



**Defense and Veterans Brain Injury Center “Clinical Updates in Brain Injury Science Today [CUBIST]” Podcast  
“Time Trends in Concussion Symptom Presentation and Assessment Methods in High School Athletes”**

TRT: 9:28 min

**Host:** Anne Bunner, MD

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## Defense and Veterans Brain Injury Center “Clinical Updates in Brain Injury Science Today [CUBIST]” Podcast

### **Episode 112: Assessing Concussion in High School Athletes**

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**Anne Bunner:** The views, opinions and findings contained in this podcast are those of the host and subject matter experts. They should not be construed as official Department of Defense positions, policies or decisions unless designated by other official documentation.

**Bunner:** Hi! Welcome to Clinical Updates in Brain Injury Science Today, or CUBIST, a podcast for health care providers about current research on traumatic brain injury, also known as TBI.

This program is produced by the Defense and Veterans Brain Injury Center, otherwise known as DVVIC. I’m your host today, Anne Bunner. I’m a biologist and program analyst here at DVVIC.

In today’s episode, I’ll be talking with Dr. Don Marion. Dr. Marion is a neurosurgeon and senior clinical consultant at DVVIC. Don and I will discuss a study entitled: Time Trends in Concussion Symptom Presentation and Assessment Methods in High School Athletes. This article was recently published in The American Journal of Sports Medicine by Dustin Currie and his colleagues.

**Bunner:** Don, welcome.

**Don Marion:** Thanks, Anne.

**Bunner:** What were the key findings of this study?

**Marion:** In a sample of 100 high schools from all parts of the US, and including both small and large schools, sports-related concussions appeared to be increasingly more common from 2007 to the 2014-2015 school year, though the concussions were less severe. The study strongly suggests that this

increase is due to improved reporting rather than an actual increase in the incidence of concussions. In addition, fewer CT and MRI scans for the evaluation of concussed athletes are obtained now compared with eight years ago, and more computerized neurocognitive assessments are being obtained today.

**Bunner:** What was the rationale for this analysis?

**Marion:** Anne, during the past 8 years there have been significant changes in high school policies about sport-related concussion education and prevention, especially influenced by new state laws. Following the passage of the Zachery Lystedt Law in the state of Washington in May of 2009, all 50 states have now adopted legislation that requires some form of training of high school coaches or trainers about concussion, and prohibits concussed athletes from returning to play the same day or until they are cleared by a qualified professional. In addition, the CDC has created and widely promoted the Heads Up Concussion in Youth Sports initiative intended to promote safe play, and better identification and treatment of concussion. There was interest in determining if these large policies and programs had an effect.

**Bunner:** This was a surveillance study, so the concussion and patient data were taken from a large database. Tell us about the database and who or what it includes.

**Marion:** High School RIO (Reporting Information Online) is an internet-based data collection tool used in the National High School Sports-Related Injury Surveillance Study. This study was first implemented during the 2005/06 academic year by Dr. Dawn Comstock, has been maintained annually, and now includes nearly 250 high schools. High School RIO captures athletic exposures, that is number of athlete practices and number of athlete competitions per week, injury, including body site, diagnosis and severity and injury event, including mechanism, activity, position per event, field or court location. It collects that data weekly throughout the academic year using certified athletic trainers as data reporters. A reportable concussion must have occurred as a result of participation in an organized high school competition or practice (or performance for cheerleading) and must have required medical attention by a team physician, certified athletic trainer, or other health care provider.

For this study, 100 high schools, both small and large, were randomly selected from the West, South, Midwest and Northeast regions of the US. Data from the 2007-8 school year through the 2014-15 school year were analyzed. During this period of eight academic years, a total of 6,205 concussions were reported from the 100 selected high schools.

**Bunner:** Ok, a pretty good sample size. These 100 schools were among the first to enroll in this surveillance study?

**Marion:** That's correct, yes.

**Bunner:** The authors noted that during the study period less severe symptoms became more common, and more severe symptoms became less common. Why are some symptoms considered more severe than others?

**Marion:** Anne, previous studies have shown that outcomes for patients with acute loss of consciousness or with amnesia for the event following a concussion or a traumatic event result in worse outcomes than those who just “had their bell rung” or had alteration of consciousness. For example, those with loss of consciousness are much more likely to have significant difficulties, say returning to school or to normal life at one year after injury than those with simply an alteration in their level of consciousness.

**Bunner:** What were the limitations?

**Marion:** Anne, the primary limitation in my view is that this study was only a sampling of the available data and did not include information about all of the high schools in the US. Analysis of a more comprehensive data set might have uncovered any regional or school size differences in the incidence, severity or treatment of concussions. In addition, the willingness of schools to participate in the RIO program might have biased the results of the study since it could indicate that they are also the schools that are most invested in injury prevention and detection programs and want to brag about their successes. Finally, the RIO protocol does not require comprehensive clinical concussion assessments.

**Bunner:** You noted that the schools in this sample were among the most pro-active in addressing concussion, and of course, they also have the resources to have a certified athletic trainer. How would these data look, do you think, for schools with fewer resources?

**Marion:** Anne, I am worried that for very small or rural schools the data might still look very much like it did a decade ago, with poor reporting of concussions and more severe concussions occurring in those smaller schools.

**Bunner:** One of the findings the authors noted that time to symptom resolution was longer at the end of the study period. Is this a good news story that there is less loss of consciousness, or a bad news story because there are longer recovery times and a higher number of concussions?

**Marion:** Oh Anne, I think I think this is very good news story and suggests several things. Number one, I think it suggests that state concussion laws and CDC programs are having the desired effect of improving concussion reporting, improving recognition of lingering symptoms of concussion, and diminishing the severity of concussions when they occur. Number two, I think we have fewer inappropriate CT scans being obtained, thereby reducing exposure to ionizing radiation in these younger kids. Number three, the study demonstrates that it is possible to coordinate and sustain a large country-wide database of high school concussions that is maintained by athletic trainers.

**Bunner:** Finally, what should providers take from this study?

**Marion:** I think providers should be aware that students with a history of concussion are now more likely to have, or complain of, lingering post-concussion symptoms than a decade ago. They also should feel very confident in not routinely obtaining imaging studies, such as CT or MRI, for every student who has had a concussion. Finally, all providers who are involved in any way with contact sports should be strong advocates for, and promote, local concussion safety policies and the CDC Heads Up Concussion in Youth Sports initiative.

**Bunner:** Thank you so much Don for your insights. That's all we have time for today. We hope you enjoyed this quick literature update.

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CUBIST is produced and edited by Deborah Bailin and was hosted today by me, Anne Bunner. It is a product of the Defense and Veteran's Brain Injury Center, led by acting division head Kathy Helmick.

Thank you for listening to this and previous episodes of our first season of CUBIST. We hope you will join us in 2018 for our second season.

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