Concussion Evaluation and Management in the Primary Care Setting
Grace Brouillette, DO, MBA, FAAP
University of Kansas Health System
April 21, 2017

Disclosure

- I have no relevant financial relationships with the manufacturers(s) of any commercial product(s) and/or provider of commercial services discussed in this CME activity.
- I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.

Outline

- Review Concussion Evaluation and Diagnosis
- Review Management of Concussion
- Discuss barriers in evaluation, diagnosis and management in the primary care setting
- Review tools utilized within one general pediatrics primary care practice
  - Workflow Algorithms
  - Education Feedback
  - Return to school/Academic Accommodations
  - Return to play guidelines
Concussion Diagnosis

Definition
- Complex pathophysiological process affecting the brain, induced by biomechanical forces

Cause
- Direct impact to head, neck, face or another part of body with force transmitted to the head
- Functional rather than structural changes

Result
- Short-lived impairment of neurologic function, usually spontaneously resolving over time

Concussion Diagnosis Committee on Sports-Related Concussions in Youth, 2017

Concussion Diagnosis

Diagnosed clinically
- No one diagnostic test exists for diagnosis concussion
- Relies on excellent history and physical exam skills
- Diagnosis can be variable based on clinician evaluating patient and time at which patient is evaluated

Concussion Diagnosis

Previous criteria graded on scale 1, 2, 3 for mild, moderate and severe; HOWEVER, latest guidelines from 2012 NO longer use this grading scale because evidence now suggests that a brief loss of consciousness in association with concussion does NOT predict clinical course or long-term cognitive impairment

Similarly, the absence of loss of consciousness in a young athlete who has sustained a concussion should NOT be used to justify more rapid return to play.

Giza CC, et al.
Centers for Disease Control and Prevention estimate that as many as 3.8 million sport-related traumatic brain injuries occur annually.

Standardized tools do exist to assist in diagnosing but are not required to formally diagnose:
- Acute Concussion Evaluation tool (ACE)
- Child Sport Concussion Assessment Tool 3 (Child SCAT 3)
- Sport Concussion Assessment Tool 3 (SCAT 3)
- Balance Error Scoring System (BESS)

Concussion Symptoms by Category

<table>
<thead>
<tr>
<th>Somatic</th>
<th>Cognitive</th>
<th>Emotional</th>
<th>Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Difficulty thinking clearly</td>
<td>Instability</td>
<td>Sleeping more than usual</td>
</tr>
<tr>
<td>Fuzzy or blurry vision</td>
<td>Feeling slowed down</td>
<td>Sadness</td>
<td>Sleeping less than usual</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Difficulty concentrating</td>
<td>Feeling emotional</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Difficulty remembering new information</td>
<td>Nervousness or anxiety</td>
<td></td>
</tr>
<tr>
<td>Drowsiness</td>
<td>Sensitivity to light</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>Sensitivity to noise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>Balance problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nausea or vomiting (early on)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Patients that are high risk (well appearing but have any of the following) warrant imaging for structural intracranial injury:

- Focal neurologic findings
- Skull fracture, especially findings of basilar skull fracture
- Seizure
- Persistent alteration in mental status
- Prolonged loss of consciousness

Cognitive and Physical rest are primary interventions for concussion

In addition to AVOIDANCE of subsequent injury

Most patients will be asymptomatic by seven days after injury

Concussion symptoms usually have a high burden on functioning during the 2 weeks of symptom activity

Irritability, sleep disturbance, frustration, and poor concentration can take more than 14-16 days to resolve

Most athletes can return gradual return to play by 10–14 days post concussive injury
Concussion Complications

- Strenuous cognitive and physical exertion during the earlier parts of recovery may prolong or exacerbate the symptoms of concussion
- Second impact syndrome
  - Death or devastating neurological injury attributed to massive swelling in patients who sustain subsequent brain injury prior to fully recovering from a concussion
- Chronic traumatic encephalopathy
  - PERMANENT changes in mood, behavior, cognition, somatic symptoms, and, in severe cases, dementia or Parkinsonian symptoms occurring in patients with multiple concussions

Kansas Law for Student Athletes

- Kansas Legislature enacted the School Sports Head Injury Prevention Act (the “Kansas Act”) that went into effect July 1, 2011
- Kansas was the 19th state to sign this legislation
- Now all 50 states have concussion legislation
- Parents and students ARE REQUIRED to complete a Concussion & Head Injury Information Release Form each academic year
- Return to Play or Practice Clearance Requirements:
  - The clearance must be in writing and signed by a healthcare provider
  - No contact or impact is allowed on the same day the athlete was removed from play
  - The National Federation and the KSHSAA recommend the clearance should not be issued on the same day the athlete was removed from play
  - Gradual return to play FOLLOWING concussion clearance

Question

- A 13 year old girl presents to you one week after a head injury for her initial medical evaluation. She was playing soccer and collided heads with another player. She had no loss of consciousness, no amnesia, and no immediate headache. She did not receive acute medical care, and after sitting out the rest of the game, she returned to school and sports the next day without difficulties. One day prior to presentation, she developed a bifrontal headache that has been refractory to over-the-counter analgesics. She presents to you for evaluation of the headache. How likely would you be to diagnose the patient with a concussion?
  - A. Very likely
  - B. Likely
  - C. Neither likely nor unlikely
  - D. Unlikely
  - E. Very unlikely
An 11-year-old boy presents to you five days after a head injury for his initial medical evaluation. He fell over the handlebars of his bicycle and struck his head. He was not wearing a helmet. He had no loss of consciousness and no amnesia, and had an initial mild headache that resolved with acetaminophen. He did not receive acute medical care, and returned to school the next day. His mother has noticed that, since his fall, he has been more irritable than normal and has been taking longer to complete his homework. How likely would you be to diagnose the patient with a concussion?

- A. Very Likely
- B. Likely
- C. Neither Likely nor Unlikely
- D. Unlikely
- E. Very Unlikely

A 17-year-old boy presents to you one day after a head injury for his initial medical evaluation. He had a direct helmet-to-helmet with another player while playing football. Witnesses say he was briefly stunned and seemed confused for about 10 minutes after the hit. He sat out the rest of the game and did not seek acute medical care. He has amnesia to the event and intermittent headaches for the following day, which prompts his mother to bring him to you for evaluation. How likely are you to diagnose this patient with a concussion?

- A. Very Likely
- B. Likely
- C. Neither Likely nor Unlikely
- D. Unlikely
- E. Very Unlikely

What barriers impact concussion diagnosis?

PEDiATRICS

The online version of this article, along with updated information and services, is located at

http://www.pediatrics.org/content/vol132/issue1/361.full.html

The Journal of the American Academy of Pediatrics

The online version of this article, along with updated information and services, is located at

http://www.pediatrics.org/content/vol132/issue1/361.full.html
Barriers identified

- Study looked at cross-sectional survey to pediatric primary care and emergency medicine providers in a single, large pediatric care network
- 91% of respondents had at least 1 concussion patient in prior three months to the survey
- 92% of clinicians had referred at least 1 concussion patient in the previous 3 months after the initial visit, PCP more likely to refer then emergency medicine clinicians

Barriers to diagnosis and managing concussion

- ER physicians felt not their place to manage concussion patients
- PCPs were more uncomfortable or didn’t have time to manage
- Authors found:
  - 16% inadequate training to educate
  - 15% inadequate time to educate
  - 96% of providers without provider decision support tool specific to concussion and 100% without discharge instructions believed these would be helpful

Is this applicable to practices around Kansas?

- Well, we surveyed general pediatrics faculty (including physicians, nurse practitioners and physician assistants) and pediatric residents at University of Kansas Health System in Kansas City
- And guess what, we weren’t so hot at managing these, and not everyone in department was aware of resources available to manage concussions
75% of respondents had cared for a patient with an acute (within 24 hours) or non-acute (> 24 hours) since symptom onset of concussion.

50% of respondents reported referring some patients with symptoms consistent with concussion.

38% of respondents reported referring ALL patients with symptoms consistent with concussion.

What reasons for referring concussion patients?
- 43% respondents reported not always feeling comfortable with management
- 46% respondents reported not always having time for management
- 60% respondents reported not always having adequate resources for management

Think back to our three patients earlier.
- How likely would you be to recommend concussion specific interventions for:
  - 13 year old girl who collided while playing soccer?
  - 11 year old boy who fell off his handlebars?
  - 17 year old boy with helmet to helmet contact while playing football?
- How likely would you be to refer any of the above patients?
Implementations to Improve Concussion Management

- Survey results reviewed with department with education regarding concussion diagnosis and management
- Resources for patient education, academic accommodations and step-wise return to play reviewed with faculty and made available in clinic locations
- Workflow Algorithm created and implemented department wide for appropriate management and referral pathway

Management Work Flow Algorithm

Evaluating Symptoms at Each Encounter

- Concussion Symptom Checklist provided to every patient with concussion concerns or head injury upon check-in
- Results entered into electronic medical record
### Step Wise Return to Play Hand-Out

1. **Pre-screen:**
   - Check for last 24 hours of symptoms.
   - No vomiting, headache, sensitivity to light, or sound.
   - Alert level, ability to concentrate, memory, and balance.

2. **Safety:**
   - Wear protective gear.
   - Headache.
   - Vision changes.

3. **Progression:**
   - Check with doctor after 12 hours.
   - Gradually increase activity.
   - Monitor for symptoms.

4. **Recovery:**
   - Symptom-free for 24 hours.
   - No pre-screen symptoms.
   - Doctor's clearance.

### Concussion Resources

- Concussion Legacy Foundation
- Heads Up
- University of Kansas Health System
  - [http://concussionfoundation.org](http://concussionfoundation.org/)
- Healthy Children
  - [http://www.kumed.com/medicalservices/concussionmanagement/resources](http://www.kumed.com/medicalservices/concussionmanagement/resources)
- Kansas State High School Activities Association
  - [http://www.khsaa.org/concussions](http://www.khsaa.org/concussions)
- Kansas Sports Concussion Partnership
  - [http://www.kansassportsconcussion.org](http://www.kansassportsconcussion.org)

### References

Thank you

- Dr. Julianne Schwerdtfager
- Dr. George Phillips
- Dr. Steven Lauer
- General Pediatrics Division at University of Kansas Health Systems