What is a concussion?
A concussion is a mild traumatic brain injury (mTBI) caused by a blow or jolt to the head or body that causes the brain to shake. The shaking can cause the brain to not work normally and can result in serious side effects. It is estimated that 1.8-3.6 million concussions occur annually. Approximately 650,000 children and youth are diagnosed with concussion each year — only half are sports related. A significant number go undiagnosed and untreated.

Concussions can occur even when a child does not lose consciousness. In fact, only 10 percent of children with concussions report being “knocked out.” Some of the symptoms of a concussion can appear immediately after the injury, while others may not show up for several days. Symptoms may last days, weeks or months. Sometimes symptoms may be subtle and not obvious.

What are the symptoms of a concussion?
The symptoms of a concussion are related to how well the brain cells are functioning and working together. The most common symptoms are:

<table>
<thead>
<tr>
<th>Physical</th>
<th>Sleep</th>
<th>Thinking/ Remembering</th>
<th>Mood Disruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache Nausea and vomiting Balance problems Slowed reaction time Dizziness Sensitivity to light Sensitivity to sound Fuzzy or blurry vision</td>
<td>Sleeping more or less than usual Trouble falling asleep Feeling fatigued or drowsy</td>
<td>Difficulty concentrating Difficulty remembering Confusion Feeling “mentally foggy” Feeling slowed down</td>
<td>More emotional Irritable Sad Nervous Depressed</td>
</tr>
</tbody>
</table>

Often, symptoms will worsen over a matter of days, and it is common for new symptoms to appear in the days following the injury. Symptoms may also worsen when the brain is stressed, for example, when a child is doing schoolwork or participating in a physical activity.

Age and pre-existing conditions
The following pre-existing conditions may be worsened or more difficult to control during a concussion. Concussion symptoms may also be more severe or prolonged in those with these underlying conditions.

- Migraine Headaches
- Learning disabilities
- Attention deficit disorder (ADD)
- Attention deficit hyperactivity disorder (ADHD)
- Psychiatric Problems
- Mood disorders (anxiety, depression, etc.)
• Motion sickness
• Eye problems

Pediatric/adolescent concussions take longer to recover from. Those with prior concussions may take longer to recover.

Call 911 or go to the Emergency Department if your child has any of the following symptoms that may be a sign of a more serious brain injury than a concussion:

- Seizures (twitching or jerking movement of parts of the body; may look stiff)
- Weakness or tingling in the arms or legs
- Cannot recognize people or places
- Confused, restless or agitated
- Impaired consciousness
- Difficult to arouse or unable to awaken
- Repeated vomiting
- Slurred speech
- Bloody or clear fluid from the nose or ears
- Any other new concerning issues

How is a concussion diagnosed?

You cannot see a concussion on basic brain imaging, like a CT scan or an MRI, because brain imaging looks at the structure of the brain, and a concussion affects the function of the brain — not its structure. In fact, there is no one single test that can diagnose a concussion.

Instead, our team will use all of the information they gather to diagnose and manage the patient’s concussion. At the beginning of your appointment, the patient may be asked to take a computerized test to better understand how their brain is functioning. This may take 30 minutes to complete. If the patient has had any “Baseline” neuropsychological testing (i.e., ImPACT Testing) performed within the last year, please bring it to the appointment in order for us to compare the before and after results. Following this test, our team will ask a lot of questions to understand how the injury happened and what symptoms the patient is experiencing. A comprehensive neurological examination will provide our team with further information. We will explain to the patient (and parents), step-by-step, what we are looking for while performing each test.

When this evaluation is completed, our team will discuss our findings with the patient (and parents) and review what our concerns are for this particular concussion. We will set up a protocol for returning to school/work, return-to-play, will assist with any academic accommodations, rehabilitation, or with any other necessary issues. Occasionally, the patient may temporarily be prescribed a
medication to assist in treating the symptoms of a concussion.

**Treating Acute Concussions**

It is important to allow for sufficient brain rest so that the brain is able to heal. Someone who has a concussion should not participate in activities that will exert his or her brain or body (“Cognitive and Physical Rest”). Think of it as placing a cast on the patient’s brain. We are giving the brain time “to heal itself”. Such activities may include:

- Activities that could cause another head injury (such as sports, gym class, riding a bike, etc.)
- Other physical activities that cause an increase in your child’s heart rate and make her symptoms worse (such as any activity that causes her to break a sweat, lifting heavy items, etc.)
- Activities that require a lot of concentration (for example, attending school, doing homework, playing video games, texting, computers, driving, etc.)
- Standing on the sidelines or in the stands watching your team play
- As a general rule, no school, texting, video games, computers, or driving.
- Television, depending on the nature of the show, is generally ok.

Parents should allow their child to sleep as much as he or she needs. Your child should stay home from school until her symptoms are resolved. It is important to watch your child closely, pay attention to her specific symptoms, and contact your physician with any concerns.

**Return-to-School**

The student should not attempt any makeup work while he or she is home from school and still has symptoms. When the patient has had no symptoms for 24 hours (Note: sleeping for 14 hours a day/most of the day is a symptom), he or she may attempt to do age-appropriate schoolwork at home. The treatment team will outline the amount, progression, and type of work your child should attempt. When the patient is able to complete this phase without symptoms, he or she may return to school (partial or full school day) depending on the recommendations of the treatment team. Makeup work should be completed in a progressive fashion as dictated by the Coastal Team in cooperation with the school. Return-to-Work protocols are similar to Return-to-School protocols. We will assist the patient and family in communicating the plan with the school or place of work. Coastal is proud of the School-Wide Concussion Protocols it has helped institute at IMG Academy, Cardinal Mooney, and the Saint Stephen’s Episcopal School. This same protocol is being used to design the Manatee County School Concussion Protocol.

**Return-to-Play and Florida Law**

The Zurich Guidelines set forth in the 2012 Consensus Statement for Concussion in Sport is the most recognized and most utilized standard for returning the
athlete to play following a concussion. It is a graduated return to play where stress levels are slowly increased with each phase. The speed of progression through each phase is sometimes modified depending on the age or past history of the individual.

We will work closely with the patient and, when appropriate, the patient’s athletic trainer to monitor the progression through this protocol. A “Personal Trainer” should never be used to monitor a patient through this protocol.

As of July 2012, Florida Law mandates that any student-athlete diagnosed with a concussion must have “medical clearance” prior to returning to play. The Florida High School Athletic Association mandates that the student-athlete be cleared by a physician prior to returning to play.

**Treating Chronic Concussions**

During the acute phase of a concussion, we advocate cognitive and physical rest to “allow the brain to heal itself”. Unfortunately some concussions persist to the chronic stage even if the concussion was managed properly by the patient, family, school, and treating team. At this point, we “take the cast off”. Long-term cognitive function is not impaired by additional brain stimulation at this point. However, while one’s concussion cannot be made worse, he or she can prolong the recovery period by overexertion. The patient will begin “subthreshold” physical activity, as dictated by the treatment team, trying to work through the symptoms but not overdoing it. The Team will carefully dictate this protocol. If the patient has not returned to school, then school or schoolwork is slowly reintroduced. If the patient is having difficulty in school, we will explore why and will assist the patient and school in setting up an academic plan. Those with balance issues, headaches or other findings often benefit from vestibular or physical therapy. Older patients with memory or other problems may benefit from cognitive therapy. Chronic concussions may take up to six months or more to treat.

Pediatric and adolescent patients should be monitored to ensure they continue their social development, which is sometimes slowed when he or she is held out of school or other activities. It is important to re-integrate these patients as soon as possible. It also helps to improve overall mood and the desire to recover.

**When is it time to stop playing sports or a particular sport?**

This is one of the most common questions asked by patients and their families. Factors to consider are having prolonged symptoms after a concussion, multiple concussions that occur from seemingly lesser and lesser trauma, when each successive concussion takes longer and longer periods to resolve, when cognitive testing documents a notable decline (ImPACT scores not returning to baseline), level of play (recreational league versus professional), whether it’s
“worth it” anymore, and the impact on one’s way of life. This is a shared decision that is not just about sports but lifestyle. This decision is not always clear-cut. We will review these and other issues with the patient and family in order to allow them to make an informed decision.

For more information, you can see the following link: **CDC: Heads Up: Concussion in Youth Sports** [http://www.cdc.gov/concussion/HeadsUp/youth.html](http://www.cdc.gov/concussion/HeadsUp/youth.html)

Acknowledgement – Children’s Hospital of Philadelphia Concussion Website