Pitfalls of Post Concussion Syndrome

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Disclaimer
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Objectives
1. Describe the role of personal experience and expectation for recovery on overall health and positive outcomes.
2. Examine the role of communication, tone and patient education when discussing recovery with patients with post-concussive symptoms.
3. Examine the impact of fear and negative information available in the media and general population on individual recovery from concussion.

Post Concussion Syndrome
Persistent symptoms beyond the typical timeframe for recovery (~3 mos)

- Three or more of the following:
  - headache
  - dizziness
  - vertigo
  - fatigue
  - memory problems
  - trouble concentrating
  - sleeping problems
  - insomnia
  - restlessness
  - irritability
  - apathy
  - depression
  - anxiety
  - personality changes
  - sensitivity to noise and light
**Post Concussion Syndrome**

- ICD-10
  - 4 weeks
  - 3/8 symptoms
- DSM-IV
  - > 3 months
  - 3/8 symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>ICD-10</th>
<th>DSM-IV</th>
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<tbody>
<tr>
<td>Headache</td>
<td>X</td>
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<tr>
<td>Dizziness</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Fatigue</td>
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<td>X</td>
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<tr>
<td>Irritability</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Sleep problems</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Concentration difficulty</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Memory difficulty</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cannot handle stress/emotion/alcohol</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mood/anxiety/depression</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Personality changes</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Apathy</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Inter-relationship of Symptoms**

(Brent DA, Cur Psychiatry Rep, 2017)

- Insomnia
- Hypersomnia
- Fatigue
- HA/Dizziness
- Light & Noise Intolerance
- Blood Anxety
- Emotional Instability
- Memory
- Concentration

**Fear Avoidance Model**

(Wijenberg MLM, Brain Injury, 2017)

- Depression
- Traumatic Brain Injury
- Post-concussion symptoms/fear avoidance
- Post-concussion symptoms/catastrophizing
- Number of saccades and number of symptoms ($r = -0.42$)
- Mediated by integrity of left subgenual cingulum
- Higher number of saccades in those more removed from date of injury
- Mediated by integrity of left uncinate fasciculus
- $n = 59$ persistently symptomatic with at least 2 concussions
- Performed self-paced saccadic eye movements
- Number of self-reported symptoms
- Integrity of white matter tracts
- Interval from last concussion

(Taghdiri F, J of Neurotrauma, 2017)

**Neuroimaging**

- Number of saccades and number of symptoms ($r = -0.42$)
- Mediated by integrity of left subgenual cingulum
- Higher number of saccades in those more removed from date of injury
- Mediated by integrity of left uncinate fasciculus

(Taghdiri F, J of Neurotrauma, 2017)

**Biomarkers**

Blood-based biomarkers
- No relationship between elevated neuron-specific enolase (NSE) serum level and PCS
  - (Mercier E, Brain Inj, 2017)
- No relationship between elevated S-100B serum level and persistent PCS
  - (Mercier E, J Neurotrauma, 2017)
**Biomarkers**

**Neuroimaging biomarkers**
- Resting state fMRI revealed abnormal functional connectivity in the emotional network in PCS
  - Emotional
  - Cognitive
  - (Zhang X, Zhonghua Yi Xue Za Zhi, 2017)

**Blood-based biomarkers**
- RNA profiles from whole blood samples
  - 86% classification accuracy for healthy vs. long-term concussed
    - Sn = 80%
    - Sp = 89%
  - (Hardy JJ, PLoS One, 2017)

**Biomarkers**

"Most studies have recruited samples that are not representative and generalisable to the mTBI population. These exclusion criteria limit the potential use and translation of promising serum protein biomarkers to predict postconcussion symptoms."

(Mercier E, BMJ Open, 2017)

**Electrovestibulography**
- Peripheral, spontaneously evoked vestibuloacoustic signals were recorded
  - 84% classification accuracy for healthy vs. short- and long-term PCS
  - 79% classification accuracy for short- vs. long-term PCS
  - (Suleiman A, Sci Rep, 2017)

**Questionnaires**

(King NS, J Neurol Neurosurg Psychiatry, 1996)

- Rivermeade Postconcussion Symptom Questionnaire
- Hospital Anxiety and Depression Scale
- Impact Event Scale
- Post-traumatic amnesia
- Paced Auditory Serial Addition Test
- Short Orientation Memory and Concentration Test

**Risk Factors**

(Brent DA, Cur Psychiatry Rep, 2017)

- Age
- Female
- Previous concussion
- Pre-morbid depression or mental illness
- Tendency to somatization
- Current headaches
- History of migraine
- Greater symptoms
- Stress & Anxiety
- Sleep disturbances
- ADHD
- Not removed from play
Mitigating Emotional Risk Factors
(Ruff RM, Brain Injury, 1996)

➢ Confront unrealistic expectations (no special treatment or magic bullet)
➢ Monitor impulsivity
➢ Stress management to prevent overload, anxiety, and a non-productive state
➢ Multiple small reductions can decrease the overall level of stress/anxiety
➢ Pre-morbid emotional traumas can be reactivated by mTBI

Sleep problems

➢ Females reported more sleep problems after a single concussion
➢ Greater sleep disturbance - more headaches and mood changes
➢ More strongly correlated with cognitive problems
➢ Equal sleep problems after repeated concussions

(Oyegbile TO, Sleep Med, 2017)

Brain Drawings
(Jones KM, Psychology & Health, 2016)

Negative Expectations

➢ Individuals who were told they would likely do poorly on a cognitive test due to their concussion did poorly
➢ Individuals who were told they would do well on a cognitive test due to their recovery did well

Illness Perceptions
(Snell DL, Brain Injury, 2011)

➢ Poor outcome at 3 months:
  ➢ Stronger beliefs about injury
  ➢ Emotional impact
  ➢ Higher educational attainment

Treatment Targets

➢ Managing distress
➢ Understanding the condition
➢ Recovery expectations and timeframes
➢ Action plans for managing symptoms
➢ Gradually resume usual levels of activity and participation

Early Physical Activity

➢ Lower risk of PCS than those with no physical activity (25% vs. 44%)
  ➢ (Grool AM, JAMA, 2016)
➢ Active rehabilitation was associated with greater reduction on the Post-concussion Symptom Scale than treat as usual
  ➢ (Chan C, Archives of Phys Med and Rehabil, 2016)
➢ Cognitive rest resulted in a longer duration of symptoms
➢ Moderate levels of cognitive and physical exertion over the first month post-injury had improved outcomes over small or large amounts
  ➢ (Sawyer Q, J of Athletic Training, 2016)
Concussion-like Symptoms at Baseline

➢ Can we expect complete symptom resolution after concussion?
➢ Up to 67% of healthy young athletes experienced mild to moderate symptoms at baseline
➢ Fatigue
➢ Nervousness
➢ Drowsiness
➢ (Hunt AW, J of Athletic Training, 2016)

Collaborative Care

➢ Patient-centered, multidisciplinary team to manage athletes with complex concussion
➢ (Sawyer Q, J of Athletic Training, 2016)
➢ Weekly team meeting among care coordinator, cognitive behavior therapist, pediatrician, and psychiatrist
➢ (McCarty CA, Pediatrics, 2016)

“A paradigm that views... the product of an inter-play between biology and experience seems appropriate to understanding the genesis of the post-concussion syndrome.”

- Wood, 2004

Risk Factors in High School Athletes

➢ Memory
➢ Concentration
➢ Sleep
➢ Balance
➢ Noise
➢ Visual difficulty
➢ (Kerr ZY, J Sci Med Sport, 2017)

External Risk Factors for PCS

➢ Negative consequences seen in media/society
➢ Mindset/approach of treating clinicians
➢ Multiple clinicians with differing viewpoints

<table>
<thead>
<tr>
<th>Time after injury</th>
<th>Potential emerging factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-24 h (immediate symptoms)</td>
<td>Many organic factors</td>
</tr>
<tr>
<td>1 day-4 weeks (early symptoms)</td>
<td>Overdoing and failing tasks</td>
</tr>
<tr>
<td>1-6 mos (medium-term symptoms)</td>
<td>Fear that a more serious injury has been misdiagnosed</td>
</tr>
<tr>
<td>Over 6 months (long term or possibly permanent symptoms)</td>
<td>Unhelpful strategies for coping with uncertainty and uncertain etiology of symptoms</td>
</tr>
</tbody>
</table>

Adapted from King BJP 2003
Negative Expectations

- 80-90% of individuals will recover fully within 3-4 weeks after a concussion
- 10-20% with prolonged symptoms
- Post-Concussion Syndrome (3 mos)

Does activity/behavior during the first week impact likelihood of post concussion syndrome?

Symptoms only... how can I tell???

- Few obvious “signs” of a concussion
- Diagnosis, care, progression, recovery all based on self report
- Opportunity to Downplay or Embellish symptoms
  - Desire to avoid school
  - Desire to play in next game
  - Desire to rest/not participate in school/athletic/social event
  - Social pressures in teenage years

Prescribing Rest

SIGNS VS SYMPTOMS

- Patients with symptoms were more likely to remain symptomatic after injury if prescribed rest
- Patients with signs of injury benefited from rest after injury
- Individualized (early) treatment planning

Am I missing something?

- Second Impact Syndrome
- CTE

CASE STUDY
47 year old female

Sustained a concussion 5 months ago due to MVC. She was the restrained driver of her vehicle when another driver veered into her lane, causing her to strike the left side of her head against the door frame.

Acute markers of injury included reported LOC (5 minutes) and confusion. Acute symptoms included headache (severity: 9/10, generally localized), dizziness, mental fogginess, photo/phonosensitivity, nausea, blurred left eye vision, and left facial numbness.

Did not seek care at the time of the injury

Went to the ER 3 days after the injury due to persistence of symptoms. She was admitted, evaluated, and administered a CT and MRI of the head, both of which were read as unremarkable. Discharged home with diagnosis of concussion

6 weeks post MVC, sustained a potential reinjury when shopping a rack fell on top of her, hitting her on the head. Initially with minimal symptoms, but went to the ER 3 days following this with worsened "concussion and whole body symptoms". A new CT performed indicated "no evidence of an ICH, fracture or acute pathology to suggest an etiology for the pain."

Management to date: 4 ED visits, PCP, Pain clinic, Concussion Clinic, Vestibular PT trial (6 visits - unsuccessful); Has also been evaluated by neurology, ophthalmology and cardiology – without abnormal findings

Referred to Vestibular PT for ongoing dizziness, imbalance, nausea

PMH

- Cardiac – angina, benign hypertension w/o heart failure
- Diabetes (Type II)
- Diabetic polyneuropathy
- Chronic pain – shoulders, spine, hips
- Fibromyalgia
- Migraine
- Car sickness
- Psychiatric – Depression, anxiety, panic disorder

Medications:

- ASPIRIN 81MG
- clopidogrel (PLAVIX)
- diltiazem (CARDIZEM CD)
- fosfomycin (LASIX)
- nitroglycerine (NITROLINGUAL) - as needed for chest pain
- rosuvastatin (CRESTOR)
- saxagliptin (ANAVESTA)
- metformin (GLUCOTROL SR) 1,000 mg oral tablet
- gabapentin (NEURONTIN)
- HYDROchlorothiazide (MORICID) – as needed for pain
- morphine (MS CONTIN) 15 mg oral extended-release tablet - one pill by mouth three times daily
- tramadol (ULTRAM)
- ondansetron HCl (ZOFRAN) – as needed for nausea
- Clonazepam (KLONOPIN) 1 mg Oral Tablet
- WELLBUTRIN
- famotidine (PEPCID)
- fluticasone (FLONASE)

Biopsychosocial:

- The patient is on permanent disability due to an inoperable heart condition and diabetes.
- Patient is divorced and lives with her elderly father as his primary caregiver. Spends much of her time managing her various medical conditions as well as his.
- Since sustaining the injury, the patient has been reclusive socially, feels too cognitively inefficient to interact socially, is fearful of driving.

Things that go through your mind . . .

- Is it too late to put her on someone else’s schedule?
- Maybe she won’t show up
- This would be a great learning experience for our 3rd year student

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Vestibular PT Eval: 5 months post injury

➢ During evaluation was very tearful recounting the circumstances of the injuries. Felt that the other driver was careless, smoking, holding cell phone, cut her off the road. The police were delayed in coming to the scene.

➢ Pt feels her condition has not improved, noting she is experiencing constant headaches and cognitive lapses (e.g., losing her place in conversation, forgetting things). Facial numbness and tingling has also persisted since the injury. Pt also noted significant anxiety regarding driving since the accident.

➢ Physical: Headache (severity: 7/10, generally constant), dizziness, disrupted balance, fogginess, photo/phonophobia, nausea, blurred left eye vision. Notes that she has been having episodes of chest pain as well as elevated blood glucose measures.

➢ EMR notes multiple calls to pcp office, eg. “Called You Monday, never heard back from the Nurse. I have numbness on my entire face still, pain in my brain, left eye problems, neck pain, lower back pain, left buttocks pain. I have a Concussion in the Brain and bruised/broken ribs. I need to see you ASAP. Thank you.”

Evaluation:

➢ ABC Scale Total Score: 17.5%
➢ DHI Total Score: 94/100
➢ Dizziness Rating: Current: 4, Best: 9, Worst: 9
➢ Headache Rating: Current: 7, Best: 9, Worst: 9
➢ Balance/Gait exam:
  ➢ Impaired balance with EC on firm and compliant surface
  ➢ Gait speed: .8 m/sec with formal testing
➢ Clinical Dynamic Visual Acuity Test: NT

Post-Concussion Symptom Scale

• Items rated 0-6

<table>
<thead>
<tr>
<th>Symptom Score</th>
<th>Headache</th>
<th>Mood</th>
<th>Memory</th>
<th>Balance/Mobility</th>
<th>Fatigue</th>
<th>Nausea</th>
<th>Photophobia</th>
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<tbody>
<tr>
<td>Leeds</td>
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<td>3</td>
<td>3</td>
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<tr>
<td>Facial numbness</td>
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<td>Visual disorders</td>
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<td>3</td>
<td>3</td>
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<tr>
<td>Sensory in eyes</td>
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<tr>
<td>Sensitivity to motion</td>
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<td>3</td>
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<tr>
<td>Irritability</td>
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<td>Sedative</td>
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<td>Nystagmus</td>
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<td>Pain in butt</td>
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<tr>
<td>Total Symptom Score</td>
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</table>

VOMS - 5 months post injury

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Headache (10-0)</th>
<th>Dizziness (10-0)</th>
<th>Nausea (10-0)</th>
<th>Photophobia (10-0)</th>
<th>Time (sec)</th>
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<tbody>
<tr>
<td>Saccade Horizontal</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>21</td>
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<tr>
<td>Saccade Vertical</td>
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<td>Convergence (Near Point)</td>
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<td>6</td>
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<tr>
<td>Visual Motion Sensitivity Test</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>21</td>
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</table>

Patient Goals:

➢ “Feel normal again”
➢ “Not be dizzy all the time”
➢ “Get rid of my headaches”
➢ “Feel like I can concentrate”
➢ “To have my life back”

“PCS” is not specific to Concussion!

• 31% of a healthy control group met criterion for PCS according to ICD-10 definition (Wajas et al 2015)
  • In a study of high school students, (Iverson et al. 2015) 19% of boys and 28% of girls reported symptoms resembling PCS despite no concussion. Preexisting conditions related to this symptom profile were
    • prior treatment of a psychiatric condition
    • history of migraines
    • substance abuse
    • attention-deficit/hyperactivity disorder
  • In a study of mTBI patients and trauma controls in Australia, rates of “PCS” were similar at 3 months for both groups (Ponsford et al, 2012)
What Persistent PCS is NOT related to:

➢ Structural MRI abnormalities and microstructural white matter findings at 1 month were not associated with PCS at 1 year (Waljas et al, 2015)
➢ Race, insurance status, body mass index, sport, helmet use, medication use, type of symptom (Morgan et al 2014)
➢ CT findings, GCS score, post-traumatic amnesia (van der Naalt et al, 2017)
➢ Prior history mTBI
➢ Yes: Morgan et al, 2014; Theodom et al, 2016
➢ No: Iverson et al, 2015; van der Naalt et al, 2017; Ponsford et al, 2012

What Persistent PCS IS related to . . .

@ 2 months:
• Catastrophizing constructs of: rumination, magnification, and helplessness present at 4 weeks (Chapot et al, 2016)

@ 3 months:
• Anxiety, female gender and noise sensitivity in first 10 days
• Premorbid mood or psychiatric disorder, significant life stressors (Morgan et al, 2014)
• Family history mood/psychiatric disorder; family history migraines (Morgan et al, 2014)
• Pre-injury psychiatric history, pre-injury health status (Ponsford 2012)
• Anxiety symptoms on HADS at 1 week (Ponsford 2012)
• Current anxiety symptoms, PTSD symptoms and presence of life stressors (Ponsford 2012)

@ 6 months:
• Psychological factors (ie. emotional distress and maladaptive coping experienced early after injury): pre-injury mental health problems, education (lower), age (40-64 yrs) (van der Naalt et al, 2017)

@ 1 year:
• Depression (Waljas et al 2015)
• Having at least one comorbidity, history of brain injury, living alone, alcohol and medication use, and being female (Theodom et al, 2016)

Other
• Catastrophizing and Fear Avoidance common in chronic PCS (Wijenberg et al, 2017)

Considering this information – and what we know about this case – are you surprised this patient is experiencing persistent issues?

"It is more important to know what sort of person has a disease than to know what sort of disease a person has.” - Hippocrates

Management Considerations

Recognize Somatization

SOMATIZATION:
➢ According to Wikipedia . . .
➢ “the generation of physical symptoms of a psychiatric condition such as anxiety”
➢ “a tendency to experience and communicate psychological distress in the form of somatic symptoms and to seek medical help for them”
➢ 16-18% of patients with medically unexplained illness are diagnosed with Functional Neurological Disorder (Stone et al 2009)
➢ Psychogenic Gait Disorders - Found in 9% of neurologic inpatients!! (Lempert 1991)
➢ Up to 20% of patients in Movement Disorder Clinics are diagnosed with a Functional Movement Disorder (Williams et al 1995)
➢ 20-50% of patients evaluated for epilepsy diagnosed with Psychogenic Non-Epileptic Seizures (PNES)
➢ Persistent Postural-Perceptual Dizziness (3PD) - functional dizziness as a primary cause of vestibular symptoms amounts to 10% in neuro-otology centers (Dieterich 2017)

Is there evidence for somatization with this patient?
➢ Extensive medical records for multiple conditions
➢ ER visits and medical visits without findings
➢ Chest pain, left facial pain & N/T, blurry vision left eye
➢ Symptoms aggravated by levels of stress and emotionality
➢ Gait/balance measures (abnormally low ABC, gait speed abnormally low, etc)

3 Considerations for managing these patients differently:
A. Create behavioral change
B. Address hypersensitivity issues
C. Team approach

We need to treat patients with somatization issues differently

A. Change your patient’s BEHAVIOR

PT – Specific Considerations:
➢ Cognitive-Behavioral principles
➢ Role of PT is “coach”
➢ Use Motivational Interviewing Concepts
➢ Alter focus from symptom-specific goals to participation/activity-life goals
➢ Hold patient accountable and responsible for their own improvement
➢ Written plan with patient highly encouraged
➢ Avoid PASSIVE treatments!
Goal Re-structuring
Recall initial goals:
➢ "Feel normal again"
➢ "Not be dizzy all the time"
➢ "Get rid of my headaches"
➢ "Feel like I can concentrate"
➢ "To have my life back again"

What does it MEAN to you to have your life back again – what would you be DOING?

Recall initial goals:
➢ "Feel normal again"
➢ "Not be dizzy all the time"
➢ "Get rid of my headaches"
➢ "Feel like I can concentrate"
➢ "To have my life back again"

Restructured goals:
➢ "Be able to go out to dinner with my friends"
➢ "Be able to take father shopping – flea markets, estate sales"
➢ "Be able to go with family to amusement park and watch grands kids ride"
➢ "Be able to attend country music concert with daughter"

Plan: Plan to see patient 4-6 visits, total, if attendance and adherence to behavioral program were maintained.

Regulate Schedule
➢ Ask pt to describe daily routine
➢ Identify opportunities to modify schedule
➢ Sleep/Wake
➢ Get/School hours/attendance
➢ Meals/Diet
➢ Exercise (symptom-free status not expected)
➢ Social
➢ Close to normal as possible!
➢ GOALS:
   ➢ Limit time for rumination
   ➢ Use schedule to address activity-specific goals

Positively Affecting Behavior
➢ Do NOT remove from work, school, exercise, social activity, etc. – if possible
➢ Accommodations may be needed
➢ Incorporate rest breaks (BUT not sleeping) to assist with pacing
➢ Normalize sleep pattern
➢ Encourage normal social interaction
➢ Exercise, Exercise, Exercise
   ➢ Identify appropriate levels and require regular participation
   ➢ May need to find ways to implement exercise – yoga, community resources, etc.
➢ DO NOT inventory symptoms frequently (patient or family)
➢ Focus on Function and Participation

B. HYPERSENSITIVITY... One feature common to many of these cases...
The Hypersensitive Patient:

IF:  THEN:

IF:  THEN:

The Hypersensitive Patient - What We Have Learned:

➢ Hypersensitivity profiles are usually comorbid w/ migraine and anxiety profiles
➢ Treat with Expose-Recover model
➢ Symptom-free is not the goal; "tolerable symptoms"
➢ Goal: HABITUATION; increase tolerance level of CNS to stimuli
➢ Daily/systematic exposure to provocative stimuli (light/noise/motion/complex environments)
➢ Break when symptoms reach moderate levels to allow symptom recovery
➢ Assess recovery time
➢ Goal: response moderates with regular exposure
➢ Limit/avoid use of aides to filter stimuli unless absolutely necessary!

Case Example - Interventions

➢ Seen 1x/week in clinic with detailed HEP that related to functional goals
➢ Physical activity – walking in busy environment 30 min/day. Progress to group dance classes.
➢ Every day, select a busy environment to spend time in to moderate symptom provocation.
➢ Not to wear sunglasses indoors; normal volume for TV, radio
➢ Breathing & relaxation techniques for symptom management
➢ Schedule Regulation
➢ Supplementary vestibular ex – habituation of sensitive findings

C. You Need a Team

Interdisciplinary Team Strategies:

ALL team members:
- Symptom acknowledgment and reassurance
- Instill the expectation they will get better
- Employ CBT principles
- Active, problem solving approach
- Reduced focus on symptoms
- Goal directed sessions
- Activity-based homework
- Motivational interviewing techniques

Avoid mixed messages!

➢ ALL TEAM MEMBERS utilize similar language, approach, goals
➢ Involve additional individuals/resources as needed:
  ➢ Appropriate physician(s)/medication management
  ➢ Psychotherapy/Psychiatry – if needed
  ➢ Complimentary treatments – if indicated
➢ BUT . . . AVOID OVER-REFERRING
➢ Involve those who are necessary and with similar treatment approach

➢ Involve those who are necessary and with similar treatment approach.

If Behavioral Interventions alone are not enough: YOU MAY NEED MEDICATIONS

- Eg: 3PD, Generalized Anxiety Disorders, etc

- Medications:
  - SSRIs
  - SNRIs
  - Benzodiazepams (low dose)

Case Interventions:

➢ Entire treatment team – Concussion Clinic, PCP, Pain MD, Psychiatrist – looped in on functional management approach via EMR communication
➢ Psychiatrist – modified medication (d/c Wellbutrin, started Cymbalta)
➢ Psychotherapy – with CBT approach
➢ Pt was told to maintain ALL consultation with current team ONLY – no outside referrals

Case Outcome:

➢ Seen for 6 visits over 3 months
  ➢ 1x/week for 4 weeks, then 1x/month

- Goals met:
  ➢ Tolerance to busy environments > 2hrs
  ➢ Returned to driving
  ➢ Attend concert with daughter with full participation
  ➢ Went with grandchildren to amusement park 3x
  ➢ Takes father to flea market or mall every week
  ➢ Exercising regularly – 45 min daily walking (any environment) or exercise class
  ➢ Socializing regularly with family and friends

- Goals unmet:
  ◆ Dizziness subjective rating < 3/10 (0-7/10 at d/c)
  ◆ DHI < 50 (82 at d/c)
  ◆ ABC 80% (43% at d/c)

1. Change behavior!!
  ➢ Normalize schedule
  ➢ Focus on function and participation, not symptoms
  ➢ Promote exercise
  ➢ Relaxation strategies for anxiety control
  ➢ Habituation, Not Avoidance!!
  ➢ Hold patients accountable for behavioral change

2. Hypersensitivity is often a feature of these patients
  ➢ De-sensitization/habituation may be better approach

3. Treatment With A Team (with common approach) is more effective

Somatization/Psychogenic issues are COMMON! (and not unique to concussion)

- Additional Help May Be Needed! Don’t be afraid to advocate for:
  ➢ Psychotherapy
  ➢ Medications

Questions & Discussion
References


References

Take home

Pitfalls

Pitfalls of Post Concussion Syndrome

Karen Lambert PT, DPT, NCS
Anne Mucha PT, DPT, ME, NCS
Carrie Hoppes PT, PhD, NCS, OCS
Disclosures/Conflict of Interest

Disclaimer

The views expressed are those of the authors and do not necessarily reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

Objectives

1. Describe the role of personal experience and expectation for recovery on overall health and positive outcomes.
2. Examine the role of communication, tone and patient education when discussing recovery with patients with post-concussive symptoms.
3. Examine the impact of fear and negative information available in the media and general population on individual recovery from concussion.

Post Concussion Syndrome

Persistent symptoms beyond the typical timeframe for recovery (~3 mo)
- Three or more of the following:
  - headache
  - dizziness
  - vertigo
  - fatigue
  - memory problems
  - trouble concentrating
  - sleeping problems
  - insomia
  - memory problems
  - irritability
  - apathy
  - depression
  - anxiety
  - personality changes
  - sensitivity to noise and light

Post Concussion Syndrome

ICD-10
- 4 weeks
- 3/8 symptoms

DSM-IV
- > 3 months
- 3/8 symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>ICD-10</th>
<th>DSM-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
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<td>X</td>
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<tr>
<td>Dizziness</td>
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<td>X</td>
</tr>
<tr>
<td>Fatigue</td>
<td>X</td>
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<td>Irritability</td>
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<td>X</td>
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<td>Sleep problems</td>
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<td>Concentration difficulty</td>
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<tr>
<td>Memory difficulty</td>
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<td>X</td>
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<td>Cannot handle stress</td>
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<td>Sensitivity to alcohol</td>
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<tr>
<td>Personality changes</td>
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<td>X</td>
</tr>
<tr>
<td>Apathy</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Inter-relationship of Symptoms
(Brent DA, Cur Psychiatry Rep, 2017)

Fear Avoidance Model
(Wijenberg MLM, Brain Injury, 2017)

Neuroimaging
- n = 59 persistently symptomatic with at least 2 concussions
- Performed self-paced saccadic eye movements
- Number of self-reported symptoms
- Integrity of white matter tracts
- Interval from last concussion

(Taghdiri F, J of Neurotrauma, 2017)

Neuroimaging
- Number of saccades and number of symptoms (r = -0.42)
  - Mediated by integrity of left subgenual cingulum
  - Higher number of saccades in those more removed from date of injury
  - Mediated by integrity of left uncinate fasciculus

(Taghdiri F, J of Neurotrauma, 2017)

Biomarkers
- Blood-based biomarkers
  - No relationship between elevated neuron-specific enolase (NSE) serum level and PCS
    (Mercier E, Brain Inj, 2017)
  - No relationship between elevated S-100B serum level and persistent PCS
    (Mercier E, J Neurotrauma, 2017)

Biomarkers
- Neuroimaging biomarkers
  - Resting-state fMRI revealed abnormal functional connectivity in the emotional network in PCS
    - Emotion
    - Cognition
(Zhang X, Zhonghua Yi Xue Za Zhi, 2017)
Biomarkers

- Blood-based biomarkers
  - RNA profiles from whole blood samples
  - 84% classification accuracy for healthy vs. long-term concussed
  - Sn = 80%
  - Sp = 89%
  (Hardy JJ, PLoS One, 2017)

Biomarkers

"Most studies have recruited samples that are not representative and generalisable to the mTBI population. These exclusion criteria limit the potential use and translation of promising serum protein biomarkers to predict postconcussion symptoms."
(Mercier E, BMJ Open, 2017)

Electrovestibulography

- Peripheral, spontaneously-evoked vestibuloacoustic signals were recorded
- 84% classification accuracy for healthy vs. short- and long-term PCS
- 75% classification accuracy for short- vs. long-term PCS
(Suleiman A, Sci Rep, 2017)

Questionnaires

(King NS, J Neurol Neurosurg Psychiatry, 1996)

- Rivermeade Postconcussion Symptom Questionnaire
- Hospital Anxiety and Depression Scale
- Impact Event Scale
- Post-traumatic amnesia
- Paced Auditory Serial Addition Test
- Short Orientation Memory and Concentration Test

Risk Factors

(Brent DA, Cur Psychiatry Rep, 2017)

- Age
- Female
- Previous concussion
- Pre-morbid depression or mental illness
- Tendency to somatization
- Current headaches
- History of migraine
- Greater symptoms
- Stress & Anxiety
- Sleep disturbances
- ADHD
- Not removed from play

Mitigating Emotional Risk Factors

(Ruff RM, Brain Injury, 1996)

1. Confront unrealistic expectations (no special treatment or magic bullet)
2. Monitor impulsivity
3. Stress management to prevent overload, anxiety, and a non-productive state
4. Multiple small reductions can decrease the overall level of stress/anxiety
5. Pre-morbid emotional traumas can by reactivated by mTBI
Sleep problems

- Females reported more sleep problems after a single concussion
- Greater sleep disturbance = more headaches and mood changes
- More strongly correlated with cognitive problems
- Equal sleep problems after repeated concussions

(Oyegbile TO, Sleep Med, 2017)

Brain Drawings
(Jones KM, Psychology & Health, 2016)

Negative Expectations

- Individuals who were told they would likely do poorly on a cognitive test due to their concussion did poorly
- Individuals who were told they would do well on a cognitive test due to their recovery did well

Illness Perceptions
(Snell DL, Brain Injury, 2011)

- Poor outcome at 3 months:
  - Stronger beliefs about injury identity
  - Emotional impact
  - Higher educational attainment

Treatment Targets
- Managing distress
- Understanding the condition
- Recovery expectations and timeframes
- Action plans for managing symptoms
- Gradually resume usual levels of activity and participation

Early Physical Activity

- Lower risk of PCS than those with no physical activity (26% vs. 44%)
(Grool AM, JAMA, 2016)
- Active rehabilitation was associated with greater reduction on the Post-concussion Symptom Scale than treat as usual
(Chan C, Archives of Phys Med and Rehabil, 2017)
- Cognitive rest resulted in a longer duration of symptoms
- Moderate levels of cognitive and physical exertion over the first month post-injury had improved outcomes over small or large amounts
(Sawyer Q, J of Athletic Training, 2016)

Concussion-like Symptoms at Baseline

Can we expect complete symptom resolution after concussion?

- Up to 67% of healthy young athletes experienced mild to moderate symptoms at baseline
  - Fatigue
  - Sensitivity
  - Drowsiness

(Hays AH, J of Athletic Training, 2016)
Collaborative Care

- Patient-centered, multidisciplinary team to manage athletes with complex concussion
  (Sawyer, Q. J of Athletic Training, 2016)
- Weekly team meeting among care coordinator, cognitive behavior therapist, pediatrician, and psychologist
  (McCarty, CA. Pediatrics, 2016)

References


KAREN & Annes: This is the end of the slides I was planning on presenting. Not sure if we want to pull some of the other draft slides below up, finalize them, and add them into the talk?

"A paradigm that views... the product of an interplay between biology and experience seems appropriate in understanding the genesis of the post-concussional syndrome."
- Wood, 2004

END OF CARRIE’S SLIDES
Risk Factors in High School Athletes

- Memory
- Concentration
- Sleep
- Balance
- Noise
- Visual difficulty

(Kerr ZY, J Sci Med Sport, 2017)

External Risk Factors for PCS

- Negative consequences seen in media/society
- Mindset/approach of treating clinicians
- Multiple clinicians with differing viewpoints

Time after injury | Potential emerging factors
--- | ---
0-24 h (immediate symptoms) | Mainly organic factors
1 day-4 weeks (early symptoms) | Ongoing and failing tasks increase in life demands following recuperation
Difficulties coping with cognitive impairments
Fear that more serious injury has been misdiagnosed

1-6 mos (medium-term symptoms) | Concerns regarding potential permanence of symptoms
Uncertainty about progress of injury
Uncertainty about etiology of symptoms

Over 6 months (long-term or possibly permanent symptoms) | Issues relating to adjustment to long-term disability
Lack of understanding/belief from others
Compensation-claim factors
Developmental, medical, educational
Issues relating to adjustment to long-term disability

Adapted from King BJP 2003

Concussion Recovery

- 80%-90% of individuals will recover fully without intervention within 3-4 weeks after a concussion—right now, no evidence
- 10%-20% with prolonged symptoms
  - Post-Concussion Syndrome (PCS) (3 mos)
  - Speech, memory, concentration, mood

Symptoms only... how can I tell???

- Few obvious "signs" of a concussion
- Diagnosis, care, progression, recovery all based on self-report

- New "signs" of a concussion
- Diagnosis, care, progression, recovery all based on self-report
- Opportunity to Downplay or Embellish symptoms
  - Desire to attend school
  - Desire to play in next game
  - Desire to rest/not participate in school/athletic/social event
  - Desire to participate in social event
  - Social pressures in teenage years

- Few obvious "signs" of a concussion
- Diagnosis, care, progression, recovery all based on self-report
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  - Desire to participate in social event
  - Social pressures in teenage years
Prescribing Rest

- Patients with predominantly symptoms were more likely to remain symptomatic after injury if prescribed rest
- Patients with signs of injury benefited from rest after injury
- Individualized (early) treatment planning

(Sufinko AM, J Pediatr, 2017)

Am I missing something?

- Second Impact Syndrome
- CTE

CASE STUDY
Anne’s Patient

- Do this one after Karen’s case not before?
- What happens when you get a patient who is already experiencing persistent PCS (too late to avoid?)
- Introduce Clinical pearls

CASE 2 AF

- 47 year old female
- Sustained a concussion 5 months ago due to MVC. She was the restrained driver of her vehicle when another driver veered into her lane, causing her to strike the left side of her head against the door frame.
- Acute markers of injury included reported LOC (5 minutes) and confusion. Acute symptoms included headache (severity: 9/10, generally localized), dizziness, mental fogginess, photo/phonosensitivity, nausea, blurred left eye vision, and left facial numbness.
- Did not seek care at the time on the injury

- Went to the ER 3 days after the injury due to persistence of symptoms. She was admitted, evaluated, and administered a CT and MRI of the head, both of which were read as unremarkable. Discharged home with diagnosis of concussion
- 6 weeks post MVC, sustained a potential reinjury when shopping a rack fell on top of her, hitting her on the head. Initially with minimal symptoms, but went to the ER 3 days following this with worsened "concussion and whole body symptoms". A new CT performed indicated "no evidence of an ICH, fracture or acute pathology to suggest an etiology for the pain."
- Management to date: 4 ED visits, PCP, Pain clinic, Concussion Clinic, Vestibular PT trial (6 visits - unsuccessful); Has also been evaluated by neurology, ophthalmology and cardiology – without abnormal findings.
- Re-Referred to Vestibular PT for ongoing dizziness, imbalance, nausea

PMH

- Cardiac – angina, benign hypertension w/o heart failure
- Diabetes (Type II)
- Diabetic polyneuropathy
- Chronic pain – shoulders, spine, hips
- Fibromyalgia
- Migraine
- Carsickness
- Psychiatric – Depression, anxiety, panic disorder
Medications:
- ASPIRIN 81MG
- clopidogrel (PLAVIX)
- diltiazem (CARDIZEM CD)
- furosemide (LASIX)
- nitrroglycerin (NITROLINGUAL) - as needed for chest pain
- rosuvastatin (CRESTOR)
- sitaGLIPtin (JANUVIA)
- metFORMIN (GLUCOPHAGE) 1,000 mg oral tablet
- gabapentin (NEURONTIN)
- HYDROcodone - acetaminophen (NORCO) - as needed for pain
- Clonazepam (KLONOPIN) 1 mg Oral Tablet
- WELLBUTRIN
- famotidine (PEPCID)
- fluticasone (FLONASE)

Biopsychosocial:
- The patient is on permanent disability due to an inoperable heart condition and diabetes.
- Patient is divorced and lives with her elderly father as his primary caregiver. She spends much of her time managing her various medical conditions as well as his.
- Since sustaining the injury, the patient has been reclusive socially, feels too cognitively inefficient to interact socially, is fearful of driving.

Things that go through your mind . . .

Vestibular PT Eval: 5 months post injury
- During evaluation was very tearful recounting the circumstances of the injuries. Felt that the other driver was careless, smoking, holding cell phone, cut her off the road. The police were delayed in coming to the scene.
- Pt feels her condition has not improved, noting she is experiencing constant headaches and cognitive lapses (e.g., losing her place in conversation, forgetting things). Facial numbness and tingling has also persisted since the injury. Pt also noted significant anxiety regarding driving since the accident.
- Physical: Headache (severity: 7/10, generally constant), dizziness, disrupted balance, fogginess, photo/phonophobia, nausea, blurred left eye vision. Notes that she has been having episodes of chest pain as well as elevated blood glucose measures.
- EMR notes multiple calls to pcp office, eg. “Called You Monday, never heard back from the Nurse. I have numbness on my entire face still, pain in my brain, left eye problems, neck pain, lower back pain, left buttocks pain. I have a Concussion in the Brain and bruised/broken ribs. I need to see you ASAP. Thank you.”

Evaluation:
- ABC Scale Total Score 17.5%
- DHI Total Score: 94/100
- Dizziness Rating: Current: 4 Best: 2 Worst: 9
- Balance/Gait exam:
  - Impaired balance with EC on firm and compliant surface
  - Gait speed .8 m/sec with formal testing
- Clinical Dynamic Visual Acuity Test: NT

Post-Concussion Symptom Scale
- Items rated 0-6
VOMS - 5 months post injury

<table>
<thead>
<tr>
<th>Neuro-Motor Tests</th>
<th>No. Tested</th>
<th>Headache (0-10)</th>
<th>Stiffness (0-10)</th>
<th>Dizziness (0-10)</th>
<th>Nausea (0-10)</th>
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<tr>
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<td>7</td>
<td>4</td>
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<td>23</td>
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</table>

Pt's goals:
- “Feel normal again”
- “Not be dizzy all the time”
- “Get rid of my headaches”
- “Feel like I can concentrate”
- “To have my life back”

“PCS” is not specific to Concussion!
- 31% of a healthy control group met criterion for PCS according to ICD-10 definition (Walia et al 2015)
- In a study of high school students, (Iverson et al, 2015) 19% of boys and 28% of girls reported symptoms resembling PCS despite no concussion. Preexisting conditions related to this symptom profile were:
  - prior treatment of a psychiatric condition
  - history of migraines
  - substance abuse
  - attention-deficit/hyperactivity disorder

- In a study of mTBI patients and trauma controls in Australia, rates of “PCS” were similar at 3 months for both groups (Ponsford et al, 2012)

What Persistent PCS IS related to . . .

@ 2 months:
- Catastrophizing constructs of: rumination, magnification, and helplessness present at 4 weeks (Chaput et al, 2016)

@ 3 months:
- Anxiety, female gender and noise sensitivity in first 10 days
- Premorbid mood or psychiatric disorder, significant life stressors (Morgan et al, 2014)
- Family history mood/psychiatric disorder; family history migraine (Morgan et al, 2014)
- Pre-injury psychiatric history; pre-injury health status (Ponsford 2012)
- Anxiety symptoms on HADS at 1 week (Ponsford 2013)
- Current anxiety symptoms, PTSD symptoms and presence of life stressors (Ponsford 2013)

@ 6 months:
- Psychological factors (ie, emotional distress and maladaptive coping experienced early after injury), pre-injury mental health problems, education (lower), age (40-54 yrs) (van der Naalt et al, 2017)

@ 1 year:
- Depression (Walia et al, 2015)
- Having at least one comorbidity, history of brain injury, living alone, alcohol and medication use, and being female (Theodore et al, 2015)

Other:
- Catastrophizing and Fear Avoidance common in chronic PCS (Wijnberg et al, 2017)

Considering this information – and what we know about this case – are you surprised this patient is experiencing persistent issues

"It is more important to know what sort of person has a disease than to know what sort of disease a person has." - Hippocrates
Management Considerations

Recognize Somatization

SOMATIZATION:
According to Wikipedia . . .
• "the generation of physical symptoms of a psychiatric condition such as anxiety"
• "a tendency to experience and communicate psychological distress in the form of somatic symptoms and to seek medical help for them"

Is there evidence for somatization with this patient?
• Extensive medical records for multiple conditions
• ER visits and medical visits without findings
  • Chest pain, left facial pain &N/T, blurry vision left eye
• Symptoms aggravated by levels of stress and emotionality
• Gait/balance measures (abnormally low ABC, gait speed abnormally low, etc)

We need to treat patients with somatization issues differently

• 15-18% of patients with medically unexplained illness are diagnosed with Functional Neurological Disorder (Stone et al 2009)
• Psychogenic Gait Disorders - Found in 9% of neurologic inpatients! (Lempert 1993)
• Up to 20% of patients in Movement Disorder Clinics are diagnosed with a Functional Movement Disorder (Williams et al 1993)
• 20–50% of patients evaluated for epilepsy diagnosed with Psychogenic Non-Epileptic Seizures (PNES)
• Persistent Postural-Perceptual Dizziness (3PD) - functional dizziness as a primary cause of vestibular symptoms amounts to 10% in neuro-otology centers (Dieterich 2017)

Is there evidence for somatization with this patient?
• Extensive medical records for multiple conditions
• ER visits and medical visits without findings
  • Chest pain, left facial pain &N/T, blurry vision left eye
• Symptoms aggravated by levels of stress and emotionality
• Gait/balance measures (abnormally low ABC, gait speed abnormally low, etc)
3 Considerations for managing these patients differently:
A. Create behavioral change
B. Address hypersensitivity issues
C. Team approach

A. Change your patient’s BEHAVIOR

Goal Re-structuring
Recall initial goals:
• “Feel normal again”
• “Not be dizzy all the time”
• “Get rid of my headaches”
• “Feel like I can concentrate”
• “To have my life back again”

Restructured goals:
• “Be able to go out to dinner with my friends”
• “Be able to go with family to amusement park and watch grands ride”
• “Be able to attend country music concert with daughter”

Plan: Plan to see patient 4-6 visits, total, if attendance and adherence to behavioral program were maintained.

PT – Specific Considerations:
• Cognitive-Behavioral principles
• Role of PT is “coach”
• Use Motivational Interviewing Concepts
• Altern focus from symptom-specific goals to participation/activity-life goals
• Hold patient accountable and responsible for their own improvement
• Written plan with patient highly encouraged
• Avoid PASSIVE treatments!

Regulate Schedule
• Ask pt to describe daily routine
• Identify opportunities to modify schedule
• Sleep/Wake
• Work/School hours/attendance
• Meals/Diet
• Exercise (symptom-free status not expected)
• Social
• Close to normal as possible!
• GOALS:
  • Limit time for rumination
  • Use schedule to address activity-specific goals
Recall patient’s symptom report (PCSS)

- Items rated 0-6
- Do any items reflect hypersensitivity?

<table>
<thead>
<tr>
<th>Functions Involved</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing</td>
<td>-Control ears*</td>
</tr>
<tr>
<td>Balance Disorders</td>
<td>- Spatial awareness</td>
</tr>
<tr>
<td>Vision</td>
<td>- Visual changes</td>
</tr>
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<td>Taste</td>
<td>- Taste changes</td>
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<td>Smell</td>
<td>- Smell changes</td>
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<tr>
<td>Temperance</td>
<td>- Temperature changes</td>
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<tr>
<td>Pain</td>
<td>- Pain changes</td>
</tr>
<tr>
<td>Fatigue</td>
<td>- Fatigue</td>
</tr>
<tr>
<td>Memory</td>
<td>- Memory loss</td>
</tr>
<tr>
<td>Sleep</td>
<td>- Sleep disturbance</td>
</tr>
</tbody>
</table>

Positively Affecting Behavior

- Do NOT remove from work, school, exercise, social activity, etc. – if possible
- Accommodations may be needed
- Incorporate rest breaks (BUT not sleeping) to assist with pacing
- Normalize sleep pattern
- Encourage normal social interaction
- Exercise, Exercise, Exercise
- Identify appropriate levels and require regular participation
- May need to find ways to implement exercise – yoga, community resources, etc.
- **DO NOT inventory symptoms frequently** (patient or family)
- Focus on Function and Participation

B. HYPERSENSITIVITY... One feature common to many of these cases...

The Hypersensitive Patient:

**IF:**
- HYPERSENSITIVITY

**THEN:**
- TREAT WITH EXPOSE-RECOVER MODEL

The Hypersensitive Patient - What We Have Learned:

- Hypersensitivity profiles are usually comorbid with migraine and anxiety profiles
- Treat with Expose-Recover model
- Symptom-free is not the goal; "tolerable symptoms"
- Goal: HABITUATION; increase tolerance level of CNS to stimuli
- Daily/systematic exposure to provocative stimuli (light/noise/motion/complex environments)
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- Breathing & relaxation techniques for symptom management
- Schedule Regulation
- Supplementary vestibular ex – habituation of sensitive findings

Property of K. Lambert, C. Hoppes and A. Mucha. Do not use without permission.
C. You Need a Team

Interdisciplinary Team Strategies:

**ALL team members:**
- Symptom acknowledgment and reassurance
- Instill the expectation they will get better
- Employ CBT principles
- Active, problem solving approach
- Reduced focus on symptoms
- Goal directed sessions
- Activity-based homework
- Motivational interviewing techniques

Avoid mixed messages!

*ALL TEAM MEMBERS* utilize similar language, approach, goals

- Involve additional individuals/resources as needed:
  - Appropriate physician(s)/medication management
  - Psychotherapy/psychiatry – if needed
  - Complimentary treatments – if indicated

**But... Avoid over-referring**

- Involve those who are necessary and with similar treatment approach

If Behavioral Interventions alone are not enough: YOU MAY NEED MEDICATIONS!!

- **Eg:** 3PD, Generalized Anxiety Disorders, etc
- **Medications:**
  - SSRI's
  - SNRI's
  - Benzodiazepams (low dose)

<table>
<thead>
<tr>
<th>Medication</th>
<th>Daily Dose (mg)</th>
<th>Daily Dose (mg)</th>
<th>Transition Range</th>
<th>Daily Dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escitalopram</td>
<td>10</td>
<td>20</td>
<td>20-40</td>
<td>20</td>
</tr>
<tr>
<td>Sertraline</td>
<td>100</td>
<td>200</td>
<td>200-400</td>
<td>200</td>
</tr>
<tr>
<td>Citalopram</td>
<td>30</td>
<td>60</td>
<td>60-100</td>
<td>60</td>
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<tr>
<td>Claroxin</td>
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<td>20-40</td>
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<tr>
<td>Mirtazapine</td>
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<td>30-60</td>
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<tr>
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<td>50-100</td>
<td>50</td>
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<tr>
<td>Desipramine</td>
<td>50</td>
<td>250</td>
<td>250-500</td>
<td>250</td>
</tr>
</tbody>
</table>

Case Interventions:

- Entire treatment team – Concussion Clinic, PCP, Pain MD, Psychiatrist – looped in on functional management approach via EMR communication
- Psychiatrist – modified medication (d/c Wellbutrin, started Cymbalta)
- Psychotherapy – with CBT approach
- Pt was told to maintain ALL consultation with current team ONLY – no outside referrals
Case Outcome:
- Seen for 6 visits over 3 months
  - 1x/week for 4 weeks, then 1x/month
- Goals met:
  - Tolerance to busy environments > 2hrs
  - Returned to driving
  - Attend concert with daughter with full participation
  - Went with grandchildren to amusement park 3x
  - Takes father to flea market or mall every week
  - Exercising regularly – 45 min daily walking (any environment) or exercise class
  - Socializing regularly with family and friends
- Goals unmet:
  - Dizziness subjective rating < 3/10 (0-7/10 at d/c)
  - DHI < 50 (82 at d/c)
  - ABC 80% (43% at d/c)

Somatization/Psychogenic issues are COMMON!
(and not unique to concussion)

1. Change behavior!!
   - Normalize schedule
   - Focus on function and participation, not symptoms
   - Promote exercise
   - Relaxation strategies for anxiety control
   - Habitation; Not Avoidance!!
   - Hold patients accountable for behavioral change
2. Hypersensitivity is often a feature of these patients
   - De-sensitization/habituation may be better approach
3. Treatment With A Team (with common approach) is more effective
   - Additional Help May be Needed! Don’t be afraid to advocate for:
     - Psychotherapy
     - Medications

Questions & Discussion

Pitfalls

Take home