

# A New Game Plan

As new research on the dangers of concussions is uncovered, treatment on sports sidelines is



**W**hen Beth Mallon was watching her son Tommy play in his final high school lacrosse game in May of 2009, two weeks before graduation, the last thing on her mind was whether there was a certified athletic trainer at the event. But when Tommy suffered a brutal hit that left him with numbness in the back of his head, it was Sante Fe Christian's athletic trainer who insisted that he remain immobilized.

Tommy had sustained a concussion—the third of his fledgling athletic career—and a fractured neck after colliding with an opponent while pursuing a ground ball. If he had been helped off the field or even moved at all, he could have lost his life, and what began as a routine play could have turned into a tragedy.

“We were really lucky,” says Mallon. “There were so many things that could’ve gone wrong.”

But because the school's trainer, Riki Kirchoff, was on hand to evaluate the injury and call the paramedics—who were then able to safely place Tommy on a board and transport him to the hospital—he is alive today.

Some families aren't so lucky. Over the past few years, a number of stories have made the headlines involving mismanaged injuries in young athletes that turned catastrophic. Too many times, players have been moved off the field when they shouldn't have been or cleared to return to play before they

fully recovered. Instead of heading off to college, teenagers like Matthew Newman of Cowiche, WA, are spending what would be their freshman year making trips to rehabilitation facilities. Newman suffered a traumatic brain injury (TBI) during a football game in September 2009, and has been fighting a long battle to recover ever since.

In some cases the outcomes have been even worse. Just after Newman's injury, another Washington athlete—Andrew Swank of Valley Christian High School in Spokane Valley—suffered a hit that cost him his life. In October 2010, Nathan Stiles, a high school senior from Spring Hill, KS, died of an undetected subdural hematoma which was an apparent re-bleed of a previous injury. (A subdural hematoma is a collection of blood on the brain's surface, often from a concussion.)

Although incidents like these are rare, they are not isolated. And for the families and friends of young athletes, even one fatality is too many. Fortunately, the national attention garnered by these injuries has helped bring awareness to the dangers of concussions, and has placed added emphasis on the need to improve prevention.

As a result, dangerous hits are being taken more seriously. Athletic organizations at every level—from Pop Warner football to the National Football League—are changing the rules that dictate when players can return to the field, what type of

# for Concussion

changing—from the little leagues to the professional level. BY KATE HUVANE GAMBLE

personnel must be present at sporting events, and how to determine if an athlete can suit up... or should sit down.

Additionally, a number of states have begun to adopt legislation requiring that players who are suspected to have suffered a concussion be removed from play. (See box, “Making Concussion Safety a Law.”) Data from the Center for Injury Research and Policy at Nationwide Children’s Hospital in Columbus, OH, show that as many as 40 percent of high school athletes who sustain concussions return to action prematurely, which raises the risk for more severe injuries.

“Letting someone continue to play when they are concussed will commonly cause a longer, more complex injury,” says Jeffrey Kutcher, M.D., assistant professor of neurology at University of Michigan Health System in Ann Arbor, MI, and director of the

Michigan Neurosport Program. If an athlete re-enters a game or practice, he or she faces serious risks—even if there is no further physical contact. “If they continue to exert themselves physically and mentally at high levels, the injury worsens, with more complex symptoms and a more difficult recovery,” he says.

Dr. Kutcher is also chair of the Sports Neurology Section of the American Academy of Neurology (AAN), which the Associated Press recently dubbed “the most authoritative medical group when it comes to concussion.” The AAN drafted a position statement in November 2010 to help guide the management of athletes with suspected concussions. Although “the majority of concussions are self-limited injuries, catastrophic results can occur, and we do not yet know the long-term effects of multiple concussions,” Dr. Kutcher said in the position statement, adding that the neurology community owes it to athletes to “advocate for policy measures that promote high quality, safe care for those participating in contact sports.”

Although researchers have made great strides in understanding how high-impact injuries affect the brain in the short- and long-term, there is still much to be learned.

## THE NEW POSITION ON CONCUSSION

What is known is that concussions are happening far too often. According to the Centers for Disease Control and Prevention (CDC), three million concussions occur every year in the United States. Among people 15 to 24 years old, sports are second only to motor vehicle accidents as the leading cause of TBI. Concussions represent an estimated 8.9 percent of all high school athletic injuries, according to a report from the American Academy of Pediatrics (AAP).

“These injuries are happening more frequently than we ever realized,” and they’re not always easy to detect, says Julian Bailes, M.D., director of the Brain Injury Research Institute and professor and chairman of the department of neurosurgery at West Virginia University School of Medicine in Morgantown. “It can be very difficult to discern how serious a hit is by just seeing or hearing what happened,” Dr. Bailes says.

That was one of the key drivers behind the AAN’s recommendations: to take the decision of whether a player can return to the field out of the coach’s hand, and to leverage the technological innovations and advances in research that have surfaced in recent months to improve the care of athletes, says Dr. Kutcher.

“Over the last few years, our clinical understanding of these injuries has reached a point where we realized that the practice parameter statement from 1997 was no longer the best way to manage concussions,” he says.

The updated AAN Position Statement on Sports Concussions seeks to provide practical guidance that more accurately meets the needs of athletes, coaches, and parents, and reflects the data that have been released during the past few years.

## THE NEW RULES

The bottom line of the new position is actually quite simple: Got a possible concussion? Get off the field.

**ONE BAD HIT** Tommy Mallon was injured playing his last high school lacrosse game. If not for the response of his team’s certified athletic trainer, he might have died.

## Concussion: The Basics

**A**ccording to Mark Halstead, M.D., a concussion is “a transient alteration in mental status following a blow to the head—or to the body if it imparts a quick movement to the head. These hits are fairly common in football and occur often in sports like soccer and basketball as well, with girls seemingly more susceptible than boys.”

You may also have heard the terms “traumatic brain injury” or “head injury.” Traumatic brain injuries are caused by a violent blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. Not all blows or jolts to the head result in a TBI, according to the CDC. The severity of this injury can range from “mild” (a brief change in mental status or consciousness) to “severe” (an extended period of unconsciousness or amnesia after the injury). A concussion is one kind of traumatic brain injury.

The National Institutes of Health defines a head injury as any trauma that leads to injury of the scalp, skull, or brain. The injuries can range from a minor bump on the skull to serious brain injury. Head injuries are classified as either closed or open. A closed injury occurs when an athlete receives a hard blow to the head from striking an object but the object does not break the skull. An open or penetrating head injury means an athlete was hit with an object that broke the skull and entered the brain.



**WAIT IT OUT** As many as 40 percent of high school athletes who sustain concussions return to action prematurely, which raises the risk for more severe injuries.

and talking, and they look normal.”

That’s where testing comes into play. Through a neuropsychological evaluation, physicians acquire important information about a patient’s cognitive, motor, behavioral, language, and executive functioning, which can guide them in making a diagnosis and determining when it is safe for an athlete to return to play.

According to the AAP, evaluation is based on several computerized neuropsychological tests designed to objectively evaluate an athlete’s post-injury condition and track recovery to prevent cumulative effects of concussion. A neuropsychologist may also administer a pencil-and-paper test to the patient.

“It’s really important to use neuropsychological testing,” Dr. Bailes says. “Most of the time these players don’t have any brain hemorrhage. If you get an MRI or CAT scan, they’re almost always normal.”

## GETTING BACK IN THE GAME

Determining when an athlete can resume activity can be tricky, as different individuals tend to recover at a different pace. And although the majority of athletes with a concussion will no longer exhibit symptoms within a week of the injury, studies have shown that younger athletes may require seven to 10 days or longer. Therefore, Dr. Halstead and Kevin D. Walter, M.D., co-authors of the AAP report, called “Sport-Related Concussion in Children and Adolescents,” recommend the adage, “When it doubt, sit them out.”

Whereas in the past, the decision of whether an athlete

According to Dr. Bailes, it all starts with identifying a hit that might result in a concussion and immediately removing the player for a formal evaluation. “There needs to be a culture change, and a very conservative approach toward management of these injuries,” he says.

Part of that approach means ensuring that athletes who exhibit any signs of a concussion are assessed and evaluated by physicians with specific training in this area, according to Dr. Kutcher. (See “Concussion Signs and Symptoms” in Resource Central, page 43.)

“The brain is an extremely fragile organ with complex networks that can be affected by these injuries,” Dr. Kutcher says. “Neurologists have the experience to evaluate patients from a clinical perspective and examine the brain. We know this organ, and this type of injury, better than anybody.”

While experts such as neurologists and certified athletic trainers are qualified to identify the signs of a concussion, doing so can be much more difficult for the untrained. Many people believe that concussions only occur when a player is unconscious. This assumption, says Dr. Bailes, is both incorrect and dangerous. “With the vast majority of concussions in sports—90 percent of the time, in fact—athletes don’t get knocked out,” he notes. “They’re walking around

## The AAN’s Position on Concussion

1. Any athlete who is suspected to have suffered a concussion should be removed from participation until he or she is evaluated by a physician with training in the evaluation and management of sports concussions.
2. No athlete should be allowed to participate in sports if he or she is still experiencing concussion symptoms.
3. Following a concussion, a neurologist or physician with proper training should be consulted prior to clearing the athlete for return to participation.
4. A certified athletic trainer should be present at all sporting events, including practices, where athletes are at risk for concussion.
5. Education efforts should be maximized to improve the understanding of concussion by all athletes, parents, and coaches.

## The bottom line of the new American Academy of Neurology position on concussions is simple: Got a possible concussion? **Get off the field.**

can return to action often rested with the coaching staff, new guidelines dictate that individuals must be cleared by a medical professional. “It should not be left in the hands of a coach or parent,” Dr. Halstead says.

The consequences of returning to play before a concussion is fully healed can be catastrophic; in rare cases, it can lead to death from second impact syndrome, a condition in which the brain swells, shutting down the brainstem and resulting in respiratory failure. In 2009, two high school football players from North Carolina died from second impact syndrome after returning to play within two days of sustaining a concussion.

“These less common but more devastating injuries of malignant cerebral edema or second impact syndrome are extremely rare but catastrophic,” Dr. Kutcher says. “Being able to recognize those injuries upfront is key.”

Pop Warner, the nation’s largest youth football organization, recently established a rule that any athlete who has sustained a head injury must obtain a note from a licensed medical professional who is trained in the evaluation and management of concussions before suiting up to play (for example, a neurologist or a pediatric sports medicine specialist). This is particularly critical at the youth level, since so many coaches are parent-volunteers who lack the skills needed to decipher whether a player can safely return to the field. What’s more, young athletes may not be able to accurately communicate their symptoms as articulately as older players.

The prevalence of concussions is lower in youth football, since young athletes generally “do not generate the high velocity force that it takes to cause a concussion,” says Dr. Bailes, who is chairman of the Pop Warner Medical Advisory Board. However, serious injuries can occur, and “they need to be addressed seriously,” he says.

### WHY TRAINERS ARE NEEDED

One step that can assist in identifying and assessing possible concussions is the presence of a certified athletic trainer. According to Dr. Kutcher, this is important for several reasons.

“Athletic trainers have the experience and the training to be able to block out all of the environmental distractions that exist during games and triage an injury,” says Dr. Kutcher, who is also a team physician for the University of Michigan and Eastern Michigan University athletic programs. And trainers are taught to be completely objective when evaluating athletes.

“While I would love to think that all parents, coaches, and teammates can have objective viewpoints on these injuries, the

**TRAINER’S TOUCH**  
Athletic trainers develop the skills to not let an athlete’s importance to the team affect their clinical judgment.



truth is, that’s hard to do. Athletic trainers accept that responsibility, and they’ve developed the skills to not let the person’s position of importance to the team—for example, the starting quarterback—affect their clinical judgment.”

What distinguishes certified athletic trainers from other professionals such as personal trainers is the fact that they must graduate with a bachelor’s or master’s degree from an accredited professional athletic training education program and pass a test administered by the Board of Certification, according to the National Athletic Trainer’s Association. Once certified, they must meet ongoing continuing education requirements.

Having an onsite trainer may not be feasible for every school, Dr. Kutcher acknowledges. In today’s economic environment, many school districts have either had to cut the position or never had one in the first place.

In fact, just one in three high schools in the United States have certified trainers on staff, according to a Scripps Howard News Service review. It’s a sobering statistic that Beth Mallon and her son Tommy, co-founders of Advocates for Injured Athletes ([injuredathletes.org](http://injuredathletes.org)), are working to amend. The primary goal of the organization is to help schools obtain the funds needed to employ full-time trainers.

“We felt like we were so lucky in our case,” Mallon says. Although her son Tommy has difficulty sleeping at times and still may have to undergo surgery, he is able to go running and play golf, and has come “a long way” since the injury.

“If injuries are **managed appropriately**, the vast majority of athletes don’t have a significant long-term risk of injury.”

—JEFFREY KUTCHER, M.D.

“In our case, we were at a private school that had a trainer on staff, but that isn’t always the case,” Mallon says. “We want to get other parents thinking about this and asking who is there to protect their kids when they are out on the field. Athletic trainers have the skills needed to handle catastrophic injuries. We spend so much money on the best equipment, the best helmets, the best sticks—we need to pay attention to this.”

### THE POWER OF EDUCATION

Mallon’s advocacy work also focuses heavily on education. Through an initiative called “Athletes Saving Athletes,” their organization aims to help athletes better understand the

**SAFETY FIRST** Former Oakland Raider Jim Otto speaking in support of a California bill that would require written medical and parental approval for a youth to return to competition after head trauma.



### Making Concussion Safety a Law

**A** number of states have passed legislation that addresses concussion management in young athletes. Named after Zackery Lystedt—who suffered a life-threatening brain injury in 2006 at 16 during a high school football game after he returned to play following a concussion—the law requires coaches to remove any athlete from play who exhibit any signs of a concussion.

Lystedt and his family first pushed to get the law passed in Washington State, where school districts are now required to work with the Washington Interscholastic Activities Association to develop a standard for educating coaches, players, and parents on the dangers of concussions and head injuries. A concussion and head injury information sheet must be signed by the athletes and their parents or guardians.

Although Washington’s law regulating when high school athletes can return to games after having sustained a concussion is the toughest, many other states have followed suit with similar legislation designed to ensure the safety of young athletes. As of December 2010, New Jersey, Texas, Oregon, Massachusetts, Pennsylvania, Connecticut, and Virginia are among the states to adopt laws, and congress is considering a Federal law.

signs and symptoms of concussions as well as the long-term effects. “We believe that if we can get kids to understand things like second impact syndrome, it can make a difference,” Mallon says. “If they notice that a teammate looks dazed, they need to encourage them to get to the sidelines. They need to know that they can play a role in this.”

Dr. Kutcher agrees that education should start with the youngest athletes—through messaging tailored specifically to them—and should include parents and coaches. “The idea is not only being able to recognize a concussion, but to understand the recovery process, the approach to safe return to play, and the vast number of variables that go into decisions about continuing to play,” he says. “How athletes respond to injuries can vary so much. People at all levels are beginning to understand that we need to take an individual approach to each person.”

For parents, all of this information can seem overwhelming, Dr. Kutcher says, but it doesn’t have to be quite so complicated. “The key is recognizing concussions when they happen and making sure that athletes are given an appropriate amount of time to rest. There needs to be a very careful and progressive return to play,” he says. The good news, he adds, is that “if injuries are managed appropriately, the vast majority of athletes don’t have a significant long-term risk of injury.”

### WHAT’S NEXT?

More research needs to be done on the long-term consequences of concussions, says Dr. Bailes. He believes that future studies will also look at the ability to make a definitive diagnosis through neuropsychological testing and imaging. “We’re also looking into the field of biomarkers [indicators that may be used to determine how well the body responds to treatment], and at genetic testing,” he said, adding that “there may be a subset of the population that is genetically predisposed to concussions.

“We’re seeing not only more research and understanding, but also an acceptance of the fact that concussions are real and need to be managed appropriately,” Dr. Bailes says. “If we do so, I think all of our sports are going to be around for every one to enjoy for many years.” NN



For more information on concussion, see **RESOURCE CENTRAL** on page 43.