Lessons from Rugby Medicine
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contributors

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It gives us great pleasure to welcome you to the 2nd Edition of the Undergraduate Sport and Exercise Medicine Society (USEMS) eMagazine, on the theme of Rugby Medicine and Science. We've learnt a lot since publishing our first edition on The Female Athlete (which had over 2000 downloads!), and we hope that you enjoy this quarter’s edition as much as the last.

In our opinion, there is no better time to release this eMagazine. Fresh from the Rugby World Cup, and right in the middle of an intensely competitive Six Nations, the sport has captured the public’s imagination over the past few months. With this growing interest comes greater scrutiny on the medical practices within the sport, and this is exemplified by the vast amount of media column space dedicated to discussing concussion. More recently, the issue of tackling in underage rugby has generated fierce debate - a debate which we’re not going to try and settle in this introduction!

We are very fortunate to have several world-class contributors to this quarter’s edition including practitioners who have worked at several Rugby World Cups and British and Irish Lions Tours. We have been overwhelmed by the generosity of the sports medicine and science community in giving their time to supporting the education of undergraduates in the subject. In particular, we’d like to thank Dr Martin Raftery, Chief Medical Officer, who opened this magazine by reflecting on the success of the 2015 Rugby World Cup.

The 3rd edition of the eMagazine will be on the theme of Football Medicine, and is due to be released just in time for the UEFA Euro 2016 Championships. In the meantime, if you want to see some of the contributors for that edition speak in person, we’d encourage you to get to the Football Medicine Strategies: Return to Play Conference in London in April - it’s consistently one of the best events in the sports medicine calendar.

We hope you enjoy reading this eMagazine, and if you have any feedback, don’t hesitate to get in touch with us on social media.

Yours in Rugby,

Dr Sean Carmody and Steffan Griffin

Editors.

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Welcome to the 2nd edition of the USEMS eMagazine
I would like to begin by congratulating the founders and editors of this UK national undergraduate Sports Medicine society e-magazine. Having been involved in sports medicine for over 25 years as a private practitioner, team physician and medical administrator, I am acutely aware that education, support and camaraderie within our profession are key to continued development and expansion of our specialty.

In mid-2011, I was privileged to be appointed as CMO of World Rugby. One of my first official responsibilities was to attend the 2011 Rugby World Cup (RWC) in New Zealand. The RWC is Rugby’s showcase global event and one of the world’s biggest and best-loved major sports events. RWC features the world’s top 20 fifteen-a-side teams competing for the most prestigious prize in the sport, the Webb Ellis Cup. With 2.4 million fans in attendance, a global television audience of 780 million homes and global social reach of more than 300 million.

Despite 2011, I consider RWC 2015 as my first true World Cup as Chief Medical Officer of World Rugby. The structure and format of the Rugby World Cup results in the Tournament owner (World Rugby) working along-side of the Tournament Organiser (English Rugby – ER15). Medical risk management is also split between these two parties with World Rugby being responsible for medical risk management around governance, regulation and compliance and ER15 Medical Advisory Group led by Tournament Medical Director, Dr Simon Kemp, providing medical logistics, game day and team medical support.

Feedback from all 20 teams and team doctors has confirmed that the medical logistics and support provided by ER15 during RWC 2015 was the best ever. Having been a Team Doctor during 2003 and 2007 RWCs I can confirm that these services were of the highest order. All medical scenarios had been analysed, dissected and planned for efficient management at all stadia. Back up medical services for teams away from competition were also excellent with designated area medical officers and priority access to key medical support services being available.

From a World Rugby perspective, management of key high risk medical scenarios, including concussion, were considered to be exemplary. Of course outcomes often reflect preparation and all team medical staff deserve congratulations for their preparation that preceded their attendance at RWC 2015.

RWC 2015 was the first international sporting event to introduce legally binding education and player welfare standards. In order to obtain accreditation for RWC 2015 medical staff, entering the field of play, were required to have completed on-line education modules covering Match Day Medical Staff roles and responsibility, Concussion Education, Anti-doping and Anti-corruption. In addition completion of the 2-day, Level 2 Immediate Care in Rugby course was also compulsory.

These four on-line modules are freely available to members of your society by simply registering on http://playerwelfare.worldrugby.org/

The other key initiatives introduced during RWC 2015 included side-line and medical room video access supported by Hawk-eye technology, the provision of computer tablets loaded with software specifically developed to support Rugby’s Head Injury Assessment (HIA) process and the introduction of Independent Concussion Consultants (ICC).

The aim of the ICC was to support Team Doctors in deciding if a return to play following a diagnosed concussion was appropriate. Using eleven experts from eight countries, ICCs appointed by World Rugby provided face-to-face or video-consultations for concussive issues.

Survey of teams and team medical staff confirmed that the medical services and support provided during RWC 2015 was rated extremely high being 4.4 out 5.

Going forward a major focus for medicine in Rugby will revolve around a game-wide injury prevention program.

World Rugby has a proud history in the medical education field with the following data confirming completion of on-line education modules prior to RWC 2015.

• First Aid in Rugby – 8,573
• Immediate Care in Rugby modules – 1,034
• Concussion modules – 19,946

In addition to implementation of a game-wide injury prevention program World Rugby is committed to increasing the number of people completing on-line medical education and also expanding the medical education topics available on-line.

I would like to close by thanking the Medical Advisory Group from ER15 that included Dr Simon Kemp, Dr Mike England, Dr Andy Smith and Dr John Williams for their support in organising the highest quality medical services during RWC 2015. Thanks also go to all team’s medical staff, match day doctors and immediate care staff for their support, enthusiasm and expertise provided during this Tournament.

Kind Regards,

Dr Martin Raftery
MBBS FACSP
Injury rates in Rugby Union:
Introduction
Rugby Union is a collision sport with match injury rates at the professional level being approximately 80 – 100 injuries per 1000 match hours [1, 2]. Contrastingly, at the international level injury rates are double this (200 injuries/ 1000 match hours) [3, 4]. This roughly equates to between two and four injuries per match. Several governing bodies within Rugby Union are now routinely conducting injury surveillance year-on-year and publishing the data. From these findings priority injury problems can be identified, injury patterns over time can be determined and the impact on team performance can be quantified.

Current priority injury problems
Arguably the most talked about rugby injury in recent years is concussion. But is the media spotlight surrounding this injury overestimating the impact it is having on Rugby Union? The numbers, in particular its high match injury incidence, actually show that it is one of the priority injury problems. Incidence of concussion during matches ranges from 7 – 14 per 1000 match hours.

“These current rates of concussion are the highest we have witnessed in years.”

However, it is important to note that these rates are probably the most accurate they have ever been, in part due to World Rugby’s ‘Recognise and Remove’ campaign [5] and national governing bodies providing concussion education to those involved in Rugby Union at all levels.

Perhaps one of the less talked about rugby injuries are haematomas, which predominantly occur to the quadriceps. These almost always occur due to player-to-player contact and whilst the severity is usually low for quadriceps haematomas the match incidence is high. Therefore, medical practitioners working within rugby can expect to see a number of these each season.

Both the knee and shoulder regions have a high incidence of traumatic injuries during matches. For the knee, the medial collateral ligament (MCL) typically has a high incidence (injuries per unit of time) and prevalence (percentage of players unavailable) per season. Such injuries predominantly occur due to blows to the lateral aspect of the knee. On the other hand there are fewer anterior cruciate ligament (ACL) injuries than MCL injuries, but they have a higher prevalence as they generally result in surgery. This makes ACL injuries more severe (more days-lost per injury) than MCL injuries [6].

In terms of traumatic shoulder injuries, the acromio-clavicular joint (ACJ) is the most frequently injured part but dislocations are the most severe [7]. Unsurprisingly, the majority of shoulder injuries occur during tackles or contact with the ground, when large forces are exerted either directly onto the shoulder or onto the arm, pushing the arm into a vulnerable position that acts as leverage to load the shoulder [8].

“The importance of correct tackle technique cannot be overstated as an injury prevention measure for many shoulder injuries.”

Injury patterns over the years
There has been very little change in the priority injuries over time in Rugby Union, with concussion, quadriceps haematomas, and traumatic knee and shoulder injuries generally having the highest high injury incidence or prevalence. That said, as mentioned above, concussion rates have increased slowly, probably due to many years of underreporting. We have also witnessed a greater occurrence, and severity of, traumatic shoulder injuries in international Rugby Union. For example, during the 2011 Rugby World Cup (RWC) shoulder match injury incidence was higher than in the 2007 RWC (13 vs. 9 injuries/ 1000 match hours) [9, 10]. A similar trend was seen in the severity, with the 2011 RWC resulting in over double the mean number of days lost per injury than the 2007 RWC (44 vs. 19 days).
In international rugby the type of tournament can affect injury patterns. For example, the shoulder injury incidence was over four times higher in Autumn internationals than in the 2011 RWC (63 vs. 14 injuries/1000 match hours) [3]. There are several factors that are likely to influence these injury patterns, such as tournament schedule, substitution rates, player specific match exposure [11], and the length and intensity of pre-tournament preparation [3].

“We are also starting to see seasonal fluctuations in injury rates for professional Rugby Union, in particular injury rates appear to spike in January.”

Fluctuations in training workload between December and January may be a major contributory factor, due to rapid increases in workload after a rest period [12].

What also needs to be considered is the patterns of injuries sustained by a single player, particularly as a fifth (20%) of all injuries are recurrent injury problems. Based on our recent findings, which looked at injuries over three years for one international Rugby Union team [3], the majority of players (72%) within a squad will sustain at least one injury in this timeframe. This may not seem too surprising, however we also identified that a group of players appear particularly susceptible to injury. This ‘highly susceptible’ group (n = 10) sustained 58% (n = 107) of all injuries, with each player in the group sustaining five or more injuries. Much more work is needed before possible risk factors can be identified which prospectively distinguish between a player likely to sustain numerous injuries and a player likely to sustain only one or two. However, retrospective analysis has already enabled medical practitioners to provide targeted injury prevention strategies for players identified as being highly susceptibility to injuries.

Do injuries have an impact on performance? Injuries and team performance have long been connected, perhaps more intuitively than through evidence. However, recent work in soccer and rugby lends support to this notion.

“The specific injuries that are seen year on year are quadriceps haematoma, concussion, traumatic shoulder problems and knee ligament strains.”

It is likely that the number of recently reported concussions is a true reflection of concussion rates within Rugby Union, with previous years possibly being an underestimation. Meanwhile the severity of traumatic shoulder injuries appears to be increasing. With longitudinal injury surveillance being conducted we can identify rugby players with a high susceptibility for injury. The challenge is now to identify them before they sustain too many injuries. Injuries can have a negative impact on team performance, especially for smaller squads. Therefore, identifying mechanistic risk factors for the priority injuries that can inform injury prevention strategies and reduce injury incidence and/or severity should be of concern for all involved in rugby as it could, ultimately, have a positive impact on a team’s performance.

“Eleven year data from soccer has shown that a lower injury burden (injury incidence x mean days-lost per injury) and higher player availability [(number of matches x squad size) – total number of matches missed due to injury] is associated with higher final league ranking and greater success in European competitions [13].”

The Rugby Football Union has reported similar evidence in their annual injury report, showing a strong relationship between injury burden and league points [2]. However, having more players in a squad weakens this relationship, meaning a bigger squad is less likely to have their performance affected by injuries. This supports the need for, what pundits’ call, good ‘squad depth’, as well as emphasising the integral role medical practitioners play with regards to a team’s performance by their work to reduce injury incidence and/or severity.

Summary
In summary, the priority injuries in Rugby Union have remained unchanged for several years.
References
Wheelchair Rugby:
Wheelchair rugby, often affectionately referred to as ‘Murder Ball’ due to the aggressive, full-contact nature of the sport, originated in Canada in 1977 as an alternative to wheelchair basketball that allowed quadriplegic athletes to compete in integral roles within the team. The popularity of the sport quickly grew and by 1993 its position in sport was recognized by the establishment of the International Wheelchair Rugby Federation (IWRF), then the following year it was officially recognised as a Paralympic sport by the International Paralympic Committee (1).

The game itself is played on a basketball-style court with a white ball similar to that of volleyball. Experienced players tend to compete in purpose-built chairs with a variety of safety features and the exact specification of the chair depends on the player’s role within the game. Players new to the game can compete in a standard wheelchair, however those competing in international competitions must use a wheelchair designed for the sport as they have greater stability. The court is demarcated using cones (pylons) which show the goal line at either end of the court – a goal being scored when a player with the ball crosses the line with at least two wheels of their chair.

Each team can be composed of as many as twelve players but a maximum of four may be on the court at any one time. Each player is classified based upon their functional ability and given a point value – the total point value on the court at any one time must not exceed eight. Athletes must have some form of functional disability in both upper and lower limbs in order to take part in the sport. Players with a high functional ability will be classified with a maximum of 3.5 points and those with less ability attract a minimum of 0.5 points. During the game there is no limit to the number of substitutions that can be made, as long as the team remains within the eight point limit at any point.

Wheelchair rugby returned to the Queen Elizabeth Olympic Park in October 2015 for the inaugural World Wheelchair Rugby Challenge (WWRC) with eight international teams taking part over five days and saw Canada beating the USA to clinch the title after a closely-fought 54-50 battle in the final match. Clearly, medical cover for this event brought unique challenges in terms of both competitor and spectator requirements.

“Athletes who use wheelchairs are more susceptible to certain medical conditions than those with a full range of functional ability, for example pressure ulcers and urinary retention.”

Those athletes who have sustained a spinal cord injury at or above the level of the sixth thoracic vertebra are at risk of developing autonomic dysreflexia – a serious condition which results in acute hypertension which, if not recognised and appropriately treated, can lead to pulmonary oedema, myocardial infarction, cerebral haemorrhage and death (2).

Autonomic dysreflexia (AD) is initially trigged by a stimulus, usually noxious but not always, below the level of the spinal cord injury. Bladder distension or irritation being responsible for 75-85% of cases, with bowel related issues causing 13-19% of cases (3). However, in those partaking in sport versus those who are more sedentary, trauma is the more likely cause due to the higher risk of injury. Wheelchair rugby is a contact sport which often results in the player falling to the floor when tackled which in turn can lead to an unnoticed injury and the development of autonomic dysreflexia.

A Medic’s Perspective

Dr Natasha Beach and Mark Taylor
“Sufferers will generally complain of intense headache, blurred vision, anxiety, nasal congestion and blotchy skin above the level of the injury.”

Examination will demonstrate a systolic and diastolic BP of greater than 20mmHg above baseline, a flushed appearance and sweating above the level of their spinal cord injury. (4)

Initial treatment involves sitting the patient upright to help with orthostatic pooling of blood in the peripheries and finding the source of the stimulus. (5) Patients without a catheter are often at this point catheterised to relieve any bladder distension which may be causing the stimulus. For those patients with a systolic BP above 150 mmHg the mainstay of treatment, as well as finding the source of the stimulus and eliminating it, is immediate release nifedipine. (6)

Athletes who are susceptible to AD are aware of its consequences and thus are alert to the signs and symptoms.

“Unfortunately, the consequences of the development of raised stroke volume from the development of AD can be abused by some athletes to enhance performance in a form of doping known as boosting.”

This effect can be brought on in a variety of ways but some common methods are clamping of the catheter or intentionally breaking a toe. This ‘boosting’ is something which is not restricted to wheelchair rugby but is something that both on-site medical and anti-doping teams need to be aware of (7).

Wheelchair rugby is a sport that is growing in popularity with over forty countries taking part and matches worthy of live terrestrial TV rights. With this increase in activity, sports medicine practitioners are increasingly likely to be involved in caring for athletes both during training and competition and so need to be aware of the game itself and the medical conditions that are associated with it.
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USEMS Top 20 Sport and Exercise Medicine Resources

Following on from the last edition’s much-discussed ‘Top 20 Twitter Accounts in SEM’, Liam Newton, USEMS Committee member and physiotherapist, has compiled a list of the Top 20 resources in Sport and Exercise Medicine.

1. Brukner and Khan Clinical Sports Medicine

The overwhelming favourite of our recent twitter poll, this comprehensive text book is the complete practical guide to musculoskeletal medicine and physiotherapy, covering all aspects of diagnosis and management of sports related injuries and physical activity. With the 4th and soon to be released 5th edition having over 4 hours of online assessment and treatment videos, this book is a must for all aspiring sport and exercise medicine students and clinicians.

2. The British Journal of Sports Medicine (BJSM)

Arguably the leading journal within sport and exercise medicine, offering a multimedia portal of authoritative original research and consensus statements. Further content includes blogs, a YouTube channel, Twitter feed, podcasts, regular discussion and a detailed website. The BJSM serves 19 sports medicine and sports physiotherapy societies, so sign up to gain full access to this leading sports medicine journal.

3. Oxford Handbook for Sport and Exercise Medicine

Looking for a small, concise, sports medicine book - look no further. This handbook brings together the common problems and diagnosis in sport and exercise medicine with a focused summary of the latest strategies, management plans and evidenced based protocols. The book adopts a system-orientated layout to help manage real clinical situations including treatments, exercise benefits and epidemiology.

4. The Physio Matters Podcast (TPMP)

The first of three highly rated podcasts. The Physio Matters Podcasts lives up to its mission statement of putting big mouths and big ideas behind the microphone. The podcast delivers monthly episodes with leading figures within the musculoskeletal and sports medicine field and thus far has explored topics such as the rugby shoulder, tendons, biomechanics and pain, KT tape and exercise prescription to name a few. The podcast comes with an accompanying newsletter with all the research discussed.
The Physio Edge Podcast is the original physiotherapy and sports medicine podcasts set up with the aim to inspire, promote discussion and provide access to world leading experts. Topics include injury reduction, ACL rehabilitation, tendon rehabilitation, persistent pain amongst many more topics. More recently the podcast has started producing a wide range of resources including webinars with leading experts.

The PT Inquest podcast is the third of our podcasts comes in the form of a journal club seeking to discuss the science and evidence of physiotherapy and sports medicine research. This regular inquest explores strengths, weaknesses, and clinical implications of current research in an honest, open and critical fashion.

This textbook provides a comprehensive look at the clinical aspects of exercise physiology by thoroughly examining the relationship between exercise and chronic disease. It provides professionals and students with fundamental knowledge of disease specific pathology and treatment guidelines while also guiding readers through exercise testing and training principles.

The Aspetar Sports Medicine Journal is a print and online publication that bridges the gap between traditional scientific journal and magazine. It presents a multidisciplinary approach to athlete care with topics including sports science, sports medicine, sports surgery, sports rehabilitation and sports radiology. This FREE journal is published by Aspetar – orthopaedic sports medicine hospital where athletes are provided the highest level of treatment in state-of-the-art facilities.
9  
Grieve’s Modern Musculoskeletal Physiotherapy

Now in its 4th edition, this book bring the latest state-of-the-art research from both clinical practice and the related basic sciences, of which is most related to practitioners. The book encompasses both the peripheral and spinal aspects of musculoskeletal system, pain and motor control, neuromuscular adaptation to exercise, management of musculoskeletal disorders as well as a focus on the use of cognitive behavioral therapy. Widely seen by many as the bible of the musculoskeletal physiotherapy.

10  
Faculty of Sport and Exercise Medicine – Medical Student Exercise Prescription Booklet

A must read for medical students wanting to promote physical activity with patients with a range of medical conditions. In this series of case studies, exercise prescription in health and disease, has been written by 16 consultants, doctors and experts including Fellows and Members of the Faculty and has been edited by Dr Patrick O’Halloran and Dr Gurjit Bhogal. Full details can be found in the link provided http://www.fsem.ac.uk/training-education/exercise-prescription-booklet.aspx

11  
Twitter

The use of social media and particular Twitter within the sport and exercise medicine has grown significantly. It provides users with instant access to world leading experts discussing current topics as well as sharing a wealth of knowledge. A must for all. Check out last months issue for our Top 20 Twitter Accounts.

12  
Shadowing Clinicians

A simple yet highly valuable resource both to increase personal connections and to gain first hand experience/shadowing of front line clinicians in their day-to-day role. Got a particular sport, profession or clinical interest and want to gain some experience? A polite well worded letter or email is a great way to get the ball rolling – who knows where you could end up!
13

BASEM/USEMS Conferences

The British Association for Sport and Exercise Medicine (BASEM) provides education and support to those caring for athletes and individuals undertaking or aspiring to undertake regular physical activity at all levels. Meanwhile, the Undergraduate Sport and Exercise Medicine Society (USEMS) provides a similar role for students with an interest in sports medicine. Both BASEM and USEMS hold annual conferences exploring methods to increase physical activity, working with specific population, surface anatomy as well as lectures from leading professional within sport and exercise medicine.

14

Atlas of Living and Surface Anatomy for Sports Medicine

During clinical assessment and manual treatments, thorough knowledge of anatomy is fundamental. This comprehensive, highly illustrated atlas of human living and surface anatomy is essential for effective physical examination of sports injuries. An accompanying DVD includes illustrations of the various manoeuvres and tests used in demonstrating instability of structures. The atlas covers normal surface and living human anatomy on a regional basis in sufficient depth to facilitate effective physical examination and manipulative techniques. Full colour photographs of anatomy and skeletal parts show how to locate and identify structures.

15

The Sports Physio and Running Physio Blogs

Yes ok, technically this is two resources but we couldn’t pick one – so we have both! The Sports Physio blog is written by Adam Meakins and topics include current issues in physiotherapy as well as having a focus on the shoulder. Meanwhile, the Running Physio blog, written by Tom Goom, provides a comprehensive guide to lower limb, specifically running injuries. Both Blogs are well written, regular, honest and evidence based. A great read if heavy journals are bogging you down!

16

Physical Activity in the Prevention and Treatment of Disease

This online resource summarises up to date, scientific knowledge on how to prevent and treat various diseases and conditions using physical activity. By combining recommendations on suitable exercise activities with a description of the potential risks of physical activity for various patient groups, this handbook can comprehensively be used by anyone working with physical activity. http://www.fyss.se/fyss-in-english/
With concussion being a hot topic within sports medicine in recent years, optimal management and player welfare must be a priority of those working in sport, at any level. This website provides a range of head injury and concussion resources to suit all stakeholders. The website offers interactive modules as well as an online test. 
http://www.irbplayerwellfare.com/concussion

Following on from the success of the High Performance Training for Team Sports book, Joyce and Lewindon kick 2016 off with this gem of a book. World-class preparation and rehabilitation of the injured athlete integrates best practice in sports medicine and physical therapy with training and conditioning techniques based on cutting-edge sports science. In this ground-breaking new book, leading sports injury and rehabilitation professionals, strength and conditioning coaches, biomechanists and sport scientists show how this integrated model works in practice across the full spectrum of athlete care, from the prevention of sports injury to the assessment and treatment of injuries, and the design and implementation of effective rehabilitation programmes.

Organised by the Isokinetic group, this is one of the leading conferences within the sports medicine field. This weekend conference hosts the biggest names in sports medicine under one room and allows delegates the opportunity to listen and interact with world leading clinicians in large lecture setting, workshops and poster presentations. Topics for this years conference include: Science of RTP, RTP following ACL, shoulder and spinal injuries, reconditioning and RTP a well as RTP and the nightmare of re-injury.
Changing Nature of the Game - Is the Southern Hemisphere pulling away from the Northern hemisphere?

RWC 2015:
A reflection
Introduction
It is clear that the game of Rugby Union has changed since the inaugural RWC in 1995. The recent RWC report on the 2015 tournament provides interesting reading in this respect. The report notes when a comparison of RWC 2015 is made with RWC 1995 (a 20-year period) the following statistics are relevant:

• Ball in play per match has increased by 26 per cent
• Passes per match has gone from 201 to 282 – an increase of almost 40 per cent
• Rucks/mauls per match has nearly doubled, going up from 94 per game to 178 per game – an increase of almost 90 per cent
• Kicks per match has gone down from 59 to 39 per game
• Scrums per match has gone down from 23 to 13 with lineouts per match going down from 37 to 26.

We will discuss the relevance of these changing statistics for the game shortly but first let us acknowledge one major positive outcome of the recent RWC. That concerns the outstanding progression shown by tier 2 nations.

Tier 1 versus Tier 2 – the gap is closing
It is clear that in this RWC the tier 2 teams performed very well. For example the following statistics reflect the ever improving standing of tier 2 nations’ performances:

• the average scoring margin in tier one v tier two matches has become closer in each of the last four Rugby World Cups
• 30% more tries were scored by tier two teams against tier one teams than in RWC 2011
• 2% fewer tries were conceded in 2015 compared to 2011 RWC
• For more than half the tier two teams, their average losing margin against tier one teams in 2015 was lower than in any of the previous four Rugby World Cups
Why is this closing gap happening? One plausible reason is likely that of World Rugby’s growing involvement in assisting tier 2 nations’ programmes of development. For example, several coaches who have retired from national and professional club duty or have taken a sabbatical from such have been working in a coaching, mentoring, strength and conditioning, technical analysis role within these tier 2 nations for a number of years. Their contribution in addition to that of the local coaches and support staff have assisted in this positive development. Take coaches such as Steph Nell (South Africa) who has assisted several African Nations in their development programme over the years, Phil Davies (Wales) who has assisted Namibia, Eddie Jones (Australia) who has assisted Japan, Richie Dixon (Scotland) and Michael Bradley (Ireland) who have assisted Georgia and several others including Craig White (strength and conditioning coach) and coaches from the talent optimization programme (TOP) coach education programme of World Rugby. In addition World Rugby staff have been very active in liaising and encouraging local development programmes within the tier 2 nations. All of these no doubt have allowed tier 2 nations to thrive within the game.

Now back to the changing nature of the game. There are clear progressions listed above in terms of ball in play time, passes made, rucks and mauls as well as reductions in kicks and scrums. All suggesting that the game is now more expansive and challenging in terms of movement skills. Ball in play is an important metric and deserves a little closer attention.

Ball in Play Time
As noted ball in play time has increased over successive RWC tournaments. In the 2015 RWC the average ball in play time for pool games was 34 mins 24 seconds and during the knock out stages the ball in play time increased to an average of 37 mins 34 seconds.

“This suggests that players will require greater repeated high intensity fitness levels as the ball in play time increases.”

No doubt that this is something that the strength and conditioning coaches have taken into account in the preparation of their teams. Comparing ball in play time between 6-Nations, Rugby Championship and RWC tournaments is of interest and this tells us that there is little actual difference in ball in play time between tournaments. For example, average ball in play time from the 6 Nations in 2014 was 36 mins and 57 seconds, reflecting a similar time to that of the knock-out stages of the RWC in 2015.

Further, it was not unusual for a large player, who may well be positioned in the front row in an Irish school setting, to be expected to play in all positions in the corresponding New Zealand/Australian school. Further, the play time spent in informal rugby play was most evident on our visit. This was in stark contrast to the limited play time that we had recorded for Irish schoolboy players.

But once again the evidence from the last day of play in the 2015 6-Nations tournament causes us to pause and reflect that northern hemisphere professional players may very well have the skills set, if allowed to express them. This is ultimately a reflection in the way the game is allowed to be played.

Conservative coaching
According to the RWC 2015 report key factors associated with the southern hemisphere ability to score more tries were: “strategy, vision and skills while still maintaining a committed and effective defence”

“Are northern hemisphere coaches restraining the strategy, vision and skills of their players?”

According to the RWC report maybe so. This is once again amplified in the performance of players in the last round of the 2015 6-Nations tournament where it seemed as if the conservative shackles were discarded in the competing teams. Were game plans thrown aside with the only focus being on tries and more tries? The impact of this super one day display of rugby union in the northern hemisphere, it can be argued, begs many questions about the tactical and ultimately coaching focus of the teams that essentially reflect the mindset of the teams as guided and influenced by their coaching staff.

Summary
The recent RWC was a fascinating tournament. Obviously, one of the highlights was the performance of the New Zealand team in winning the tournament. In addition, the performance of the tier 2 nations was eye catching. Further, the changing nature of the game over successive RWC tournaments and the dominance of the southern hemisphere winning teams since 2003 has promoted debate as to the northern versus southern hemisphere differences, if such exists at all. Our brief reflections do not offer any constructive answers but do raise a number of challenging differences that seem to be emerging between the two hemispheres.

“The critical question however, is it a mindset issue or a system issue?”
Player Size

The changing nature of the game is also reflected in the size of players. For example, Ireland’s average player size has progressed from 94kg to 98kg to 104kg from 1999 to 2003 to 2015. Currently the average body mass of forwards, half-back and backs in RWC 2015 shows that backs are now heavier than the overall average of players 20 years ago (Figure 1).

![Figure 1. Average player body mass from RWC 2015 tournament (from RWC 2015 Statistical Report).](image)

Of further interest is that the average body mass of players is now relatively similar across both tier 1 and a number of tier 2 nations (Figure 2).

![Figure 2. Average body mass of teams playing in RWC 2015 tournament (from RWC 2015 Statistical Report).](image)

While Wales rank highest in body mass, the difference in average player body mass in the heaviest 10 nations is 3 kgs. Argentina and Australia display lower average body mass figures compared to other tier one nations. Thus it may be that size is no longer the dominant physical attribute in the changing game of Rugby Union at this level. One perhaps important statistic is that while forwards are relatively similar in size between the top 10 nations, the New Zealand backs average 100kgs topping the average backs body mass across all nations. In other words it seems that the All-Blacks are becoming more homogenous across all playing positions.

![Figure 3. Average body mass of backs across all teams in RWC 2015 (from RWC 2015 Statistical Report).](image)

Does this trend in the New Zealand team suggest that there is a commensurate level of skill of handling and coordination skills (both general and game specific) between forwards and backs? It does seem that the progression in terms of making the game a more expansive one seems to be southern hemisphere nation driven change. This may well reflect the differences in the way the game is played between the two hemispheres.

Hemisphere Differences

1. More tries scored in southern hemisphere regardless of tournament

In this world cup the top teams scored more tries. For example, New Zealand and Australia scored 25 tries in 7 tier one games compared to 26 tries in total for the other 8 tier one teams (WR 2015). But this is not just reflected in world cup performances. Compare the Rugby Championship of 2015 with the 2015 6 Nations: New Zealand and Australia scored 25 tries in 7 matches, while Ireland and England scored just 7 tries in 5 matches. While we are not addressing the build up to the tries here it does seem that repeated high intensity movement patterns are pre-requisites to try scoring. Thus it is reasonable to suggest that southern hemisphere teams are engaged in more repeated high intensity movement and contact activities during match play compared to northern hemisphere teams.
2. More penalty goals scored in the northern hemisphere game
Maybe Ireland can take some comfort in that during the 2014 Championship win its ratio of tries to penalty goals was similar to that of the southern hemisphere teams at 1: 0.6. Note that in general the northern hemisphere teams typically score more penalty goals than tries, the reverse of the southern hemisphere teams (Figure 5).

3. More limited and conservative approach in northern hemisphere
Of importance is the final 6 Nations tournament day in 2015 when ‘exceptional circumstances’ prevailed. Teams had to score significantly more points than normal to seek to win the championship. This resulted in a most offensive type of game as compared to the standard defensive approach that is now associated with northern hemisphere team play. Is there a message here – can the northern hemisphere teams actually play a more attacking expansive game when required?

While the northern hemisphere game trend does indicate that the game is largely defensive with kicking as opposed to running dominating and also largely narrow in focus and less expansive compared to the Rugby Championship tournament, the players when challenged may be very capable of turning the game into a more expansive offensive focus game. But that then begs the question as to why they not do so more regularly?
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Here are some unscientific reflections on this issue:

1. Periodisation of preparation and playing calendar
2. Player Skills set
3. Conservative coaching

Periodisation of preparation and playing calendar
Northern hemisphere players focus each year is on being superbly fit and match ready for the 6-Nations tournament. Indeed the previous European Championship (previously Heineken Cup) matches in January are an ideal pre-6-Nations tournament preparation for this international tournament. So far so good. But the RWC is played during the Autumn period every 4th year. Consider that the last competitive test match in the northern hemisphere occurs in the previous April with the concluding 6-Nations games. In comparison the last Rugby Championship match occurs in August of the same year. While northern hemisphere teams play ‘friendly’ pre-RWC tournament games, it is very likely that these are not the equivalent of the full-on Rugby Championship games that take place during July and August each year. The point here is that it can be argued that the southern hemisphere player is more ‘battle hardened’ when it comes to the RWC tournament compared to the northern hemisphere player, as a result of this more expansive game preparation programme. Also note that many northern hemisphere players will only be returning to first team play as a result of injuries sustained in the warm-up games when the actual RWC pool games commence. As Gabbeth (2015) has noted, it will take up to 5 weeks of incremental training to return to full training not to mind to be match fit with a number of full-intensity matches under their belts so to speak. This limits match-fit readiness in some players in northern hemisphere teams for the knock-out stages of the tournament.

Player skills set
Are southern hemisphere players more skillful compared to northern hemisphere players? This is a common question and topic of debate in social settings and also within coaching circles. The answer is not simple. It may seem that some players such as forwards from the southern hemisphere display more breadth in terms of their handling skills and indeed set piece skills but quantifying such possible differences is very challenging.

When the development system within the respective countries that make up the tier one nations is examined, it does appear the underpinning philosophy of ensuring a broad skills set during the critical stages of the player’s development will impact on the players’ overall skills-set. When a young player is empowered with a broad set of fundamental movement skills as well as basic game skills then he is likely to be better able to develop these broad and fundamental skills later in his career. These include skills such as coordination, evasion and general athletic movement skills that now seem to be so important in evading and avoiding an opponent. It has been appreciated and it is reasonable to suggest that if these athletic skills are not practiced and coached at an early age then it is likely that they will not manifest themselves later in the player’s career (Gallaghee and Donnelly 2003). Is there a hemisphere difference in coaching philosophy here?

A visit to the southern hemisphere in 2005 convinced a group of IRFU delegates that this indeed was the case. New Zealand and Australian schools’ coaches focused on a breath of general movement and game related skill development in the early years coaching development of their players.

Further, it was not unusual for a large player, who may well be positioned in the front row in an Irish school setting, to be expected to play in all positions in the corresponding New Zealand/Australian school. Further, the play time spent in informal rugby play was most evident on our visit. This was in stark contrast to the limited play time that we had recorded for Irish schoolboy players.

But once again the evidence from the last day of play in the 2015 6-Nations tournament causes us to pause and reflect that northern hemisphere professional players may very well have the skills set, if allowed to express them. This is ultimately a reflection in the way the game is allowed to be played.

Conservative coaching
According to the RWC 2015 report key factors associated with the southern hemisphere ability to score more tries were: “strategy, vision and skills while still maintaining a committed and effective defence”

“Are northern hemisphere coaches restraining the strategy, vision and skills of their players?”

According to the RWC report maybe so. This is once again amplified in the performance of players in the last round of the 2015 6-Nations’ tournament where it seemed as if the conservative shackles were discarded in the competing teams. Were game plans thrown aside with the only focus being on tries and more tries? The impact of this super one day display of rugby union in the northern hemisphere, it can be argued, begs many questions about the tactical and ultimately coaching focus of the teams that essentially reflect the mindset of the teams as guided and influenced by their coaching staff.

Summary
The recent RWC was a fascinating tournament. Obviously, one of the highlights was the performance of the New Zealand team in winning the tournament. In addition, the performance of the tier 2 nations was eye catching. Further, the changing nature of the game over successive RWC tournaments and the dominance of the southern hemisphere winning teams since 2003 has promoted debate as to the northern versus southern hemisphere differences, if such exists at all. Our brief reflections do not offer any constructive answers but do raise a number of challenging differences that seem to be emerging between the two hemispheres.

“The critical question however, is it a
References
A week in the life: during the biggest global rugby tournament
Winning versus player care

Tournament competition is always high-pressured. Regardless of whether you are a player or member of the management team, personal and public expectation always weighs heavily on every team. Everyone is looking to compete at the highest level and to give the best account of themselves and their country they represent.

"These emotional and physical pressures are multiplied exponentially during a Rugby World Cup, unequivocally regarded as the greatest tournament for our sport."

Together with personal and public expectation comes an unprecedented level of media attention.

A glance at a week in the life of the Welsh medical team will hopefully reflect what it means to manage the 31 players who were competing for the biggest prize in the sport. This reflection describes the week of the England versus Wales group match played at Twickenham Stadium.

Match day versus England

"Mid afternoon sees the players undertake a short explosive full body weights session to act as a physical primer in readiness for evening competition."

Players then have their prescribed pre-match meal and take their specified supplementation programmes. Extensive pre-match taping, soft tissue and musculoskeletal treatments are then undertaken in the dressing room.

"During the game there are two pitchside medics and a medical spotter in the coaches box."

This spotter is in addition to the unprecedented extensive live video replay system that was introduced for the Rugby World Cup. The medical spotter sits in the coaches box with an additional live replay system utilised to assist the pitchside medics in managing on-field scenarios. The first half remains a close and tense affair, with little in the way of medical incidence.

The second half unfolds and the team begins a period of attrition. Firstly a player is struck with a significant knee injury that subsequently unfolds as an Anterior Cruciate rupture, secondly there was a triple injury situation, all of which involved the Welsh team.
Preparing for the next game

Following the match, all players were appropriately triaged with onsite imaging undertaking as required. The side then made the 3-hour coach trip back to the team base in Wales. The decision to make the journey back the same evening was taken as the team had their next group match against Fiji within five days.

On arrival back to the base, all players undertook a whole body cryotherapy session at 02:00 in the morning. For the next two days a period of active recovery including soft tissue therapy, whole body cryotherapy, physical and nutritional preparation was undertaken in readiness for the match against Fiji. During these days the medical team (consisting of a sports physician, three physiotherapists and two soft tissue therapists) work around the clock to get players ready. Sadly, it is the end of the tournament for those who sustained serious injuries in the preceding game. For these players imaging, consultant reviews and subsequent surgery is discussed, organised and communicated to their club medical teams who will manage their return to sport.

The team only have two days to prepare for the match following their recovery from the previous fixture.

“It is imperative to ensure that management of training loads are robust to optimise performance while minimising injury risk.”

To aid this process the team undertakes a plethora of daily screening and data analysis.

Each morning players undertake subjective online wellness questionnaires, answering questions regarding, sleep, energy, mood, illness and body stiffness. Following this, players are triaged and treated to optimise their ability to train. During all training sessions rigorous GPS and heart rate data analysis is undertaken allowing the management team to continually analyse the team’s performance. During and on the conclusion of each session there is ongoing analysis of each player, allowing for sessions to be modified and optimised to improve performance of the team. This analysis includes input from all departments endorsing the essential team work ethic in our sport. Subsequently training times and distances are modified to reflect the levels of recovery needed from the previous game and the short period prior to next.

In this current day and age Sports Medicine and Sports Science are heavily integrated to improve both team performance and injury management.

While the tournament remained a disappointment from an injury perspective it seemed to galvanize the team, sadly the 2015 tournament ended with a loss to South Africa in the Quarter Final stages.

“The rebuilding and preparation for the next tournament in 2019 has already begun with firm aspirations of winning the greatest prize in our sport.”

Prav Mathema
National Medical Manager of the Welsh Rugby Union
Can you describe the planning that takes place in the lead up to a World Cup from a medical perspective?

There are several elements to this – the most important of which is ensuring that players coming into an International team camp/tournament are transitioned well from their Clubs. Not all of the players finished their Club domestic season at the same time. Ensuring that they all got an adequate physical and psychological rest before embarking on the intensity of World Cup preparation was important.

Also, some players needed surgical intervention between the end of the Six Nations in March and the start of the tournament in September. Discussions around the timing of these interventions, when Club and Country have a different agenda, can be challenging.

The other principal areas to ensure you get right are staff, equipment and drugs. The England Senior team normally operates in camp (at home or abroad) with 3 Physiotherapists. This is based on what we think is an appropriate ratio of 1 therapist to 10 players. Our initial WC camp, however, had over 40 players in situ and so additional Physio time was required. Equipment was less of an issue for us at a home World Cup as everything we needed was already in situ at our training base at Pennyhill Park.

“Just because they’re in a team sport does not mean that they all need treating the same. Every player had their own gym based resilience programme to work on outside of team weights sessions.”

Several of the northern hemisphere teams were unlucky with injuries during the World Cup. Do you think the timing of the tournament favours Southern Hemisphere teams?

As a squad – England compared well versus other nations from an injury incidence perspective. I am confident that this was partly due to the injury prevention and resilience mechanisms we put into place over the summer. I am also aware, however, that luck also played its part! Anyone watching our match vs. Wales would have thought that this was the most brutal tournament ever in terms of injury severity. Objective data indicates, however, that injury incidence and severity across England 2015 as a whole was broadly similar to previous World Cups.

One can argue all day over whether the current World Rugby calendar favours one hemisphere vs. another in terms of match results. In terms of injury incidence and severity – I don’t believe it does and I’ve seen no objective evidence to support that view.

Appropriate governance of any medications you stock is obviously of vital importance. Drug import regulations are different for many countries and legally, of course, are not something any doctor can afford to fall foul of!
“athletes don’t care how much you know until they know how much you care.”
Have we learnt anything new about concussion following RWC 2015?

The management of match day concussion in the tournament was always going to be an area for huge media scrutiny.

“The presence of Match Day Doctors to take contentious decisions out of the hands of Team medics was, in my opinion, a positive move. I expect this initiative to now become normal practice.”

Also, after undergoing the appropriate graded return protocol, a player could not return to match play until the decision was ratified by an “Independent Concussion Consultant” appointed by World Rugby. These Consultants were mostly Neurologists and none were affiliated to any team in the competition. This was deemed an appropriate belt and braces process to ensure that no player returned when they were medically unfit to do so.

Everyone involved in sport needs to continue to support research in the area of optimal injury management and prevention.

“Concussion is no different from other injuries in this regard. Less ill informed noisy rhetoric and more evidenced based opinion would be a good place to start!”

Can you give an insight into the anti-doping procedures that took place in the lead up to and during the tournament?

All professional rugby union players are subject to WADA Regulations in terms of doping control.

“It is therefore vitally important that Team Doctors take responsibility for ensuring that appropriate TUEs are in place for any of their squad that require one.”

Whilst any athlete his/her self is ultimately responsible for what they take (intentionally or otherwise), as doctors we have a duty to aid education in this field at all levels of sport. Our squad had frequent urine and occasional blood samples tested during the training camp by Doping Control Officers appointed by World Rugby. 2 players from each team were subject to urine testing after every game.

There were several examples of players cruelly missing out on playing in the tournament due to injury. As a physician, how do you communicate the bad news to the player?

The World Cup was of course also a potential once in a career opportunity for many of the players as well. Informing players that their tournament has ended through injury is one of the hardest parts of the job. It’s really important to be factually accurate, not to patronise and not be over emotional. Unless you’ve been an International athlete yourself – pretending you know what they’re going through will be a big mistake. That said always remember – athletes don’t care how much you know until they know how much you care.

The next World Cup is taking place in Japan for the first time. What key factors will team doctors have to take into account when planning for 2019?

I was fortunate enough to go to Japan in 2009 with England U20s for the Junior World Cup. It is a unique country and a challenge logistically due to how few of the population speak English. I’ve no doubt though that the Tournament will be fantastically well organised. With a good liaison officer we should be fine! From a sports medicine perspective – travel across time zones always presents a challenge but that could be a whole set of questions all on their own!
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We have set up a new Twitter and Facebook page to raise awareness of research, courses, conferences and career pathways into SEM. These are regularly updated by committee members to provide the latest events and projects. On the Facebook page members are also encouraged to share their own ideas and post things that they find relevant to SEM. We therefore hope to make this a platform for sharing, and for expanding the junior doctor interest in SEM.

In the coming months ECOSEP JDC will be releasing a new website containing information on Sports and Exercise Medicine postgraduate degrees, courses and conferences across Europe, as well as a forum for trainees to discuss SEM related issues. Watch this space!

Overall it is an exciting time for the ECOSEP JDC and SEM and we hope to provide a platform and guidance for you. To keep updated of our progress please follow us at -

Twitter: @ECOSEP_JDC
Facebook: ECOSEP Junior Doctors
Website: http://www.ecosep.eu/Junior-Doctors-Committee

Dean Chatterjee and Georgie Crate

We would like to thank USEMS for giving us the opportunity to promote the European College of Sports and Exercise Physicians Junior Doctors Committee (ECOSEP JDC) in this issue.

“The main objective of the ECOSEP JDC is to build a network of junior doctors and medical students across Europe of those individuals that are to be the future pioneers in Sports and Exercise Medicine (SEM).”

The committee aims to provide support and education, as well as increase opportunities for medical students and junior doctors wishing to pursue a career in SEM. The committee is made up of a group of junior doctors from different specialty backgrounds not only based in the UK but also throughout Europe. These backgrounds range from foundation training and general practice through to sports and exercise medicine training. We may all be from different specialty backgrounds, but we have the same goal of promoting SEM to those at similar points in their careers, as well as to medical students who wish to pursue this career path.

We are currently in the process of creating a UK and Europe based database of contacts that are willing to take students on for small audits and projects in SEM. As well as this, we are creating a database of SEM institutions, clinics and sports clubs who are willing to provide short electives for medical students and junior doctors to gain SEM experience. Following on from previous years we are planning to collaborate with the medical student committee at ECOSEP to run a conference/workshop at the end of 2016. This will cover basic SEM topics such as tendinopathies and biomechanical assessments of upper and lower limbs.