

# Game Changers

Stats, Stories and  
What Communities Are Doing  
to Protect Young Athletes

AUGUST 2013



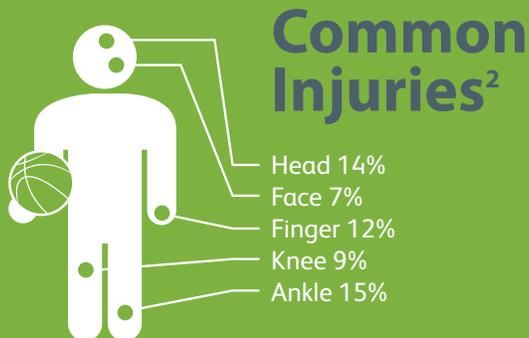
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# 1.35 Million

Number of children seen in emergency departments with sports-related injuries in 2012<sup>2</sup>

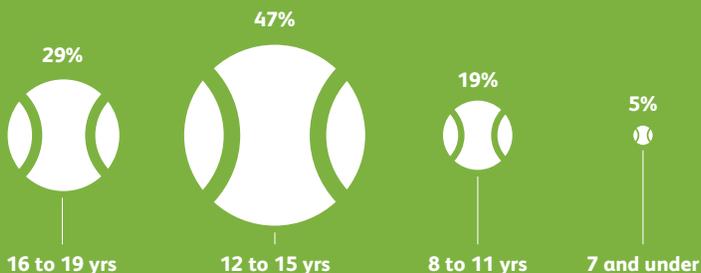


**3**

Every 3 minutes, a child is seen in an ED for a sports-related concussion.<sup>2</sup>

**47%**

Almost half of youth sports-related concussions occur in children ages 12 to 15 years old.<sup>2</sup> Younger children take longer to recover from concussions than older children.<sup>6</sup>



## Common Diagnoses

Most common diagnoses seen in emergency departments for sports-related injuries<sup>2</sup>

Strains and sprains  
451,480



Fractures  
249,500



Contusions and abrasions  
210,640



Concussions  
163,670



## Injuries by Sport

For athletes ages 12 to 17 years, 2011<sup>1,2</sup>

Sport	Number of players	Number of injuries	% of injuries that are concussions
Basketball	26,095,000	249,650	7%
Soccer	13,941,000	104,190	13%
Baseball	12,292,000	61,510	11%
Softball	10,383,000	39,070	11%
Volleyball	10,075,000	31,460	6%
Football	9,034,000	275,050	13%
Wrestling	3,217,000	33,790	14%
Cheerleading	3,053,000	28,890	12%
Ice hockey	2,996,000	9,540	31%

## Executive Summary

In 2011, more than 46.5 million children played team sports.<sup>1</sup> It's the nature of sports that athletes get the occasional bump or bruise. However, too often young athletes get serious injuries that can keep them from playing the sports they love. In 2012, more than 1.35 million children ages 19 and under were seen in emergency departments for injuries related to 14 commonly played sports.<sup>2</sup> In fact, sports injuries make up 20 percent of all injury-related emergency department visits for children ages 6 to 19.<sup>2,26</sup> In addition to the suffering of children there is an alarming economic cost. Medical costs for sports injury emergency department visits exceed \$935 million each year.<sup>2,27</sup>

Safe Kids Worldwide analyzed data from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System to better understand the characteristics of these injuries and to inform what we can do to prevent them.

We found that 163,670 children were seen in emergency departments last year for sports-related concussions—that's one child every three minutes. What's more, 47 percent of these concussions were in children ages 12 to 15. Head injuries weren't the only serious sports-related injury seen in emergency departments—knee injuries made up 9% of emergency department visits.<sup>2</sup> Many of these knee injuries, specifically tears to the anterior cruciate ligament (ACL), are disproportionately affecting young female athletes, who are up to eight times more likely to have an ACL injury than male athletes.<sup>3</sup>

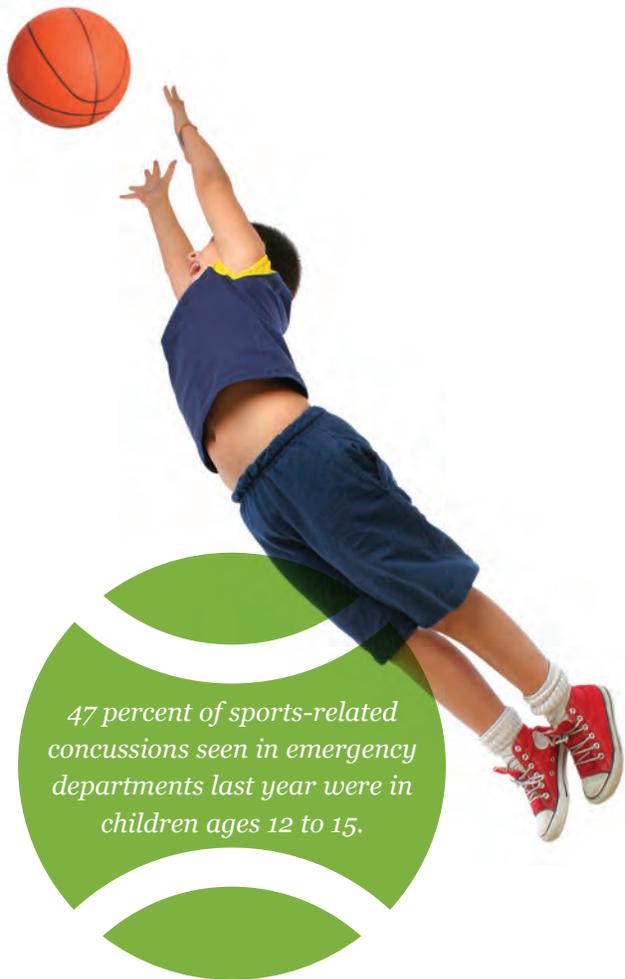
What is being done to prevent these injuries? Through our partnership with Johnson & Johnson, Safe Kids Worldwide's network of state and local coalitions has held more than 1,000 sports safety clinics and events over the past four years, reaching more than 700,000 parents, athletes and coaches. Through these events, as well as through the efforts of our partners, many athletes, parents and coaches are finding the help they need. From an 11th grade baseball player in Pennsylvania, a Pop Warner football coach in New York, and a 15-year-old soccer player in Georgia, we found exciting and inspiring stories of people who have been affected by a sports injury and are now working to raise awareness so other young athletes can avoid these preventable injuries.

State lawmakers are joining the team as well. Laws to prevent damage caused by concussions have passed in at least 48 states and the District of Columbia.

Based on our research, Safe Kids recommends four things parents, young athletes and coaches can do to avoid preventable sports injuries. We call them **game changers**:

1. **Get educated about preventing serious sports-related injuries and share that knowledge with parents, athletes, coaches and officials.**
2. **Learn skills to prevent injuries while playing sports.**
3. **Encourage athletes to speak up about injuries.**
4. **Support coaches and officials in making decisions to prevent serious injuries.**

All parents want their children to reach their potential and live an active and healthy life. By making sure that kids are staying safe while playing sports, we can better ensure that they do.



## Sports Injuries: The Big Picture

What do we mean when we talk about serious sports injuries? In this report, we are not addressing minor injuries that are commonplace in sports—a bruised shin or a minor cut, for example. Instead, we are concerned by the injuries that can be serious enough to require emergency medical treatment, such as concussions, knee ligament injuries and fractures. Some of these conditions are easy to see, and others aren't. Many children are reluctant to talk about an injury, because drawing attention to it might lead to sitting out an important game, going to the doctor, or feeling like they are letting down their teammates. Other kids may not have the words to describe how they feel, or may not have someone they feel comfortable talking to about an injury.

### Emergency Department Visits

To better understand the kinds of serious sports-related injuries seen in emergency departments, Safe Kids Worldwide analyzed 2012 data from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS). We investigated injuries seen in children ages 19 and under from 14 commonly-played sports.

We found that 1,353,750 children were seen in an emergency department in 2012 for a sports injury related to one of these sports. The most common injuries seen were strains or sprains (33%), fractures (18%), contusions (bruises) and abrasions (scrapes) (16%), and internal organ injuries including concussions (12%) (Table 1). Among body parts commonly injured, ankle injuries made up 15% of all injuries, followed by injury to the head (14%), finger (12%), knee (9%) and face (7%).<sup>2</sup>

**TABLE 1**  
Most common diagnoses seen in emergency departments for sports-related injuries<sup>2</sup>

Diagnosis	Number of Injuries
Strain or sprain	451,480
Fracture	249,500
Contusions, abrasions	210,640
Concussions	163,670
Other/not stated	141,330
Laceration	85,560
Dislocation	33,300

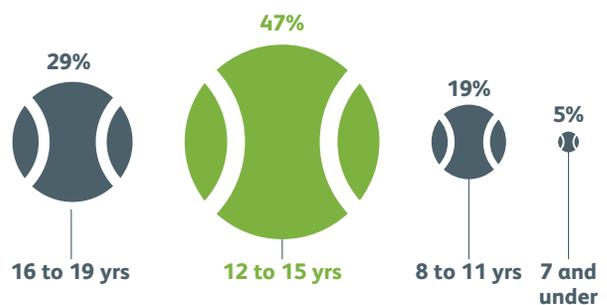
## A Closer Look at Concussions

Why are concussions so dangerous? Concussions are a traumatic brain injury (TBI) resulting from a bump, blow or jolt to the head that can cause a range of symptoms including headache, fatigue, trouble concentrating or remembering things, and problems with balance.<sup>4</sup> Being struck in the head isn't the same as being hit hard in another body part such as the leg. The brain is surrounded by fluid, and when a person is hit in the head, the brain accelerates and strikes the inside of the skull.<sup>5</sup>

In the data we analyzed, we found that among the 1.35 million sports-related injuries seen in the emergency department in 2012, 163,670 were concussions. That means that every three minutes, a child is seen in an emergency department for a sports-related concussion. Some of these injuries are severe enough to require overnight stays in the hospital and considerable time away from school. We found that the percentage of children seen for sports-related concussions who required hospitalization is almost double the percentage of non-concussion sports injuries requiring hospitalization.<sup>2</sup>

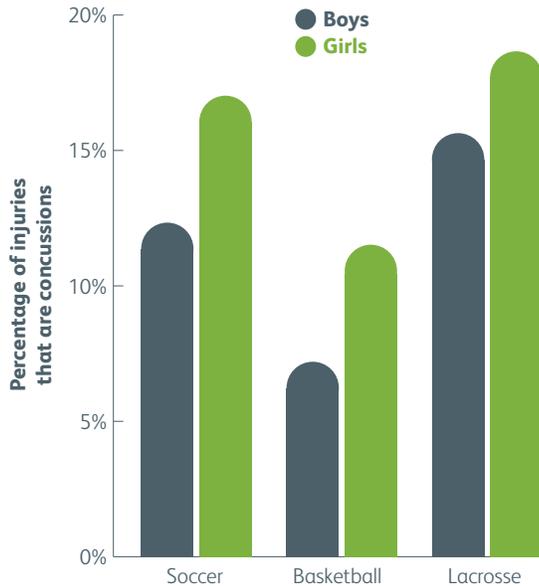
We were surprised to discover that children ages 12 to 15 made up 47% of sports-related concussions seen in the ED—77,260 children (Figure 1).<sup>2</sup> To the best of our knowledge, this is the first time that the risk to younger athletes has been quantified on a national level. Previous research shows that athletes ages 13 to 16 take a longer time to recover following a concussion—measured with memory tests, reaction times, and a symptom scale—than athletes ages 18 to 22.<sup>6</sup> Additionally, serious and potentially fatal diffuse brain swelling is more common in children who have suffered a TBI than in adults with TBIs.<sup>7</sup> Young children may struggle more with how to describe the way they feel as compared to teens.

**FIGURE 1**  
Almost half of youth sports-related concussions occur in children ages 12 to 15 years old<sup>2</sup>



Girl athletes are more likely to report concussions as a proportion of all injuries than boys in sports that both girls and boys play. We found that within soccer and basketball, girls were more likely than boys to be seen with concussions as a proportion of all sports-related injuries (Figure 2).<sup>2</sup> For example, 7.2% of injuries seen in boy basketball players in the emergency department were concussions. In contrast, 11.5% of injuries seen in girl basketball players were concussions.<sup>2</sup> In lacrosse, there are significant rule differences between girls and boys, notably, that girl lacrosse players are not required to wear helmets, unlike their male counterparts.<sup>8</sup> In fact, 18.7% of girl lacrosse players seen for injuries in the emergency department are seen for concussions, compared to 15.6% of boy lacrosse players.<sup>2</sup>

**FIGURE 2**  
**In sports that boys and girls both play, girls report a higher proportion of concussions among all injuries<sup>2</sup>**



Our results mirror previous findings from both high school and college athletes in sports where both girls and boys play.<sup>9</sup> Unfortunately no research has yet demonstrated whether boys are less likely to sustain concussions than girls, or if there are biomechanical differences that place girls at increased risk of concussions.<sup>9</sup> More research is needed to explain these differences.

### The Impact of Knee Injuries

Other kinds of injuries can result in emergency operations, sitting out the rest of the season or have lifelong consequences. In our analysis, we found that

the knee was the fourth most commonly injured body part, representing 9% of sports-related injuries among children.<sup>2</sup> One type of knee injury that disproportionately affects girls is a tear to the anterior cruciate ligament (ACL). The ACL is one of four ligaments that connect the two major bones in the leg.<sup>10</sup> When the ACL is torn, there is often a pop sound, swelling of the knee and intense pain. Previous research indicates that girls are up to eight times more likely to have an ACL injury than boys.<sup>3</sup> While it is not known why this disparity exists, there are theories that biomechanical factors and hormone levels may play a role.<sup>11</sup> Even with treatment, there can be long-term effects of ACL and other ligament tears in young athletes. Having an ACL tear puts a child at 10 times greater risk of developing degenerative knee arthritis in adulthood.<sup>12</sup> Importantly, a proper training protocol and early detection can prevent many ACL and other ligament tears. Parents, athletes and coaches can get information on training from the video available at [www.safekids.org/ACLtraining](http://www.safekids.org/ACLtraining).

### The Overuse Injury Problem in Youth Baseball

Dr. James Andrews is one of the leading sports medicine doctors in the nation. He is the team medical director for several pro and college football teams and has treated prominent athletes in almost every sport, but most of his patients are kids. And that's where his passion lies. On overuse, he says, "I have seen my patient population and surgical cases get increasingly younger. Children, parents and coaches need to realize that kids need to take a break from playing one sport year round. Sports should be fun for children. Overuse injuries in children is a concerning trend.

"One example I see is in baseball. If a young athlete is throwing too hard, too much, too early, and without rest, a serious elbow or shoulder injury may be on the horizon. That's why it is a best practice to count the pitches a player throws, and to have a limit according to age." There are other key strategies suggested by the Andrews Institute including rotating playing other positions besides pitcher, not playing year round and not using a radar gun to indicate speed.

**TABLE 2**  
**Maximum pitches per game by age<sup>25</sup>**

Age	Number of Pitches
7 – 8	50
9 – 10	75
11 – 12	85
13 – 16	95
17 – 18	105

## Public Policy Helps to Protect Kids from Sports Injuries

We have witnessed the power of legislation to save children's lives—just look at what child passenger safety legislation has done to protect children riding in cars. Effective policy also has a place in protecting kids from at least one kind of severe sports injury: concussions. Washington State was the first state to pass a concussion law in 2009. The law was inspired by a young football player, Zackery Lystedt, who was 13 years old when he sustained a concussion during a middle school football game. He wasn't checked out by a doctor, and he was sent back in to play. He collapsed, and required emergency surgery to save his life. He spent three months in a coma, and it took nine months before he could speak again, 13 months before he could move his arm and 20 months needing a feeding tube. Almost three years after receiving a traumatic brain injury, Zackery was able to stand again, with assistance.<sup>13</sup>

As of the writing of this report, at least 48 states and the District of Columbia have passed laws aimed at educating parents, coaches and kids about concussions, how to prevent them and how to minimize the long-term consequences by restricting rushed return-to-play decisions. Some of these laws are stronger than others. Only Mississippi does not have a concussion injury law or bill under consideration, while Wyoming's law is considered weak and the state of Arkansas has issued guidelines similar to return-to-play laws.\*

\* Barton L. "Strong Concussion Safety Laws in Place in All But Three States," July 5, 2013. Available at: <http://www.momsteam.com/health-safety/majority-of-states-have-youth-sports-concussion-safety-laws>. Accessed July 10, 2013.

## State Concussion Injury Laws

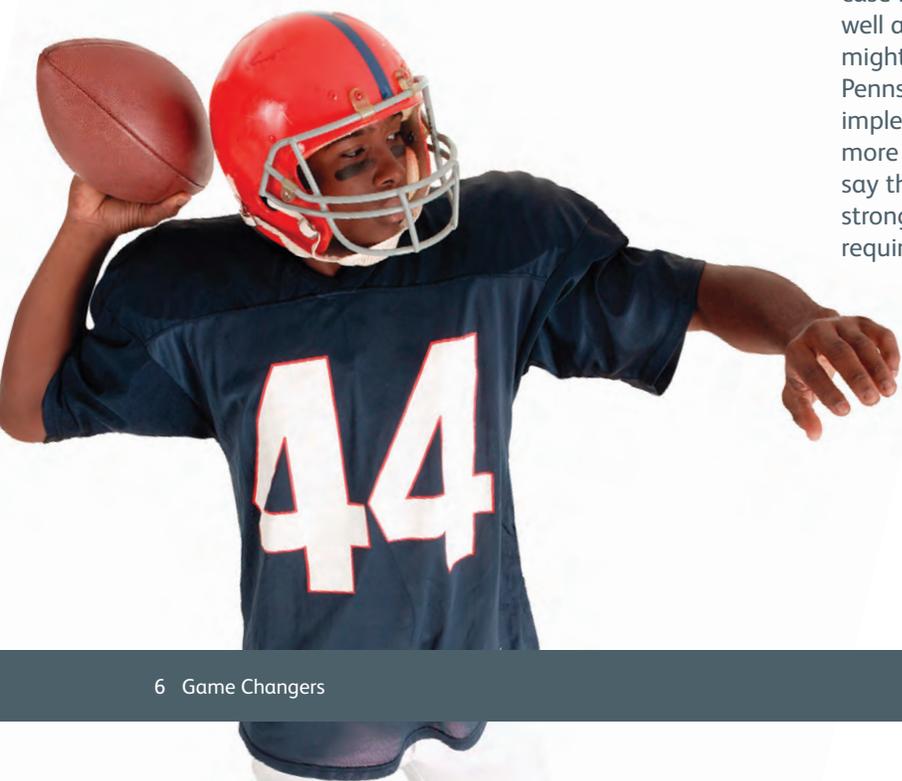
Laws passed at the state level vary in approach and rigor, but the critical elements of an effective law are as follows.

- Require pre-participation clearance exams for youth athletes. Or take the law further to ensure that pre-participation and post-concussion clearances are made by a medical professional.
- Require parents and athletes to sign a consent form acknowledging that they recognize the risk of concussions and understand the signs and symptoms of concussion.
- Require that coaches receive yearly education on concussion causes, symptoms, return to play protocols and graduated recovery.
- Require the immediate removal of an athlete from play after a sustained hit, fall or other kind of injury and keep them out until cleared by a medical professional.
- Allow an athlete to return to play only upon receiving a signed clearance document from a qualified medical professional. Stronger measures include youth sports leagues, not just those associated with schools.
- Finally, a strong law covers athletes at all levels of primary education, not just high school.

## No Need to Wait to Make Good Policy

School boards and communities don't need to wait for a law to be passed before taking action. This is the case for the states which have not yet passed a law as well as states where the laws are not as strong as they might be. The concussion program from Bucks County, Pennsylvania, which we describe in this report, was implemented as its state law was being debated, and is more rigorous than the state law requires. This is not to say that the Pennsylvania law is weak; it is in fact very strong. The Bucks County model is tougher because it requires cognitive baseline and follow-up testing.

Safe Kids has a toolkit for its coalitions or communities to develop a campaign to encourage a school board to take action. You can find it at [www.safekids.org/concussionkit](http://www.safekids.org/concussionkit).



## Effective Implementation

A Governor's signature is the beginning of the game, not the fourth quarter. One of the keys to effective implementation of legislation is training, providing ways for coaches to receive continuing education about concussions: their cause, how to prevent them, when to remove an athlete from play and other keys to saving lives and preventing long-term injury. Last year, Safe Kids Worldwide conducted a national survey which revealed that while many parents and young athletes rely on coaches to keep their children safe while playing sports, coaches feel that they need more sports safety training but lack the resources and time.<sup>15</sup> The CDC provides the free online training Heads Up program, which has been developed for many youth sports in which concussion is a risk. You can find it at [www.cdc.gov/concussion/HeadsUp/youth.html](http://www.cdc.gov/concussion/HeadsUp/youth.html).

While the risk from concussions receives the most attention, other sports injuries should be addressed such as knee injuries, overuse injuries (like stress to a pitcher's arm from throwing too many pitches) and dehydration. Some of the principles behind the state laws apply to other injuries, such as the return-to-play limitations and medical clearance before returning to the field. Communities can adapt existing concussion injury law requirements to fill the needs of other sports safety areas.

## Legislation to Keep Sports Gear Safe

Helmets and protective headgear play an important role in preventing severe TBIs, as they reduce the acceleration of the head and slow the collision between the brain and skull.<sup>16</sup> While they prevent harm to a player's teeth, certain mouth guards have been marketed as offering protection from concussions despite the lack of evidence that they are effective.<sup>16</sup> In 2013, Senator Tom Udall (D-NM) introduced the Youth Sports Concussions Act, S. 1014 to discourage misleading concussion prevention marketing claims for children's sports equipment while better ensuring that the latest science informs product safety standards for children's sports gear. HR 2118 was introduced in 2013 in the House of Representatives on a bipartisan basis by Rep. Bill Pascrell (D-NJ) and Thomas J. Rooney (R-FL). The Federal Trade Commission has already taken action to stop manufacturers of mouth guards and headbands from exaggerating the efficacy of their products to prevent concussions. The bottom line: no sports gear completely protects children from concussions, but helmets can limit or reduce the risk of a catastrophic injury.

Even though sports injuries are a significant and pervasive issue, there are communities making a difference in keeping children safe while playing sports. Parents, coaches, athletes, health and safety educators, schools and lawmakers are working together to make sports a safer and healthier pursuit for kids.

## Jake's Story: How His Legacy is Changing Colorado

In September 2004, freshman linebacker Jake Snakenberg, 15, at Grandview High School in Aurora, Colorado, took a hit on the field. His mom recalls he felt a tingling in his fingers but a concussion was not suspected. The next week, in a game against Thomas Jefferson High, Jake took another hit which did not look like an especially hard one. He made it to the next huddle in which he collapsed and was airlifted to a hospital. He died the next day. For Grandview High, the world was forever changed.

The memory of Jake inspired the momentum for legislative action that continues to protect kids on sports fields and courts today. In March 2011, the Jake Snakenberg Youth Sports Concussion Act became law.<sup>14</sup> It is believed to be one of the most comprehensive laws in the nation because it requires that coaches of all youth organized sports for children ages 11 to 18 complete a concussion education program each year. The law includes coaches of school and club sports, and the trainings are available online for free at [www.cdc.gov/concussion/HeadsUp/youth.html](http://www.cdc.gov/concussion/HeadsUp/youth.html).

Children's Hospital Colorado was a major player in the passage of the Jake Snakenberg Youth Sports Concussion Act and is the lead agency of Safe Kids Denver Metro. It runs a strong program to educate coaches about the signs and symptoms of concussion and the law's requirements. Post-concussion programs have also taken hold in the state. For example, Children's Hospital Colorado brings together parents, students, medical professionals, teachers, coaches, counselors and athletic trainers in a comprehensive approach to manage youth athletes with head injuries and gradually and safely return them to cognitive activity, school and sports activity. Other Colorado medical institutions run similar programs. Dr. Mike Kirkwood, Co-Director of Children's Hospital Concussion Program, says,

*"Jake's tragedy really was the impetus for a remarkable collaboration among legislators, healthcare personnel, athletic staff, educators and advocacy groups to pass legislation intended to keep kids active, but safe and healthy as well."*

"I can't say enough about what that means," says Kelli Jantz, Jake's mom. "I'm proud of him. If he were alive, he would want to do something like this. It's fitting that in his absence, he still has impact."

## Game Changers in Sports Safety

Sports-related injuries such as concussions are in the news almost daily, and many parents and coaches aren't aware of the practical solutions that can help protect our young athletes. The good news is that there are athletes, parents, coaches and communities making an effort to prevent sports-related injuries today. Here are four strategies that highlight what we can all do to change the culture of sports so more kids can stay healthy, active and reach their full potential.

### 1. Get educated—and pass it forward.

One common message from the parents whose stories we heard was that they wished they had known what they know now about preventing and recognizing sports injuries before their child was seriously injured. There are many ways to connect with parents, coaches and athletes. First, share some of the findings from this report—such as the fact that a child is seen every three minutes in an emergency department for a sports-related concussion—with other parents on the team. Second, talk to coaches about injury prevention strategies such as hip-strengthening exercises that can be used in team practices. Third, make sure that concussion safety laws are enforced among coaches and sports programs, and that educational and return-to-play guidelines are being met. Finally, share the stories of what parents, athletes and coaches are doing to keep kids safe—both on and off the field.

### 2. Learn skills to prevent injuries while playing sports.

Athletes can incorporate hip and knee strengthening exercises to prevent knee ligament injuries, such as in the training video at [www.safekids.org/ACLtraining](http://www.safekids.org/ACLtraining). To prevent concussions, make sure that head contact is limited during play and that proper tackling technique is being used. It's important to start teaching these strategies at a young age: our analysis shows that 47% percent of sports-related concussions are happening in children ages 12 to 15.<sup>2</sup> Stay hydrated during practice and games to avoid heat illness, and incorporate stretching and rest to prevent overuse injuries. Wearing the right gear during games and practices can prevent injuries, but remember that no sports gear is 100 percent injury- or concussion-proof, so playing smart is the best way to reduce sports-related injuries.

## Julia's Story: What Her Teammates Knew May Have Saved Her

The headlines make us believe that boys who play football are the only kids that parents have to worry about when it comes to concussion injury, but based on the data, we know that isn't the case.

Take Julia, a freshman in Southampton, Pennsylvania. On a Thursday afternoon, she jumped into a swimming pool at a field hockey team bonding party, and hit her head on the pool wall on her way to the surface. Julia didn't recognize the symptoms right away.

Fortunately, Julia and her teammates took the course through Safe Kids Bucks County, St. Mary's Medical Center and BrainSTEPS. It wasn't until Monday that her fellow field hockey players recognized the change in Julia, and encouraged her to talk to the school's certified athletic trainer. During practice she started feeling disoriented, nauseous, dizzy and lightheaded, and could not manage to run.

A doctor diagnosed a concussion, and Julia was required to take a good amount of time in cognitive rest and gradually ease into school work. Julia is back playing field hockey.

*"It's because Julia and her friends had the knowledge to recognize a concussion, and then that our team had the tools to manage her injury, that we were able to prevent post-concussion syndrome or worse."*

— Kimberly Everett  
Director of Safe Kids Bucks County

Melanie, Julia's mom, shares her perspective. "As a parent of a child who has been heavily involved in sports I never realized until then how unprepared I was to address and nurse any type of brain injury. The very thought of being unprepared for anything regarding my children is scary enough, let alone finding myself in a medical situation and not knowing what to do and when to do it."



Get educated—  
and pass it  
forward.

## Morgan's Story: The Path Back to the Soccer Field



It was the last soccer game of the year for Number 24, 15-year-old Morgan, a high school freshman in Lilburn, Georgia. She was only five minutes into her last game of the regular season when a player from the opposing team made an aggressive and illegal move on Morgan. The girls collided; Morgan fell, heard a “pop” and instantly felt a tremendous amount of pain in her knee. Immediately, Morgan couldn’t walk or put any amount of weight on her knee. She had just experienced what too many female athletes endure in this sport: a torn anterior cruciate ligament (ACL).

Morgan’s mom, Dawn, acknowledged she knew nothing about ACL injuries before Morgan endured one, and she was surprised to learn how susceptible female athletes were to this type of injury. As Dawn says, “If it could happen to Morgan, who is a very strong player, it could happen to any girl. And after going through what we went through, I don’t want it to happen to any more girls.”

Her road to recovery was a long one, but Morgan stuck to it. Morgan needed surgery to repair her knee, followed by physical therapy for seven months. She started with gradual stretching exercises to regain the full range of motion in her knee. A month later, Morgan was cleared to begin “pull-only” swimming, meaning that no kicking was involved. Nine months after the injury, her surgeon, Dr. Cliff Willimon, Medical Director of Orthopaedic Quality and Outcomes at Children’s Healthcare of Atlanta, cleared her to play soccer again. As of this writing, Morgan has already scored six goals for her team in the 2013 season.

### Morgan’s Story: What Worked

Morgan’s story has endured in another positive way. Before Morgan’s injury, another teammate had torn her ACL as well. Morgan believes her coach, Judson Hamby, “came to realize that we needed something that would help strengthen our hips and knees to prevent this type of injury from occurring to more girls.” Coach Hamby, through extensive education provided by entities like the United States Soccer Federation (USSF), began incorporating ACL prevention exercises as part of his team’s practice and game warm-up regimen. He says,

*“I learned about the importance of the hips, the core, and body positioning in helping the entire body be strong. I now have my team do specific exercises that target these core areas before practice, before games and on recovery days.”*

Knee injury prevention programs are developing around the nation, such as the PEP Program, which stands for “Preventing injuries, Enhancing Performance.” The program consists of a warm-up, stretching and strengthening regimen that addresses potential weaknesses around the stabilizing muscles around the knee joint. Results have been promising; in an evaluation of the program, athletes who took part in PEP were up to five times less likely to suffer an ACL injury. Parents, athletes and coaches can also get information on training exercises at [www.safekids.org/ACLtraining](http://www.safekids.org/ACLtraining).



Learn skills to  
prevent injuries while  
playing sports.

## Steve's Story: The Last Practice of the Season

It was the last practice before the last game of the 2011 baseball season at Steve's high school in Bucks County, Pennsylvania. Steve, a junior, was playing right field when a well-hit ball was coming his way. The second baseman was going for the ball, too, but when he saw Steve sliding under it, he tried to get out of his way. Unfortunately, his knee struck Steve's face hard, just under the left eye.

Steve went down and, when he got up he felt dizzy and in pain. He sustained multiple facial fractures as a result of his injury and doctors suggested he might also have sustained a concussion. The focus of the medical team, however, was healing his facial fractures—the visible part of his injury—and so the concern about a possible concussion faded away as Steve's face healed. "Steve was beginning to look like Steve again," recalls his mother Judy, an elementary school teacher.

Steve was a straight-A student and got through the fall semester, receiving his usual terrific grades. But Steve was struggling. He had trouble paying attention in class. When he'd try to read or write, he would feel intense pain in his forehead. He didn't understand what was going on, and didn't know how to explain it. He didn't—he wouldn't—complain or whine. His mom would ask him if he was okay, and he'd respond, "I'm fine. I'm good."

Steve wasn't fine. In December, thinking he would try out for the school's baseball team, he was required to take a course about concussions provided by community health professionals and the school's certified athletic trainer. It was when the presenters talked about the signs and symptoms of a concussion that the light bulb went on above his hurting head.

Headaches? Check.

Nausea? Check.

Tired and sleeping too much? Check.

Difficulty concentrating? Check.

"That's me," he told himself. Once diagnosed with post-concussion syndrome, Steve had his own team around him—his parents, the school athletic trainer, the school counselor and a neurologist. They developed a meticulous step-by-step program that slowly put him on the road back to school, normal life and baseball. In the spring, Steve was able to



*"Don't ignore the symptoms. Talk to someone. If you think you might have a concussion, have it checked out."*

— Steve's advice to other young athletes

return to the baseball field at school. Despite the problems at the beginning of the next semester, he was able to bring his grades back up. Steve applied to 11 colleges and will be starting at Penn State, main campus, in fall 2013.

## Steve's Road to Recovery

The light bulb moment may not have happened for Steve had it not been for the intensive concussion prevention program he received at school which was created by the Comprehensive Concussion Team of Bucks County. The team was formed by Safe Kids Bucks County, BrainSTEPS and St. Mary Medical Center in Langhorne. BrainSTEPS is a program of the Brain Injury Association of Pennsylvania which bridges the educational and the medical communities to provide optimal support for children with traumatic brain injuries including sports-related concussions. Vital to the program is a case-by-case graduated plan to return a young athlete like Steve back to school and ultimately back to sports.

*"No matter the sport, no matter the age, parents have to learn about concussions and they have to encourage their kids to tell them about injuries. I am a teacher and my job is to care for kids, and I didn't have the information I needed to care for Steve."*

— Steve's mom, Judy

The important elements of the Bucks County prevention program are:

- requiring athletes to have a pre-play physical showing they are in good health to play;
- mandating concussion education for all student athletes and coaches; and
- recommending education about concussions for school teachers, counselors and parents.

The Bucks County program is more rigorous than required under Pennsylvania's new concussion law—it was devised before the law was signed by the Pennsylvania Governor in 2011—because it requires mandatory baseline neurocognitive testing for all contact sport athletes in participating schools, and then follow-up exams to see if there have been any changes in brain function. The testing is not a brain scan or a CT scan; it's a computer-based test that evaluates an athlete's symptoms, memory and reaction time. Originally, the program was going to start in two schools, but ultimately the program involved 16 high schools, covering more than 6,000 kids. Now other school districts in the state are considering adopting it.

Encourage athletes to speak up about injuries.

### 3. Encourage athletes to speak up about injuries.

Too often, young athletes feel that if they sit out with an injury, they are letting down their parents and their teammates. In addition, there is pressure to get into the best school and win a scholarship. Not surprisingly, athletes often don't report injuries; one study found that only 47% of high-school football players with a concussion reported being injured.<sup>19</sup> It's important that if an athlete is injured, that he or she knows that getting help is okay. Recognizing an injury like a concussion and getting help can potentially prevent a more serious injury from occurring. Athletes should feel empowered to talk to a trusted adult about an injury—a parent, a grandparent, a school nurse, counselor or a coach.

### 4. Support coaches and officials in making decisions to prevent serious injuries.

Coaches sometimes feel outside pressure to keep injured children in the game; a 2012 Safe Kids Worldwide survey found that half of coaches admit being pressured by a parent or athlete to keep an injured athlete in the game.<sup>15</sup> Even if an athlete is only suspected of having an injury, missing one play or one quarter is a small price to pay to ensure that a child is safe, and that permanent, long-term damage or even worse isn't a possibility as a result of continuing to play. Coaches report wanting and needing more injury prevention training opportunities.<sup>15</sup> Sports safety clinics, such as the ones that Safe Kids Worldwide provides in partnership with their local coalitions across the country, are a great resource for information on preventing and recognizing serious sports injuries. As part of enforcing state concussion laws, priority should be given to encouraging school districts and sports leagues to require annual recertification of coaches, demonstrating knowledge of sports injury prevention and recognition through an annual online course.

Every parent wants their child to stay active and enjoy sports for a lifetime. Some kids play for the joy of the game, some play to hone their skills to perhaps one day become a professional athlete. What they all have in common is the need to stay healthy and keep their body in top shape in order to live a full and active life. By supporting these strategies, we can drive down the number of preventable sports injuries.

### Coach Falgiatano's Story

Safe Kids Upstate New York Coalition, led by Upstate Golisano Children's Hospital, delivered concussion education as part of its 2011 sports safety program to the Central New York Pop Warner Football and Cheerleading League. Pop Warner is a national organization for children ages 5 to 16 with leagues in 42 states and several countries.<sup>18</sup> Safe Kids Upstate New York, with support from Safe Kids' founding sponsor Johnson & Johnson, offered a coaches' clinic on concussion prevention, recognition and treatment presented by the director of the Upstate Concussion Management Program Dr. Brian Rieger. The Central New York Pop Warner League made the clinic mandatory for all of its coaches, and in two clinics the coalition reached more than 250 football and cheerleading coaches.



Support coaches and officials in making decisions to prevent serious injuries.

John Falgiatano is one of the coaches who attended a clinic. In addition to being a coach, he's also the President of the Cicero Falcons Pop Warner Football & Cheer. "The biggest take home point for us was recognition of the severity of the hit and symptoms," he says. "Before, the mentality was to minimize the signs of a concussion. Now, coaches are taking the time to evaluate youth who have been involved in a play that might have caused a head injury. The coaches are holding more players out who do not pass the assessment. They are less likely to put a child back in the game where they might receive further injury."

The clinics have led to some impressive results. Coach Falgiatano says that coaches are teaching their football players to not lead with their heads as much, and to keep their eyes up, which means proper tackling technique has become a priority in their league. In addition, coaches are limiting contact time to one-third of every practice, and coaches are required to carry a concussion evaluation pathway chart with them to all games and practices. Coaches are also supporting athletes in speaking up about injuries, but challenges still remain as athletes grow up. According to Coach Falgiatano, "We have encouraged players to let coaches know when they are hurt and peer police themselves. It is still an uphill battle with the older groups to make progress in this area."

The trainings also help coaches manage the expectations of players and their parents. "That's because the decision to put them back in the game is no longer in our hands," Coach Falgiatano says. "The players must be cleared by a medical professional. In our organization we had no less than four players this season, both football players and cheerleaders, who were diagnosed with concussions and had to miss time."

## Lessons Learned About Concussions

### For Parents

- Learn all you can about concussions. What causes them and what are the signs and symptoms of one? Find out if your kids' schools have a concussion prevention program and if the coaches are getting the required education.
- Partner with your schools and coaches to set up a strong concussion education and response program.

### For Kids

- Don't tough it out. If you think you have a problem, talk to someone.
- Make sure to get enough rest—between games and between seasons.

### For Coaches

- Whether the law of your state requires it or not, learn all you can about the signs and symptoms of a concussion. Coaches can receive education from the Centers for Disease Control and Prevention's Heads Up program, available at [www.cdc.gov/concussion/HeadsUp/youth.html](http://www.cdc.gov/concussion/HeadsUp/youth.html).
- If an athlete is suspected of having a concussion, that player should be pulled out of play immediately and evaluated by a trained health professional.
- Assume the role of field decision maker; don't let others, even parents, persuade you to keep an injured athlete in the game.

### For School Districts, Youth Sports Leagues and Policy Makers

- Carefully implement the return-to-play laws in your state and make sure the state's return-to-play law is being followed.
- If there's more change to make for safety, make it. Don't wait for legislation. Your school board can go beyond what the law calls for, e.g. cognitive testing, hiring athletic trainers.

## Signs and Symptoms of a Concussion<sup>4</sup>

### Signs Observed by a Coach or Parent

- Appears dazed or stunned
- Confused about a play or position
- Forgets an instruction
- Is unsure of game, score, or opponent
- Moves clumsily
- Answers questions slowly
- Loses consciousness (even briefly)
- Shows mood, behavior or personality changes
- Can't recall events before or after a hit or fall

### Symptoms Reported by an Athlete

- Headache or sensation of pressure in the head
- Nausea or vomiting
- Balance problems
- Dizziness
- Double or blurry vision
- Sensitivity to light or noise
- Feeling sluggish, hazy, foggy or groggy
- Trouble concentrating or remembering things
- Confusion
- Doesn't feel right or feels down



## Further Data

### Injuries and injury rates among athletes ages 12 to 17 in 2011 <sup>1 2</sup>

Sport	Number of players, 2011	Number of injuries	Injury rate per 1,000 athletes	Number of concussions	Concussion rate per 10,000 athletes	Percentage of injuries that are concussions
Basketball	26,095,000	249,649	10	18,632	7	7%
Soccer	13,941,000	104,192	7	13,841	10	13%
Baseball	12,292,000	61,510	5	6,743	5	11%
Softball	10,383,000	39,072	4	4,347	4	11%
Volleyball	10,075,000	31,464	3	1,952	2	6%
Football	9,034,000	275,052	30	36,465	40	13%
Wrestling	3,217,000	33,785	11	4,791	15	14%
Cheerleading	3,053,000	28,885	9	3,549	12	12%
Ice hockey	2,996,000	9,542	3	2,928	10	31%



### Injuries among athletes ages 19 and under in 2012

Sport	Injuries seen in the ED	Concussions seen in the ED
Football	394,350	58,080
Basketball	389,610	32,165
Soccer	172,470	24,840
Baseball	119,810	15,120
Softball	58,210	6,400
Volleyball	43,190	3,010
Wrestling	40,750	5,780
Cheerleading	37,770	5,920
Gymnastics	28,300	2,080
Track and field	24,910	*
Lacrosse	19,630	3,220
Ice hockey	12,730	5,090
Tennis	7,450	*
Field hockey	4,330	*

\* Estimates too small to be stable.

## Methodology

We analyzed data from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS). Cases that were included listed one of the following 14 sports as either product code 1 or product code 2; the age of the patient was  $\leq 19$  years; and occurred between January 1, 2012, and December 31, 2012. To develop the list of the sports to include, we used the top ten most commonly played sports among 7-17 year olds in 2011, using data from the National Sporting Goods Association.<sup>1</sup> In addition to football, basketball, soccer, baseball, softball, volleyball, wrestling, cheerleading, ice hockey, and tennis, we added field hockey, lacrosse, gymnastics, and track and field. To define TBI within the NEISS cases, we followed the definition set by other researchers: the body part involved was the head, and the diagnosis code was concussion or internal organ injury.<sup>21 22</sup>

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