The Role of Occupational Therapy in Concussion Management

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None

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Objectives

At the completion of this talk, you will be able to:

1. Identify the most common presentation of concussions
2. Identify the most common visual deficits related to concussions
3. Identify at least three areas of occupation in which an OT can provide intervention
4. Identify when to refer to other professionals based on deficits observed
5. Identify three common compensation techniques for improved school performance
6. Recommend appropriate physical activities based on the Return to Play (RTP) Protocol
Pathophysiology, Signs, and Symptoms of Concussion
What is Concussion?

• “A complex, pathophysiological process affecting the brain, induced by biomechanical forces.”

• Standard imaging is negative for macroscopic neural injury (CT, MRI)

McCrory, et. al., 2017; Giza & Hovda, 2014

Image courtesy of http://azchironeuro.com/concussion-and-tbi
Diagnostic Criteria for Concussion

• “Caused by a direct blow to the head, face, neck or other parts of the body with an impulsive force transmitted to the head

• May or may not involve loss of consciousness

• Usually results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously; S/s may evolve over minutes to hours

• S/s may reflect a functional disturbance rather than a structural injury, so typically no abnormality is seen on standard structural neuroimaging

• Results in a spectrum of s/s that that usually resolve in a sequential course

• Clinical recovery is defined functionally as the return to normal activities, including school, work, and sport, after injury”

McCrory, et. al., 2013 & 2017; Halstead & Walter, 2010
Pathophysiology of Concussion

• In simple terms:
  – Mechanical insult initiates a complex metabolic cascade
  – Neurotoxicity →
  – Increases energy demand but cerebral blood flow (CBF) is normal to low →
  – Energy (metabolic) crisis
• “Hypometabolic state can last up to 4 weeks”

Giza & Hovda, 2014; Halstead & Walter, 2010
Pathophysiology of Concussion

- In complex terms:
  - Disruption of neuronal membrane $\rightarrow$ K+ efflux $\rightarrow$ release of glutamate $\rightarrow$ K+ efflux $\rightarrow$ depolarization and suppression of neuronal activity
  - To restore ion balance, Na-/K+ pump increases activity $\rightarrow$ excessive ATP consumption and glucose use $\rightarrow$ accumulation of lactate $\rightarrow$ decrease of CBF $\rightarrow$ “energy crisis”

Giza & Hovda, 2014; Halstead & Walter, 2010
Chronic Pathophysiology of Neurometabolic Cascade

- Cytoskeletal damage
- Axonal dysfunction
- Altered neurotransmission
  - Decreased GAD levels in amygdala are linked to risk of developing PTSD and anxiety (proposed)
- Cell death
  - No to little in mild TBI
## Linking Pathophysiology to Clinical Symptoms

### Table 1

<table>
<thead>
<tr>
<th>Post-TBI pathophysiology</th>
<th>Acute symptom / clinical correlate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ionic flux</td>
<td>Migraine headache, photophobia, phonophobia</td>
</tr>
<tr>
<td>Energy crisis</td>
<td>Vulnerability to second injury</td>
</tr>
<tr>
<td>Axonal injury</td>
<td>Impaired cognition, slowed processing, slowed reaction time</td>
</tr>
<tr>
<td>Impaired neurotransmission</td>
<td>Impaired cognition, slowed processing, slowed reaction time</td>
</tr>
<tr>
<td>Protease activation, altered cytoskeletal proteins, cell death</td>
<td>Chronic atrophy, development of persistent impairments</td>
</tr>
</tbody>
</table>
Second Impact Syndrome

- People with h/o concussion have higher chance of additional brain injury.
- Concussed cells are more vulnerable to further injury.
- Can cause permanent damage
- “Repeated mild brain injuries occurring over an extended period (i.e., months or years) can result in cumulative neurologic and cognitive deficits (4,5), but repeated mild brain injuries occurring within a short period (i.e., hours, days, or weeks) can be catastrophic or fatal.” (CDC)

CDC; McCrory, et. al., 2013 and 2017; Halstead & Walter, 2010
### Common Signs and Symptoms of Concussion

<table>
<thead>
<tr>
<th>Physical</th>
<th>Behavioral/Emotional</th>
<th>Cognitive</th>
<th>Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Headache</td>
<td>• Drowsiness</td>
<td>• Feeling “slow”</td>
<td>• Drowsiness</td>
</tr>
<tr>
<td>• Nausea</td>
<td>• Fatigue</td>
<td>• Feeling “in a fog”</td>
<td>• Sleeping more than usual</td>
</tr>
<tr>
<td>• Vomiting</td>
<td>• Irritability</td>
<td>• Feeling “dazed”</td>
<td>• Sleeping less than usual</td>
</tr>
<tr>
<td>• Blurred or double vision</td>
<td>• Depression</td>
<td>• Difficulty concentrating</td>
<td>• Difficulty falling asleep</td>
</tr>
<tr>
<td>• Seeing stars/lights</td>
<td>• Anxiety</td>
<td>• Difficulty remembering</td>
<td></td>
</tr>
<tr>
<td>• Balance problems</td>
<td>• Panic</td>
<td>• Memory deficits</td>
<td></td>
</tr>
<tr>
<td>• Dizziness</td>
<td>• Sadness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sensitivity to light or noise</td>
<td>• More emotional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tinnitus</td>
<td>• Nervousness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

McCrory, et. al., 2017; Willer, et. al., 2006; Halstead, et. al., 2010
Sideline Assessment

- ABC’s and cervical spine stabilization
- Symptom
- Cranial nerve function
- Cognitive function
  - (Child) Sports Concussion Assessment Tool (SCAT-5)
  - Maddocks questions (incorporated into SCAT-5)
  - Standardized Assessment of Concussion (SAC)
- Balance
  - Balance Error Scoring System (BESS)

McCrory, et. al. 2017
Sideline Assessment

• Oculomotor
  – King-Devick Test (kingdevick.com)

• Removal from field; refer to ED
  – Vomiting, worsening HA, continued seizures, unsteady gait,
    weakness/numbness, skull fracture, altered mental status, GCS <15

• NO PLAYER SHOULD RETURN TO PLAY THE DAY OF THE INJURY

• THE PLAYER SHOULD NOT BE LEFT ALONE AFTER INJURY

McCrory, et. al. 2017
Medical Management of Concussion

• Neuroimaging
  – Typically normal in concussion
  – Performed if suspicion of skull injury or ICH
  – LOC > 30 seconds
  – Functional MRI can detect metabolic and hemodynamic disturbances; recommended >48 hours after injury

• Neuropsychological testing
  – Provides objective measure of brain function
  – Provides formal recommendations for accommodations to be provided at school
Medical Assessment for Concussion

- History
- Symptoms, including provocation, aggravating and alleviating factors, frequency, duration, and intensity
- Musculo-skeletal
- Cranial nerves
  - Injury can occur to single or multiple cranial nerves
  - In one study, half of patients with mTBI had CN injuries, with VII, III, and II most often injured
  - Another study notes mTBI injury with CN I as most common and then VII, III, and IV; 20% had multiple nerve injuries

Matuzka, et. al., 2016
Medical Assessment for Concussion

• Balance and coordination
• Ocular
• Vestibulo-ocular
• Cognition
  – SCAT-5 (SAC also commonly used)
• Mood and Affect
  – Patient Health Questionnaire (PHQ), Beck Depression Inventory II, and Hospital Anxiety and Depression Scale-Depression Subscale (HADS-D)

Matuzka, et. al., 2016
Rest after Concussion

• Strict rest may lead to over-reporting of symptoms and increased dysfunction.

• Complete rest > 3 days does not improve symptoms.

• Utilize “relative rest” for return to activities:
  – Shorter school days
  – Daily activities to tolerance
  – Limited screen time
  – Accommodations as necessary

Thomas, et. al., 2015; Silverberg, et. al., 2013
Concussion <> mTBI?

• Mild TBI (mTBI) and concussion are frequently used interchangeably.
• “Mild” refers to the absence of structural damage. It DOES NOT reflect – the severity of prolonged impairments and dysfunctions – the severity of the underlying metabolic and physiological processes”
• “Discrete differences between mTBI and concussion are emerging, and some literature is calling for an end to the utilization of these two words interchangeably.”

Halstead, et. al., 2010
Diagnostic Criteria for Post-Concussion Syndrome (PCS) (ICD-10)

- History of head trauma with loss of consciousness preceding symptom onset by a maximum of 4 weeks
- Symptoms in 3 or more of the following symptom categories:
  - Headache, dizziness, malaise, fatigue, noise intolerance
  - Irritability, depression, anxiety, emotional lability
  - Subjective concentration, memory, or intellectual difficulties without neuropsychological evidence of marked impairment
  - Insomnia
  - Reduced alcohol tolerance
  - Preoccupation with above symptoms and fear of brain damage with hypochondriacal concern and adoption of sick role

World Health Organization, 2012
Diagnostic Criteria for Post-Concussion Syndrome (PCS) (DSM-IV)

• History of head trauma
• Evidence from neuropsychological testing or quantified cognitive assessment of difficulty in attention or memory.
• Three or more of the following have occurred shortly after the trauma, and have lasted >3 months:
  – Easily fatigued
  – Disordered sleep
  – Headache
  – Vertigo/dizziness
  – Irritability or aggression
  – Anxiety
  – Depression
  – Personality changes
  – Apathy or lack of spontaneity
Questions ???
Concussion and Vision
Extraocular Muscle Anatomy and Physiology

Extrinsic Eye Muscles

(a) Lateral view of the right eye

- Superior oblique muscle
- Trochlea
- Superior oblique tendon
- Superior rectus muscle
- Lateral rectus muscle

(b) Anterior view of the right eye

- Trochlea
- Superior oblique
- Superior rectus
- Lateral rectus
- Medial rectus
- Inferior oblique
- Inferior rectus
Extraocular Muscle Innervations

- CN II (Optic) - sends light signals to brain
- CN III (Oculomotor) - SR, MR, IR, IO
- CN IV (Trochlear) - SO
- CN VI (Abducens) - LR
- Other important nerves for vision: V (Trigeminal), VII (Facial), VIII (Vestibular), XI (Accessory)
Normal Eye Movements are Yoked

MOVEMENTS-VERSIONS (CONJUGATE)

- Right & UP gaze
- Left & UP gaze
- Right gaze
- Forward gaze
- Left gaze
- Right & DOWN gaze
- Left & DOWN gaze

- elevation
- 1. Primary position
- depression

From Cranial Nerves 3rd Ed. by Scott, Akasson, Spacey, PMPH-USA
CN II (Optic Nerve) Pathway
Two Main Visual Processing Pathways

Dorsal or “where” stream
- Spatial processing
  - Location
  - Movement
  - Spatial transformations
  - Spatial relations

Ventral or “what” stream
- Object processing
  - Color
  - Texture
  - Pictorial detail
  - Shape
  - Size
Vestibulo-Ocular Pathways

Compensating eye movement

Excitation of extraocular muscles on one side.

Inhibition of extraocular muscles on the other side.

Lateral rectus
Medial rectus

Oculomotor nucleus (midbrain)

Abducens nucleus (pons)

Vestibular nucleus (pons)

Detection of rotation

Saccule, utricle, and semicircular canals

Right

Left

Head rotation

Inhibition
Excitation
Vision Terminology

• Visual acuity- “a measure of the resolving power of the eye”
  – Reaches adult level by 6 months

• Refractive error- disorder of refraction
  – Myopic
    • Nearsighted
    • Light lands in front of the retina
    • Signs include squinting, moving closer of the object, or showing lack of interest in the environment

Scheiman, 2011
Vision Terminology

• Refractive error- disorder of refraction continued:
  – Hyperopic
    • Farsighted
    • Light lands behind the retina
    • Amount of effort is greater at near
    • Signs and symptoms include blurred vision at near, blurred vision at far if degree of hyperopia is great, discomfort with reading, tearing, headaches associated with reading, avoidance of close work
  – Astigmatism
    • Eye is oval versus spherical shaped
    • Light rays enter the eye at two points

Scheiman, 2011
Vision Terminology

- Astigmatism, continued
  - Signs include blurred vision at distance and near, discomfort when reading, tearing, headaches associated with reading, avoidance of close work, moves objects away from eyes to read

- Anisometropia
  - Significant difference in refractive error between the two eyes
  - Leads to suppression= vision loss of that eye (amblyopia) if not treated

- Binocular vision- the ability of the visual system to fuse or combine the information from B eyes into 1 image

Scheiman, 2011
Vision Terminology

• The Triad of Accommodation (aka Near Triad, Triad Convergence)
  – Accommodation- the ability to change the focus of the eye so that objects at different distances can be seen clearly.
    • Inversely related to age
    • Happens when smooth muscles of ciliary body contract -> changes lense shape
    • Pupil constricts
  – Pupil constriction
  – Convergence

Scheiman, 2011
Vision Terminology

• Visual field- the extent of physical space visible to an eye in a given position.
  – Normal: ~65 upward, 75 downward, 60 inward, and 95 outward

• Visual pursuits (tracking)- smooth eye movements

• Saccades- jump eye movements

• Convergence- coordinated inward movement and focus of B eyes
  – Normal is 2-4 inches

• Divergence- coordinated outward movement of B eyes
  – Normal is 4-6 inches

• Vestibular-Ocular Reflex-”reflexive yoked eye movements that acts to keep the image clear (stabilized on the retina) with stimulation of the vestibular system”
  Scheiman, 2011
Vision Terminology

- OU- oculus uterque, B eyes
- OD- oculus dexter, R eye
- OS- oculus sinister, L eye
- PERRL(A)-pupil equal, round, reactive to light and accommodation
- X- Exophoria
- E- esophoria
- ET- esotropia
- XT- Exotropia
- E(T)- intermittent esotropia
- X(T)- intermittent exotropia
Critical Visual Skills Needed for Reading

- Fixation with both eyes-by 3 mos
- Accommodation (Focusing-clear target)- adult-like by 6 mos (Scheiman)
- Eye Movement Control (Pursuits & Saccades)-developed by 4 mos and adult-like by 3 yrs
- Binocularity (Eye Teaming)-developed by 6 mos
- Visual acuity-90% developed by 1 yr; 100% by 2 yrs
- Perceptual Skills (necessary for higher order thinking)-mostly developed by 3-5 yrs but fully mastered by 11 yrs

Beck, 2015
*****Most Common Visual Deficits with Concussions*****

- Accommodative Insufficiency - blurry vision
- Versional deficits (eye movements) - saccadic dysfunction
- Convergence Insufficiency
Ocular Motility Disorders: Symptoms and Effects on Performance

- Excessive head movement
- Frequent loss of place
- Skips lines
- Poor attention span
- Copying is slow and coloring and drawing results are poor
- Difficulty with activities of daily living that require frequent changes in fixation and accurate eye movements (driving, reading, writing)

Scheiman, 2011
Common Signs of Visual Processing Difficulties

- Poor letter formation and spacing
- Letter reversals
- Avoidance of written work or reading
- Poor motor coordination
- Poor reading comprehension
- Confuses or skips letters or words
- Reads slowly
- Difficulty multi-tasking
- Poor organization skills

Beck, 2015
Double Vision

Reading text that is double can be very confusing! The letters overlap, words run together, and sometimes the words appear to swim on the page. No one should have to suffer with double vision!
Questions ???
Occupational Therapy Evaluation
Occupational Therapy Evaluation- Overview

• Detailed history
• Areas of Occupation
• Symptoms Evaluation: *Post-Concussion Symptoms Checklist or Rivermead Post-Concussion Symptoms Questionnaire
• Cognitive and Symptoms Assessment: *Sport Concussion Assessment Tool-5 (SCAT-5)
• Subjective/Occupation-Based Assessment: Childhood Outcomes Scale Assessment (COSA) or Canadian Occupational Performance Measure (COPM)
Occupational Therapy Evaluation - Overview


• Other: Test of Visual Perceptual Skills (TVPS-4)

• Cognitive Assessment: SCAT-5, Test of Memory and Learning (TOMAL-2), Scales of Cognitive Ability for Traumatic Brain Injury (SCATBI)
Occupational Therapy Evaluation - History

• Obtain thorough background:
  – DOI, # of concussions, site, LOC?
  – Medications-sleep, headache, anxiety (most common meds at Children’s)
  – H/o eye/vision problems?
  – Wear glasses or contacts? Last eye exam?
  – Co-morbidities- h/o anxiety, depression, headaches?
  – H/o processing, sensory, or learning deficits (ADD, ADHD)?
  – School accommodations, previous and current
  – *The American Optometric Association recommends a comprehensive vision exam with an eye doctor at 6 mo, 3 yo, 5 yo, and annually after that.
Occupational Therapy Evaluation - Areas of Occupation

• Typical questions for all Areas of Occupation
  – Current level of function (CLOF) compared to prior level of function (PLOF)
  – Cause dizziness, headache or other symptoms? Specific activities, times of day, etc.?  
  – Are breaks needed?
  – Levels of assist?
  – Safety?
  – Sequencing issues?

• These are typically Level 1-2 of the Return to Play Protocol
Occupational Therapy Evaluation - Areas of Occupation

• ADLs- Showering specifically

• Sleep- Any changes? How much total? How long does it take to fall asleep? How many times wake up in the night and how long until fall asleep again? Feel rested in the morning?

• IADLs- Chores? Meal prep? Driving?


Occupational Therapy Evaluation - Areas of Occupation

• Education- IEP or 504 Plan? Accommodations? Reduced load? Symptomatic? Specific class or time of day when symptomatic? How get to school? Has RTL Protocol been initiated?

• Play/Leisure- Have they been removed? Athletic trainer or point person? Has RTP Protocol been initiated?
Post Concussion Symptom Scale (PCSS)
- 22 items, 7-point Likert Scale
- Self-report
- Tracks patient’s progress across sessions
- Helpful in determining school accommodations
- Higher score is indicator for longer recovery time (McCrory, et. al, 2017)

Occupational Therapy Evaluation- Symptoms Evaluation

<table>
<thead>
<tr>
<th>Name: ___________________</th>
<th>Age/DOB: ______________</th>
<th>Date of Injury: __________________</th>
</tr>
</thead>
</table>

**Post Concussion Symptom Scale**

- No symptoms: 0
- Moderate: 3
- Severe: 6

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>Days/Hrs 1</th>
<th>Days/Hrs 2</th>
<th>Days/Hrs 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Nausea</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Balance problems</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Dizziness</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Fatigue</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Trouble falling to sleep</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Excessive sleep</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Loss of sleep</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
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<tr>
<td>Dryness</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
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<tr>
<td>Light sensitivity</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Noise sensitivity</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Irritability</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Sadness</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Nervousness</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
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<tr>
<td>More emotional</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Numbness</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Feeling &quot;slow&quot;</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Feeling &quot;fuzzy&quot;</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Visual problems</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
<td>0 1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

**TOTAL SCORE**

*Use of the Post-Concussion Symptom Scale: The athlete should fill out the form, on his or her own, in order to give a subjective value for each symptom. This form can be used with each encounter to track the athlete’s progress towards the resolution of symptoms. Many athletes may have some of these reported symptoms at a baseline, such as concentration difficulties in the patient with attention-deficit disorder or sadness in an athlete with underlying depression, and must be taken into consideration when interpreting the score. Athletes do not have to be at a total score of zero to return to play if they already have had some symptoms prior to their concussion.*
Occupational Therapy Evaluation - Symptoms Evaluation

- Rivermead Post-Concussion Symptoms Questionnaire
  - 16 items, 5-point Likert Scale
  - Shorter than SCAT-5 or PCSS
  - More appropriate acutely, fewer questions than SCAT-5 or PCSS

The Rivermead Post-Concussion Symptoms Questionnaire*

After a head injury or accident some people experience symptoms which can cause worry or nuisance. We would like to know if you now suffer from any of the symptoms given below. As many of these symptoms occur normally, we would like you to compare yourself now with before the accident. For each one, please circle the number closest to your answer.

0 = Not experienced at all
1 = No more of a problem
2 = A mild problem
3 = A moderate problem
4 = A severe problem

Compared with before the accident, do you now (i.e., over the last 24 hours) suffer from:

- Headaches
- Sensations of Dizziness
- Nausea and/or Vomiting
- Noise Sensitivity
- Easily upset by loud noise
- Sleep Disturbance
- Fatigue, tiring more easily
- Being Irritable, easily angered
- Feeling Depressed or Tearful
- Feeling frustrated or impatient
- Forgetfulness, poor memory
- Poor Concentration
- Taking Longer to Think
- Blurred Vision
- Light Sensitivity
- Easily upset by bright light
- Double Vision
- Restlessness

Are you experiencing any other difficulties?
1. ___________________________ 0 1 2 3 4
2. ___________________________ 0 1 2 3 4

Occupational Therapy Evaluation- Subjective and Objective

- **SCAT-5**
  - Child (5-12) includes child and parent report
  - Adult (13+)
  - Assesses symptoms, cognition, neck, balance, coordination
  - ***Referral to ST for auditory processing and memory deficits***

McCrory, et al., 2017
Occupational Therapy Evaluation - Occupation-Based

- Childhood Occupational Self Assessment (COSA)
  - Self-report of occupational competence and value of everyday activities, influenced by MOHO
  - Ages 6-12 yo; adolescent form for 13-17 yo (www.rehabmeasures.org)

- Canadian Occupational Performance Measure (COPM)
  - Self-report
  - Helps establish goals and monitor perception of function
*Vestibular/Ocular-Motor Screening (VOMS) for Concussion

- Assesses headache, dizziness, nausea, and fogginess on a 0-10 scale while performing oculomotor and vestibular-ocular function

- Tests
  - Pursuits
  - Saccades
  - Convergence
  - VOR
  - Visual Motion Sensitivity

- Ages 9-40 years
- Takes ~ 10 minutes
Occupational Therapy Evaluation-Visual Assessment

• VOMS for Concussion-Continued
  – The VOMS demonstrated internal consistency as well as sensitivity in identifying
  – patients with concussions.
  – 34% increase in accurately diagnosing concussion
  – Internal consistency of 0.92
  – May aide in knowing when to refer for additional vestibular and ocular assessment

Mucha, et. al, 2014
Occupational Therapy Evaluation - Visual Assessment

- Northeastern State University College of Optometry (NSUCO)
  - Assesses accuracy and ability (quantity) of saccades and visual pursuits using a 1-5 scale
  - Norms for ages 5-14 years
  - Takes <5 minutes
  - Most widely researched and used oculomotor assessment

Scheiman, 2011
Questions ???
Lab

- VOMS for Concussion
- NSUCO
Occupational Therapy Evaluation - Visual Assessment

- King-Devick Test
  - Measures the speed of rapid number naming.
  - Detects impairments of eye movements, attention, language, and other correlates of suboptimal brain function.
  - Remove-from-play sideline concussion screening test.
  - Impaired eye movements can be apparent even when athletes appear to be asymptomatic or “fine” after a suspected head injury.
  - Sensitivity 85%, specificity 90%

http://kingdevicktest.com
Other Oculomotor Tests

- Cover Tests for Alignment
  - Cover/Uncover
    - How: Focus on target at 16 in., one eye is covered and uncovered. Observe movement of uncovered eye and then movement of covered eye
    - Fail: Any movement outward, more than very slight movement inward
    - Normal: No movement-very minimal movement inward
  - Cover/Cross-Cover
    - How: Focus on target at 16 in., move cover back and forth from eye to eye. Observe movement of uncovered eye and then movement of covered eye
    - Fail: Any movement outward, more than very slight movement inward
    - Normal: No movement-very minimal movement inward
Other Visual Tests

- School Bus Test of Alignment
  - Fail if line is off bus

- Worth 4-Dot Fusion Test
  - Fail if and means they are suppressing one eye if the only see red OR green dots

- Tests of Dynamic Visual Acuity (Rine & Braswell, 2001)
  - Fail if \( \geq 2 \) lines difference than static acuity
  - “Reliable and valid test of gaze stability in children”
Visual Evaluation Tips

• Perform the test on people without visual impairments first
• Starting distance is ~3 feet for VOMS; other tests recommend ~16 in or 40 cm (Harmon distance)
• Do not go outside 30 degrees in any direction on tests unless directed because this activates the vestibular system
• Allow patient to wear contacts/glasses
• Use something fun
• Diagnosis and treatment should always include multiple tests
Lab

- Cover Tests
- School Bus Test
- Worth 4-Dot Test
- Dynamic Visual Acuity
Occupational Therapy Evaluation - Other

- **Balance**
  - Quick tests for suspected deficits
    - Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) balance section
      - 4:0-21:11
    - *The Balance Error Scoring System (BESS) (modified on the SCAT-5)*
    - *Sensory Organization Test (SOT)*
    - *Head Thrust*
    - →*****Refer to PT for vestibular and balance deficits*****

- **Visual Perception**
  - Test of Visual Perception Skills (TVPS-4)
    - Ages 5-21 yo
    - 7 areas
    - Related to functional tasks like reading, writing, and driving
****Oculomotor Test- When to Refer Key Point****

- Fail NSUCO criteria
- Convergence issues
- Acuity abnormal
- Haven’t been for f/u in >1 year
- Never seen primary eye provider
- When in doubt, refer!
- Start with primary provider
- ***Then refer to Developmental Optometrist or Neuro-Ophthalmologist***
Vision Specialists

• Ophthalmologist
  – Medical doctor who specializes in diseases of eye and eye surgery
  – Tx: medication and surgery
  – Position paper stating that vision does not affect learning

• Optometrist
  – Primary eye care provider who specializes in full spectrum of care of diseases and disorders of visual system, eye, and associated structures, and dx of related systemic conditions
  – Interested in how a person is using their vision, visual efficiency, and QOL
  – Tx: lenses, prism, low vision devices, and vision therapy
Vision Specialists

• Neuro-Developmental Optometrist
  – Specialized eye doctor that has additional training on how to assess and treat the neurological development and function of the visual system and how it integrates with other senses
  – Goal is to improve visual comfort, ease, and efficiency to perform daily tasks
  – Have often completed additional residency or have passed an additional exam
    • American Academy of Optometry (Binocular Vision, Perception, and Pediatric Optometry Section) - Diplomates
    • College of Optometrists in Vision Development (COVD) - Fellows
Multi-Disciplinary Concussion Team at Children’s Health

- Physician, Physician’s Assistant, Nurse Practitioner – medical management, release
- Nurses - medical management collaboration, communication with family
- Social Worker - community resources, communication with family
- School Services - communication with school and family re: accommodations
- Neuropsychologist - testing for diagnoses, persistent cognitive deficits
- Psychologist (outsourced) – anxiety, PTSD, emotional disturbances
- Psychiatrist (outsourced) - mental health issues - medication
- Physical Therapy – vestibular, vestibular-ocular, balance, cervical, RTP and RTL Protocols
- Occupational Therapy – ocular, cognition, areas of occupation, RTP and RTL Protocols
- Speech-Language Therapy – cognition, articulation, RTL Protocols
Occupational Therapy Treatment
*****Occupational Therapy Treatment- Roles*****

- OT is part of the multi-disciplinary medical team
- Referrals to other providers
- Safety with and performance of areas of occupation
- RTP and RTL Protocols
- School accommodations
- Cognitive deficits
- Visual deficits
- Advocate and educate!
- Consult to patient, parent, school
• “...individuals recovering from a concussion may be evaluated and treated by a multidisciplinary team consisting of OTs, PTs, and SLPs, physicians and nurse practitioners.”

• “The role of the OT on this team is to address performance skills and patterns to promote return to engagement in meaningful and purposeful activities.” (Brayton-Chung, et. al., 2016)
OT Treatment- Multi-Disciplinary Team

- Multi-disciplinary assessment and early detection will benefit patients w/ persistent sx.
- Multi-disciplinary team for “targeted treatment of the pathophysiological mechanisms governing persistent concussion syndrome” (Ellis, et. al., 2015)
- OT, PT, psychology, psychiatry, radiology, PM&R, neurology, and emergency medicine as team of “clinicians with substantial experience in treating MTBI”
- Guidelines will be beneficial to multiple disciplines, including OT. (Marshall, et. al., 2012)
Occupational Therapy Treatment- Areas of Occupation

• All areas of occupation- safety first!
• ADLs
  – Modifications to environment, occupation, and person if symptoms are provokes/exacerbated
  – This is Level 1-2 of the RTP Protocol.
  – Nutrition and hydration
• Sleep (Marshall, et. al.)
  – Goal is to improve the continuity and restorative quality of sleep
  – Provide sleep hygiene advice
    • Handout
  – Relaxation training
  – Pharmacotherapy, (prescribed by physician)
Occupational Therapy Treatment - Areas of Occupation

• IADLs
  – Safety first!
  – Chores (Level 2-3 of RTP Protocol)
  – Modifications to environment, occupation, and person if symptoms are provoked/exacerbated
  – Nutrition/snack prep
  – Return to driving
    • No clear guidelines yet, but physicians recommend no driving until patient is asymptomatic with regular school day/load without accommodations or with baseline accommodations
    • At Children’s, PT, OT, and physicians must agree
Occupational Therapy Treatment- Areas of Occupation

• Work
  – Considerations for returning to school and work (Marshall et. al.)
    • Patient-related and contextual variables
    • OT for modifications
  – OT-specific recommendations (Brayton-Chung, et. al., 2016)
    • Work task simulations
    • Symptom management
    • Assertiveness training
Occupational Therapy Treatment - Areas of Occupation

• Social
  – Modifications for immediate participation in roles, habits, routines
    • Family
    • Friends
    • Other
  – Loss of roles/routines/habits can lead to depression and anxiety
Occupational Therapy Treatment - Areas of Occupation

• Education - Return to Learning Protocol
  – Cognitive rest - avoid testing, cell phone use, video games, tv, schoolwork, etc. (typically ~3 days)
  – 504 Plan or Individualized Education Plan (IEP)
    • Assist family and school with recommendations for accommodations

Halstead, et. al., 2013
Occupational Therapy Treatment- Areas of Occupation

• Education- continued
  – Return to school when student can tolerate cognitive activities for ~30-45 minute increments
    • Reduced exposure for classes that provoke more symptoms
  – Gradually increase school duration, homework load, number of examinations
    • Reintegrate into high stimulation environment.
    • If symptoms arise, return to plan for previous accommodations.

Halstead, et. al., 2013
## Education- Return to Learning Protocol

<table>
<thead>
<tr>
<th>Mental Activity</th>
<th>Activity at each step</th>
<th>Goal of each step</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Daily activities that do not give the athlete symptoms</td>
<td>Typical activities that the athlete does during the day as long as they do not increase symptoms (e.g. reading, texting, screen time). Start with 5-15 minutes at a time and gradually build up.</td>
<td>Gradual return to typical activities.</td>
</tr>
<tr>
<td>2. School activities</td>
<td>Homework, reading or other cognitive activities outside of the classroom.</td>
<td>Increase tolerance to cognitive work.</td>
</tr>
<tr>
<td>3. Return to school part-time</td>
<td>Gradual introduction of schoolwork. May need to start with a partial school day or with increased breaks during the day.</td>
<td>Increase academic activities.</td>
</tr>
<tr>
<td>4. Return to school full-time</td>
<td>Gradually progress school activities until a full day can be tolerated.</td>
<td>Return to full academic activities and catch up on missed work.</td>
</tr>
</tbody>
</table>

McCrory, et. al., 2017
### Education - How a Concussion Can Affect Students

---

#### TABLE 1: Signs and Symptoms of a Concussion and the Potential Problems They May Pose to the Student

<table>
<thead>
<tr>
<th>Sign/Symptom</th>
<th>Potential Implications in School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Most common symptom reported in concussions</td>
</tr>
<tr>
<td></td>
<td>Can distract the student from concentration</td>
</tr>
<tr>
<td></td>
<td>Can vary throughout the day and be triggered by various environments, such as fluorescent lighting, loud noises, and focusing on tasks</td>
</tr>
<tr>
<td>Dizziness/hot headaches</td>
<td>May be an indication of injury to vestibular system</td>
</tr>
<tr>
<td></td>
<td>May make standing quickly or walking in crowded environment challenging</td>
</tr>
<tr>
<td></td>
<td>Often provoked by visual stimulus (rapid movements, videos, etc)</td>
</tr>
<tr>
<td>Visual symptoms: light sensitivity, double vision, blurry vision</td>
<td>Troubles with various aspects of the school building</td>
</tr>
<tr>
<td>Noise sensitivity</td>
<td>Troubles with various aspects of the school building</td>
</tr>
<tr>
<td></td>
<td>Lunchroom</td>
</tr>
<tr>
<td></td>
<td>Shop classes</td>
</tr>
<tr>
<td></td>
<td>Music classes (band/choir)</td>
</tr>
<tr>
<td></td>
<td>Physical education classes</td>
</tr>
<tr>
<td></td>
<td>Hallways</td>
</tr>
<tr>
<td></td>
<td>Organized sports practices</td>
</tr>
<tr>
<td>Difficulty concentrating or remembering</td>
<td>Challenges learning new tasks and comprehending new materials</td>
</tr>
<tr>
<td></td>
<td>Difficulty with recalling and applying previously learned material</td>
</tr>
<tr>
<td></td>
<td>Lack of focus in the classroom</td>
</tr>
<tr>
<td></td>
<td>Troubles with test taking</td>
</tr>
<tr>
<td></td>
<td>Troubles with standardized testing</td>
</tr>
<tr>
<td></td>
<td>Reduced ability to take drivers education classes safely</td>
</tr>
<tr>
<td>Sleep disturbances</td>
<td>Excessive fatigue can hamper memory for new or past learning or ability to attend and focus</td>
</tr>
<tr>
<td></td>
<td>Insufficient sleep can lead to tardiness or excessive absences</td>
</tr>
<tr>
<td></td>
<td>Difficulty getting to sleep or frequent waking at night may lead to sleeping in class</td>
</tr>
<tr>
<td></td>
<td>Excessive napping due to fatigue may lead to further disruptions of the sleep cycle</td>
</tr>
</tbody>
</table>

Halstead, et. al. 2013
### **Education- Common School Accommodations**

<table>
<thead>
<tr>
<th>Sign/Symptom</th>
<th>Potential Adjustments in School Setting</th>
</tr>
</thead>
</table>
| **Headache**                        | Frequent breaks  
|                                    | Identifying aggravators and reducing exposure to them  
|                                    | Rests, planned or as needed, in nurses office or quiet area                                       |
| **Dizziness**                       | Allow student to put head down if symptoms worsen  
|                                    | Give student early dismissal from class and extra time to get from class to class to avoid crowded hallways |
| **Visual symptoms: light sensitivity, double vision, blurry vision** | Reduce exposure to computers, smart boards, videos  
|                                    | Reduce brightness on the screens  
|                                    | Allow the student to wear a hat or sunglasses in school  
|                                    | Consider use of audiotapes of books  
|                                    | Turn off fluorescent lights as needed  
|                                    | Seat student closer to the center of classroom activities (blurry vision)  
|                                    | Cover 1 eye with patch/tape 1 lens if glasses are worn (double vision)  |
| **Noise sensitivity**               | Allow the student to have lunch in quiet area with a classmate  
|                                    | Limit or avoid band, chair, or shop classes  
|                                    | Avoid noisy gyms and organized sports practices/games  
|                                    | Consideration of the use of earplugs  
|                                    | Give student early dismissal from class and extra time to get from class to class to avoid crowded hallways during pass time  |
| **Difficulty concentrating or remembering** | Avoid testing or completion of major projects during recovery when possible  
|                                    | Provide extra time to complete nonstandardized tests  
|                                    | Postpone standardized testing (may require that 504 plan is in place)  
|                                    | Consider 1 test per day during exam periods  
|                                    | Consider the use of preprinted notes, notetaker, scribe, or reader for oral test taking |
| **Sleep disturbances**              | Allow for late start or shortened school day to catch up on sleep  
|                                    | Allow rest breaks  |

*Patching should be prescribed and monitored by an eye care professional.*

Halstead, et. al., 2013
Education- OT-Specific Accommodations for School Tasks

• Computer and reading tolerance
  – Colored overlays and filters
  – Dimming computer screen
  – Avoid sitting under artificial light
  – Enlarged print
  – Blocking strategy (cover part of the paper)
  – Text <> speech software

Brayton-Chung, et. al., 2016
Education- OT-Specific Accommodations for School Tasks

• Breaks
• Symptom management
• Assertiveness training
• Obtain notes ahead of time (Brayton-Chung, et. al., 2016)
• Hats, sunglasses, room lighting for light sensitivity
• Ear plugs, headphones, or avoidance for/of loud places like assemblies
• Visual cues, checklists, wiggle wedge, preferential seating, standing for assignment, wiggle breaks, testing in quiet space, and timers for improved attention
• Reduced assignments, extra time for assignments
Occupational Therapy Treatment- Areas of Occupation

• Leisure and Play- Follow the Return to Play (RTP) Protocol
  – Must be asymptomatic with regular school day/load without accommodations or with baseline accommodations before returning to play
  – Stepwise progression
  – Must be asymptomatic at each stage before progressing to next stage
  – Must be at least 24 hours between stages
  – My tip-collaborate with school’s certified athletic trainer (ATC)

McCrory, et. al., 2013 & 2017
## Table 1  Graduated return to play protocol

<table>
<thead>
<tr>
<th>Rehabilitation stage</th>
<th>Functional exercise at each stage of rehabilitation</th>
<th>Objective of each stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No activity</td>
<td>Complete physical and cognitive rest</td>
<td>Recovery</td>
</tr>
<tr>
<td>2. Light aerobic exercise</td>
<td>Walking, swimming or stationary cycling keeping intensity &lt;70% maximum predicted heart rate</td>
<td>Increase heart rate</td>
</tr>
<tr>
<td></td>
<td>No resistance training</td>
<td></td>
</tr>
<tr>
<td>3. Sport-specific exercise</td>
<td>Skating drills in ice hockey, running drills in soccer. No head impact activities</td>
<td>Add movement</td>
</tr>
<tr>
<td>4. Non-contact training</td>
<td>Progression to more complex training drills, eg passing drills in football and ice hockey</td>
<td>Exercise, coordination, and cognitive load</td>
</tr>
<tr>
<td>drills</td>
<td>May start progressive resistance training</td>
<td></td>
</tr>
<tr>
<td>5. Full contact practice</td>
<td>Following medical clearance participate in normal training activities</td>
<td>Restore confidence and assess functional skills by coaching staff</td>
</tr>
<tr>
<td>6. Return to play</td>
<td>Normal game play</td>
<td></td>
</tr>
</tbody>
</table>

McCrory, et. al., 2017
Expected Recovery Times

- 80-90% of all concussions resolve in 7-10 days (McCrory, et al. 2017)
- Of those with PCS, 90% recover within 3 months
- Factors (possibly) associated with prolonged recovery:
  - Age (the younger the longer it takes to recover)
  - Prolonged LOC >1 min, amnesia
  - Repeated concussions, injuries close together
  - Concussive convulsions
  - Female gender

Ellis, et. al. 2015; Halstead, et. al., 2013; McCrory, et al., 2013 & 2017
Expected Recovery Times

• Factors (possibly) associated with prolonged recovery - continued:
  – Hospital admission
  – Symptom severity score (#, duration >10 days, severity)
  – Previous comorbidities: headaches, ADHD, LD, depression, sleeping disorders
  – Medications
  – Psychoactive drugs, anticoagulants
  – Dangerous play style
  – High-risk activity, contact and collision sport, high sporting level

Ellis, et. al. 2015; Halstead, et. al., 2013; McCrory, et al., 2013 & 2017
Expected Recovery Times

- Vestibulo-ocular dysfunction (VOD)
  - $\geq 2$ of the following: visual disturbance, intermittent blurred vision or double vision, gaze instability or difficulty focusing, dizziness, difficulty reading, or motion sensitivity as well as:
  - $\geq 2$ of the following: near-point convergence $>6$cm, abnormal extraocular movements or smooth pursuits, abnormal or symptomatic horizontal or vertical saccades, or VOR
  - other definitions include dizziness, vertigo, fogginess, disequilibrium, postural or gait imbalance, and symptoms above

Ellis, et. al., 2015
Expected Recovery Times

• Findings:
  – For people with SRC and +VOD, median recovery time of 40 days compared to SRC and –VOD median recovery time of 21 days
  – Children with acute SRC and +VOD at initial eval were 4x higher chance of developing PCS
  – Likelihood of developing PCS directly related to PCSS scores

Ellis, et. al., 2015
Considerations for Lack of Progression with RTP Protocol

- Differential dx, and comorbid, concurrent, and confounding dx
- Autonomic dysregulation
  - Looks like exercises intolerance, sx exacerbation, dizziness, vestibular dysfunction, orthostatic hypotension, postural orthostatic tachycardia syndrome, or altered heart rate and BP response
  - Orthostatic hypotension
    - systolic BP decrease \( \geq 20 \text{ mm Hg} \) or diastolic BP decrease \( 10 \text{ mm Hg} \) after 3 minutes of standing with or without symptoms
    - HR change is not required
  - Postural Orthostatic Tachycardia Syndrome (POTS)
    - Tachycardiac HR response without drop in BP

Matuzka, et. al., 2016
Components Related to Occupational Performance - Cognition

- SLPs address executive function, memory, and cognitive endurance
- OTs collaborate with SLPs, and OT’s primary address:
  - Remediation of skills that affect daily routines
  - Self-management of symptoms
  - Taking breaks
  - Organizational skills
  - Task and component specific simulation

Brayton-Chung, et. al., 2016
Components Related to Occupational Performance - Cognition

• Cognitive deficits
  – Safety
  – Sequencing
  – Visual memory with strategies
  – Visual aides/ external memory devices
  – Chunking information/reducing info on page
  – Schedules
  – There are apps for that!

→*****Referral to NeuroPsych for more complex and persistent problems
→***** Referral to ST for processing difficulties
Components Related to Occupational Performance - Emotional

• “With our professional foundation routed in psychiatry, OT practitioners are trained to provide services that support mental health through client-centered engagement in meaningful daily activities.” (AOTA)

• Stages of Change Model
• Mindfulness techniques
• Relaxation techniques
• Goal-directed techniques
• Management of symptoms (physical and emotional)
• Assertiveness techniques (Brayton-Chung, et. al., 2016)
• Guided imagery, progressive muscle relation, deep breathing, and CBT
Components Related to Occupation Performance- Vision

- Vision treatment
  - Need for defined OT’s roles in this area!
  - Recommend functional, areas on TVPS-4, coordination, visual perception, visual attention, visual fixation, visual pursuits, saccades, gaze stabilization, and VOR

- Collaborate with Developmental Optometrist and other eye care specialists
Visual Therapy Treatment Ideas- Tracking

- Level 2 of RTP Activities
  - Mazes
  - Dot to dot worksheets
  - Pinball
- Level 3 of RTP Activities
  - Marsden ball
  - Bubbles
  - Balloons
  - Playing catch
  - Frisbee beach volleyball
- How would you make these Level 4?
Visual Therapy Treatment Ideas- Saccades

• Level 2 of RTP Activities
  – Door saccades
  – Pyramid saccades
  – Card games- Blink
  – Computer programs (limit screen time)
  – Scanning activities

• Level 3 of RTP Activities
  – Wall/shuffle saccades
  – Uno saccades
  – Catch
  – Sit-ups with target

• How would you make these Level 4?
Visual Therapy Treatment Ideas - Convergence

• Level 3 of RTP Activities
  – Marsden baseball
  – Rebounder
  – Use dowel to hit ball
  – Beach ball
  – Toss/ catch

• How would you make these Level 4?
Visual Therapy Treatment Ideas

• Directional confusion
  – Kirschner arrows
    • With weighted ball
    • Moving whole body- like Mario
  – Twister
  – Songs with imitation –Hokey Pokey, Cha Cha Slide

• TVPS-4 areas
  – Memory- sequencing of Move Your Body Cards, obstacle course
  – Visual closure- walking around building and identify hidden signs
Physical Treatment Ideas

- Yoga
- Move Your Body Cards
- Theraball Cards
- Obstacle course
- Rock wall and slide
- Ladder drills
- Bal-A-Vis-Ex
- Cardio and weights
- Also check 10 sport-specific ideas!
Treatment Guidelines

• Use principles of Motor Learning Theory, Person Environment Occupation (PEO), and other theories and models commonly used in OT

• Progression of physical, visual, and cognitive treatment:
  – Person and environment
    • Person stable, environment stable
    • Person stable, environment moving
    • Person moving, environment stable
    • Person moving, environment moving
Treatment Guidelines

• Progression of physical, visual, and cognitive treatment:
  – Task and environment
    • Reduced stimuli → task-specific environment with distractions (physical, visual, and cognitive tasks simultaneously)
  – Task
    • Single task → multi-task
    • Simple → complex
    • Components of task (skill acquisition) → whole task (skill mastery)
  – Person, environment, and occupation
    • Accommodate and remediate
    • Desensitize and habituate
Case Study- Lauren

- 16 yo female
- DOI: 06/10/2017 and 06/15/2017, both in cheerleading practice
- HS Junior at a local public school
- Aspires to attend an Ivy League College and be a Psychologist
- Previous dx: anxiety, ADHD, dyslexia, wears glasses
- Supportive family who appreciates hearing research
- What further information would you like to know?
- What would you recommend for her?
Case Study- Jesus

- 9 yo male
- DOI: 07/04/2017
- 4th grader at a local public school
- Likes Boy Scouts, playing with little sister and friends, and math
- Previous dx: none
- Single parent, no car
- What further information would you like to know?
- What would you recommend for him?
Possible Areas for Growth for OT in Concussion Rehab

- Vision therapy
- Rebirth of mental health!
- Legislation – help write the laws in your state, school district, youth league!
- Research
- Education- educate and collaborate for your colleagues and local health system
- School therapists- educate and collaborate with ATCs; help with sensory needs, RTP, RTL
- Acute care- establish protocols for your hospital, provide education and resources
- What other ideas do you have?
Resources

- http://aaopt.org/section/bv/diplomates/index.asp (to find VT Opto)
- www.aoa.org/childrens-vision.xml
- www.austineyegym.com (Dr. Beck)
- http://www.biausa.org
- www.bouldervt.com
- www.canchild.ca (handouts)
Resources

- http://www.cdc.gov/concussion
- https://www.cdc.gov/headsup handouts)
- https://www.cdc.gov/traumaticbraininjury/symptoms.html
- www.childrens.com/Concussions (handouts)
- www.covd.org (to find VT Opto)
- www.eyeicanlearn.com (tx ideas)
- www.infantsee.org
Resources

- [http://kingdevicktest.com](http://kingdevicktest.com)
- [www.ncaa.org](http://www.ncaa.org)
- [https://nora.cc/](https://nora.cc/) (to find VT Opto)
- [www.rehabmeasures.org](http://www.rehabmeasures.org)
- [www.teachingvisuallyimpaired.com](http://www.teachingvisuallyimpaired.com)
- [www.understood.org](http://www.understood.org) (504 versus IEP)
- [www.visionandlearning.org](http://www.visionandlearning.org)
- Eye Games: Easy and Fun Vision Exercises by Lois Hickman & Rebecca E. Hutchins (2010)
References


References


Refences


References


References


Credits

• A portion of this information was provided by Dr. Mary McMains Beck, COVD, at the following CEUs:
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  – Concussion Diagnosis/Treatment: Understanding Vision in the Cognition, Vestibular and Visual Best Practices Triad

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