Disclosures

• I have no relevant financial disclosures
Who is impacted by concussion...

The numbers don’t lie

- Concussion rate: 4.17 per 10,000 AE across all sports, in Kerr et al’s study.
  - Boys football (10.4) highest overall > girls soccer > boys ice hockey

- Concussion incidence in practice: highest rate was boys football —> cheerleading #2

- Overall concussion rate was higher in competition than practice (rule changes can be really helpful in this area)

- Of the 3,463 practice related concussion: more occurred in the first hour of practice
  - In competition - most were in the latter half of that competition

- Mechanism: 62.3% were person to person; 17.5% contact with surface; 15.8% contact with equipment/apparatus

- Recurrence: 8.3%; most notable in ice hockey > boys lacrosse > girls field hockey.
Defining Sports Related Concussion “SRC”

• SRC= mTBI
• We know “its a mild traumatic brain injury induced by biomechanical force” resulting in “a disturbance in brain function”
• Several common features:
  • Caused by- “direct blow to the head, face, neck or body with force transmitted to the head”
  • Typically “results in rapid onset of impairment of neurological function however signs and sx may evolve over minutes to hours.”
  • May “result in neuropathological changes but the acute sx/sx largely reflect a functional disturbance rather than a structural injury, thus neuroimaging is normal”
  • Results in “a range of clinical signs and symptoms. LOC is less often seen. Usually symptoms resolve in a sequential course but prolonged symptoms may occur.”
1. Widespread depolarization and neurotransmitter release

2. Potassium efflux

3. Calcium in the cell impairs ATP production in mitochondria, worsening energy crisis

4. Calcium influx also causes axonal swelling

5. Na/K ATP-requiring transporters work overtime to restore balance

Slide courtesy Nicole Ryan
Metabolic disarray and mismatch

Why I don’t clear in the first week back to contact sports

- Functional disturbances which are complex and not fully understood

![Neurometabolic Cascade of mTBI](image)

**Neurometabolic Cascade Following Cerebral Concussion/mTBI**

From Giza CC, et al. [19]
Risk Factor profile

Make sure the history takes note of the following:

CONSIDER the following
- sex differences,
- younger age, adolescents vs adults
- neurodevelopmental factors such as ADHD, learning disorders,
- patient or family hx of headaches/migraines
- patient or family hx of mental health
- patient or family hx of eye issues.
- # of prior SRC (& how long to recovery?)

I recommend “adding a dot phrase” into your annual sports physicals templates that ask about SRCs past or present

Identify any premorbid or comorbid conditions that could make the diagnosis and management of concussion more difficult- and consider earlier referral in some.
Female gender and SRC

Sports variance, age variance, effect of rules
Anatomical differences as well

- Although male athletes have greater numbers of overall concussion, Female athletes are > male athletes for SRC
- Womens soccer incidence of SRC is second to football
- In sex comparable sports HS females had greater rates than males
- Ice hockey and LAX are the fastest growing sports currently (girls are no checking
  - Adult females had lower concussion rates BUT
  - Those athletes under age 18 - females and males had similar rates.
  - Mens lax is considered collision (womens lax contact)- decreasing rates of concussion in mens lax with increasing rates in women.
- Softball vs baseball (shorter distance from pitch to home in softball)
  - In HS- female softball players have more concussions as catcher, in baseball it was majority batter
  - In college- TBIs are in the batter in softball, middle infielder in baseball.
Female gender and SRC continued

ANATOMICAL VARIANCES

• Females have higher global cerebral blood flow on PET scan (noninjured studies)
  • Cerebral blood flow can be monitored with transcranial doppler
  • In vitro rat studies show anatomical variations in axonal size (at baseline) and that female rats demonstrated “more” damage to these structures when common forces were applied to them- perhaps explaining some sx discrepancies
  • ?hormonal changes ‘during cycles”
  • Biomarker variability- still area of expanding research.
• ?neck strength and heading the ball
• Headgear has not been proven effective to date
Females:
• Had higher symptoms scores on presentation (headache, dizziness, confusion, and balance being the most common)
  • Of note females typically have higher symptom burdens than males both at baseline before injury and at injury presentation.
• Time to presentation: females took longer (increased time to specialized care is associated with prolonged recovery)
• Females took longer to return to non contact aerobic exercise
• Of note female sustain high rates of concussion in soccer, basketball and cheerleading and generally these sports are uncovered by sideline medical personal inclu ATCs
  • Could represent delay in diagnosis/ recognition, decreased rate of removal from play, slower initiation of concussion management
ADHD & Learning disorders

Complicate return to learn and recovery

- ADHD being one of the most common neurodevelopmental disorders- affecting 10% of the pediatric population (based on 2016 surveillance data)
  - Characterized by inattentiveness, hyperactivity and compulsive behaviors
  - ADHD and periods of increased impulsivity may impede self protection mechanisms during sports increasing likelihood of mTBI

- More symptoms; focus on goal directed behaviors and function
Office assessment

- Comprehensive patient hx along with thorough discussion of prior concussion- mechanism- approximate time to healing, rehabs needed (if applicable)
  - DISCUSS current injury, MOI, symptoms immediate and over the next few days
- Neurological examination (must be complete (II-XII))
- Ocular and Vestibulocular function (VOMS)
- MSK exam- don’t forget about the neck (ROM, palpation, Spurlings)
- Gait and balance assessment
- Neurocognitive testing if available
**VOMS**

- Near Point of Convergence
  - CI: difficulty or inability to converge (cross) one's eyes

- Accommodation
  - Accommodative Insufficiency (AI) is a condition in which a patient has an inability to focus or sustain focus at near.
  - up to 58% of children with convergence insufficiency have accommodative dysfunction

**VOMS**

- Dysmetria
  - Finger-nose-finger
- Nystagmus
  - Rapid lateral gaze tracking
- Gaze stability testing
  - Focus on fixed object with horizontal/vertical head movement
- Saccades
  - Hold two stationary targets placed shoulder width apart, have them move eyes quickly from target to target as head stays still
- Convergence deficit
  - Hold item with words at arms length and bring closer to face, as words become blurry, document measurement
  - Normal - 6 cm
Eye Movements

- Saccades (30 reps),
- Gaze stabilization (10 reps)
- Convergence/ accommodation
- Tracking fast moving object
Vertical Tracking Problems
Tracking problem:

Headaches at school
Reading as been a problem.

Previous 3 exams reported normal
Balance Evaluation

- Make it difficult!
Vestibular Dysfunction study at CHOP

100 children 11-17 years of age

**RESULTS**

**Vision examination including assessment:**
- Visual acuity
- Binocular vision (eye teaming)
- Accommodation (focusing)
- Eye movements (saccadic function)
- Convergence Insufficiency Symptom
- Scale with additional mTBI questions

**Normal Population**

- Binocular vision 5%
- Accommodation 3%
- Eye movements 2%

**Vestibular and Vision Deficits**
- Vision Problems 69%
- Vestibular Problems 55%
- Both Vision and Vestibular Deficits 49%
- Only Vision Deficits 16%
- Only Vestibular Deficits 20%

---

When the eyes don’t work

Convergence insufficiency affects vision in several ways, including:

• Double Vision, especially with reading or other near work
• Words move, jump, swim, or appear to float on the page
• Blurred vision or words appearing to come in and out of focus

Convergence insufficiency causes a number of symptoms, including the feeling that your eyes feel:

• Headaches
• Tired
• Uncomfortable
• A “pulling” feeling around your eyes

Convergence insufficiency also has a number of effects on performance of near tasks, including:

• Loss of concentration when reading
• Difficulty remembering what has been read • Loss of place when reading
• Mistakenly re-reading the same line of text
A complex web

- Symptoms - Somatic (headache), Cognitive (feeling in a fog) and Emotional (labile)
- Physical signs - LOC, amnesia
- Balance impairment - gait unsteadiness
- Behavioral - irritable
- Cognitive impair’t - slowed rxn times
- sleep/wake - drowsiness

From AMSSM consensus state’t
American Medical Society for Sports Medicine Position Statement on Concussion in Sport

Kimberly G. Hamon, MD,† James R. Clugston, MD,‡§ Katherine Dec, MD,¶ Brian Hainline, MD,‖ Stanley A. Herring, MD,*** Shawn Kane, MD,†† Anthony P. Kontos, PhD,†‡ John J. Leddy, MD,§§ Michael A. McCrea, PhD,¶¶ Sourav K. Poddar, MD,**** Margot Putukian, MD,††† Julie C. Wilson, MD,††† and William O. Roberts, MD§§§

Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016

MANAGEMENT

• #1 BRIEF rest- 48hours or less- then get them back into partial schedules at least

• The days of cocooning and rest till better ARE OVER

• THEY WILL BE SYMPTOMATIC AT SCHOOL- IT’S OK.
  • Teach them to work within a manageable window of symptoms
  • provide academic accommodations to schools. (vestibular exam will help decipher level of impairment)

• They don’t return to sports till symptom FREE but they can return to sub-symptomatic aerobic threshold rehab as soon as they can tolerate and work up to 30mins a day (must avoid contract drills, scrimmage and games)
Factors Affecting Recovery Trajectories in Pediatric Female Concussion

Natasha Desai, MD, CAQSM,* Douglas J. Wiebe, PhD; †Daniel J. Conwin, MD; †Julia E. Lockyer, MS; †\nMatthew F. Grady, MD, CAQSM; ‡ and Christina L. Master, MD, CAQSM.‡

Be in the know “return to learn”

Recommendations for school accommodations for pediatric patients with concussions


<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity</th>
<th>Goal of Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physical and cognitive rest</td>
<td>Home and leisure activities during the day that do not increase symptoms (e.g., reading, texting, screen time). Minimal physical activity</td>
</tr>
<tr>
<td>2</td>
<td>Prepare for school reentry</td>
<td>Subsymptom cognitive activity (e.g., light schoolwork at home over shorter stretches of time compared with usual). Social encounters with 1 or 2 friends</td>
</tr>
<tr>
<td>3</td>
<td>Back to school</td>
<td>Increase cognitive activity in a school environment with accommodations. Start with 1 h, half days, or every other day school attendance, as needed. Begin with listening-only days, attend less stressful classes, temporarily avoiding music or gym class, or preferential seating as needed. Extra time to complete homework/classwork as needed</td>
</tr>
<tr>
<td>4</td>
<td>Normal routine with some restrictions</td>
<td>Back to full days of school (but can be &lt; 5 d a week, if needed). Completing as much homework in longer stretches of time as tolerated. Resume tests and quizzes as tolerated, with extended time if needed. Allow students to catch up on missed tests or work gradually while working to keep up with learning new material</td>
</tr>
<tr>
<td>5</td>
<td>Full reintegration</td>
<td>This should include regular attendance, regular homework, regular tests, extracurricular activities</td>
</tr>
</tbody>
</table>

Frequent breaks as needed in quiet areas to rest during class (may need to be scheduled in younger patients).

Limit the number of classes in a day.

Initially limit test taking. Once they return to test taking, limit the number of tests per day. Permit breaks during tests.

Temporary use of sunglasses, dimmed screens, and/or paper printouts.

Temporary use of earplugs/headphones in loud busy places.

Delayed return to gym class or outdoor recess.

Permit initially school reentry to include a listening day without note taking or reading.

Vertical saccades deficits: limit note taking and provide preprinted notes.

Horizontal saccade deficits: Provide larger text font, double-spaced lines, audio books, recorded lectures, movies, and so forth.

Convergence deficits: larger font (size 18), preprinted teachers notes, recorded lectures.
Exercise as Medicine

• Exercise intolerance is a physiological sign of acute concussion that seems to reflect impaired autonomic function and control of cerebral blood flow.

• Exercise improves:
  • ANVS balance and CO2 sensitivity,
  • cerebral blood flow regulation
  • Mood and sleep

• Mainstay of aerobic rehab is the Buffalo Concussion Treadmill Test by Dr. John Leddy and colleagues
## Return to play

<table>
<thead>
<tr>
<th>Stage</th>
<th>Aim</th>
<th>Activity</th>
<th>Goal of Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Symptom-limited activity</td>
<td>Day-to-day activities that do not provoke symptoms</td>
<td>Gradual reintroduction of school activities</td>
</tr>
<tr>
<td>2</td>
<td>Light aerobic exercise</td>
<td>Walking or stationary biking at slow to medium pace. No resistance training</td>
<td>Increase heart rate</td>
</tr>
<tr>
<td>3</td>
<td>Sport-specific exercise</td>
<td>Running or skating drills. No head-impact activities</td>
<td>Add movement</td>
</tr>
<tr>
<td>4</td>
<td>Noncontact practice</td>
<td>More difficult training drills (eg, passing drills, rapid starts and stops). May start progressive resistance training</td>
<td>Increased cognition, exercise, and coordination</td>
</tr>
<tr>
<td>5</td>
<td>Full contact practice</td>
<td>Following medical clearance, normal training activities</td>
<td>Restore confidence and assess functional skill</td>
</tr>
<tr>
<td>6</td>
<td>Return to sport</td>
<td>Regular game play</td>
<td></td>
</tr>
</tbody>
</table>

- Each stage is 24hour….cannot double up
- In younger child sometimes can take 2 days at each stage
- Some will do extremely well in the “non-contact” portions then develop issues with more of the contact drills
- If symptomatic- go back one stage and try again

NOTE: Athletes should be at each stage for at least 24 h or longer. If any symptoms worsen during physical activity, the athlete should go back to the previous step. Resistance training should not be added until stage 3 at the earliest. If symptoms are persistent for greater than 1 mo, the athlete should be referred to a health care professional who is an
Rehab & Additional Services

• MSK- neck and whiplash rehab
• Vestibular rehab
• Pure vision rehab with a Developmental Optometrist
• Aerobic rehab through the Buffalo protocol.

• Be open minded- consider therapy and CBT when necessary
• Neuropsychologists can also be very helpful especially with learning disabilities +/- large mental health component.
Time to recovery

A difficult task! A single physiological window DOES NOT exist

- Lack of gold standard in diagnosis
- Symptoms scores are subjective
- Imperfect clinical exam and neuropsychological testing
- Patients frequently experience more persistent sx (migraines, anxiety, PTSD, sleep dysfunction etc)
- Returning to sport to early can lead to issues, repeat injury, etc
  - RTP progression can act like a buffer zone- take it seriously and DO NOT RUSH it (physiological dysfunction may outlast current clinical measures of recovery)
Persistent Symptoms

• Per the Berlin concussion statement, prolonged or persistent symptoms by definition are symptoms that persist beyond:
  • 14 days in adults and
  • >4 weeks in children

• Treatment needs to be individualized, there is no formula for “one treatment fits all”
Learning more; family resources
SCAT5®
SPORT CONCUSSION ASSESSMENT TOOL — 5TH EDITION
DEVELOPED BY THE CONCUSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by
FIFA

OLYMPIC FEDERATION

SCAT 5 (13 and up) and child SCAT5(12 and younger) Great in office tool

Essential for sideline coverage

Consider symptom scaling your concussion patients at each visit!

IF IN DOUBT, SIT THEM OUT!!!!!!!!!!!!!!!!!!!!!!!!!!!
DEAR SCHOOL STAFF:

This letter offers advice from a healthcare provider with experience in treating concussions, a type of traumatic brain injury. This letter was created to help school professionals and parents support students returning to school after a concussion. You can use these recommendations to make decisions about support for your student based on his or her specific needs. This letter is not intended to create a 504 plan or an IEP unless school professionals determine that one is needed. Most students will only need short-term support as they recover from a concussion. A strong relationship between the healthcare provider, the school, and the parents will help your student recover and return to school.

Student Name:

Date:

Healthcare Provider's Name:

The student is currently reporting the following symptoms:

- Physical:
  - Slighted by light or noise
  - Dizziness or balance problems
  - Feeling tired, no energy
  - Headaches
  - Nausea or vomiting
  - Vision problems

- Thinking or remembering:
  - Attention or concentration problems
  - Feeling slowed down
  - Forgetting or trouble organizing
  - Problems with short- or long-term memory
  - Trouble thinking clearly

- Social or emotional:
  - Anxiety or nervousness
  - Irritability or easily angered
  - Feeling more emotional
  - Sadness

- Sleep:
  - Sleeping less than usual
  - Sleeping more than usual
  - Trouble falling asleep

The student also reported these symptoms:

The student is currently reporting the following symptoms:

- Physical:
  - Slighted by light or noise
  - Dizziness or balance problems
  - Feeling tired, no energy
  - Headaches
  - Nausea or vomiting
  - Vision problems

- Thinking or remembering:
  - Attention or concentration problems
  - Feeling slowed down
  - Forgetting or trouble organizing
  - Problems with short- or long-term memory
  - Trouble thinking clearly

- Social or emotional:
  - Anxiety or nervousness
  - Irritability or easily angered
  - Feeling more emotional
  - Sadness

- Sleep:
  - Sleeping less than usual
  - Sleeping more than usual
  - Trouble falling asleep

Based on the student's current symptoms, I recommend that the student:

- Be permitted to return to school and activities while school professionals closely monitor the student. School professionals should observe and check in with the student for the first two weeks, and note if symptoms worsen. If symptoms do not worsen during this activity, then the activity is OK for the student. If symptoms worsen, the student should cut back on time spent engaging in that activity, and may need some short-term support at school. Tell the student to update his or her teachers and school counselor if symptoms worsen.

- Is excused from school for ________ days.

- Return to school with the following changes until his or her symptoms improve.

  (Note: Making short-term changes to a student's daily school activities can help him or her return to a regular routine more quickly. As the student begins to feel better, you can slowly remove these changes.)

  - No physical activity during recess
  - No physical education (PE) class
  - No after-school sports
  - Shortened school day
  - Later lunch start time
  - Reduce the amount of homework
  - Postpone classroom tests or standardized testing
  - Provide extra time to complete school work, homework, or take tests
  - Provide written notes for school lessons and assignments (when possible)
  - Allow for a quiet place to take rest breaks throughout the day
  - Lessen the amount of screen time for the student, such as computers, tablets, etc.
  - Give a Cooper or acamprosate to help reduce headaches (as needed)
  - Allow the student to wear sunglasses, a hard hat, or headphones if bothered by light or noise
  - Other:

Most children with a concussion feel better within a couple of weeks. However, for some, symptoms can last for a month or longer. If there are any symptoms that concern you, or if your child is worsening, notify the student's parents that the student should be seen by a healthcare provider as soon as possible.

For information on helping students return to school safely after a concussion, visit www.cdc.gov/HEADUP.
You have been diagnosed with a concussion (also known as a mild traumatic brain injury). This personal plan is based on your symptoms and designed to help speed your recovery. Your careful attention to it can also prevent further injury.

You should not participate in any high-risk activities (e.g., sports, physical education [PE], riding a bike, etc.) if you still have any of the symptoms below. It is important to limit activities that require a lot of thinking or concentration (homework, job-related activities), as this can also make your symptoms worse. If you no longer have any of the symptoms below and believe that your concentration and thinking are back to normal, you can slowly and carefully return to your daily activities. Children and teenagers will need help from their parents, teachers, coaches, or athletic trainers to help monitor their recovery and return to activities.

Today the following symptoms are present (circle or check):

- [ ] No reported symptoms

### Physical
- Headaches
- Sensitivity to light or noise
- Fatigue
- Nausea
- Visual changes

### Thinking
- Problems concentrating
- Feeling more emotional
- Feeling less usual

### Emotional
- Feeling more slowed down
- Nervousness
- Trouble falling asleep

### Sleep
- Difficulty waking up
- Difficulty falling asleep
- Wakes up many times
- Sleepless

### RED FLAGS: Call your doctor or go to your emergency department if you suddenly experience any of the following:
- Headache that worsens
- Slight vomiting or nausea
- Abnormal behavior
- Unusual level of confusion
- Loss of consciousness

### Returning to Daily Activities
1. Get 8 to 10 hrs of rest. After long days, make sure you get enough sleep at night. No naps are expected.
2. Take daytime naps or rest breaks while you feel tired.
3. Limit physical activity as well as activities that require a lot of thinking or concentration. These activities can make symptoms worse.
   - Physical activity includes PE, sports practices, weight-training, running, exercising, heavy lifting, etc.
   - Thinning and concentration activities (e.g., homework, schoolwork, job-related activity).

4. Drink lots of fluids and eat carbohydrates or protein to maintain appropriate blood sugar levels.

5. As symptoms decrease, you may begin to gradually return to your daily activities. If symptoms worsen or return, lessen your activities, then try again to increase your activities gradually.

6. During recovery, it is normal to feel frustrated and sad when you do not feel right and you cannot be as active as usual.

### Returning to School
1. If you (or your child) are still having symptoms of concussion you may need extra help to perform school-related activities.
2. Inform the teacher(s), school nurse, school psychologist or counselor, and administrator(s) about your (or your child's) injury and symptoms. School personnel should be instructed to watch for:
   - Increased problems paying attention or concentrating
   - Increased problems with learning or retaining new information
   - Longer times needed to complete tasks or assignments
   - Greater irritability, less able to cope with stress
   - Symptoms worsen (e.g., headache, tiredness) when doing schoolwork

### Returning to School (Continued)

#### Until you (or your child) have fully recovered, the following supports are recommended:

- No return to school. Return on date:
- Return on school with following supports. Review on:
  - Shortened day (e.g., 6 hours per day until return).
  - Reduced class sizes (i.e., rest breaks during class).
  - Shortened class length.
  - Less homework load.
  - Manipulate class size in small increments.
  - Check for return of symptoms (use symptom table on front page of this form) when doing activities that require a lot of attention or concentration.

#### Requesting of notes or School Management Team to discuss this plan and needed supports.

### Returning to Sports
1. You should NEVER return to play if you still have ANY symptoms – (Be sure that you do not have any symptoms at rest and while doing any physical activity and that activities that require a lot of thinking or concentration.)
2. Be sure that the PE teacher, coach, and/or athletic trainer are aware of your injury and symptoms.
3. It is normal to feel frustrated, sad, and even angry because you cannot return to sports right away. With any injury, a full recovery will reduce the chances of getting hurt again, it is better to miss one or two games than the whole season.

#### The following are recommended at the present time:

- Do not return to PE class at this time.
- Return to PE class at this time.
- Do not return to PE class.
- Gradual return to sports practices/games at this time.

### Gradual Return to Play Plan

#### Gradual Return to Play Plan

1. No physical activity.
2. Low levels of physical activity (e.g., low). This includes walking, light jogging, light stationary biking, light weightlifting (lower weight, higher reps, no bench, no squats).
3. Moderate levels of physical activity (e.g., low). This includes moderate jogging, brisk running, moderate-intensity stationary biking, moderate-intensity weightlifting (reduced time and reduced weight from your typical routine).
4. Heavy non-contact physical activity. This includes sprinting, high-intensity stationary biking, regular weightlifting routine, non-contact sport-specific drills (3-5 times of movement).
5. Full contact in controlled practice.
6. Full contact in game play.

This referral is based on today’s evaluation:

- Return to school. Date: Time:
- Refer to: Neurology, Neurosurgery, Sports Medicine, Physiatrist, Psychologist, Other
- Other

ACE Care Plan Completed by:  MD RN NP PhD ATC

© Copyright G. Giza & M. Collins, 2000
Research tools only

- Functional MRI
- Diffusion tensor imaging
- Magnetic resonance spectroscopy
- Cerebral blood flow
- Electrophysiology
- Heart rate
- Measure of exercise performance
- Fluid biomarkers
- Transcranial magnetic stimulation
S100beta: marker of BBB function; elevations may detect BBB leakage vs parenchymal damage. Currently being used in primary brain cancer and CNS mets

Glial fibrillary acidic protein (GFAP): protein expressed by numerous CNS cells; its important in cell communicating and the functioning of the BBB

Ubiquitin C-terminal hydrolase- L1 (UCH-L1)

Of note: GFAP and UCH-L1 are two biomarkers recently granted FDA clearance for clinical use intracranial injury for more severe TBI

Neurofilament light chain (NF-L)

Tau biomarkers

In large NCAA study- GFAP, UCH-L1 and tau levels were elevated in concussed athletes vs their preseason baseline and vs healthy non concussed controls. Conclusions: Biomarkers may provide some future objective information for concussion diagnosis but further investigation is warranted. (Michael McCrea et al, Association of Blood Biomarkers with acute SRC in collegiate Athletes, JAMA Jan 20202)
DON’T WASTE YOUR $$$

- Impact sensors- NOT PERFECT
- Fluid (blood, saliva and CSF) biomarkers are under evaluation but not recommended to make a diagnosis.
- Helmets need to be properly fit but don’t believe that the more expensive one is any more protective.
- Headbands/soccer bands are not proven to protect against concussion.
- Ultra high doses of vitamins/supplements not proven to work.
Questions???

- For referrals please place a “Pediatric Sports Medicine referral” ！!!!!!!!!!!!!!!!!!!
- Brynn Fuller, ATC is my right hand gal - so she can always be of service also.
  - Direct sports line: (206)386-3083
  - Peds Sports medicine scheduling line: (206)215-3544
  - Main ortho line 206-215-2700