National Federation of State High School Associations

Recommendations and Guidelines for Minimizing Head Impact Exposure and Concussion Risk in Football

National Federation of State High School Associations (NFHS)
Report from the July 2014 NFHS Concussion Summit Task Force

The National Federation of State High School Associations (NFHS) and its member associations firmly believe that athletic participation by students promotes health and fitness, academic achievement, healthy lifestyles, and good citizenship. While there will always be a risk of injury, minimizing the risk of head trauma and concussion in all sports is a priority for the NFHS. Over the past several years, the NFHS and the NFHS Sports Medicine Advisory Committee (SMAC) have:

1) Produced a 20-minute online educational course with the Centers for Disease Control (CDC) on "Concussion in Sports."
2) Specifically addressed concussion management in the rules books of all sports, including football.
3) Written several Points of Emphasis in the football rules book focused on limiting helmet-to-helmet contact and blows to the head with the shoulder, forearm, and hand.
4) Disseminated multiple publications regarding concussion management to the member state associations.

In July of 2014, at the request of the NFHS Board of Directors, a task force of medical and scientific experts, high school football coaches, state association personnel, and representatives of several stakeholder organizations met to discuss strategies to reduce head impacts and minimize concussion risk in high school football players during contests and practices, as well as during activities conducted outside of the traditional fall football season (spring and summer practices). The Fundamentals outlined below represent the task force's recommendations and guidelines developed following two days of presentations and discussion of the relevant medical literature and current expert opinion.

The members of the task force fully acknowledge the present limited – though evolving – scientific evidence available to support the Fundamentals outlined below with absolute certainty and explicit detail. Accordingly, the outcomes and clinical relevance of an increasing number of research studies may eventually alter these recommendations and guidelines. Ideally, this emerging data will clarify the potential for long-term adverse cognitive, emotional, and/or neurologic effects from concussions and repetitive blows to the head that may not result in the clinical symptoms of concussion. Based on what is currently known, the guiding principles in developing this report for young athletes and those who oversee, support and administer high school football programs were to reasonably limit overall

exposure to multiple blows to the head and body (*head impact exposure*) and minimize concussion risk, while maintaining the integrity of the game and attempting to avoid unintended consequences.

The Fundamentals below are designed to allow flexibility for the state associations that collectively oversee the more than 15,000 high schools playing football across the country. The teams fielded by these schools may vary tremendously in the number of available players. Team size dictates numerous variables that may affect an athlete's potential head impact exposure. Those variables cannot be easily accounted for by stringent guidelines. For example:

- An athlete playing on offense, defense and special teams will have greater cumulative head impact exposure and will be at higher risk for injury than an athlete playing a single position.
- The fewer the number of players on a team, the greater the chance some players will need to participate in repeated drills, raising head impact exposure and potential injury risk.

As additional evidence emerges, these Fundamentals will evolve and may become more or less restrictive. While the current level of knowledge keeps this task force from making proposals that are specific and rigid, there is consensus that lessening the frequency of contact (and thus head impact exposure) is likely beneficial to overall brain health. The task force also recognizes multiple contributing factors that affect head impact exposure and the parallel effects on an individual football player's brain. For example:

- Position played (linemen receive more total blows than other positions)
- Two-way players versus those who only play offense or defense
- Tackling and blocking techniques
- Practice frequency and duration
- Players that practice and/or compete on multiple levels (such as varsity and sub-varsity)*
- Concussion history
- Genetic predisposition to concussion

***Note:** *This contributing factor was added to the document by the NFHS SMAC.*

It is very likely that each athlete has a unique level of resilience or susceptibility to concussion and further brain injury. While there is currently no definitive way to measure or quantify this resilience or susceptibility, the task force recommends reasonably limiting head impact exposure through the Fundamentals presented below. Individual risk factors that are modifiable, such as position played, total time spent on field, and sport technique, must be also considered when implementing contact limitations.

Fundamentals for Minimizing Head Impact Exposure and Concussion Risk in Football

1. Full-contact should be limited during the regular season, as well as during activity outside of the traditional fall football season. For purposes of these recommendations and guidelines, full-contact consists of both "Thud" and "Live Action" using the USA Football definitions of *Levels of Contact*.

> ***Rationale:*** By definition, "Thud" involves initiation of contact at, or up to, full speed with no pre-determined winner and no take-down to the ground. Accordingly, the task force supports that initial contact, particularly with linemen, is just as violent with "Thud" as with "Live Action." However, the task force also recognizes that "Live Action" likely carries a higher risk for other

injuries to the body than does “Thud.” The USA Football *Levels of Contact* “Air,” “Bags,” and “Control” are considered no- or light-contact, and thus no limitations are placed on their use.

2. Member state associations should consider a variety of options for limiting contact in practices. The task force strongly recommends full-contact be allowed in no more than 2-3 practices per week. Consideration should also be given to limiting full-contact on consecutive days and limiting full-contact time to no more than 30 minutes per day and no more than 60-90 minutes per week.

Rationale: The task force acknowledges that there are insufficient data to specify with certainty a research-validated “best practices” standard for contact limitations. Several states (Alabama, Arizona, Maryland, and Texas) adopted varying limitations on contact prior to the 2013 football season. Preliminary *High School RIO* injury surveillance data suggest these states have seen a statistically significant decrease in concussion rates during practices, with no increase in concussion or other injuries during games.

3. Pre-season practices may require more full-contact time than practices occurring later in the regular season, to allow for teaching fundamentals with sufficient repetition.

A. Pre-season acclimatization protocols and regulations regarding heat and hydration take precedent and should always be followed.
B. While total full-contact practice days and time limitations may be increased during the pre-season, the emphasis should focus on the proper principles of tackling and blocking during the first several practices, before progressing to “Thud” and “Live Contact.”

Rationale: The task force acknowledges regular season practice limitations may need to be revised during the pre-season. This should be done in a specific and systematic manner to allow coaches to spend sufficient time teaching proper tackling and blocking techniques. Emphasis should be placed upon inexperienced players, as they slowly work through tackling and blocking progressions with “Air,” “Bags,” and “Control” using the USA Football definitions of “*Levels of Contact.*”

4. During pre-season twice-daily practices, only one session per day should include full contact.

Rationale: The adolescent brain needs sufficient recovery time following full-contact practices. In addition, concussion signs and/or symptoms may not develop for several hours after the initial injury.

5. Each member state association should review its current policies regarding total quarters or games played during a one-week time frame.

***Rationale*:** *High School RIO* injury surveillance data consistently show that competition presents the highest risk for concussion. The task force is concerned that participation in games at multiple levels of competition during a single week increases risk for head injury and unnecessarily increases head impact exposure. In addition, games played on consecutive days or those scheduled on the same day (Freshman and Junior Varsity games or Junior Varsity and Varsity games) may not allow the brain an opportunity to adequately recover. Consideration should be given to moderating these situations as much as possible.

6. Consistent with efforts to minimize total exposure to full-contact, head impact exposure, and concussion risk, member state associations with jurisdiction over football outside of the traditional fall football season should review their current policies to assess if those policies stand in alignment with the Fundamentals discussed within this report and, if needed, modify the policies accordingly.

> ***Rationale:*** Football played outside of the traditional fall football season presents an opportunity for learning, physical activity, and skill development. However, athletes are at further risk for head impact exposure and concussion during any full-contact activity. Consideration should be given to significantly limiting the total time of full contact. Other factors to consider include time elapsed since the previous football season and whether individual athletes have recently been, or are currently, participating in other contact/collision sports (e.g., Ice Hockey, Lacrosse, Soccer and Wrestling).

7. Each member state association should reach out to its respective state coaches' association on designing and implementing a coach education program that appropriately integrates youth, middle school, and high school football programs in every community. USA Football and the NFHS Fundamentals of Coaching courses should be the primary education resources for all coaches. Education for coaches should also include the proper fitting and care of helmets.

> ***Rationale:*** The game of football continues to evolve and proper coaching technique at each level is fundamental to keeping the game safe and enjoyable. A proper fitting helmet may help decrease, but not eliminate concussion risk.

8. Each member state association should regularly educate its schools on current state concussion law and policies and encourage schools to have a written Concussion Management Protocol. Schools should also be encouraged to share this information with coaches, parents, and students annually.

> ***Rationale:*** Many schools experience frequent turnover of Athletic Directors and coaches. Frequent "refreshers" on state concussion laws and policies as well as sample concussion management protocols should be made available to ensure all schools are current on, and prepared for, safe and effective concussion management.

9. An Emergency Action Plan (EAP) with clearly defined written and practiced protocols should be developed and in place at every high school. When possible, an athletic trainer should be present at all practices and games.

> ***Rationale:*** An effective EAP should be in place, as a prompt and appropriate response to any emergency situation can save a life. The EAP should be designed and practiced to address all teams (Freshman, Junior Varsity, and Varsity) and all practice and game sites. An athletic trainer is a key component in any strategy to minimize injury risk and optimize safety for all participants.

Resources:

Bailes JE, Petraglia AL, Omalu BI, Nauman E, Talavage T. Role of subconcussion in repetitive mild traumatic brain injury. *J Neurosurg*. 2013 Nov;119(5):1235-45.

Breedlove EL, Robinson M, Talavage TM, Morigaki KE, Yoruk U, O'Keefe K, King J, Leverenz LJ, Gilger JW, Nauman EA. Biomechanical correlates of symptomatic and asymptomatic neurophysiological impairment in high school football. *J Biomech*. 2012 Apr 30;45(7):1265-72.

Broglio SP, Cantu RC, Gioia GA, Guskiewicz KM, Kutcher J, Palm M, Valovich McLeod TC. National Athletic Trainers' Association position statement: management of sport concussion. *J Athl Train*. 2014 Mar-Apr;49(2):245-65.

Broglio SP, Martini D, Kasper L, Eckner JT, Kutcher JS. Estimation of head impact exposure in high school football: implications for regulating contact practices. *Am J Sports Med*. 2013 Dec;41(12):2877-84.

Broglio SP, Eckner JT, Martini D, Sosnoff JJ, Kutcher JS, Randolph C. Cumulative head impact burden in high school football. *J Neurotrauma*. 2011 Oct;28(10):2069-78.

Davenport EM, Whitlow CT, Urban JE, Espeland MA, Jung Y, Rosenbaum DA, Gioia GA, Powers AK, Stitzel JD, Maldjian JA. Abnormal White Matter Integrity Related to Head Impact Exposure in a Season of High School Varsity Football. *J Neurotrauma*. 2014 Jul 14. [Epub ahead of print].

Urban JE, Davenport EM, Golman AJ, Maldjian JA, Whitlow CT, Powers AK, Stitzel JD. Head impact exposure in youth football: high school ages 14 to 18 years and cumulative impact analysis. *Ann Biomed Eng*. 2013 Dec;41(12):2474-87.

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