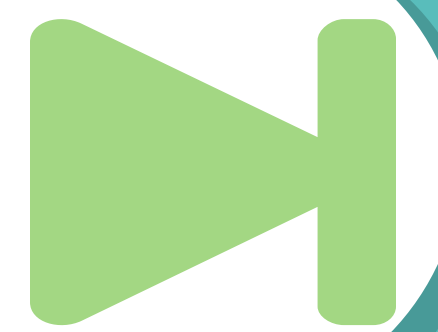
“Now, I want you to do the same thing, look at my nose, but go up and down with your head ten times. Always keep your eyes focused on my nose. Did that give you any symptoms?”

- o “Do you feel any new symptoms or worsened symptoms compared to before the test? Rate them on a scale for 0 (none) to 10 (severe).”



### JUMP TO PHRASING

Virtual Coordination, Upper  
Extremity Gross and  
Sensorimotor Examination



## ABNORMAL FINDINGS

### Vestibulo-Ocular Reflex

- Patients with VOR dysfunction will naturally tend to perform this slowly to avoid provoking symptoms.
- You may get a false negative if done slowly.
- Look for provocation or worsening of concussion-like symptoms.

## TAKE ACTION ON ABNORMAL FINDINGS

### Vestibulo-Ocular Reflex

- If vestibular-ocular testing abnormalities demonstrate abnormal findings or symptom exacerbation, refer to a physiotherapist, or other health care provider including optometrist with vestibular therapy expertise, especially if eye findings persist beyond one month. If symptoms remain functionally limiting a short-term trial of visual rehabilitation to assess responsiveness to treatment may be considered. Consider a referral to optometry, ophthalmology, neuro-ophthalmology, neurology, and/or a vision rehabilitation team. A prolonged course of therapy in the absence of patient improvement is discouraged.<sup>4</sup>



# Virtual Coordination, Upper Extremity Gross and Sensorimotor Examination

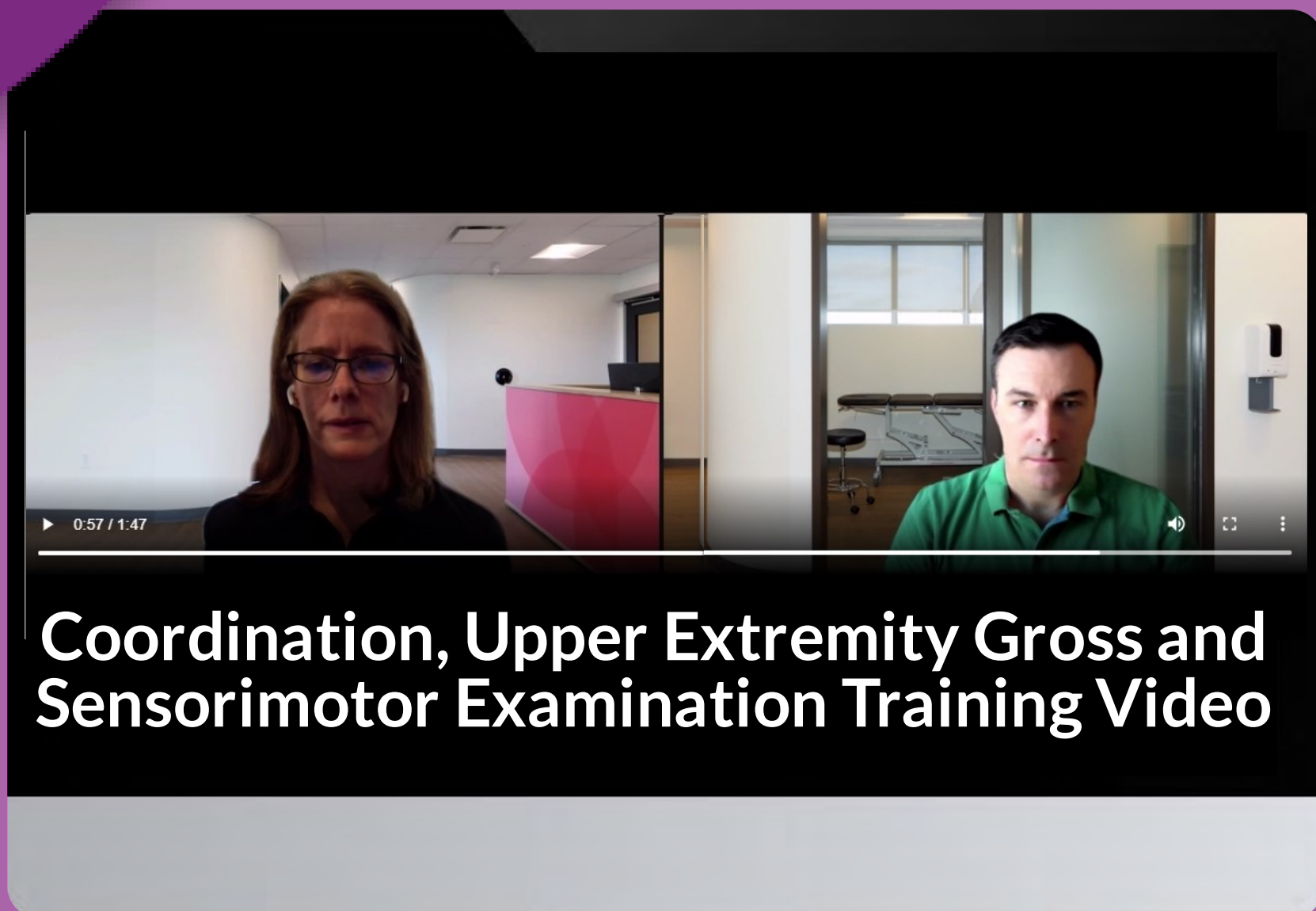


Average completion time:  
4 minutes



## OVERVIEW

These tests screen for cerebellar dysfunction causing poor coordination of movements and for upper extremity sensorimotor function. These tests should all be normal in someone who only has a concussion. Have the patient repeat the Finger-Nose test a few times with each hand and do the RAM test for about 10 seconds each hand.



Coordination, Upper Extremity Gross and Sensorimotor Examination Training Video

## PHRASING: FINGER-NOSE TEST

“Now, I want you to hold your left index finger out about 18 inches in front of your left shoulder and use your right index finger to touch your nose, then touch your left finger- move your left finger across to in front of your right shoulder and touch your nose with your right finger then touch your left finger again.”

“Now I want you to do this with your eyes closed: move your right finger from your nose to your left finger on your left side then repeat over on your right side.”

“Now I want you to switch hands and hold your right index finger out in front of your right shoulder and use your left hand to touch your nose, then your finger, and repeat moving your right finger over to the other side.”

“Now, one more time with your left hand touching your nose with your eyes closed.”

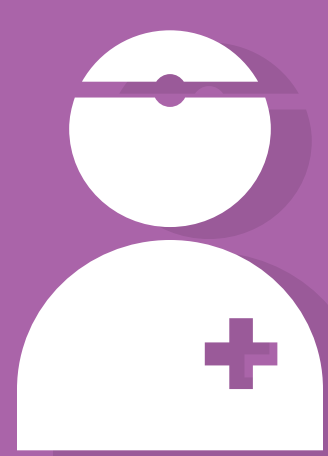
## PHRASING: RAM TEST

Now, I want you to hold your left hand out palm up in front of you and repeatedly tap your right hand onto your left palm alternating between the back of your hand and your palm as quickly as you can.

Now I want you to do the same exercise holding your right palm out in front of you and tapping your left hand onto it rotating back of your left hand and palm as quickly as you can.

## PHRASING: PRONATOR DRIFT TEST

Now I want you to close your eyes and hold your arms straight out in front and turn your hands, so the palms face up for 10 seconds.”



**JUMP TO PHRASING**  
Virtual Positional Sensitivity Examination



## ABNORMAL FINDINGS

### Coordination or Sensorimotor



- Look for overshooting or undershooting of the target in Finger-Nose test.
- Look for clumsy or slow movements in the RAM test.
- Look for any asymmetrical arm dropping or pronation.
- Consider if shoulder or arm injuries contribute to asymmetry.

## TAKE ACTION ON ABNORMAL FINDINGS

### Coordination or Sensorimotor



- Abnormal findings of coordination of sensorimotor function may warrant further investigation by a neurologist

# Virtual Positional Sensitivity Examination



Average completion time:  
1 minute



## OVERVIEW

This examination assesses if the patient experiences any positional dizziness or lightheadedness, which could represent autonomic dysfunction. The patient is asked to lie supine for a few moments, then to stand up and report any symptoms they experience standing from. If you are concerned the patient may be unsteady, does not have someone to support them, or there is not a bed or couch to lie on, then do this exam from seated to standing position.



## PHRASING: VIRTUAL POSITIONAL SENSITIVITY EXAM

"First, is there a couch or a bed where you can lie down for me?"

"Now, I want you to lie down on the couch or bed."

"Now, please stand up using as little support from the bed or couch as needed."

"Are you experiencing any symptoms after getting up?" "If yes let me know when the symptoms are done."



## JUMP TO PHRASING

Virtual Lower Extremity Gross Motor and Sensorimotor Exam



## ABNORMAL FINDINGS

### Virtual Positional Sensitivity

- Exacerbation or production of dizziness, (a motion sensation), is common in acute concussion patients and may be due to vestibular dysfunction however lightheadedness, (pre-syncopal sensation) and/or headache occurring with positional change, may indicate autonomic dysfunction (e.g., postural tachycardia, orthostatic hypotension).
- If the patient becomes vertiginous, then this may indicate benign positional paroxysmal vertigo – ask about symptoms when rolling over in bed.

## TAKE ACTION ON ABNORMAL FINDINGS

### Virtual Positional Sensitivity

- If symptoms are consistent with autonomic dysfunction, then consider referral for sub-symptom threshold aerobic exercise as an evidence-based treatment of autonomic dysfunction in concussion. If symptoms are predominantly vertiginous, then consider providing in-office assessment or physiotherapy referral for Epley maneuver and or a vestibular assessment.

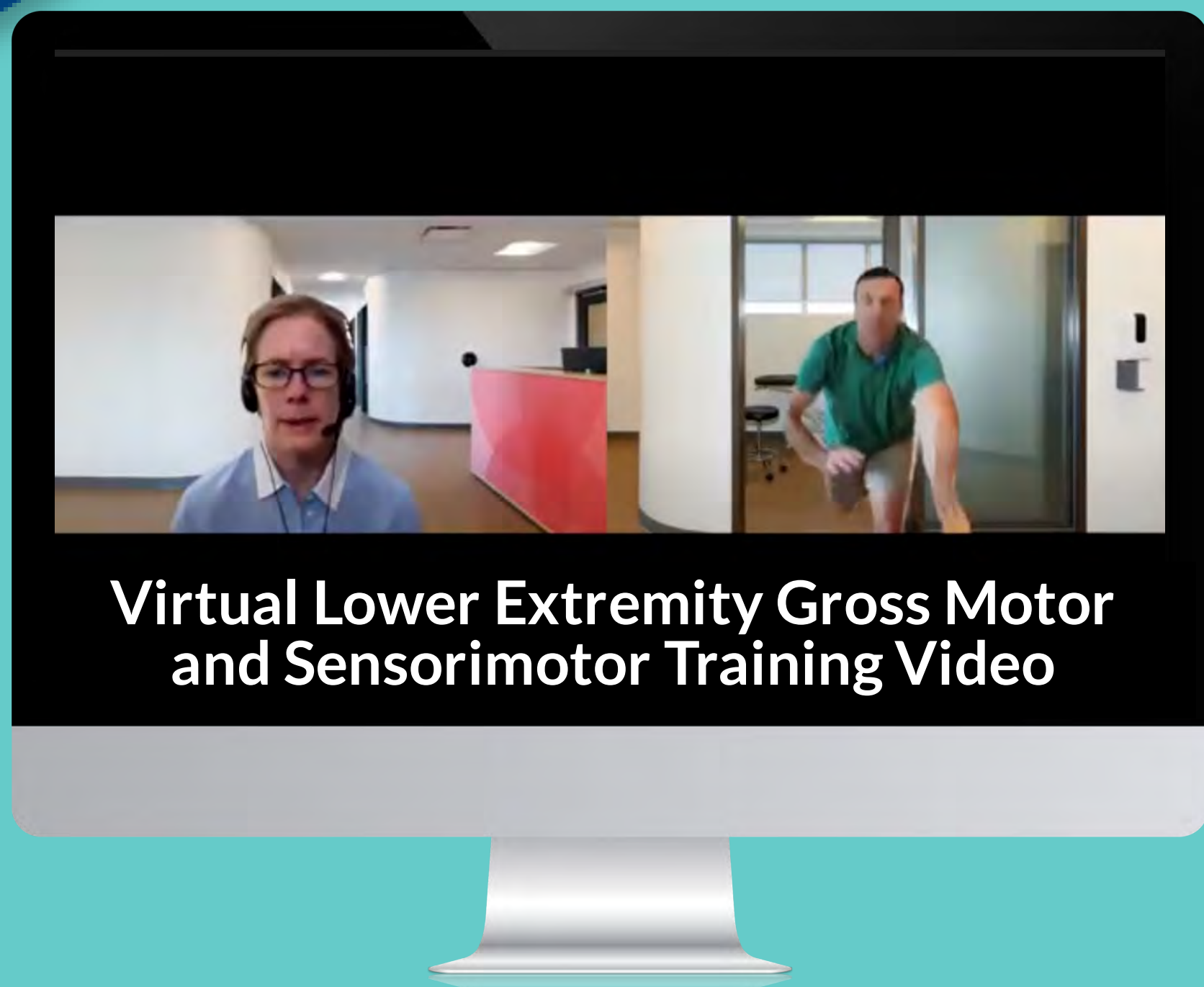


# Virtual Lower Extremity Gross Motor and Sensorimotor Exam: Squat, Romberg, and Modified Balance Error Scoring System (BESS)

Average completion time:  
2 minutes and 15 seconds

## OVERVIEW

These tests can help identify gross motor and sensorimotor deficits of the lower extremities (squat) and balance or vestibular deficits or proprioception dysfunction (Romberg and BESS) which impact safety and activity counseling. This should be performed with someone present or along a counter or other area where patients can reach for a stable surface if imbalanced. Have the patient stand for a few seconds with their eyes open and feet together to assess their steadiness before asking them to close their eyes for the Romberg test. The patient performs a tandem (one foot directly in front of the other) stance with hands on the hips and attempts to hold it first with their eyes open for 20 seconds. If successful or with only mild imbalance they are assessed with eyes closed for 20 seconds.



## PHRASING: SQUAT, ROMBERG, AND MODIFIED BALANCE ERROR SCORING SYSTEM

“I am going to check your balance and strength now. For this I need you to stand up preferably next to a counter or table or a dresser or something in case you are swaying a bit and need to catch your balance. I need you to stand so that I can see your whole body in the camera, especially your midsection and upper legs and feet.”

I want you to stand with your feet shoulder width apart and arms out to steady yourself and squat down as low as you can comfortably go then stand up.

“Now I want you to stand with your feet together side by side, your hands at your side, **OBSERVE FOR STEADINESS BEFORE PROCEEDING.** “Now close your eyes and hold that position standing steady for 20 seconds. If you step out of it, sway, or need to move your arms out for balance just get back into the position as soon as you can.”

“Now, I want you to try a heel toe alignment of your feet with your dominant foot, the foot with which you would kick a soccer ball, in front and your back foot toes right up against your heel. Put your hands on your hips, close your eyes, and try to hold that position for 20 seconds.”

**JUMP TO PHRASING**

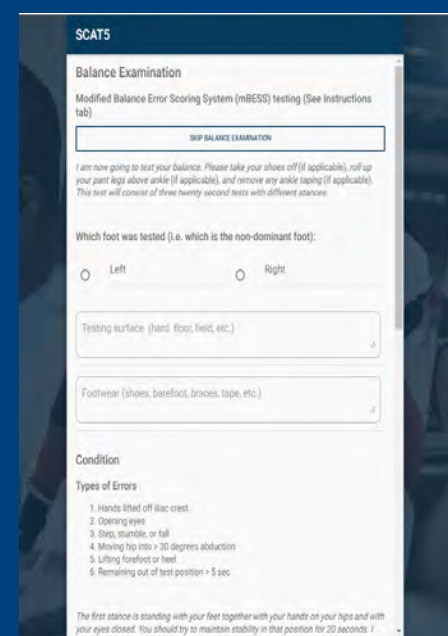
Additional Virtual Assessments of Cranial Nerve I



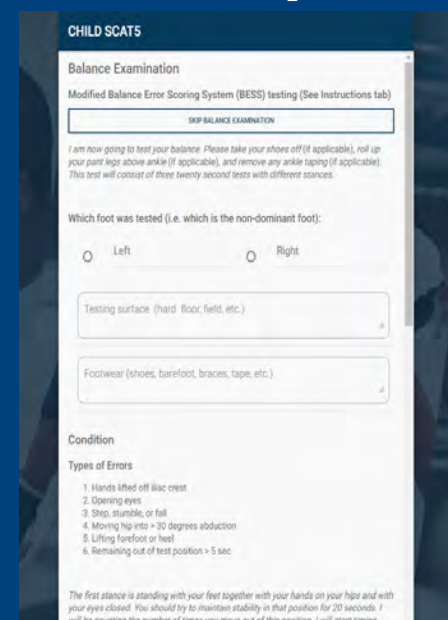
# ADDITIONAL RESOURCES



Ages 13+:



Pediatric (children 5-12 years of age):



## ABNORMAL FINDINGS

### Squat, Romberg, and Modified Balance Error Scoring System (BESS)



- Look for any weakness or asymmetry in squatting or standing which is not a concussion finding and may require further assessment.
- Look for falling or stumbling out of position during the Romberg or hands lifting off hips, or eyes opening which may indicate vestibular dysfunction or cerebellar/proprioception dysfunction
  - Exacerbation of dizziness, light-headedness and/or headache may occur with the physical and cognitive effort of the balance testing for patients with a concussion.

## TAKE ACTION ON ABNORMAL FINDINGS

### Squat, Romberg, and Modified Balance Error Scoring System (BESS)



- Consider referral to a physiotherapist with vestibular therapy expertise.
- Consider additional investigation or referral for motor weakness or isolated positive Romberg.

# Additional Virtual Assessments of Cranial Nerve I



Average completion time:

15 seconds

## OVERVIEW



CN I : If patient reports difficulty with smell or there is clinical suspicion of anosmia, testing CN I is warranted.

## PHRASING: CRANIAL NERVE I

“First, please grab a handful of coffee grounds, an unlit candle, or any other household item with a safe but distinct smell. Do you have something like that?”

“Now, close your eyes and gently breathe in through your nose.”

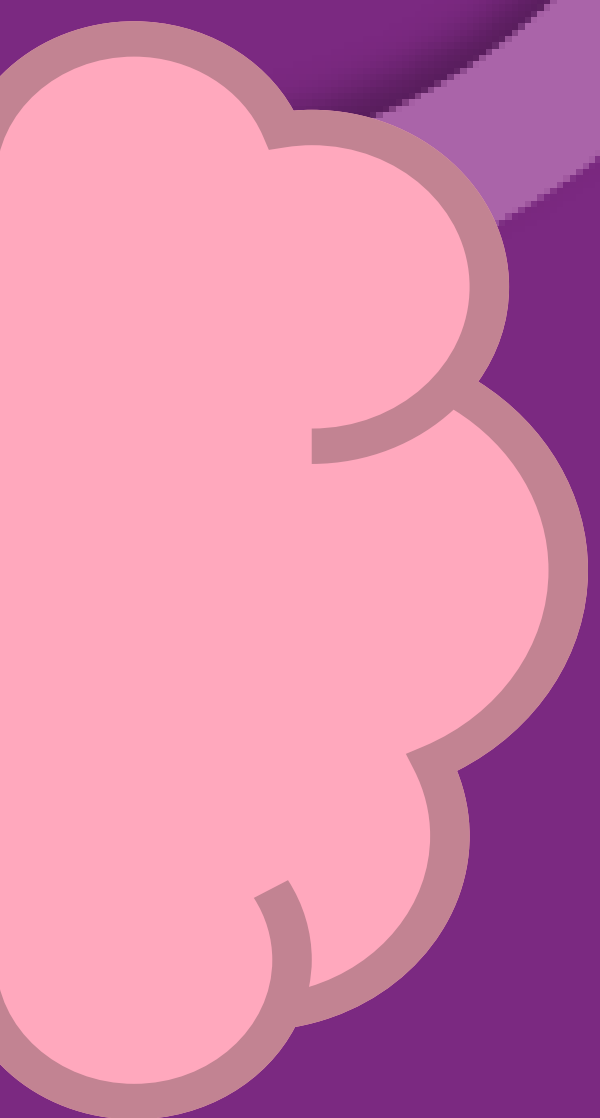
“Can you smell anything?”



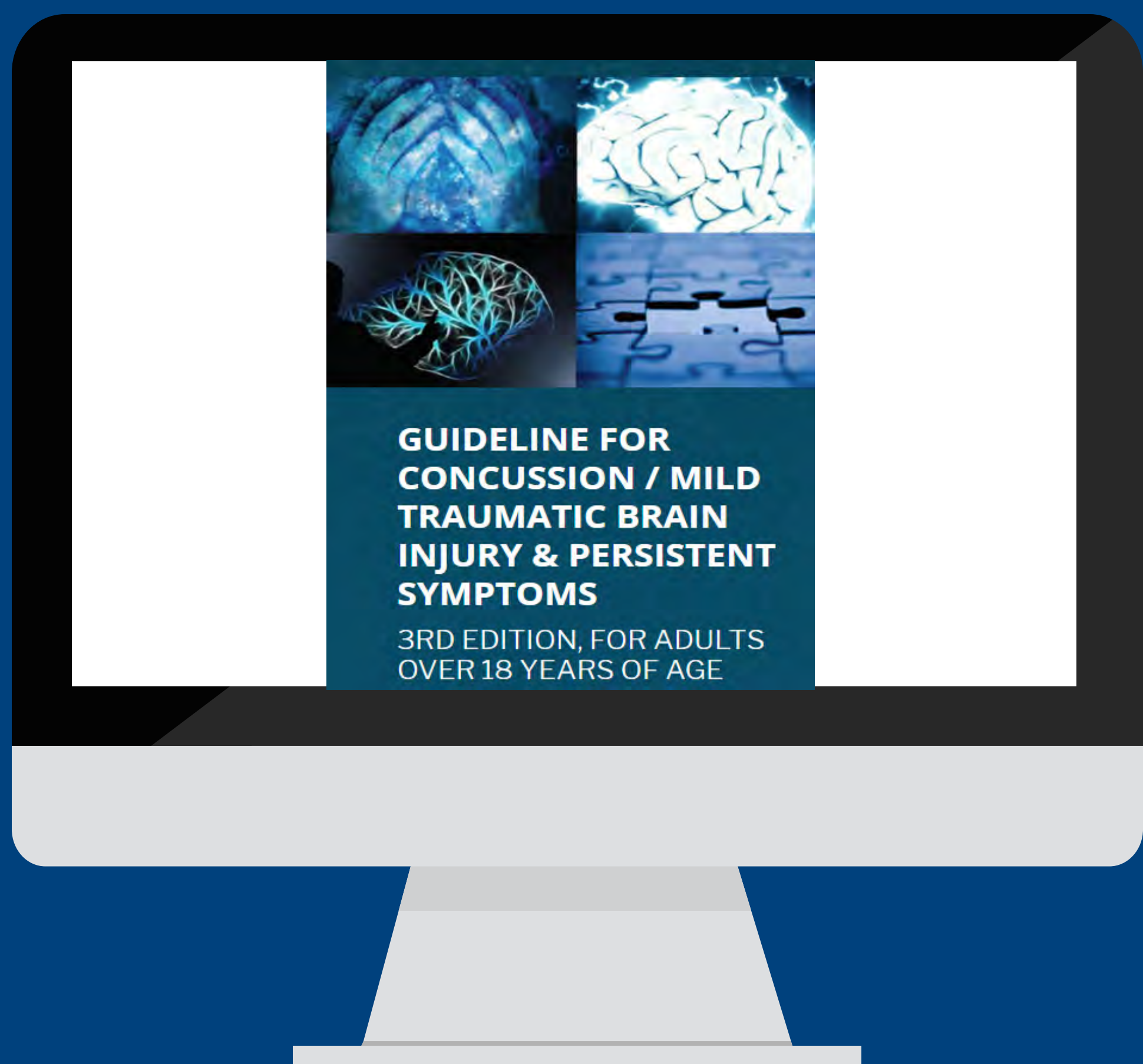
## ABNORMAL FINDINGS

### Decreased Smell or Anosmia (CN I)

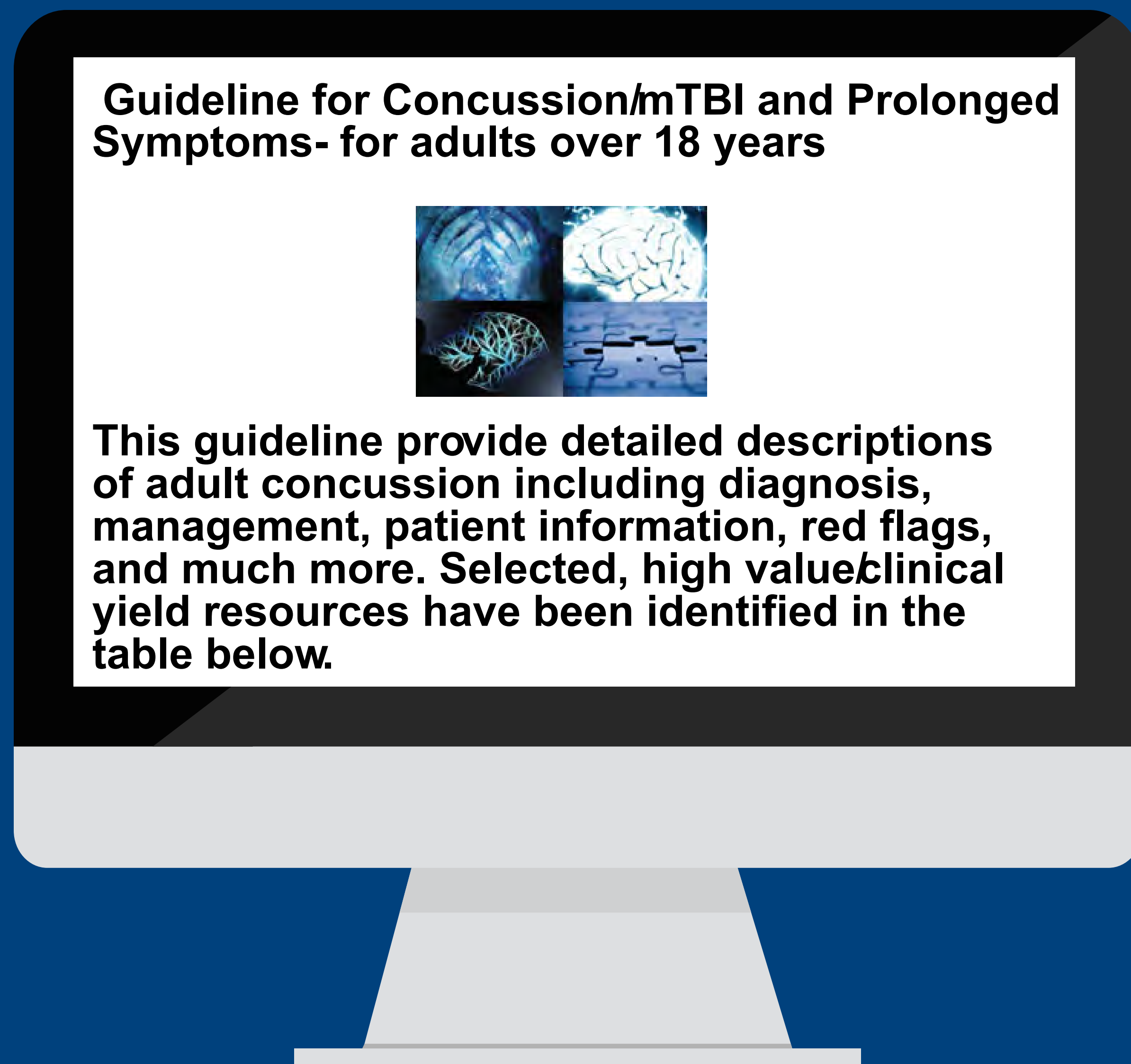
- Ask the patient about any decreased sense of smell.

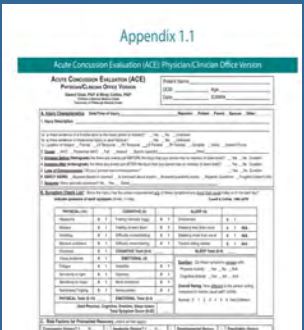
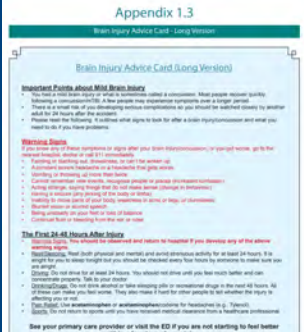
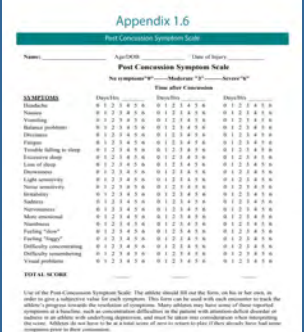
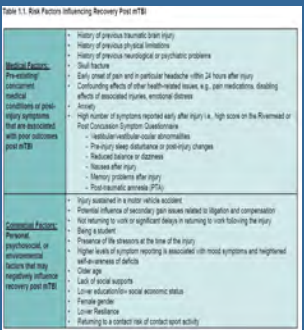
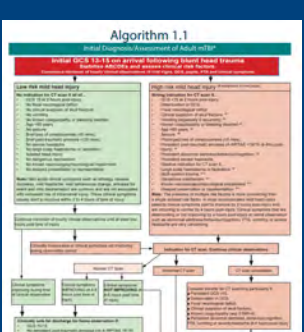
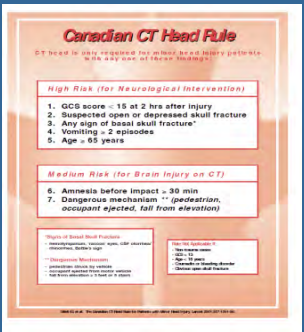


# Appendix 1. Resources for Best Practice Concussion Exam and Management



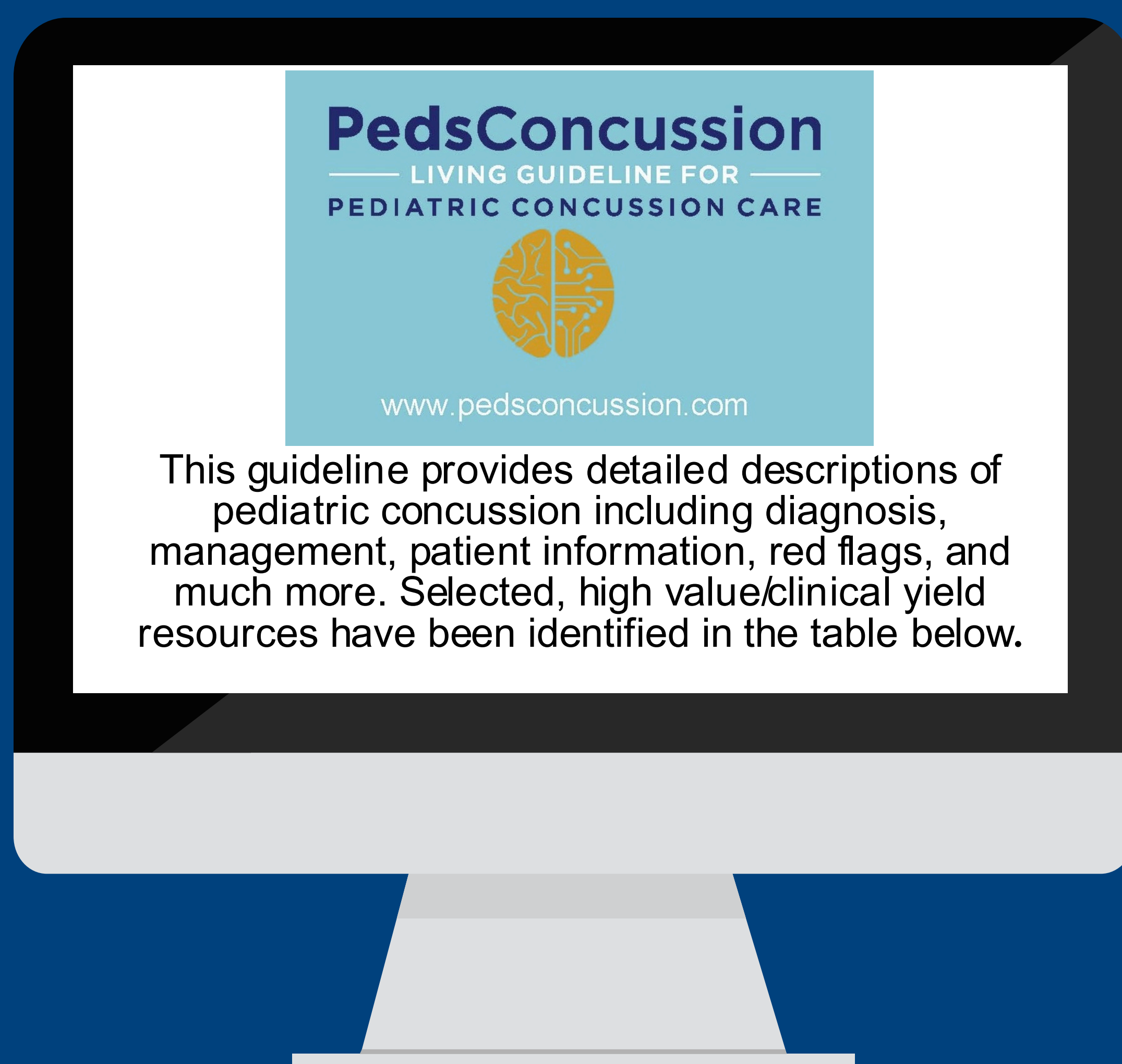
# ADULT (18+ YEARS) RECOMMENDED RESOURCES



RESOURCE NAME	DESCRIPTION
 <p><a href="#">Acute Concussion Exam: Physicians/Clinician Office Version</a></p>	<p>Template for acute, in-person concussion examination and management</p>
 <p><a href="#">Brain Injury Advice Card</a></p>	<p>Easy to read patient information on concussion</p>
 <p><a href="#">Post Concussion Symptom Scale</a></p>	<p>Easily quantifies the severity of concussive symptoms in <u>non-athletes</u></p>
 <p><a href="#">Rivermead Post Concussion Symptom Questionnaire</a></p>	<p>Easily quantifies the severity of concussive symptoms in <u>athletes</u></p>
 <p><a href="#">Risk Factors Influencing Recovery Post mTBI</a></p>	<p>Identifies factors that may impede recovery process</p>
 <p><a href="#">Initial Diagnosis/Assessment of Adult mTBI</a></p>	<p>Algorithm to identify low- and high-risk patients. High risk patients should be referred to the emergency department for further investigation and assessment.</p>
 <p><a href="#">CT Head Rule</a></p>	<p>CT Head Rule is used to clear head injury without imaging.</p>

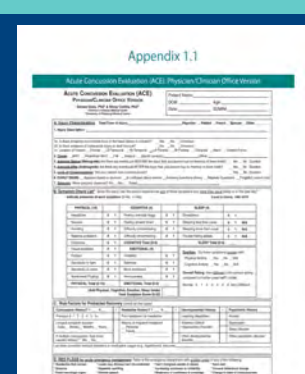


# PEDIATRIC (UNDER 18 YEARS) RECOMMENDED RESOURCES



## RESOURCE NAME

## DESCRIPTION



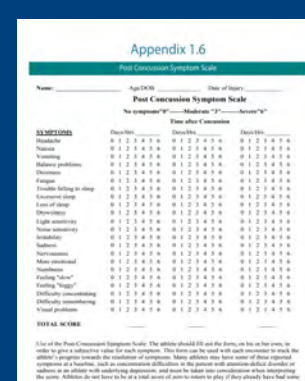
[Acute Concussion Exam: Physicians/Clinician Office Version](#)

Template for acute, in-person concussion examination and management



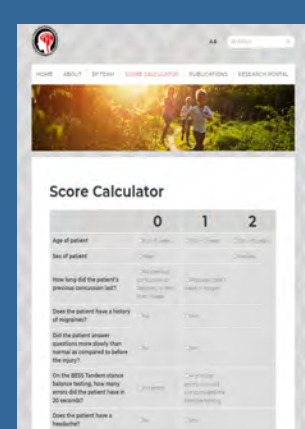
[Post-Concussion Information Sheet](#)

Easy to read patient information on concussion



[Post Concussion Symptom Scale](#)

Easily quantifies the severity of concussive symptoms in athletes



[Predicting Persistent Post-Concussive Problems in Pediatrics \(5P\): Score Calculator](#)

Identifies risk of prolonged post-concussive symptoms lasting longer than 1 month



[The Canadian Assessment of Tomography for Childhood Head injury 2 \(CATCH2\) Rule](#)

Easy criteria to identify children requiring further assessment in the emergency department



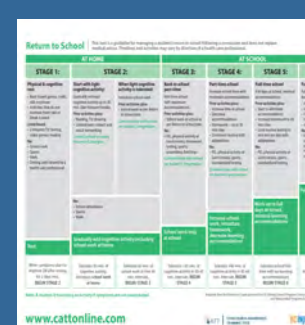
[Concussion Awareness Training Tool: Return to Sport](#)

Step-by-step guidance for returning to sports



[Concussion Awareness Training Tool: Return to Activity](#)

Step-by-step guidance for returning to general activities



[Concussion Awareness Training Tool: Return to School](#)

Step-by-step guidance for returning to school

# References

1. Reed, Z., Zemek, R., Dawson., et al. Living Guideline for Pediatric Concussion Care (2021) doi:10.17605/OSF.IO/3VWN9. [www.pedsconcussion.com](http://www.pedsconcussion.com)

2. Matuszak, J. M., McVige, J, McPherson, J., Willer, B. & Leddy, J. A Practical Concussion Physical Examination Toolbox: Evidence-Based Physical Examination for Concussion. *Sports Health* 8, 260–269 (2016).

3. Stiell, I. G. The Canadian C-Spine Rule for Radiography in Alert and Stable Trauma Patients. *JAMA* 286, 1841 (2001).

4. Department of Veterans Affairs, Department of Defense. VA/DoD Clinical practice guideline for the management of concussion-mild traumatic brain injury. The Management of Concussion-Mild Traumatic Brain Injury Working Group.; 2016. [www.tricare.mil](http://www.tricare.mil)