IMPLEMENTING A WORLDWIDE CONCUSSION PROGRAMME

THE WORLD RUGBY STRATEGY TO SECURE PLAYER WELFARE

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World Rugby, formerly known as the International Rugby Board, is the global governing body for Rugby Union, representing more than 7.2 million men, women and children playing the game across 120 national member unions, affiliated via six regional associations.

Rugby is a sport for all shapes and sizes and the variants of the game include Fifteens, Sevens (which will debut at the Rio 2016 Olympic Games), Beach and the non-contact variants of Touch and Tag.

World Rugby's governance responsibilities cover both the professional and community games and is also responsible for development of the game in emerging and new markets.

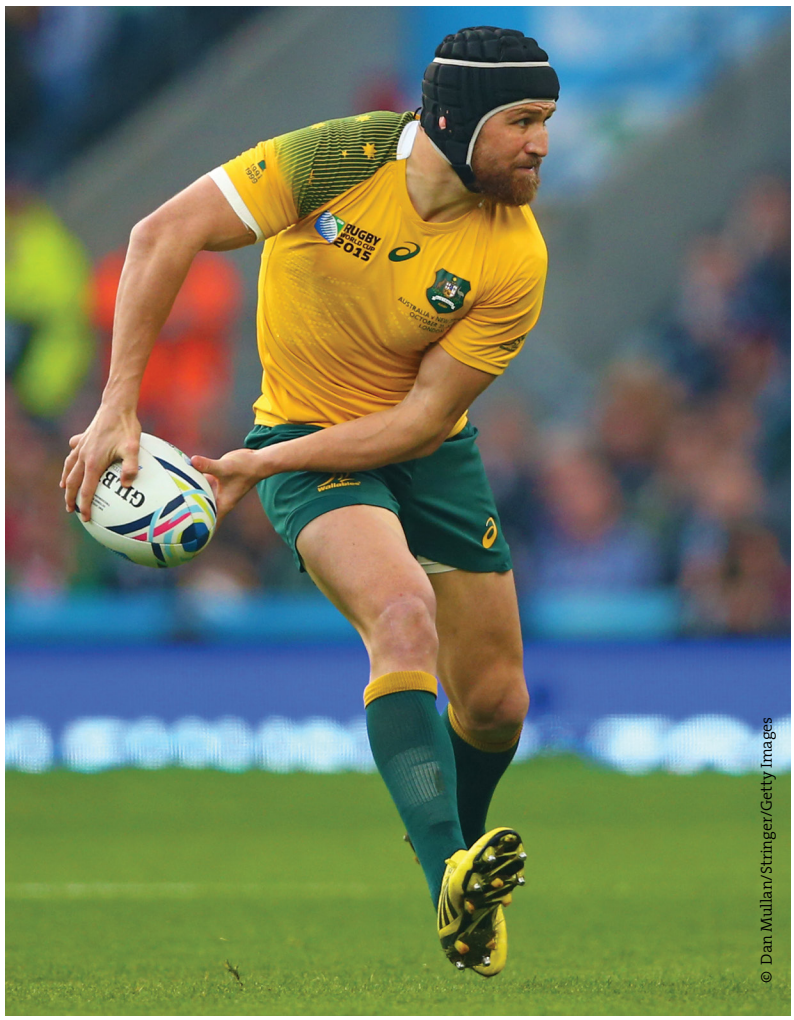
Rugby's showcase global event is the Rugby World Cup (RWC), which is one of the world's biggest and best-loved major sports events. The RWC features the world's top 20 fifteen-a-side teams, competing for the most prestigious prize in the sport, the Webb Ellis Cup. As one of the largest single-sport tournaments worldwide, the RWC 2015 drew crowds of over 2.4 million fans to games, had a global television audience of 780 million and a global social media reach of more than 300 million.

World Rugby's number one priority is player welfare and this is reflected within the World Rugby Strategic Plan and confirmed by its position as the number one agenda item at all World Rugby Executive, Council and Rugby Committee meetings.

At the 2011 World Rugby Medical Commission Conference, concussion was identified as the number one medical risk in rugby. This opinion was supported by previous World Rugby research, which concluded that concussion was under-recognised[1], yet it was still rated in rugby among the top five most frequently occurring match injuries in the 2009 to 2010 season[2].

CONCUSSION INTERVENTIONS AND RESULTS

World Rugby's concussion programme is based on activities focused on the following four pillars:



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1. Education and awareness
2. Injury management
3. Injury prevention
4. Research

The key intervention in World Rugby driving the worldwide concussion programme has been the introduction of the Head Injury Assessment (HIA) in 2012. This highly visible intervention was developed primarily to improve pitch-side care for our elite athletes, but it was recognised from the outset that it would play a critical role in a public awareness programme for concussion across the entire sport.

Education and awareness

Since 2012, with the HIA as the spearhead for public awareness, World Rugby has developed written guidelines, videos and online education modules to support the dissemination of educational and awareness messages. The following interventions have been key to our public awareness programme and are available on www.playerwelfare.worldrugby.org/concussion:

- World Rugby Concussion Guidance for the General Public (in six languages) – this was developed with the support of our International Concussion Advisory Group and has been used by several other sporting federations and governments – for example, Scotland– to underpin the development of their general public education documents.
- Four Online Concussion Education Modules (in eight languages) – four different educational modules have been developed, one each for the general public, non-rugby healthcare professionals, non-elite team rugby healthcare professionals and elite team rugby healthcare professionals. To date, over 20,000 people have completed these concussion education modules, with an 83% increase in completions in the first 10 months of 2015. This material is available via: www.playerwelfare.worldrugby.org/concussion
- #RecogniseAndRemove Campaign – promoted across World Rugby's social and digital channels. The campaign features posters (in 12 languages), video, Facebook, Twitter and Instagram content that targets the general public. This campaign complements World Rugby's Rugby Ready programme – a safety awareness programme, completed over 175,000 times since its launch.
- Concussion App – in 2015 World Rugby launched its Concussion Guidance App for the general public which is freely available via: www.itunes.apple.com/gb/app/world-rugby-concussion-management/id1031517215?mt=8

In addition to these interventions, World Rugby has also introduced and enforces compliance with compulsory annual concussion education for all elite team members including players, coaches and management staff.

In total, more than 250,000 players, coaches, medics and individuals have been educated through these World Rugby interventions.

It should be noted that the above education and awareness initiatives have been implemented by World Rugby and are complemented by each Union's individual programmes.

Injury management

The key intervention strategy in injury management has been the introduction of the HIA process for the elite game. Introduced in 2012, it was initially known as the PSCA or Pitch-Side Concussion Assessment, however in 2014, the name of this pitch-side tool was changed to the HIA.

This intervention has not only provided a worldwide standardisation of pitch-side assessment of head injuries in the elite game, but it has also led a marketing programme for the World Rugby Concussion General Public Awareness Programme. Combined with the compulsory education of all team medical staff, the HIA process has raised the standard of care within rugby with respect to head injuries.

> ***The introduction of the Player Welfare Standards into the Rugby World Cup Participation Agreement has provided a mechanism for enforcing compliance with Head Injury Assessment protocols***

The key and unique levers used to assist with the introduction of – and compliance with – the HIA process are discussed later in this paper.

Completion of the online elite team concussion educational module is compulsory for access and accreditation to use the HIA. Since its development in 2012, it has been completed by over 1450 medical staff worldwide.

At the community level of the game, the introduction of a 'Blue Card' system is being trialled in two member unions. The blue card is shown by the referee to any player who leaves the field or is required to leave the field for a suspected head injury. They must receive clearance from a medical practitioner to return to play. The rationale behind this system is that it identifies to all spectators and coaches the necessity to remove a player following a head injury and highlights the necessity for medical follow-up of this injury.

Injury prevention

In 2012, World Rugby commissioned an independent safety scientist to review all rugby laws and regulations in use within the game. The goal was to confirm that safety within the sport with respect to head injuries was being maximised. This review was not limited to only identifying the existence of appropriate laws and regulations, but also included an assessment of implementation and compliance by key match officials. This review resulted in strengthening the recognition and enforcement of the laws and regulations that impact on head contact.

Research

Another benefit of the introduction of the HIA process has been the ability to identify over 600 videos related to HIA game intervention. This video library of head impacts events is currently being analysed to assist in identifying common mechanisms for HIA events. The aim of this research is to assess whether changes in rugby laws or changes in other areas within the game can be identified that will help reduce the incidence of head injuries in the sport.

Further research is also currently being undertaken into protective materials, in an effort to identify preventative interventions.

THE HEAD INJURY ASSESSMENT (HIA) PROCESS

At the 2011 World Rugby Medical Commission Conference, it was agreed that all player welfare initiatives developed must:

a) improve player welfare or safety
b) not undermine the fabric of the game
c) not be open to tactical manipulation.

With these principles as guidance, in early 2012 a working group was established to investigate and develop a side-line assessment process for evaluation and management of head injuries in the elite adult game. This resulted in the development of the PSCA tool, later in 2014, to be known as the HIA tool.

The working group consisted of medical representatives from 5 countries (all had previous experience as team doctors at the elite level of the game), a player representative, two independent (non-rugby) concussion experts and the Chief Medical Officer of World Rugby, who did not have any voting rights, but chaired these meetings.

The objective for this group was 'to investigate the available options for pitch side assessment of head injury at the elite level of the game, recognising that, at present, rugby is in a unique position in world sport, where free interchange of players for tactical or injury purposes is not allowed under the current laws and regulations'.

What appeared to be an initial impediment to the development of a pitch-side assessment for head injury, that is, no access to a temporary replacement, was to become the lever for many benefits that arose from the HIA process.

In 2012, there was agreement across the sport, including working group members, Unions, teams and medical staff, that provision of a temporary replacement player for head injury assessment was essential.

In early 2012, the World Rugby Executive Committee approved a trial law to allow temporary replacement for a head injury. This unanimous decision was obtained after review of the following information:

- Research from two independent sources, World Rugby Junior World Championship Injury Surveillance[3] and English Rugby Union (RFU) Injury Surveillance[4], which confirmed that 56% of players with a concussion returned to play following their head incident.
- Video analysis by the World Rugby Game Analysis Department, which showed that during the 2011 RWC, team doctors took on average 64 seconds to

make a decision, 'on the run and on the field', regarding a player's removal from play following a head impact event.

Obtaining a law change for temporary replacement for head injury was critical to the pitch-side HIA process, but the most important working group strategic decision was linking access to a temporary replacement for head injury to:

a) use of a standardised assessment tool (developed by the HIA Working Group),
b) compulsory education for all medical and healthcare practitioners involved in on-field head injury management and
c) compulsory participation of teams who access a temporary replacement, in a multi-national research programme.

These strategic decisions have resulted in a uniform approach to pitch-side head injury management across the world within rugby, provided the HIA Working Group with an homogenous cohort for research purposes and provided the working group with information that has allowed for ongoing improvement in the HIA process.

EVOLUTION OF THE HIA

In mid-2012, the pitch-side head injury assessment tool and process, initially known as the PSCA, but now called the HIA, was trialled in the Under 20 Junior World Championship and, following feedback regarding logistics, was introduced into elite adult rugby competitions in both the northern and southern hemispheres.

The HIA has subsequently been through three evolutionary phases and these are outlined below. It should be highlighted that in Phases 1 and 2, the temporary replacement time was limited to 5 minutes as there was concern amongst administrators that the temporary replacement might be open to tactical manipulation. This concern had been heightened by an episode of abuse of the law for temporary substitution for 'blood injuries' in 2009.

All versions of the HIA tool have been based on the Sport Concussion Assessment Tool (SCAT) 2[5] and SCAT 3[6], developed by the Concussion in Sports group. The HIA 1 (pitch-side) tool uses two distinct criteria, each requiring a different action:

- Criteria 1 – indications for immediate and permanent removal, no pitch-side assessment required
- Criteria 2 – indications for pitch-side assessment using the standardised tool.

The key differences in the 3 phases are outlined below:

Phase 1: August 2012 to July 2013

- In this period, the tool was known as a Pitch-Side Concussion Assessment or PSCA.
- The number of Criteria 1 indications was three and included confirmed concussion, convulsion and tonic posturing.
- When Criteria 2 indications were met, a 5-minute temporary replacement period was allowed for completion of the PCSA.
- The PSCA was undertaken in the medical room or at another agreed location if the medical room was too far from the field of play.
- The content of the PCSA included a symptom checklist, Maddock's Questions and tandem stance assessment.
- Post-game follow-up processes were at the team doctor's discretion using the follow-up assessment tool (SCAT 2 or computerised neuro-cognitive tool) of that team's choice.

All PSCA data was collected centrally by World Rugby and an official report (not peer-reviewed) was delivered to the working group in late July 2013. This official report identified that the number of players with a confirmed concussion remaining on the field following their injury had dropped from 56% to 12% with the introduction of this pitch-side intervention.

Following this report, Version 2 of the PSCA Tool was developed and a more rigid and rigorous post-game follow-up process introduced.

Phase 2: August 2013 to May 2014

- Version 2 of the PSCA Tool was introduced from August 2013.
- This included an increase in the number of Criteria 1 indicators from three to five with suspected loss of consciousness and obvious ataxia being added.

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- Both the 5-minute temporary replacement for head injury assessment and the assessment component of the PSCA 1 Tool remained unchanged in this phase.
- A more rigid and standardised post-game follow-up procedure was introduced with the implementation of compulsory PSCA 2 (post-game, same-day assessment – SCAT 3) and PSCA 3 (a 36 to 48 hour assessment) assessments.

In January 2014, the Phase 1 Scientific Report[7] was published in the *British Journal of Sports Medicine* authored by Dr Gordon Fuller. This scientific report:

- Confirmed the Phase 1 Official Report findings that the number of players with confirmed concussions returning to play following a concussive injury had dropped from 56% to 12% following the introduction of the PSCA process.
- Identified areas for improvement in the PSCA tool and process that were introduced in Phase 3.

In May 2014, the Phase 2 Official Report was developed by Paris University, confirming similar results to those obtained in Phase 1 Official and Scientific reports.

Phase 3: August 2014 to August 2016

- Results from the Phase 1 Scientific Report and the Phase 2 Official Report underpinned changes in the name, content and time allowed for the temporary replacement.
- Phase 3 changes introduced in August 2014 included:
  - Name change of pitch-side tool from PSCA to HIA. This name change reflected that the assessment was an assessment of a head injury, not an assessment of a concussion. The three tools were now referred to as HIA 1 (pitch-side tool), HIA 2 (post-game, same day tool) and HIA 3 (36 to 48 hour tool).
  - Expansion of Criteria 1 indicators (immediate and permanent removal criteria) from five to eleven criteria.
  - Consolidation of Criteria 2 indicators used to identify players requiring temporary replacement and side-line assessment using the HIA 1 tool.
  - Change in HIA 1 tool content – the cognitive evaluation component of the HIA was strengthened by substituting the Standardised Assessment of Concussion (SAC) for Maddock's Questions and the tandem balance test was replaced by the tandem gait test.
  - Time for temporary replacement increased from 5 minutes to 10 minutes due to increased activities required to be undertaken with the new HIA tool.

> ***The number of players with a confirmed concussion remaining on the field following their injury droppped from 56% to 12% with the intoduction of this pitch-side intervention***

In May 2014, the World Rugby Executive Committee approved an increase in time allowed for temporary replacement for head injury assessment from 5 to 10 minutes. Phase 3 research commenced in August 2014 and continues to date.

On 1 August 2015, temporary replacement for head injury moved from a trial law within Rugby Union to a permanent law.

NEXT STEPS

During the first 3 years of the HIA trial, enforcement of compliance was difficult as teams and medical staff in most instances were not participating in World Rugby tournaments and therefore were not operating directly within World Rugby's jurisdiction. The move of temporary substitution for head injury from a trial law to permanent law resulted in an opportunity to improve World Rugby's ability to enforce compliance.

This improved control over compliance was achieved in 2015 by introducing World Rugby's Player Welfare Standards into the RWC participation agreements.

Player Welfare Standards were not only unique in content, but were included in the contractual agreement between participating teams and the tournament owner (World Rugby). This resulted in the Player Welfare Standards, which covered compliance with HIA processes, being legally binding.

This intervention was a first for rugby and international sport.

The World Rugby Executive Committee initially adopted the Player Welfare Standards for RWC in 2015 and then immediately extended them to all World Rugby tournaments, and strongly recommended their adoption across all elite Rugby tournaments.

At the time of writing, the majority of elite tournaments around the world have adopted the Player Welfare Standards and the expectation is that these standards will provide a uniform player welfare standard worldwide.

The Player Welfare Standards introduced for the RWC 2015 covered more than concussion and included the following:

1. Unions must confirm that team staff are suitably qualified and fully-registered with the appropriate body in their respective medical fields.
2. Unions and team medical staff must confirm that a pre-tournament medical, mental and physical assessment has been completed on all tournament players.
3. Unions and team medical staff must confirm that cardiac screening including ECG, has been completed on all tournament players.
4. Unions and team medical staff must confirm that baseline concussion

tests have been completed on all players. As a minimum, baseline SCAT 3 is required and computer neuro-cognitive assessments are recommended.

5. Team medical staff must confirm that risk stratification for concussion is completed on all players.
6. Unions and team medical staff must confirm that concussion education for all players and team officials has been undertaken and delivered within the 12 months prior to start of a tournament or competition.
7. Team medical staff must ensure that players who meet the criteria identified in the HIA Tool and procedures for permanent removal from the field of play (Criteria 1) are removed from play and do not return to play.
8. Team medical staff must ensure that players who have sustained a confirmed concussion follow a graduated return to play protocol, as outlined in the World Rugby Concussion Guidelines.
9. Team medical staff must have completed the following online World Rugby education modules:
   - Match Day Medical Staff – www.playerwelfare.worldrugby.org/
   - Concussion Management for Elite Level Match Day Medical Staff – www.playerwelfare.worldrugby.org/concussion
   - Keep Rugby Clean (Anti-doping) – www.keeprugbyclean.worldrugby.org/
   - Keep Rugby Onside (Integrity) – www.integrity.worldrugby.org/
10. On-field healthcare team staff must have completed the Immediate Care in Rugby Level 2 course or equivalent, within the preceding 3 years.
11. Unions and teams must agree to participate in an untoward incident review process, if requested by World Rugby.
12. Team medical staff must acknowledge that the match day doctor under Regulation 15, has the final say on whether a player can access 15 minute temporary substitution for a blood injury and also if a player is not to return to play following a head injury or any other injury.

Prior to issuing the medical accreditation for the RWC 2015, the educational compliance (online modules and the 2-day Level 2 Immediate Care in Rugby course) was confirmed for all 65 team medical and healthcare professional staff who were allowed admission to the field of play during a game. In addition, 77 medical staff, providing immediate care during games, had also completed all educational requirements.

The introduction of the Player Welfare Standards into the RWC Participation Agreement has provided a mechanism for enforcing compliance with HIA protocols. The recommendation from the World Rugby Executive Committee for the adoption of the Player Welfare Standards in non-World Rugby tournaments and competitions will support compliance and underpin the highest standards of medical care for our athletes.

Conclusion

The introduction and delivery of a worldwide Concussion Programme in World Rugby has required a collective approach from all national member unions. The critical steps supporting the success of the programme worldwide included:

- Formation of a multi-national working group to develop the HIA Tool.
- Inclusion of external experts in the development of both the HIA Tool and educational materials.
- Use of the elite pitch-side HIA tool as a marketing device for a wider concussion awareness programme.
- Use of access to temporary substitution as a lever for a uniform worldwide approach to pitch-side head injury management and multi-national research.
- Recognition that review supported by research and ongoing assessment of the content of the pitch-side tool was essential.
- Introduction of Player Welfare Standards to enforce compliance with HIA protocols.
- Global public relations approach to educate players and public at all levels.

Delivering this worldwide Concussion Programme has followed the accepted business model of 'develop, implement, review, improve and measure.'

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