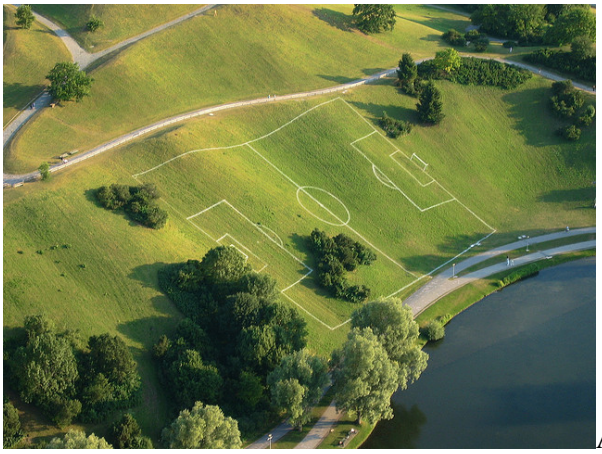
Concussion, risk assessment, and practical steps to reform: Learning from the Hugo Lloris example

21 Nov, 2013

By Dr. John Orchard (@DrJohnOrchard)



Another month in professional sport and we have another (few) concussion management controversies in multiple sports and multiple countries. Although we respect the fundamentals of the original van Mechelen injury prevention paradigm [1] it is clearer than ever that "real-world implementation" is at least half the battle [2].

This BJSM Blog [3 4] and multiple newspaper columnists on both sides of the Atlantic have tipped a bucket on the Tottenham manager Mr Villas-Boas' apparent actions in overriding his medical staff and allowing the concussed goalkeeper Hugo Lloris to return to the field in a Premier League match. However as a departure from the Zurich guidelines [5], it was *not* an isolated incident, simply the most blatant disregard for them in the last few months given that the player was incontrovertibly unconscious and amnesic.

Bearing in mind the lesser degrees of certainty (but high degree of probability) the following additional teams (at least) stand somewhat accused of letting potentially concussed players continue in the game in the time since the Zurich meeting: along with Tottenham, EPL teams Arsenal , Everton, Stoke and probably the majority of the league; the Australian Rugby Union , NSW Waratahs team; the South Sydney & Canberra Raiders NRL teams; the Leeds Super League team; the South African and South Australian cricket teams; and probably the entire NFL.

When one team or doctor isn't following the 2013 Zurich guidelines you can put it down to intransigence or incompetence. When there is a widespread failure to adhere, then the office-based experts need to look further as to why the coalface implementers aren't complying.

Let's try to **estimate** some of the risks related to the Tottenham / Lloris incident:

(1) The additional risk that by staying on, Lloris would have suffered a **second head injury** with a **catastrophic** outcome – probably in the vicinity of **1 in 500** to **1 in 5000** (i.e. higher

than baseline but possibly still a risk that a professional athlete might find acceptable, even when assessing the risks whilst not concussed!). It is worth noting that our assessment of the likelihood of this risk (i.e. very low but possible) hasn't changed in recent years.

(2) The additional risk that by staying on and suffering further incidental contact (on this and other occasions) that the player might suffer a **premature neurodegenerative condition** such as Alzheimer or motor neuron disease – possibly in the vicinity of **1 in 20** to **1 in 200** although these odds are not well known and the lag time is probably **10-30 years**. However this is the additional risk which we now appreciate is much higher than what we thought a decade ago. It is why the 2013 publication of the 4th Zurich Concussion in Sport Guidelines are more conservative than the first.

(3) Let's compare the risk that the manager, Andre Villas-Boas, will get **sacked** at some stage during the 2013-14 season – possibly in the vicinity of **1 in 3** to **1 in 5**. Although he may not be doing these actual calculations in his head, let's assume that he thinks or realises that these odds will increase if his team loses the game against Everton, and that he thinks or realises that the chances of losing the game materially increase if he "wastes" one of his three substitutes on a (relatively unfatigued) goalkeeper instead of using it, like his opponents probably will, on a fatigued midfielder.

(4) Now let's compare the risk that a member of the Tottenham **medical team** will get sacked at the end of the 2013-14 season – possibly in the vicinity of **1 in 5** to **1 in 20** (demonstrably lower than the manager but far higher than a colleague working in the NHS). It's not being unrealistic to assume that this risk becomes lower if they all "stick solid" with the manager on the decision to return the player to the field and becomes much more likely if a public statement was made to the media along the lines of "the medical team requested that the player be substituted for safety reasons but the manager over-ruled us".

(5) Finally, for a player in a specialist position like the goalkeeper, the risk of losing the status and salary of being the team's first choice in this position is up there with the risk that the manager will get sacked. If he is replaced, even for half a game, it allows his understudy the chance of making a match-winning save that could mean the manager decides to make the substitution a permanent one.

So if we ask why the Zurich guidelines aren't being followed it is clear that all agents – the players, coaches/managers and even medical staff might be making 'rational' choices (see Thaler and Sunstein in 'Nudge' about 'Econs' how make rational decisions). Clearly the concrete high risks of bad outcomes in the short term (i.e. losing one's job) are greater than nebulous long-term risks to the player's future health, even though we are now certain that these long-term risks exist.

Substitution rules provide a solution

A common denominator for many of the team sports is that substitutions are limited and represent an important currency or resource that teams do not want to waste [6]. Managing concussion or suspected concussion according to the Zurich guidelines can cost teams some of this limited commodity (and potentially reduce the chances of the team winning the game).

The most restrictive of sports with respect to substitution is Test cricket, which is played over 5 days, and which only allows substitution for fielding (but not batting or bowling). Many

traditionalist cricketers are proud that this sport is the last bastion in which a fatigued player cannot be replaced by a fresh one [7]. It is a separate debate as to whether – in an age of a ridiculously cluttered cricket calendar and high rates of fast bowler injuries [8] – bowlers should be able to be 'subbed' out of Test matches to prevent injury.

It is serendipitous that Graeme Smith the South African captain, one of the traditionalists who argued the opposing case to me in a recent debate on this issue, recently suffered a concussion from being hit in the head by a bouncer in a Test match. He was not allowed a substitute at the time of this injury and continued to perform well — he scored a double century which helped South Africa level the series. However he then needed to leave the same Tour early after complaining of post-concussive symptoms. Once the dust settles on this incident, it would be pertinent to ask Smith whether he still believes that it is important that the rules of Test cricket encourage players to continue on with injuries such as concussion? He has a one year old daughter & hopefully will not suffer a neurodegenerative consequence that would stop him enjoying his retirement with his children. But if his daughter decides as an adult to herself play cricket and gets hit on the head by a bouncer, would he encourage her to sit the rest of the game out for her own safety or continue on to help her team win the match? If he now thinks that he would advise her to sit out, how would he respond if she asked why she couldn't continue to play just as he did in the Test match of 2013 against Pakistan? When and if he contemplates these scenarios, he again should be asked if it is a wise and good thing that Test cricket encourages players to ignore injury, including concussion, and stay on the field, or whether he accepts that there needs to be an elevation of safety concerns in determining the rules of cricket.

If it indeed were the case that his recent concussion has changed his views then it would be tempting to conclude that the cricket ball had actually knocked some sense into him. It is more accurate to conclude that it is not only medical staff but also rule-makers who owe a duty of care to the future health of players. The "culture" of cricket is that a player must be tough enough in a Test match scenario to push through injury. There are occasions when it becomes reckless to do so – concussion is one of them – and authority figures need to temper the player's natural desire to push through.

At the moment, players, coaching staff and even medical staffers appear to be ignoring the 2013 Zurich guidelines, but the guidelines don't prescribe consequences for doing so and recommendations as to how the widespread non-adherence can be resolved. In football, rugby league and cricket, extra substitutions (in the event of concussions) have been proposed even by the coaching staff. This would create further issues for the various sports. In football, where players are prepared to fake shin contact to be awarded penalties, it may be considered fair gamesmanship to fake a concussion in order to get the team an additional substitute. Something similar has happened before in the rugby union Bloodgate incident. But the question needs to now be asked – would it be a worse problem to have uninjured players faking that they are concussed to leave the game or to have concussed players faking that they aren't injured to stay in the game? (..given that we now appreciate that premature neurodegenerative disease is a consequence of the latter). In the Bloodgate incident, the RFU were prepared to hand out far stricter punishments than any administrative body has managed to contemplate for breach of concussion laws. Further safeguards can be instituted around "free" substitutes by prescribing minimum stand-down periods for an athlete's 1st, 2nd and subsequent seasonal and career concussions to encourage conservative management and discourage rorting of the system.

An early suggestion for the 2016 Concussion in Sport Meeting

If the next round of the Concussion In Sport Group Consensus statement (planned for 2016) actually recommended, for example, that FIFA institute an additional free substitute for a concussed player, and if other sports were to follow suit, then one of two things would happen. If the rule changes were instituted there would almost certainly be a more substantive move in the direction of safer management. If they weren't instituted then it would be the entire sport, rather than just the coalface individuals, who would be in breach of those 2016/17 Concussion In Sport Guidelines.

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Dr. John Orchard @DrJohnOrchard is an Australian sports physician, injury prevention researcher, Cricket NSW doctor, and BJSM Associate Editor.

A month is a long time in football (Dec 18, 2013)

On November 21st, I was one of three sports physicians who wrote a Blog at BJSM on the topic of concussions in football & managerial interference in medical decisions. I tried to assess the risks involved for all of the participants in the Hugo Lloris concussion incident. Perhaps controversially, I estimated that the (then) Tottenham manager, Andre Villas-Boas, had between a 1 in 3 and 1 in 5 chance of being sacked this season. Well as it turns out if I had have offered to hold bets at these apparently meagre odds I would have been taken to the cleaners, as he didn't survive the calendar year, let alone the remainder of the football season.

Which begs the question, why should someone (an EPL manager) with a job expectancy of roughly a year – give or take – have any role in decisions which may have an impact on the health of the player 20 years down the track? The answer is that of course they shouldn't, but of course they do. If there was one thing that AVB made very clear in his short tenure, it was that he and he alone decided when players were substituted off the field. Other managers have said that they respect the opinion of their medical staff, but those at the coalface know of pressure to not be "too conservative" in a cut-throat world with limited substitutions.

It's not surprising that a manager would put 'team performance' ahead of 'long-term player welfare'. (We are not pointing any fingers – we are just drawing a logical conclusion).

Did AVB's stance on concussion have a role in his downfall? I suspect not; my experience in professional sport is that managers are judged primarily on (poor) results. If Tottenham were leading the EPL then he would have been getting praised for being a strong leader who made tough decisions. Since my November blog, the Australian cricket coach Darren Lehmann has talked about batting on after being knocked unconscious by a ball the first time he batted at the WACA. No one talked about this being an inappropriate thing to say, possibly because cricket has fewer incidences of concussion but – more pragmatically – because coaches are fair game for criticism when they are losing but almost immune to criticism when they are winning. Darren Lehmann has just presided over a 3-0 Ashes win for Australia that – like AVB getting the sack – would have seemed impossible a month ago.

The 'must win' culture for coaches is unfair

The deal which coaches get – "win or else" – is unfair, but all in sport need to understand this deal and then question whether those under such ridiculous pressure to win should have the health and welfare of players in their hands? How can AVB be asked to think about Hugo Lloris' health 20 years hence when the coach might only be in the job another month? Given the manager is NOT well placed to consider a player's long-term health, how are sports administrators redressing the imbalance of power on match day between the coaching and medical staff? Note that the NFL paid out close to 800 million $US to football players who

felt their long-term health was not a club priority during their playing years. NHL players are now seeking a similar payout. (Of course the NFL did not acknowledge 'guilt' of any kind).

Is there time for doctors to make an accurate concussion diagnosis pitchside?

A further development from my Blog, but relating to a different game (i.e. NOT the Tottenham doctors) is that a team doctor who has been accused – by the press – of allowing a concussed player to stay on the field wrote to say that in the incident in question he didn't believe the player to have been concussed (despite what the press wrote). He admitted that the rules of football meant that his assessment was unfortunately a brief one on the pitch and that he supported a rule where he could more thoroughly assess the player on the sideline. Rugby Union has introduced Pitchside Concussion Medical Assessment. Doctors are thus under conflicting pressure from their teams (to err on the side of leaving the player on the field) and their medical colleagues (to err on the side of taking the player off, permanently if this is all the rules allow). It is a hard time to be a team doctor.

Legislate to be allow doctors to make additional concussion assessments and require player substitution as needed.

The bottom line is that in almost every professional sport the decisions on which players to substitute are primarily controlled by coaching staff who are forced by the nature of the job to think in the short term. Witness AVB's sacking. Doctors are in a position to think longer term with respect to a player's health later in life. The rules of sport need to change to allow doctors to have the power to make (additional) assessments and substitutes in the case of potentially concussed players.

Dr. John Orchard @DrJohnOrchard is an Australian sports physician, injury prevention researcher, Cricket NSW doctor, and BJSM Associate Editor.

Concussion: how do we reconcile risk-averse policies with risk-taking sports?

15 Mar, 2012

I have just started working in my 15th season as a professional NRL (National Rugby League, Australia) team doctor but with respect to one injury feel as uneasy as I ever have at any stage of working in sports medicine. In theory I should be more experienced and therefore more relaxed at being able to cope with what the game can throw up at me. I am worried about one of my players suffering a minor concussion in a game, which is almost certainly going to happen in the next 6-8 weeks.

I'm not worried about one of my players suffering a significant concussion, which probably also will happen. By significant, I mean either than he is knocked out (for, say, >=10 seconds) or he is disoriented and reports are coming through that he doesn't know where he is or what he is doing in the match. In this situation, the management will be simple – the player will come off the ground, I'll recommend that he doesn't come back on and the coaching staff for my team (who have a very responsible attitude towards injured players) will take my advice, with the player done for the day.

Why am I more worried about the so-called 'minor' concussion than the more serious one? Because the NRL has just brought in a rule that if a doctor assesses a player as having had a concussion (irrespective of whether he has been deemed to have recovered), then the player must not be allowed to return to play in that game. In bringing this zero-tolerance rule in, the NRL are following international trends and appearing to be doing the right thing by players. The problem is that the NRL haven't really properly defined concussion (which doesn't distinguish them too badly as even the consensus panels struggle to give a good definition) and, more importantly, haven't defined a severity cut-off. I've seen players in the NRL before get knocked out cold for 60 seconds, come off on a Medicab, and 20 minutes later return to the field. I agree that this is not a good look and in the current climate we need to stop it happening with rule changes. So there is a part of me that is happy that the regulators are trying to stamp this sort of practice out.

The part of me that isn't comfortable came out at an internal club meeting we had the other day. I told the coaching and training staff that the new official rule was that if I examined a player and determined that he had been concussed that day that, under the new rules, I couldn't let him return to the field and the club couldn't overrule me. However, it was quickly pointed out, if I didn't examine the player, then the rules would allow him to continue. I think everyone can see where this is heading. An anonymous NRL player has blatantly recorded in the Sydney papers that players will avoid doctors and lie to them to make sure they aren't removed from the field under the new rules.

Thus, I am either going to be put in one of the 3 uncomfortable positions very soon:

1. That I am going to be pulling players out of the game who I have been comfortable letting continue for many years, and possibly hurting our team's chances of winning games.

2. That I am going to turn a blind eye and not examine or fully assess a player who looks as though he is fit to continue.
3. That I am going to re-name something I used to call "mild transient concussion" something different like "traumatic migraine" so the player can be allowed to continue, even though deep down I think that the player has probably had a very mild concussion that has quickly recovered.

Over the past 14 years I have overseen about 10000 player games and have recorded approximately 250 concussions (about one in every 40 player games). I would also expect that maybe even second incident that could count as a concussion I wouldn't even see/record (i.e. a player wouldn't necessarily report symptoms to me). Of the 250 I did record, about 100 (less than half) left the field on the day, with 68 coming off for good and the other 32 being allowed to return to the game at some stage with a careful eye being kept on them by me and the on-field trainers. I am not aware of any of these players coming to long-term harm as a result of the concussions they have suffered – certainly none seemed to in the time that they were with the team.

I am aware that there is now a massive question mark over the long term effects of concussion, in that ex-footballers seem to have a higher rate than normal of erratic behaviour, including depression and suicide. The problem is whether you can pin these characteristics on concussion or simply playing professional team sport which attracts risk-taking, mood-swinging behaviour types. Cricketers are also renowned for having psychological issues post-retirement, yet the rate of concussion is very low. We obviously need some well conducted case-control studies (by well-conducted I mean where players with depression aren't prompted to remember their previous concussions any more than players who are living happily). Sadly we aren't going to get much further high quality research before we get the hysteria associated with the NFL concussion lawsuits, where retired players who have managed to blow their post-football life are going to have a crack at arguing that the concussions they received in the NFL were responsible. I'm not suggesting that they have no right to take action, but I think everyone can understand that in the absence of definitive scientific evidence that such a case will be decided by emotive arguments to a judge rather than a proven scientific link being established.

Will team doctors become the meat in the sandwich? Collision sports have rules which encourage a limited amount of violence and you win games by dominating the opposition players. If players are injured and come off the park, teams lose games. Perhaps there will be a trend for the leagues to pin the responsibility for player safety on the team doctors, yet the doctors get paid by the teams whose primary responsibility is to try to win games. One thing that the leagues can do, and which the NRL did very well last week, is crack down on high contact and increase penalties and suspensions to give a disincentive for players to tackle in such a way that concussions could result.

I was previously comfortable with a middle-ground approach to concussion – removing those who had moderate to severe symptoms from the game and watching those with mild symptoms which recovered quickly to make sure they didn't get worse or become recurrent. It is probably a responsibility of the collision sports to ensure that players with moderate or severe concussions do not return to play on the same day (but to allow for enough substitutions so that teams aren't disadvantaged by medically doing the right thing). A further dilemma for the contact sports is on how to handle the so-called 'minor' concussions where a player doesn't get knocked unconscious but has transient symptoms lasting for less than a

minute. Removing all of these players for the day is very problematic (and if it is mandated it becomes very difficult to police). No doubt it will be a major topic of discussion in the 4th concussion in sport consensus statement conference in Zurich this November.

Related BJSM Publications

International Olympic Committee's special BJSM issue – Injury Prevention and Health Protection (IPHP): Read about that here.

BJSM publication of the proceedings of the 3rd International Conference on Concussion in Sport (Zurich 2008).

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John Orchard *BA, MD, PhD, FACSP, FACSM, FFSEM (UK), is a Sports Physician, and an Adjunct Associate Professor at the University of Sydney, School of Public Health.*