Turning people into couch potatoes is not the cure for sports concussion

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INTRODUCTION

In little more than a decade, concussion has become one of the biggest issues taxing modern sport. Incidents of apparently concussed athletes in football's World Cup and in recent Six Nations' rugby matches have generated unparalleled column inches in the press, comment on social media and challenging review articles;[1] the clear suggestion is that something is wrong in sport, and young brains are at risk. With the Rugby World Cup under way, yet more scrutiny of further high profile incidents is inevitable. In the USA, heightened anxiety over sports concussion has caused participation levels to fall. Similar reactions are likely to follow in other countries.

Is this reaction justified? What is the risk of losing the proven benefits of participation in sport compared with the risks of sports concussion?

IMMEDIATE AND LATE COMPLICATIONS OF CONCUSSION

Concussions are common in contact sports. Data in rugby union suggest approximately one player per match at community level will sustain a head injury requiring medical attention,[2] with around one concussion in every 2.5 matches at the elite level.[3] Symptoms vary, and may include headache, visual disturbance and seizure. Importantly, loss of consciousness occurs in only a minority of concussions, perhaps as low as 10%.[4] Concussed athletes remaining on the field perform poorly, are at increased risk of further injury, and are susceptible to the rare but catastrophic complication 'second impact syndrome', a pathology virtually exclusive to adolescents.[5]

There is now recognition of longer term health consequences linked to concussion, specifically a form of neurodegenerative disease known as chronic traumatic encephalopathy (CTE). Originally thought exclusive to former boxers, hence formerly termed 'dementia pugilistica', more recently CTE has been reported in retired athletes from a range of sports,[6] including a single case in a former rugby union player.[7] To date, no clinical diagnostic criteria for CTE have been established; detailed neuropathological examination at autopsy remains the only means to confirm the diagnosis.[6]

TALK OF CONSENSUS, BUT FAILED DELIVERY

The increasing awareness of the health issues associated with sports concussion has led to a number of initiatives to improve concussion management, the intent being to minimise risk of morbidity while maintaining high levels of participation. Most recognisable among these initiatives are the quadrennial Concussion In Sport Group consensus meetings and statements. The most recent consensus statement, the 'Zurich Consensus' was published in 2013,[4] with the next such meeting due to be held in Berlin on 26–29 October 2016 (anticipated April 2017 publication in *BJSM* and other journals). The influence of this consensus statement can be measured by a brief review of the concussion polices of various sports organisations, which often observe early in the draft that their protocols are '*in line with the Zurich Consensus Statement*'.

However, closer examination of the concussion protocols across sport reveals that, while 'in line with Zurich', details on management vary considerably between and within sports. Further, in many instances an individual sport's concussion management policy appears directed purely at elite level participants, and overlooks the overwhelming majority participating at grass roots or amateur level. One notable exception in global sports is World Rugby and its acknowledged development of specific concussion management protocols targeted to each level of the game from grass roots to elite.

CONSENSUS IN PRACTICE

While the nature of elite sport is such that any change in side-line medical management policy requires inevitable and lengthy review, at grass roots level there should be no question that concussion management should be common across all sports. At this level, without pitch-side sports and exercise medicine specialists and likely no health professionals at all, the core message is 'if in doubt, sit them out'.

Recognising this, in Scotland a multisector, multiagency, multisport group joined to draft a single set of universal guidelines for concussion recognition and management at grass roots level, for all sports and activities. This landmark collaborative document was endorsed by the multiple associations and institutions representing over 50 sports in Scotland and the Scottish Government. The document guides concussion management across all sports, and spells out a graduated return to play protocol (table 1; Scottish Concussion Guidance —see online supplementary material).

RECOGNISING AND MANAGING RISK PROMOTES ENGAGEMENT

With an estimated annual healthcare cost of £7.4 billion in the UK attributable to physical inactivity,[8] regular participation in sport must be promoted. Although not everyone will win an Olympic gold, everyone can win through sport, which improves health and well-being, yielding benefits to at least 40 chronic diseases. However, these unquestioned benefits must always be balanced against risks through participation. Failure to respond with pragmatic, cross-sports, coordinated information and advice on safe concussion management will promote confusion and anxiety over the infrequent but, nevertheless, significant consequences of the injury. Such concern has the concomitant danger of causing disengagement with sport, particularly at grass roots level.

The Scottish initiative demonstrates that working with a range of partners across sports and agencies to produce a common voice and guidelines on concussion is feasible and, through this unified approach, the undoubted benefits of participation in sport and physical activity can continue to be promoted for all ages and abilities, backed up by robust and informed guidance on safe injury management.

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Table 1 Scottish concussion guidance graduated return to play protocol

Stage	Rehabilitation stage	Exercise allowed	% Maximum heart rate	Duration	Objective
1	Minimum rest period	Complete body and brain rest			Recovery
2	Light exercise	Walking, light jogging, swimming, stationary cycling or equivalent No resistance training, weight lifting, jumping or hard running	<70	<15 min	Increase heart rate
3	Sport-specific exercise	Simple movement activities for example, running drills Limit body and head movement NO head impact activities	<80	<45 min	Add movement
4	Non-contact training	Progression to more complex training activities with increased intensity, coordination and attention for example, passing May start resistance training NO head impact activities	<90	<60 min	Exercise, coordination and skills/tactics
5	Full contact practice	Normal training activities for example, tackling			Restore confidence and assess functional skills by coaching staff
6	Return to play	Player rehabilitated			Return to play

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REFERENCES

1 Kirkwood G, Parekh N, Ofori-Asenso R, *et al*. Concussion in youth rugby union and rugby league: a systematic review. *Br J Sports Med* 2015;49:506–10.
2 Roberts SP, Trewartha G, England M, *et al*. Incidence and nature of medical attendance injuries in English community rugby union. *OJSM* 2014;2.
3 England Professional Rugby Injury Surveillance Project Steering Group. *England professional rugby injury surveillance project: 2013–2014 season report*. Twickenham: 2015 Rugby Football Union, 2015.
4 McCrory P, Meeuwisse WH, Aubry M, *et al*. Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *Br J Sports Med* 2013;47:250–8.
5 Thomas M, Haas TS, Doerer JJ. Epidemiology of sudden death in young, competitive athletes due to blunt trauma. *Pediatrics* 2011;128:e1–8.
6 Smith DH, Johnson VE, Stewart W. Chronic neuropathologies of single and repetitive TBI: substrates of dementia? *Nat Rev Neurol* 2013;9:211–21.
7 Stewart W, McNamara PH, Lawlor B, *et al*. Chronic traumatic encephalopathy: a potential late and under recognized consequence of rugby union? *QJM* 2015.
8 Public Health England. *Everybody active every day: an evidence-based approach to physical activity*. Public Health England, 2014.