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A Statement by Nicholas H. Wright, M.D.

For Presentation to the Mount Greylock Regional High School Committee on Nov 15@7 p.m.

“Concussion: The case for Yet More Prudence and Primary Prevention in High School Athletics”

Good evening.

My name is Nicholas Wright, and I am a retired physician who specialized in epidemiology. Epidemiology is the study of disease and disability in human populations, rather than individuals. Its focus is on prevention and health policy.

Since moving to Williamstown in 2000, I have taught a Winter Study Course at the College entitled “Epidemiology, Public Health, and Leadership in the Health Professions”. In each of the times I have taught the course, we have included a seminar on athletic health.

These seminars review original athletic health literature, whose quality has improved greatly since the 1990s. A main objective of much of this early literature, however, appears to have been to suppress concern over athletic injuries, especially concussion, which then was called MTBI, or mild traumatic brain injury. On the field and locker rooms, they were “dings” and “bell ringers”.

My message tonight is that concussive and sub-concussive blows to the head are far from a “mild” problem. The more recent medical and public health literature suggests that these blows are a serious problem and are inimical to the goals of education. Although surely well-intentioned, some of our current policies, even faithfully implemented, as they are at MGRHS, still leave significant numbers of high school students at serious risk of brain injury.

One difficulty in appreciating the full extent of concussive and sub-concussive brain damage is that this is--for the most part-- an **epidemic in slow motion**. Boxing presented no such difficulty in connecting the exposure---blows to the head---with the outcome---“dementia pugilistica”. As a result, boxing was progressively dropped from the amateur sports “menu”.

In the case of brain damage associated with other sports, long term (and expensive) prospective observational studies will be needed to attempt to dot all the i’s and cross all the t’s, and we may have to wait for another decade or two for definitive results. In effect, with regard to concussive and sub-concussive blows to the head and their causal relationship to premature dementia, depression, and other adverse neuro-cognitive outcomes, we are where the tobacco and cancer story was in the mid to late 1950s, when the tobacco companies were still claiming that any relationship to multiple cancers was a “mere statistical association”, i.e., not causal.

Let me summarize briefly [what we do know](#):

1. The descriptive epidemiology of serious athletic injuries is [available from a 15-year \(1988-2003\) surveillance study](#) done by the NCAA, vetted by the U.S. government Centers for Disease Control and Prevention (CDC), and broken down by type of injury, gender, and sport. (1) Looking at the big picture, this massive data base shows no important trends in injury rates, **except for concussion, which increased 7 % over the period.**

It will not come as a surprise that this and other data (2) show that the biggest outlier for rates of concussion is football. The scale of the difference with other sports, however, is surprising. If we consider men's sports in two high school data sets, and, on a scale of 1 to 100 assign the concussion rate in football as 100, wrestling comes in at about 30, basketball at 25, and baseball at 10, i.e., with a rate of concussions 90% lower than football. These large disparities of risk are not well-appreciated and have implications for athletic policy. For example, if baseball delivers effectively all the social benefits we attribute to sport, i.e., self-confidence, team play, competitive spirit, etc., as well as any other sport, why sponsor a much riskier sport like football at the high school level?

2. A [cross-sectional study was commissioned by the NFL](#) and implemented by the U.Michigan Institute for Social Research. [Leaked to the NYTimes in 2009](#), the unpublished report suggests that in a sample of former NFL players with a history of 3 or more concussions, dementia is over 10 times more common before 50, and 5 times more common after 50 than expected in the general population of men of comparable age.(3)
3. A recently published study from the Mayo Clinic (4) indicates that chronic traumatic encephalopathy (CTE), the lesion identified by Dr.Bennet Omalu in the brain of the Pittsburgh Steeler, Mike Webster, is a useful marker for contact sports exposure. However, its natural history remains unclear, as it cannot be visualized in the brain of living subjects. **But it is very important to note that CTE has been found in the brains of football players who never played beyond the high-school level.** In other words, this brain lesion is not exclusively found in professional football players.
4. Age at first exposure (before 12) to repeated head trauma in tackle football has been shown to be associated with greater later-life cognitive impairment using objective neuropsychological tests.(5) **With an estimated 4.8 million youth football players in the US incurring an average of 240 (up to 585) head impacts per season, the public health implications are enormous.**
5. Yet another study with 93 former high school and college players links an estimate of CHII (cumulative head impact index, developed from history and helmet accelerometer studies) with statistically significant declines in later life cognitive impairment, self-reported executive dysfunction, depression, apathy, and behavioral dysregulation. (6) In this study, the CHII demonstrated greater predictive power than other measures of head impact, including documented concussions.
6. How common is head impact in football? Far more common than you might think. In a four season study of just 95 high school football players, the U.of Michigan's Neurotrauma Research Laboratory, using the Head Impact Telemetry System, registered 102,000 impacts collected across 190 practice sessions and 50 games. **In a 14 week season, the average player sustained 652 impacts. For linemen, the average was 868. (7)**

How have we tried to respond?

The 'iron curtain' of denial of any relationship between concussion and later pathology still persists in many corners, but changes have come, some mandated and some voluntary. Contact in football practice has been reduced in many places by new rules, and **risky behavior on the field is punishable by new rules, although enforcement at the NFL and the more competitive NCAA levels of football seems disappointingly irregular.** Formal, vetted studies of the effects of these changes are still not available at the high school level. It must also be recognized that, as with textbooks, mandated changes and consensus statements lag well behind the research.

Additionally, 'return to play after concussion' protocols have been established, and are increasingly applied---as secondary prevention---provided that concussions are recognized /reported. But reporting and recognition are a major problem, as multiple studies suggest a reluctance to report, especially if the football player believes that the coach will not be interested in hearing the report. And players also want to stay with the team, and not be removed from play. **Some studies suggest that only as few as 5% of concussions are reported at the sidelines. And what then of the sub-concussive blows, which many believe are critical to the evolution of CTE and later cognitive problems, especially in more vulnerable, younger players?**

There are additional reasons for thinking that the return to play after concussion protocols cannot work anywhere near as effectively as hoped. Before and after clinical evaluation by medical professionals is known to be imprecise. The precision of before and after more objective neurocognitive testing is also subject to significant error in trying to make a correct call that the player is ready to return to play, much less "recovered". Finally, that we know so little of the natural history of CTE does not keep enthusiasts from claiming that the return to play after concussion protocols have averted prospective brain damage. Such claims are irresponsible, and have no firm basis in the epidemiological or clinical evidence. Beyond perhaps preventing the thankfully rare complication of "second impact syndrome", it is clear that the return to play after concussion protocols protect the game and the sponsoring institution more than the players.

Largely missing from the literature---and I find this glaring--- are comprehensive studies of "returning to learn after concussion", despite plentiful anecdotes about chronic headache, visual disturbance, weeks in dark rooms, and academic "adjustments", presumably allowing the injured player to get through the academic year and/or graduate on time.

Doesn't this suggest that we should re-evaluate our priorities with regard to the health of our "scholar-athletes"?

Where does all this leave us?

Again, while all the causal i's have not been dotted and t's crossed, **there is a growing understanding that repetitive brain trauma in sport can lead to CTE and, later, chronic cognitive and behavioral issues.** Young athletes are thought to be at higher risk, and although football is not the only cause of the problem, it is a major contributor.

The three Ds (deny, defer and delay) have been prevalent for some time, but we are finally, although still timidly, taking some partial steps to reduce the violence, especially in football. However, the prevalent secondary prevention measure, "return to play after concussion", as discussed earlier, cannot provide effective protection for young athletes. In sum, then, **to date we have made only token changes to keep our children from harm's way.**

Some of these concerns may account for the editorial in the *New York Times* ("[Head Trauma Haunts the Gridiron](#)", Oct. 16, 2016) that reported that **perhaps up to 800,000 parents have withdrawn their sons from the pee-wee football leagues over the past few years.** However, the same report tells us that 2.2 million youngsters 6-14 still participated in these leagues last year. I know of no estimates on trends in high school football participation rates, although some high schools have given up football, allegedly because their student populations were too small to support the game.

It was forcefully suggested by an NFL operative in the film "Concussion" that one of the NFL's greatest fears was the erosion of the football "feeding chain" that begins in the youth leagues. These fears have played out in NFL ads during professional games over the past two seasons. More recently, the ads announce a "Play 60" youth-oriented activity so that thousands of kids would "learn the values of the NFL on and off the field". Late last year, but apparently not seen again this year, there was a brief suggestion of a "flag" football league for youngsters.

Following that ironic lead from the NFL, and remembering that football's original rules are not inscribed in stone and in fact have been changed regularly since Walter Camp drafted them in 1876, **we might do the same prudent service for our 14-17 year old boys by suspending football after the current season, and, at the same time, challenging the Massachusetts Interscholastic Athletic Association (MIAA) to develop a new "flag" football league for Massachusetts.** Certainly, and given the evidence in front of us, no high school that is committed to be, in your chairwoman's vision as a "house of learning for our community of learners" can continue to preside over sports that carry an undue risk of damaging brain power. **Increasingly, this is an ethical matter.**

It is my personal opinion that, at the youth league and high-school level, **this is football's last chance.** There are already reports of class action lawsuits against the Pop Warner Leagues, and high schools will follow. Athletic insurance costs are bound to increase.

If the MGRHS Committee elects to appoint a working group to evaluate athletic health policy for all the other high school men's and women's sports, I will do my best to help. The Committee is welcome to attend my seminar on athletic health this January, and I will inform Ms. Greene of the date, time and place, when that is set.

Thank you for the opportunity to speak to you.

There may be time for a few questions.

■ END OF PREPARED REMARKS

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Nicholas H. Wright, retired from [Robert Wood Johnson Medical School](#) in 2000. In his working life following NYU medical school and a degree in Public Health at the University of Michigan, he was an EIS Officer (1963-66), and then, with the Population Council (1966-1976) a resident consultant to the Governments of Thailand and Sri Lanka, in the development, execution and evaluation of their national MCH and fertility control programs. While a faculty member at R.W. Johnson Medical School, he consulted widely in MCH and fertility control issues for USAID, World Bank, Asian Development Bank, the governments of Sweden and Sri Lanka, and also several NGOs. Wright also spent a sabbatical year as advisor to the Thai Field Epidemiology Training Program. A Williams College graduate, he lives in Williamstown.

In retirement, he teaches a course for undergraduates at Williams College, "Epidemiology, Public Health and Leadership in the Health Professions" and is currently seeking Field Epidemiology Training Program Summer externships for the brightest and best motivated of his students. He also grows ambrosian pears in a small orchard.

RELATED LINKS SUPPLIED BY BILL DENSMORE:

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