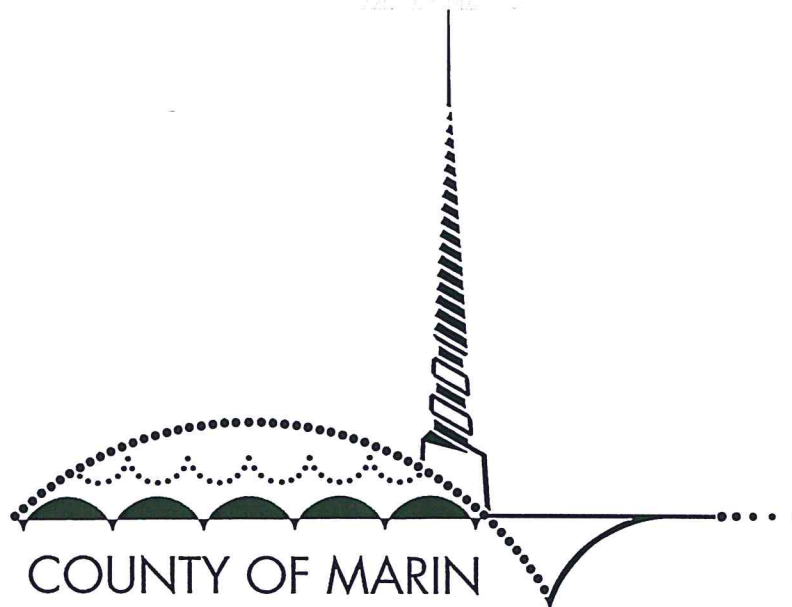


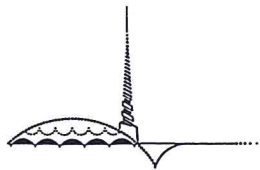
2015/2016 MARIN COUNTY CIVIL GRAND JURY

Head Injuries and Concussions:
Are Our High Schools Keeping Our Children Safe?

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Head Injuries and Concussions: *Are Our High Schools Keeping Our Children Safe?*

SUMMARY

Bodies are moving and whistles are blowing. Football fields, soccer fields, baseball diamonds, swimming pools, basketball courts, wrestling mats, lacrosse fields, running tracks are abuzz with activities. Without a doubt, athletic programs are an important component of high school life in Marin. A large percentage of students—more than 50% in some schools—participate in one or more sports each year reaping many social, health and confidence-building benefits. Yet, there are serious risks associated with these activities. Head injuries, in particular, can have long term, devastating consequences. Legislation has recently been passed in California requiring concussion information be sent to students and their parents and guardians, and football practice times have been restructured to limit hitting.¹ Our investigation into head injuries examined what school policies and practices are being used in Marin to protect our high school youth from injury. Based on our investigation, the Grand Jury concluded:

- *Neurocognitive Testing* provides a record of cognitive skills in student-athletes prior to their participation in sports. Re-testing the student after a suspected head injury is a valuable tool in helping medical professionals evaluate if a student has recovered. ***Each district should require mandatory annual neurocognitive testing of all high school athletes and mandatory re-testing post-injury and each district should add the cost of neurocognitive testing to its annual budget.***
- A *Certified Athletic Trainer (ATC)* is an important element for protecting student-athletes' health and for administering necessary baseline neurocognitive testing and post-injury re-testing. An ATC can be the most qualified person to monitor a student's recovery from a head injury and to coordinate with the student's health care professionals, school counselors, and teachers as the student recovers. ATC's are not always available in all Marin County high schools. ***A certified athletic trainer should attend high-risk high school sporting events. Each district should budget for and hire a full-time certified athletic trainer for each of its high schools.***
- *Injury Reporting Procedures and Protocols* vary greatly in our schools. CA State Law AB 2127 (effective January 1, 2015) states a student diagnosed with a concussion must follow the Return-to-Play Protocol. Procedures and protocols also need to be followed in consistent, coherent and clear ways across all Marin high school athletic departments. ***Each district should adopt a robust "Reporting a Head Injury Protocol" so that all relevant persons are informed of a student's head injury and can work as a team to carry out prescribed "Return-to-Play" and "Return-to-Learn" protocols.***
- *Student and Parent Awareness and Education* are critical components in promptly reporting, diagnosing and treating head injuries. Currently there is no required mandatory education for

¹ California AB 25 (2011) and AB 2127 (2014)

students or parents about concussions, their symptoms and treatment beyond a Concussion Information Sheet required to be signed by both student and parent and returned to the school annually. *Mandatory Concussion Education for student-athletes should be adopted by each school district. No athlete should begin participation before completing this education. Student education could use the “Barrow Brainbook”, “HEADS UP” concussion training or some other equivalent training.*

- A centralized *Countywide Database* could be an important component in assessing head injury data across all high schools in Marin. Many athletic departments do not track how many head injuries have occurred in any school athletic season or year. This kind of data can be instrumental in determining the effectiveness of our head injury programs including diagnosis, treatment and prevention techniques. Gathering and sharing information for identifying problem areas and implementing change is a crucial component in keeping our kids safe. *The Marin County Office of Education should collect head injury data and compile the data in a centralized database. The data should be reported to the Marin County Athletic League (MCAL) and the California Interscholastic Federation (CIF) for analysis and summary, and the results published annually for the public, while keeping all names of students confidential.*

In summary, this report addresses a number of areas of concern with regard to head injuries and concussions involving student-athletes in Marin County public high schools. The body of this report describes in detail the components of our investigation. Our recommendations are the results of our investigative findings.

BACKGROUND

Centers for Disease Control (CDC) defines a concussion as “a type of traumatic brain injury—or TBI—caused by a bump, blow, or jolt to the head or by a hit to the body that causes the head and brain to move rapidly back and forth. This sudden movement can cause the brain to bounce around or twist in the skull, stretching and damaging the brain cells and creating chemical changes in the brain.”²

The benefits of sports participation are numerous: students learn leadership, cooperation, social skills, gain self-esteem and improve physical fitness. Sports participation can also be an effective alternative to high risk and antisocial behaviour. As we are learning, there are risks—some resulting in significant and devastating injuries, including concussions.

The average high school football player is nearly twice as likely to suffer a concussion as a college player. A National Academy of Sciences panel of medical experts analyzed academic studies that showed college football players suffer 6.3 concussions per 10,000 “athletic exposures”—an exposure is a game or practice—while high school football players suffer 11.2 concussions. There is no consensus about why there is this difference. Some experts feel it is due to the immature development of adolescent brains,

² http://www.cdc.gov/headsup/basics/concussion_what.html

others say reporting and awareness is better for students living at home. The reason does not matter--it is the reality.³

The same study reported that after football, the sports with the highest incidence of concussions for boys were lacrosse, wrestling and soccer; and for girls they were soccer, basketball and lacrosse. In addition, sports-related concussions reported to emergency rooms (for persons under age 19) increased from 150,000 in 2001 to 250,000 in 2009.⁴

Frequency of Injury

Sport	Boys	Girls
Football	11.2	NA
Lacrosse	6.9	5.2
Soccer	4.2	6.7
Wrestling	6.2	NA
Basketball	2.8	5.6
Field Hockey	NA	4.2
Softball	NA	1.6
Baseball	1.2	NA

Rates per 10,000 athletic exposures, as reported by trainers, by sport
Source: *National Academy of Sciences, Datalys Center (2010-12)*⁵

Public awareness of the risks of concussion, head trauma and their consequences are increasingly in the news. Christmas Day 2015 brought the word *Concussion* to newspaper headlines with the movie opening by that name starring Will Smith. The film portrays Dr. Bennet Omalu, a forensic neuropathologist, who discovered Chronic Traumatic Encephalopathy (CTE) during autopsies of former NFL players. CTE is linked to early onset Alzheimer's and dementia. His research findings exposed the National Football League (NFL) to scrutiny about its management of head injuries to players. Smith, as a lifelong football fan, was initially hesitant to play Dr. Omalu. He finally agreed, saying,

"I think the thing that really took it over the edge for me is when he (Omalu) explained the science and I realized that, as a parent, I wasn't aware — like, I had no idea," said Smith. "While my son was playing football, there was never a conversation about the concussion issue. It never

³ Farrey, Tom. "Preps at Greater Concussion Risk." ESPN.com, October 30, 2013.
http://espn.go.com/espn/story/_/id/9902116/report-details-concussion-risks-high-school-athletes

⁴ Ibid.

⁵ Ibid.

*came up for four years — and this was at Oaks Christian [in Westlake Village], which is a football powerhouse. If I didn't know, I knew other parents didn't know."*⁶

Many college and professional players were unaware of the risks, but recent discoveries have led several players to retire prematurely rather than continue taking such risks. For example, in March 2015, Chris Borland, a rookie linebacker for the San Francisco 49ers retired, at age 24. He left contract money on the table and retired due to his concern about his long-term health after already having suffered two concussions that occurred before he joined the NFL.⁷

Recent studies revealed a high incidence (87 of 91 brains) of NFL players whose brains were autopsied suffered from CTE.⁸ The family of legendary NFL star Frank Gifford reported in November 2015 that an autopsy showed he had suffered from CTE.⁹ And in February 2016, former NFL quarterback Ken "The Snake" Stabler's family revealed that his autopsy showed Stage 3 CTE (1-4 scale).¹⁰

Research at the Mayo Clinic published in the December 2015 journal *Acta Neuropathologica* found CTE also showed up in men who had played high school contact sports. While it is unknown how common CTE is in the general population, about ⅓ of the men (66) who had donated their brains to the Mayo Clinic and who had played contact sports showed evidence of CTE. This compared to a group of 198 (including 66 women) who had never played contact sports and showed no evidence of CTE.¹¹

CDC estimates that between 1.6 and 3.8 million concussions occur every year in the United States. An estimated 5-10% of athletes will experience a concussion during a sports season. Men's football has a 75% concussion chance risk, while women's soccer has a 50% concussion risk. Fewer than 10% of concussions involve a loss of consciousness and 47% of athletes have no immediately apparent symptoms after a concussive blow.¹²

Research has not only shown that a higher percentage of high school athletes suffer from concussions than collegiate or professional athletes, but they also experience more severe symptoms and more neurological disturbances. An estimated 53% of high school athletes have already suffered a concussion before they participate in high school sports. If a person has suffered from a previous concussion, they

⁶ Josh Rottenberg, "Concussion' tackles the hot-button issue of brain injuries in the NFL", LA Times, November 27, 2015. <http://www.latimes.com/entertainment/movies/la-ca-mn-concussion-will-smith-nfl-production-20151129-story.html>

⁷ Ken Belson, "Chris Borland, Fearing for Health, Retires from 49ers. At 24," NYTimes.com, March 17, 2015. <http://www.nytimes.com/2015/03/18/sports/football/49ers-linebacker-citing-injury-risk-joins-list-of-nfl-retirees.html>

⁸ Report: 87 of 91 former NFL player brains have tested positive for CTE. <http://www.theguardian.com/sport/2015/sep/18/report-87-of-91-former-nfl-player-brains-have-tested-positive-for-cte>

⁹ AP, "Frank Gifford's family says CTE found in his brain", November 29, 2015. <http://newpittsburghcourieronline.com/2015/11/29/frank-giffords-family-says-cte-found-in-his-brain/>

¹⁰ John Branch, "N.F.L. Great Ken Stabler had Brain Disease C.T.E.", NYTimes.com, February 3, 2016. <http://www.nytimes.com/2016/02/04/sports/football/ken-stabler-nfl-cte-brain-disease.html>

¹¹ Korin Miller, "Men Who Played High School Sports at Risk for Brain Injury", December 2015, *Acta Neuropathologica*, <https://www.yahoo.com/health/cte-high-school-sports-232238493.html>

¹² Sports Concussion Institute. <http://www.concussiontreatment.com/concussionfacts.html>

are 1-2 times more likely to suffer a second concussion, 2-4 times more likely to suffer a third and 3-9 times more likely to sustain a fourth.¹³ Therefore, proper diagnosis and treatment is crucial.

In addition, adolescents can be victims of Second Impact Syndrome (SIS), a rare but devastating result of a second blow before the healing of an initial concussion is complete. The athlete has usually suffered post-concussion symptoms from the initial head injury, and then sustains a blow that causes massive swelling to the brain. The blow can be unremarkable and can be taken anywhere on the body. The second blow causes the head to jerk which causes the massive brain swelling and can lead to death or life-altering and lasting neurological damage including lengthy comas and life long respiratory issues. SIS occurs most often in males under the age of 18 and does not occur in adults.¹⁴

The governing body for California high school sports is the **California Interscholastic Federation (CIF)**. The CIF consists of 10 administrative sections. Marin County high schools are part of the “North Coast Section”, which consists of numerous leagues in Northern California. Most Marin County high schools are part of the Marin County Athletic League (MCAL).

CIF bylaws establish minimum requirements for California student-athletics. CIF is not an auditing or general enforcement agency, but is a bottom-up organization that provides guidelines. Each administrative section, through its governing board, enacts its own constitution and bylaws and establishes its own rules and policies that may be stricter than (but may not conflict with) CIF rules.¹⁵

The National Federation of State High School Associations (NFHS) serves all 50 states and the District of Columbia by improving the sports experience, establishing consistent standards and rules of competition, and assisting those who oversee high school sports and activities.¹⁶ NFHS estimates there were approximately 797,000 high school athletes in California in 2014-15 and 7.8 million nationwide.¹⁷

Because of the seriousness of head injuries to young persons and the large number of students participating in athletics in Marin County, the Grand Jury investigated the incidence of concussions in our County high school athletes, but found that specific, quantifiable data was not available. The Grand Jury also looked at use of certified athletic trainers, baseline testing usage, protocols for reporting concussions, training and education of parents, students and coaches, and data collection.

METHODOLOGY

The Grand Jury interviewed representatives from the following entities:

- California Interscholastic Federation (CIF)

¹³ Ibid.

¹⁴ Lindsey Barton Straus, “Second Impact Syndrome: A Rare but Usually Fatal Condition,” Momsteam.com, May 4, 2008. <http://www.momsteam.com/health-safety/concussion-safety/general/second-impact-syndrome-signs-and-symptoms>

¹⁵ Interview with CIF representative.

¹⁶ <http://www.nfhs.org>

¹⁷ http://www.nfhs.org/ParticipationStatistics/PDF/2014-15_Participation_Survey_Results.pdf

- Marin Athletic Foundation
- Marin Athletic League (MCAL)
- Marin County Office of Education
- Novato Unified School District
- San Rafael City High School District
- Shoreline Unified School District
- Sutter Health
- Tamalpais Union School District

The Grand Jury conducted online research and reviewed documents listed in the Bibliography.

DISCUSSION

Neurocognitive Testing

Neurocognitive Baseline Testing (Pre-Injury)

Neurocognitive tests, which were developed to give baseline and follow-up information for evaluating and treating concussions, measure brain processing speed, verbal and visual memory, and reaction time. These valuable tests are administered in Marin County high schools to varying degrees. Baseline testing consists of a pre-season exam used to establish a student's normal neurocognitive functioning prior to beginning athletics. These numbers are helpful to assess recovery should a head injury occur. The testing also can serve as a learning tool for students to help them understand what functions of the brain can be affected by a concussion. Marin high schools are using the ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing) System.¹⁸ This is a 20-minute battery of computer-based questions that measure attention span, working memory and reaction times.

In Marin County, ImPACT testing is available on a voluntary basis at Drake and Tamalpais High Schools and it was offered for winter sports participants at Redwood in the fall of 2015. The Booster Clubs of these three schools cover the cost. The cost of testing at Novato and San Marin high schools is covered by Sutter Health.¹⁹ The Booster Club paid for the baseline testing last year at Tomales High School. This school year the Shoreline Unified School District adopted the program and is covering the Tomales cost. Terra Linda High School received a parental donation of 600 tests in 2014. The cost of these tests has been reimbursed subsequently by the Marin Athletic Foundation. The testing is not mandatory at Terra Linda and about 50% (approximately 140) of student-athletes have been tested.²⁰ There is no commitment to continue the program when the 600 tests have been exhausted. ImPACT is used at San Rafael High School for student-athletes (excluding swimming, track, cross country, tennis and golf) and the cost is split between the District and the Booster Club.²¹

¹⁸ <https://www.impacttest.com/about/>

¹⁹ Interview with representatives of Sutter Healthcare.

²⁰ Grand Jury interviews.

²¹ Grand Jury interviews.

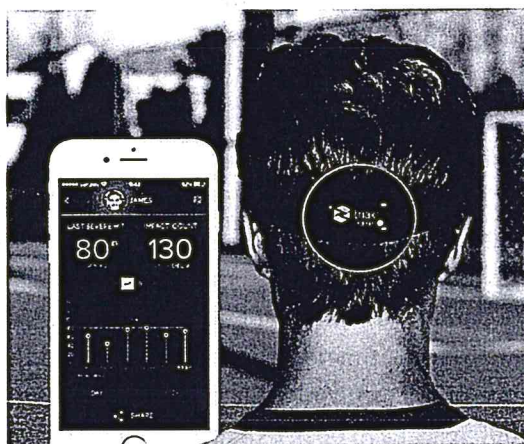
In 2015 the NFL mandated that its franchisees employ baseline testing for all players. A majority of NFL teams already use this testing as do several National Hockey League (NHL) and Major League Baseball (MLB) teams.²²

Neurocognitive Post-Injury Re-testing

Post-injury re-testing is an important tool to help verify a student has recovered from a concussion. The use of post-injury re-testing has been limited at our schools and is not subject to any Countywide protocol. At least one school would only re-test if requested by a treating medical professional. Other schools lacked someone on-staff able to interpret a re-test. The placement of Certified Athletic Trainers (ATCs) at every County high school should ensure a more consistent re-testing policy and practice. The Grand Jury believes the cost of testing through ImPact is reasonable. Currently, 100 baseline tests and 15 re-tests cost \$400, while 800 tests and 150 re-tests cost \$1200 per school organization per year.²³ (See the ImPACT price Sheet in Appendix B).

Neurocognitive Sensors

New technology is available to measure impacts to the head. San Rafael High School is using Triax Impact Sensors on several of its sports teams to monitor impacts to the head. Used in men's football, soccer, and lacrosse, and in women's soccer, the sensors are contained in a headband that is worn on the upper neck area. Impacts are read in real time and information is downloaded by the trainer after practices and games. The information is used by coaches and an athlete's doctor, but not shared with researchers. San Rafael is the only high school in Marin using this technology, though there are schools all over the United States employing the Triax technology. The cost at San Rafael High School was underwritten by several grants.²⁴



Triax Head Sensor with mobile monitoring

²² Robert Sanchez, "Colorado High Schools Getting Tougher on Concussions", May 23, 2015, http://www.denverpost.com/preps/ci_6099357

²³ <https://www.impacttest.com/purchase/form>

²⁴ Officials of San Rafael High School, interview by Grand Jury.

While the technology is still in its infancy, the link between CTE and repetitive head impacts (RHI),²⁵ makes it an important tool. In addition, a 2010 study of high school football players found measurable impairment of neurocognitive function and visual working memory, in those who had never been diagnosed with a concussion but rather had sustained a large number of Repetitive Head Impacts (RHI)—about 150 hits — in the 40g to 80g range (i.e. hits 40 to 80 times the force of gravity).²⁶

Certified Athletic Trainers

Nationwide, 70% of secondary schools employ the services of athletic trainers. National Federation of High School Sports (NFHS) in its guidelines and recommendations says, “An athletic trainer is a key component in any strategy to minimize risk injury and optimize the safety of all participants. The secondary school athletic trainer is in a unique position to monitor health safety procedures, students, facilities, practices and games on a daily basis.”²⁷

To be certified in California, an ATC must have minimally obtained a Bachelor’s degree in athletic training from an accredited college or university, completed the required clinical training and passed the certification exam administered by the Board of Certification, Inc. (BOC).²⁸ The training includes physical medicine and rehabilitation services, life-saving medical skills in emergency situations, prevention, diagnosis, treatment and rehabilitation of injuries, coordinating care with physician and healthcare professionals, and making return-to-play/return-to-learn decisions.²⁹

There has been an increase in the employment of ATCs in Marin County high schools, but currently the cost of ATCs is not fully covered by the school districts. Nor has the distribution of athletic trainer services been equitable among our high schools. The Tamalpais Union School District has employed an ATC at each of its three high schools for at least 4 years (Redwood 13 years, Drake 6 years, Tam 4 years) while the San Rafael School District (San Rafael and Terra Linda) has just begun to employ athletic trainers, as have the two Novato School District high schools (Novato and San Marin) and the Shoreline Unified School District (Tomaes).³⁰

- The 3 Tamalpais Union School District High Schools each have ATCs for 25 hours per week. ATC’s are contracted through UCSF Play Safe with the cost split 50/50 between the District and each school’s Booster Club. (The split will go to 75/25 next school year and the District will pay 100% in 2017-18 school year).

²⁵ National Academy of Sciences, “Sports-Related Concussions in Youth: Improving the Science, Changing the Culture”, 2014. <http://www.ncbi.nlm.nih.gov/books/NBK185336/>

²⁶ Lindsey Barton Straus, “Repetitive Head Impacts: A Growing Concern At All Levels of Sports”, Feb. 22, 2012. <http://www.momsteam.com/sub-concussive/sub-concussive-hits-growing-concern-in-youth-sports>

²⁷ Brian Robinson, “The Value of the Secondary School Athletic Trainer,” National Federation of State High School Associations, March 10, 2015. <https://www.nfhs.org/articles/the-value-of-the-secondary-school-athletic-trainer/>

²⁸ ca-at.org/about-us

²⁹ ca-at.org/about-us/what-is-an-athletic-trainer/

³⁰ Officials from Tamalpais Union, school district, San Rafael School district, Novato school district, Shoreline school district: interviews by the Grand Jury.

- San Rafael High School has a full-time ATC contracted through Marin General Hospital with the cost split 50/50 between the District and the Booster Club.
- Terra Linda High School has an ATC for 20-25 hours per week. The cost is split 25% District—25% Booster Club—50 % Marin General Hospital.
- Novato High School has a full-time ATC with the cost split 75/25 between Sutter Healthcare and the District.
- San Marin High School has a full-time ATC with the cost split 75/25 between Sutter Healthcare and the District.
- Tomales High School has an ATC for 10 hours per week. (ATC shared with Terra Linda). Cost is paid for by the District.

Recognizing the possibility of a concussion quickly is important. An ATC is trained to do this and can make the determination to remove an athlete from the field to be evaluated. Having an ATC present takes this responsibility away from a coach who has numerous other things to worry about during a game or practice. (Even the NFL has seen the value of a trainer's eyes allowing them to call a medical timeout for a suspected head injury.)³¹ An ATC present at an athletic event or practice is another set of eyes, and his or her primary responsibility is managing the health and safety of the players, not coaching the game. As a medically-trained person, an ATC's decision can better withstand possible disagreement with either a coach or a parent. The ATC has the last word.

An ATC is well-qualified to monitor the Return-to-Play Protocol and also to administer any baseline testing and re-testing. CDC states that baseline tests should be administered and/or interpreted by trained healthcare professionals.³² Post-injury re-testing has been inconsistently administered in our high schools due to the lack of medically-trained persons to monitor and interpret the results.

The Grand Jury concludes that having a full-time ATC on staff is vital for the health and safety of our student-athletes. We applaud the high schools for seeking certified athletic trainer services and the Booster clubs and local healthcare organizations for funding these trainers. The Grand Jury recommends a full-time trainer be present at each County high school that has an athletic program.

Injury Reporting Procedures and Protocols

The California Interscholastic Federation (CIF) adopted California State Assembly Bill AB 2127 (effective January 1, 2015) as part of its Bylaw 503(H). This Bylaw requires a student who is suspected of having received a head injury be removed immediately from competition, be evaluated by a health care provider trained in the education and management of concussions, and receive written clearance from that provider before returning to sports participation. If a licensed health care provider, trained in education and management of concussion, determines the athlete sustained a concussion or a head injury, the athlete

³¹ Lucy McCalmont, "NFL Owners Approve Medical Timeout Sparked by Vicious Super Bowl Collision", The Huffington Post, March 24, 2015. http://www.huffingtonpost.com/2015/03/24/nfl-medical-timeout-vote-passes_n_6934432.html

³² http://www.cdc.gov/headsup/basics/baseline_testing.html

is required to complete a graduated return-to-play protocol of no less than seven (7) full days from the time of diagnosis under the supervision of a licensed health care provider (MD/OD).³³

The California Interscholastic Federation issues guidelines as to “Return-to-Play (RTP) Protocol”.³⁴ This protocol outlines graduated stages for returning to competition. CIF cautions that athletes can have differing timetables for recovery and this Protocol provides minimum requirements. It is vital to monitor the progress of each individual athlete. (See RTP Protocol in Appendix A).

During the investigation, the Grand Jury learned that concussion reporting protocols at our high schools vary greatly. While each coach or Athletic Director must file an injury report when a student sustains an injury, what happens thereafter is not uniform within County schools. Reports might be filed in the front office, with the principal, at the district office, or with the school nurse. Sometimes the student’s counselor is notified by the athletic department, but in most cases this is not done. There are proactive athletic departments who notify counselors and attendance clerks, but some athletic departments feel that notifying the school nurse or counselor is a parent responsibility.

By law, the Return-to-Play Protocol must be monitored. As a medically trained individual, an athletic trainer is the appropriate person to do this. An ATC is best able to discuss the situation with the certified medical person who issued the diagnosis should any issues arise. If the school is using post-injury baseline testing, the trainer should be the one to administer the re-test and interpret the results. Because everyone recovers at a different rate, the athletic trainer can follow the individual recovery.

California Interscholastic Federation (CIF) has made a suggested Return-to-Learn (RTL) Protocol available to California high schools. This protocol provides information for parents, students, teachers and counselors about what to expect during recovery after a concussion. The Protocol was developed by a CIF Sports Medicine Committee and adapted from the Cincinnati Children’s Hospital Return-to-Learn Protocol.³⁵ (See RTL Protocol in Appendix A).

It is important for teachers and athletic departments to work together to be sure that a student is ready to return to normal activities. Every child heals at a different rate, and while a vast majority of youth recover fully within 2 weeks, for others the symptoms may linger for months or even years. Communication among the student, parents, medical professionals, teachers, and counselors is critically important to ensure a full recovery. The American Academy of Pediatrics (AAP) states that after a head injury students should be back to their prior academic performance before returning to the sports field.³⁶

The Grand Jury recommends school districts develop written procedures that ensure all the necessary persons are notified after a head injury and all are actively involved to insure the best possible recovery for our student-athletes.

³³ <http://www.cifstate.org/governance/constitution/index>

³⁴ <http://www.cifstate.org/sports-medicine/concussions/index>

³⁵ http://www.cifeds.org/uploads/2/3/3/6/23368454/cif_concussion_rtl_protocol.pdf

³⁶ Michelle Castillo, “Many High School Athletes at Greater Concussion Risk than College Counterparts:Report”, Oct. 30, 2013. <http://www.cbsnews.com/news/many-high-school-athletes-at-greater-concussion-risk-than-college-counterparts-report/>

Student and Parent Awareness and Education

California Interscholastic Federation Bylaw 503(H) was adopted pursuant to CA Assembly Bill AB 25 (effective January 1, 2012), now Education Code §49475, requiring every athlete and their parent or guardian receive a Concussion Information Sheet annually that they must read, sign, and return to the school before the student can begin sports practice or competition. This Sheet contains basic information concerning concussions, their symptoms, diagnosis, along with summarized Return-to-Play (RTP) recommendations and Return-to-Learn (RTL) guidelines. Expanded RTP and RTP information is also available on the CIF website.³⁷ (See Concussion Information Sheet, and the RTP/RTL Protocols in Appendix A).

The Grand Jury examined how our high schools are fulfilling this requirement. Some of Marin's schools have the forms available online. One concern the Grand Jury had was whether the form was being read and signed by both parents and students. If the papers can be filed online, the Jury recommends a signed and scanned version of the Concussion Information Sheet be required. If the forms are not filed online, the paper form with a live signature of both student and parent must be submitted to the school's athletic department. The Grand Jury also recommends that a copy of the form be returned to the parents.

It is critical students understand the potential serious consequences of "playing through it." Appreciating the importance of early detection of a concussion and the necessity of a full recovery to lessen the severity of subsequent concussions is crucial. Research has shown that half of high school football players said they would continue to play even if they had sustained a possible concussion, while just less than half said they would not report concussion symptoms to their coach.³⁸ There has been a stigma attached to concussions. Outwardly a student may look fine, but inwardly something "just doesn't feel right." Students are concerned that if they complain they will look weak. There remains a "culture of resistance" in which athletes do not report concussion symptoms and/or continue with prescribed treatment plans. It is vital to increase awareness in students and parents of concussion symptoms and the necessary protocols to promote recovery from a head injury. Students must become more comfortable reporting their symptoms without fear of appearing gutless or cowardly.

From our interviews, the discussion of head injuries with student-athletes ranged from few to frequent reminders. While coaches are required to complete a concussion training course every 2 years and parents and students are required to sign a Concussion Information Sheet each year, a student's knowledge of concussion symptoms primarily depends on their coaches and how much head injuries are discussed at player meetings throughout the season. One way to stimulate discussion and education is through the use of video. The state of Arizona is in the forefront of educating its student-athletes by requiring every high school athlete to watch the Barrow Brainbook interactive video (ARS §15-341 (24) (SB 1521). The video was developed by the Barrow Neurological Institute, Arizona Cardinals, and Arizona State University.

³⁷ <http://www.cifstate.org/governance/constitution/index>

³⁸ Michelle Castillo, "Many High School Athletes at Greater Concussion Risk than College Counterparts: Report", Oct. 30, 2013. <http://www.cbsnews.com/news/many-high-school-athletes-at-greater-concussion-risk-than-college-counterparts-report/>

The video contains scientific information along with information on the importance of self-reporting and reporting a friend who you suspect may have a concussion. It is an up-to-date video with likes and dislikes and areas for comments (much like Facebook).³⁹ An alternative to this course for students would be CDC's approved HEADS UP to Youth Sports concussion course.⁴⁰ Although not specifically designed for students, it could be a valuable part of their training. The more information a student has about the seriousness of a head injury and the vital importance of a prompt and accurate diagnosis, the safer they will be. The Grand Jury believes the health and safety of our student-athletes requires mandatory information meetings.

Countywide Database

During interviews, the Grand Jury learned there is no centralized data collection system for head injuries sustained in high school activities. The Marin County Office of Education has sponsored some meetings on head injuries and concussions; however they were not effectively publicized and were poorly attended. There has been no effort by that office to gather and maintain any information as to the frequency of head injuries, in what sports they occur, at which schools, etc. While athletic directors *should* have records of all injuries, general statistics are not maintained by any entity. (The Tamalpais Union High School District athletic trainers do keep some statistics through UCSF Play Safe.)⁴¹ Such a centralized reporting system would provide data to school districts as well as MCAL and CIF, allowing them to evaluate head injury information. With the increasing use of baseline testing and the Triax sensor system, this collected information could help determine the effectiveness of these programs in providing prevention and detection of head injuries in our students.

Coaches' Training and Education

The California Interscholastic Federation requires all coaches to be certified.⁴² This certification consists of taking a once-in-a-lifetime approved coaches training course along with a First Aid/CPR course that includes concussion awareness training, which must be renewed every 2 years. MCAL offers training courses for coaches three times a year.⁴³ Each school in MCAL pays into MCAL funds that allows its coaches to attend the MCAL training at no personal cost. In addition, to fulfill their one-time training requirement coaches can take the online training offered by NFHS. CDC's HEADS UP to Youth Sports online course⁴⁴ can be taken to fulfill the concussion training requirement.

The management of this training requirement varies by school. Some districts have their HR departments collect the paperwork and report to the athletic departments when the training has been completed. Other athletic departments manage this themselves. Tracking renewals of first aid and concussion training

³⁹ <http://www.barrowneuro.org/get-to-know-barrow/centers-programs/concussion-brain-injury-center/barrow-brainbook-login/>

⁴⁰ <http://www.cdc.gov/concussion/HeadsUp/Training/index.html>

⁴¹ <http://orthosurg.ucsf.edu/outreach/programs/playsafe/>

⁴² http://www.cifstate.org/coaches-admin/coaching_education/certification

⁴³ <http://mcalsports.org/CoachingEducationProgram.htm>

⁴⁴ <http://www.cdc.gov/concussion/HeadsUp/Training/index.html>

every two years is usually managed manually through the athletic departments. The Tam District is currently beta testing an online registration management system called Register My Athlete.⁴⁵ The Grand Jury believes manual systems do not have adequate safeguards (too easy to miss deadlines for re-training, etc.) and the Grand Jury strongly suggests schools adopt an online tracking system.

During our interviews, it was reported that on at least one recent occasion, a coach was actively coaching before his paperwork and training was complete. Several high schools allow interim coaches who begin their coaching duties mid-season to delay their training until prior to the start of the next season. The Grand Jury does not approve of delaying training since a number of coaches are parents or other individuals without any physical education or prior training experience. While MCAL only offers training three times a year, there are approved courses available online that can be completed prior to the commencement of coaching duties. This training, which includes concussion training, is necessary to ensure the safety of our student-athletes. No person should begin coaching before fulfilling the required training and receiving certification.

California Assembly Bill AB 2127 (effective January 1, 2015) restricts full-contact football practices to no more than two 90-minute practices per week during the preseason and season. During our interviews we heard concerns about this law. While agreeing with the spirit of the law, there were reservations expressed about its implementation. We heard several times in interviews that lack of training in proper “hitting” could actually cause more injuries. Coaches might feel the necessity to do more contact hitting within the restricted time frames. While monitoring contact hitting, there needs to be better training for coaches in proper and safe hitting techniques and more appropriate equipment available for substitute training of our high school athletes.⁴⁶

FINDINGS

- F1. Neurocognitive baseline testing provides a record of cognitive functioning in student-athletes prior to their participation in sports. Re-testing the student after a suspected head injury is a valuable tool in helping medical professionals evaluate if a student has recovered.
- F2. Marin County high schools are using baseline testing to varying degrees and are often not re-testing.
- F3. The costs of neurocognitive testing for high school athletes is currently funded in various ways, including booster clubs and other outside sources.
- F4. Certified Athletic Trainers, as medically-trained individuals, provide a necessary resource for protecting the health and safety of student-athletes.
- F5. Many schools do not have a Return-to-Learn Protocol in place for head injuries. Various systems for reporting head injuries to relevant high school staff are presently used in Marin high schools.
- F6. Student-athletes and their parents do not receive adequate education in recognizing a concussion and the importance of prompt reporting of symptoms.

⁴⁵ Grand Jury interview of Tamalpais Union School District representatives.

⁴⁶ Grand Jury interviews.

- F7. Data regarding head injuries sustained by high school student-athletes in Marin County high schools is not currently being maintained in a central database.

RECOMMENDATIONS

- R1. Each district should require mandatory annual neurocognitive testing of all high school athletes and mandatory re-testing post-injury.
- R2. A certified athletic trainer should administer and interpret all tests.
- R3. A certified athletic trainer should attend high-risk high school sporting events.
- R4. Each district should add the cost of neurocognitive testing to its annual budget.
- R5. Each district should hire a certified athletic trainer for each of its high schools.
- R6. Each district should adopt a protocol for reporting a head injury so that all relevant persons are informed of a student's head injury and can work together as a team to ensure full recovery in the classroom and on the field.
- R7. Each school should adopt Return-to-Play and Return-to Learn Protocols for all athletes.
- R8. Mandatory concussion education for student-athletes such as the Barrow Brainbook, the HEADS UP concussion training or some other equivalent education should be adopted by each school district. No student-athlete should begin participation before completing this education.
- R9. The Marin County Office of Education should collect head injury data and compile the data in a centralized database. Data should include date of injury, sport, type of injury, diagnosis, recovery information and other critical details. The data should be reported to MCAL and CIF for analysis and summary and the results published for the public annually while keeping all names of students confidential.

REQUEST FOR RESPONSES

Pursuant to Penal code section 933.05, the grand jury requests responses as follows:

From the following governing bodies:

- Marin County Office of Education-----F7 and R9
- Novato Unified School District-----F1-F7 and R1-R9
- San Rafael City School District-----F1-F7 and R1-R9
- Shoreline Unified School District----F1-F7 and R1-R9
- Tamalpais Union School District----F1-F7 and R1-R9

The governing bodies indicated above should be aware that the comment or response of the governing body must be conducted in accordance with Penal Code section 933 (c) and subject to the notice, agenda and open meeting requirements of the Brown Act.

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APPENDIX A



CIF Concussion Information Sheet

Why am I getting this information sheet?

You are receiving this information sheet about concussions because of California state law AB 25 (effective January 1, 2012), now Education Code § 49475:

1. *The law requires a student athlete who may have a concussion during a practice or game to be removed from the activity for the remainder of the day.*
2. *Any athlete removed for this reason must receive a written note from a medical doctor trained in the management of concussion before returning to practice.*
3. *Before an athlete can start the season and begin practice in a sport, a concussion information sheet must be signed and returned to the school by the athlete and the parent or guardian.*

Every 2 years all coaches are required to receive training about concussions (AB 1451), as well as certification in First Aid training, CPR, and AEDs (life-saving electrical devices that can be used during CPR).

What is a concussion and how would I recognize one?

A concussion is a kind of brain injury. It can be caused by a bump or hit to the head, or by a blow to another part of the body with the force that shakes the head. Concussions can appear in any sport, and can look differently in each person.

Most concussions get better with rest and over 90% of athletes fully recover. However, all concussions should be considered serious. If not recognized and managed the right way, they may result in problems including brain damage and even death.

Most concussions occur without being knocked out. Signs and symptoms of concussion (see back of this page) may show up right after the injury or can take hours to appear. If your child reports any symptoms of concussion or if you notice some symptoms and signs, seek medical evaluation from your team's athletic trainer and a medical doctor trained in the evaluation and management of concussion. If your child is vomiting, has a severe headache, or is having difficulty staying awake or answering simple questions, call 911 to take him or her immediately to the emergency department of your local hospital.

On the CIF website is a **Graded Concussion Symptom Checklist**. If your child fills this out after having had a concussion, it helps the doctor, athletic trainer or coach understand how he or she is feeling and hopefully shows improvement. We ask that you have your child fill out the checklist at the start of the season even before a concussion has occurred so that we can understand if some symptoms such as headache might be a part of his or her everyday life. We call this a "baseline" so that we know what symptoms are normal and common for your child. Keep a copy for your records, and turn in the original. If a concussion occurs, he or she should fill out this checklist daily. This Graded Symptom Checklist provides a list of symptoms to compare over time to make sure the athlete is recovering from the concussion.

What can happen if my child keeps playing with concussion symptoms or returns too soon after getting a concussion?

Athletes with the signs and symptoms of concussion should be removed from play immediately. There is NO same day return to play for a youth with a suspected concussion. Youth athletes may take more time to recover from concussion and are more prone to long-term serious problems from a concussion.

Even though a traditional brain scan (e.g., MRI or CT) may be "normal", the brain has still been injured. Animal and human research studies show that a second blow before the brain has recovered can result in serious damage to the brain. If your athlete suffers another concussion before completely recovering from the first one, this can lead to prolonged recovery (weeks to months), or even to severe brain swelling (Second Impact Syndrome) with devastating consequences.

There is an increasing concern that head impact exposure and recurrent concussions may contribute to long-term neurological problems. One goal of this concussion program is to prevent a too early return to play so that serious brain damage can be prevented.

Signs observed by teammates, parents and coaches include:	
<ul style="list-style-type: none"> • Looks dizzy • Looks spaced out • Confused about plays • Forgets plays • Is unsure of game, score, or opponent • Moves clumsily or awkwardly • Answers questions slowly 	<ul style="list-style-type: none"> • Slurred speech • Shows a change in personality or way of acting • Can't recall events before or after the injury • Seizures or has a fit • Any change in typical behavior or personality • Passes out

Symptoms may include one or more of the following:	
<ul style="list-style-type: none"> • Headaches • "Pressure in head" • Nausea or throws up • Neck pain • Has trouble standing or walking • Blurred, double, or fuzzy vision • Bothered by light or noise • Feeling sluggish or slowed down • Feeling foggy or groggy • Drowsiness • Change in sleep patterns 	<ul style="list-style-type: none"> • Loss of memory • "Don't feel right" • Tired or low energy • Sadness • Nervousness or feeling on edge • Irritability • More emotional • Confused • Concentration or memory problems • Repeating the same question/comment

What is Return to Learn?

Following a concussion, student athletes may have difficulties with short- and long-term memory, concentration and organization. They will require rest while recovering from injury (e.g., avoid reading, texting, video games, loud movies), and may even need to stay home from school for a few days. As they return to school, the schedule might need to start with a few classes or a half-day depending on how they feel. If recovery from a concussion is taking longer than expected, they may also benefit from a reduced class schedule and/or limited homework; a formal school assessment may also be necessary. Your school or doctor can help suggest and make these changes. Student athletes should complete the Return to Learn guidelines and return to complete school before beginning any sports or physical activities, unless your doctor makes other recommendations. Go to the CIF website (cifstate.org) for more information on Return to Learn.

How is Return to Play (RTP) determined?

Concussion symptoms should be completely gone before returning to competition. A RTP progression involves a gradual, step-wise increase in physical effort, sports-specific activities and the risk for contact. If symptoms occur with activity, the progression should be stopped. If there are no symptoms the next day, exercise can be restarted at the previous stage.

RTP after concussion should occur only with medical clearance from a medical doctor trained in the evaluation and management of concussions, and a step-wise progression program monitored by an athletic trainer, coach, or other identified school administrator. Please see cifstate.org for a graduated return to play plan. [AB 2127, a California state law effective 1/1/15, states that return to play (i.e., full competition) must be **no sooner than 7 days after the concussion diagnosis has been made by a physician.**]

Final Thoughts for Parents and Guardians:

It is well known that high school athletes will often not talk about signs of concussions, which is why this information sheet is so important to review with them. Teach your child to tell the coaching staff if he or she experiences such symptoms, or if he or she suspects that a teammate has had a concussion. You should also feel comfortable talking to the coaches or athletic trainer about possible concussion signs and symptoms that you may be seeing in your child.

References:

- American Medical Society for Sports Medicine position statement: concussion in sport (2013)
- Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012
- <http://www.cdc.gov/concussion/HeadsUp/youth.html>

CIFSTATE.ORG

CIF 5/2015

CIF Concussion Return to Play (RTP) Protocol

CA STATE LAW AB 2127 (Effective 1/1/15) STATES THAT RETURN TO PLAY (I.E., COMPETITION) CANNOT BE SOONER THAN 7 DAYS AFTER EVALUATION BY A PHYSICIAN (MD/DO) WHO HAS MADE THE DIAGNOSIS OF CONCUSSION.

Instructions:

- This *graduated return to play protocol* **MUST** be completed before you can return to FULL COMPETITION.
 - A certified athletic trainer (AT), physician, and/or identified concussion monitor (e.g., coach, athletic director), must monitor your progression and initial each stage after you successfully pass it.
 - Stages I to II-D take a *minimum* of 6 days to complete.
 - You must be back to normal academic activities before beginning Stage II, unless otherwise instructed by your physician.
 - You must complete one full practice *without restrictions* (Stage III) before competing in first game.
- After Stage I, you cannot progress more than one stage per day (or longer if instructed by your physician).
- If symptoms return at any stage in the progression, **IMMEDIATELY STOP** any physical activity and follow up with your school's AT, other identified concussion monitor, or your physician. In general, if you are symptom-free the next day, return to the previous stage where symptoms had not occurred.
- Seek further medical attention if you cannot pass a stage after 3 attempts due to concussion symptoms, or if you feel uncomfortable at anytime during the progression.

You must have written physician (MD/DO) clearance to begin and progress through the following Stages as outlined below (or as otherwise directed by physician)				
Date & Initials	Stage	Activity	Exercise Example	Objective of the Stage
	I	No physical activity for at least 2 full symptom-free days AFTER you have seen a physician	<ul style="list-style-type: none">No activities requiring exertion (weight lifting, jogging, P.E. classes)	<ul style="list-style-type: none">Recovery and elimination of symptoms
	II-A	Light aerobic activity	<ul style="list-style-type: none">10-15 minutes (<i>min</i>) of walking or stationary biking.Must be performed under <i>direct supervision</i> by designated individual	<ul style="list-style-type: none">Increase heart rate to no more than 50% of perceived maximum (<i>max</i>) exertion (e.g., < 100 beats per min)Monitor for symptom return
	II-B	Moderate aerobic activity (<i>Light resistance training</i>)	<ul style="list-style-type: none">20-30 min jogging or stationary bikingBody weight exercises (squats, planks, push-ups), max 1 set of 10, no more than 10 min total	<ul style="list-style-type: none">Increase heart rate to 50-75% max exertion (e.g., 100-150 bpm)Monitor for symptom return
	II-C	Strenuous aerobic activity (<i>Moderate resistance training</i>)	<ul style="list-style-type: none">30-45 min running or stationary bikingWeight lifting ≤ 50% of max weight	<ul style="list-style-type: none">Increase heart rate to > 75% max exertionMonitor for symptom return
	II-D	Non-contact training with sport-specific drills (<i>No restrictions for weightlifting</i>)	<ul style="list-style-type: none">Non-contact drills, sport-specific activities (cutting, jumping, sprinting)No contact with people, padding or the floor/mat	<ul style="list-style-type: none">Add total body movementMonitor for symptom return
Minimum of 6 days to pass Stages I and II. Prior to beginning Stage III, please make sure that written physician (MD/DO) clearance for return to play, after successful completion of Stages I and II, has been given to your school's concussion monitor				
	III	Limited contact practice	<ul style="list-style-type: none">Controlled contact drills allowed (no scrimmaging)	<ul style="list-style-type: none">Increase acceleration, deceleration and rotational forcesRestore confidence, assess readiness for return to playMonitor for symptom return
		Full contact practice Full unrestricted practice	<ul style="list-style-type: none">Return to normal training, with contactReturn to normal unrestricted training	
MANDATORY: You must complete at least ONE contact practice before return to competition, or if non-contact sport, ONE unrestricted practice (If contact sport, highly recommend that Stage III be divided into 2 contact practice days as outlined above)				
	IV	Return to play (competition)	<ul style="list-style-type: none">Normal game play (competitive event)	<ul style="list-style-type: none">Return to full sports activity without restrictions

Athlete's Name: _____ Date of Concussion Diagnosis: _____

CIFstate.org 5/2015

CIF Concussion Return to Learn (RTL) Protocol

Instructions:

- Keep brain activity below the level that causes worsening of symptoms (e.g., headache, tiredness, irritability).
- If symptoms worsen at any stage, stop activity and rest.
- Seek further medical attention if your child continues with symptoms beyond 7 days.
- If appropriate time is allowed to ensure complete brain recovery before returning to mental activity, your child may have a better outcome than if he or she tries to rush through these guidelines.
- Please give this form to teachers/school administrators to help them understand your child's recovery.

Stage	Home Activity	School Activity	Physical Activity
Brain Rest	Rest quietly, nap and sleep as much as needed. Avoid bright light if bothersome. Drink plenty of fluids and eat healthy foods every 3-4 hours. Avoid "screen time" (text, computer, cell phone, TV, video games).	No school. No homework or take-home tests. Avoid reading and studying.	Walking short distances to get around is okay. No exercise of any kind. No driving.
	<p style="text-align: center;"><i>This step usually ends 3-5 days after injury.</i></p> <p style="text-align: center;"><i>Progress to the next stage when your child starts to improve, but s/he may still have some symptoms.</i></p>		
Restful Home Activity	Set a regular bedtime/wake up schedule. Allow at least 8-10 hours of sleep and naps if needed. Drink lots of fluids and eat healthy foods every 3-4 hours. Limit "screen time" to less than 30 minutes a day.	No school. May begin easy tasks at home (drawing, baking, cooking). Soft music and 'books on tape' ok. Once your child can complete 60-90 minutes of light mental activity without a worsening of symptoms he/she may go to the next step.	Light physical activity, like walking. No strenuous physical activity or contact sports. No driving.
	<p style="text-align: center;"><i>Progress to the next stage when your child starts to improve and s/he has fewer symptoms.</i></p>		
Return to School - PARTIAL DAY	Allow 8-10 hours of sleep per night. Avoid napping. Drink lots of fluids and eat healthy foods every 3-4 hours. "Screen time" less than 1 hour a day. Spend limited social time with friends outside of school.	Gradually return to school. Start with a few hours/half-day. Take breaks in the nurse's office or a quiet room every 2 hours or as needed. Avoid loud areas (music, band, choir, shop class, locker room, cafeteria, loud hallway and gym). Use sunglasses/earplugs as needed. Sit in front of class. Use preprinted large font (18) class notes. Complete necessary assignments only. No tests or quizzes. Limit homework time. Multiple choice or verbal assignments better than lots of long writing. Tutoring or help as needed. Stop work if symptoms increase.	Light physical activity, like walking. No strenuous physical activity or contact sports. No driving.
	<p style="text-align: center;"><i>Progress to the next stage when your child can complete the above activities without symptoms.</i></p>		
Return to School - FULL DAY	Allow 8-10 hours of sleep per night. Avoid napping. Drink lots of fluids and eat healthy foods every 3-4 hours. "Screen time" less than 1 hour a day. Spend limited social time with friends outside of school.	Progress to attending core classes for full days of school. Add in electives when tolerated. No more than 1 test or quiz per day. Give extra time or untimed homework/tests. Tutoring or help as needed. Stop work if symptoms increase.	Light physical activity, like walking. No strenuous physical activity or contact sports. No driving.
	<p style="text-align: center;"><i>Progress to the next stage when your child has returned to full school and is able to complete all assignments/tests without symptoms.</i></p>		
Full Recovery	Return to normal home and social activities.	Return to normal school schedule and course load.	May begin and must complete the CIF Return to Play (RTP) Protocol before returning to strenuous physical activity or contact sports.

** Guidelines adapted from Cincinnati Children's Hospital Return to Learn Protocol

CIFSTATE.ORG

CIF 5/2015

APPENDIX B

ImPACT Price List⁴⁷

Our schools and teams purchase ImPACT on a yearly subscription basis. All packages include technical support and all software updates. A \$25 international fee added to orders outside of the United States. There are no other fees involved.

Choose Your Yearly Package

Package 1: 100 Baseline with 15 Post Injury Tests	\$400 Per School Organization per Year
Package 2: 300 Baseline with 60 Post Injury Tests	\$600 Per School Organization per Year
Package 3: 500 Baseline with 100 Post Injury Tests	\$800 Per School Organization per Year
Package 4: 800 Baseline with 150 Post Injury Tests	\$1200 Per School Organization per Year

⁴⁷ <https://www.impacttest.com/purchase/form>