



England Professional Rugby Injury Surveillance Project

2012-2013 Season Report
February 2014

PREMIERSHIP
RUGBY





Executive summary

- The overall risk (incidence and days absence) of match and training injury in the Premiership remained stable during the 2012-13 season and was within the “normal range” of season by season variation seen since the study began in 2002.
- 335 training injuries that led to time lost from training and/or match play were reported in the 2012-13 season. A third of all reported injuries occurred in training (rugby skills and strength and conditioning combined), a potentially controllable environment
 - The severity of training injuries was higher than the expected normal range in 2012-13. This is likely due to the increase in incidence of more severe training injuries resulting in greater than 28 days absence.
 - The injuries that contributed most to this rise were inferior tib/fib syndesmosis injuries (high ankle sprains) and grade 2 knee medial collateral ligament injuries (MCL).
 - It is hoped that the pilot study being undertaken to capture the intensity and load of training in 2013-14 and its relationship with injury will allow better contextualisation of this change.
- A clear association between injury burden measures and team performance for the period 2006-2012 was found with a lower injury burden associated with a higher league points tally. There was also a significant interaction between injury burden and squad size, such that the relationship between injury burden and team performance decreased with each additional squad member. These findings highlight the important role that medical and fitness staff have in reducing the incidence of and minimising the time lost injuries in order to improve team performance along with the importance of an appropriate squad size.
- Concussion was, for the second consecutive season, the most common Premiership match injury. The incidence for 2012-13 was above the expected variation for the first time during the study period. It is thought that this increase is caused by an increased awareness of concussion and thus a greater focus and understanding of diagnosis. This highlights the importance of a co-ordinated concussion risk management policy. The 2013-14 IRB Pitch Side Concussion Assessment (PSCA) process is being trialled in the Premiership and LV Cup. The Injury Surveillance Group is also specifically auditing Concussion match injuries and the return to play pathway. The results of which will be available in late 2014.
- The medical/injury elements of the data collection for the surveillance project will be integrated into the new RugbySquad electronic medical record database for the 2013-14 season. This will provide new opportunities to survey illness and non time-loss injuries, deliver bespoke diagnosis specific questionnaires and better correlate training load and match injury risk.

Authored by the England Professional Rugby Injury Surveillance Project Steering Group

Chaired by Dr Simon Kemp (Chief Medical Officer RFU) and comprising, Matthew Cross (PhD Student and Injury Surveillance Project Research Assistant, University of Bath), Dr John Brooks (Ex Injury Risk Analyst and Ex Harlequins and England Saxons), Dr Colin Fuller (Risk Management Consultant IRB and FIFA), Nick Johnston (High Performance Director Worcester Warriors), Dr Tim Anstiss (RPA Medical Advisor), Mr Andy Smith (Consultant in Emergency Medicine, Mid Yorkshire NHS Trust and Premiership Rugby Clinical Governance Advisor), Aileen Taylor (Physiotherapist and Ex Injury Audit Research Assistant), Dr Grant Trewartha (Senior Lecturer, University of Bath), Sean Williams (PhD Student, University of Bath) and Dr Keith Stokes (Injury Surveillance Project Principal Investigator, University of Bath)

The content of the report is based on data collected and analysed by Matthew Cross (University of Bath)

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Background

Introduction

The Rugby Football Union (RFU) and Premier Rugby Ltd (PRL) first commissioned an injury surveillance study across the Premiership and England teams in 2002 that remains driven and directed towards the improvement of player welfare throughout the game. This report presents Premiership-wide key findings from the 2012-13 season, but participating clubs also receive individual mid- and end-of-season reports comparing their data to a Premiership average. The aim is to provide information that informs best practice guidelines at each club. The 2012-13 season results in this report are compared longitudinally with the results from 9 previous seasons' research. The RFU injury surveillance project is pivotal in both providing the baseline data needed to assess trends in injury and in guiding further investigation into injuries that are common, severe or increasing in incidence.

The methods for the RFU Injury Surveillance Project can be found at the end of this report. Supporting tables are included in the supplementary data file alongside this report.

Developments 2012-13

In line with the continued growth in interest in concussion and subsequent player management, the 2012-13 season saw the RFU introduce a concussion audit across all 12 Premiership clubs. This was introduced to improve understanding of the time course resolution of concussion in professional rugby union and includes an audit of return to play practices. Data collection for this study has been running alongside the IRB global trial of the Pitchside Suspected Concussion Assessment Tool (PSCA). Both the RFU concussion study and the IRB PSCA trial continue into the 2013-14 season, and the findings will be reported in 2014.

In a study related to the injury surveillance project, a pilot study supported by the RFU, PRL and Rugby Players

Association (RPA) was conducted in 2012-13 to compare the incidence and nature of time-loss, non-time-loss and abrasion injuries during matches played on artificial turf and natural grass. This study has been extended to a full study that will continue through the 2013-14 season.

Looking forward 2013-14

The medical/injury elements of the data collection for the surveillance project have been integrated into the new Rugby Squad electronic medical record database for the 2013-14 season. This will provide new opportunities to survey illness and to drill down on areas of specific importance through the development of bespoke data capture methods.

For the first time, in a pilot study aligned with the injury surveillance project, individual player training intensity and load will be captured from a number of Premiership clubs in 2013-14. The aim of this study is to investigate the relationship between training intensity and load and injury risk, something not yet explored within the remit of the surveillance project.

In collaboration with the RFU laws group, there will also be an evaluation of the law trial amendment to the scrum engagement sequence. This change is based on research conducted by the University of Bath on behalf of the IRB. Next season's injury surveillance report will comment upon the effect of this law amendment on scrum injury risk.

Definitions

Injury

An injury was defined as 'any injury that prevents a player from taking a full part in all training activities typically planned for that day and/or match play for more than 24 hours from midnight at the end of the day the injury was sustained'. For example, if a player was injured during a match on Saturday and he was able to take a full part in training on Monday, the incident would not be classed as an injury. If the player's training was restricted on Monday due to the injury received on Saturday, the incident would be classed as an injury and reported.

Injury severity

Injury severity was measured as time (days) lost from competition and practice and defined as the number of days from the date of the injury to the date that the player was deemed to have regained full fitness not including the day of injury or the day of return. A player was deemed to have regained full fitness when he was 'able to take a part in training activities (typically planned for that day) and was available for match selection.'

Recurrent injury

An injury of the same type and at the same site as an index injury and which occurs after a player's return to full participation from the index injury.

Injury incidence and days absence

The likelihood of sustaining an injury during match play or training is reported as the Injury incidence. The Injury incidence is the number of injuries expressed per 1,000 player-hours of match exposure (or training exposure). Equally important to the player and/or his team is how long players are absent. This is known as injury severity and is measured in days absence.

Statistical significance

A result is considered to be statistically significant if the probability that it has arisen by chance is less than 5% or 1 in 20. In this report statistical analysis has been performed for the match and training injury incidence and days absence. SPC charting has been used to show the expected limits of the system with upper and lower limits set at +/- 2 standard deviations from the mean.



THE OVERALL RISK OF INJURY IN THE
PREMIERSHIP HAS BEEN STABLE SINCE 2002

Key findings

Match injury incidence and severity

Summary of match injury risk

Match injury risk remains within the expected limits of natural season-to-season variation based on the data since 2002 (For a breakdown of incidence and severity by season see **table S1**).

Likelihood or incidence of injury

588 match injuries that led to time lost from training and/or match play were reported in the 2012-13 season compared with a mean of 678 injuries for the period 2002-12. The match incidence for 2012-13 was 73/1000 player hours. This incidence is lower than in previous seasons and likely reflects the drop off in 2-3 day injuries seen in **table S2**. 405 team matches were included in the analysis during 2012-13 equating to an average of 49 match injuries per club for the season and 1.5 injuries per club per match. This is around 6 injuries per club lower for the season than in 2011-12.

Severity of injuries and days absence from playing and training as a result of match injuries

The average severity of 25 days for an injury before return to availability for match selection also falls within expected natural variation based on data since 2002, however figure 1b shows a trending pattern highlighting an increase in the severity of match injuries for the period since 2002.

The total number of days absence as a result of match injuries for 2012-13 was very similar to the mean across the study period. The average days absence per club per match in 2012-13 was 35 (For a more detailed breakdown of injury incidence by severity type see **table S2**).

Figure 1a: Incidence rates of match injuries over the study period with mean ± 2 x standard deviation shown. Note - for a normal distribution, 95% of all data should fall between (Mean - 2 x standard deviation) and (Mean + 2 x standard deviation).

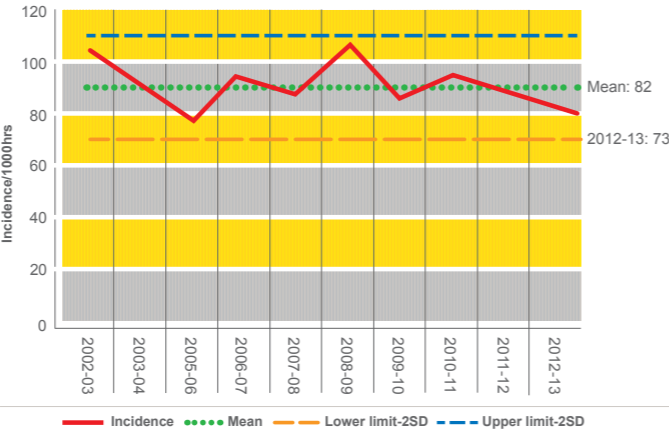


Figure 1b: Severity of match injuries over the study period with mean ± 2 x standard deviation shown



Figure 1c: Days absence/1000hrs from match injuries over the study period with mean ± 2 x standard deviation shown



Training injury incidence and severity

Summary of the Training injury risk

335 training injuries (rugby skills and strength and conditioning combined) that led to time lost from training and/or match play were reported in the 2012-13 season. This equated to an incidence rate of 2.6/1000 player hours or around 28 injuries per club per season (A season by season breakdown can be seen in **table S3**).

The incidence of injury in training fell within the expected limits of natural season-to-season variation based on the data since 2002, and was very similar to the mean incidence for the study period (2.6 vs. 2.4/1000 player hours). The severity of training injuries (29 days) was higher than the bounds of expected natural variation. This is likely due to the increase in incidence of more severe training injuries (>28 days) (**table S4**). The injuries that contributed most to this rise were inferior tib/fib syndesmosis (total days absence 953 days, mean severity 56 days) and knee MCL grade 2 injury (total days absence 611 days, mean severity 61 days).

Further research into the management of these injuries may be of particular interest to clinicians. This increase in injury severity combined with no significant change in training volume may mean that the most likely explanation is an increase in training intensity. The process of capturing training load and intensity in selected clubs will start in 2013-14 and should prove invaluable in order to contextualise these results.

Figure 2a: Incidence rates of training injuries over the study period with mean ± 2 x standard deviation shown

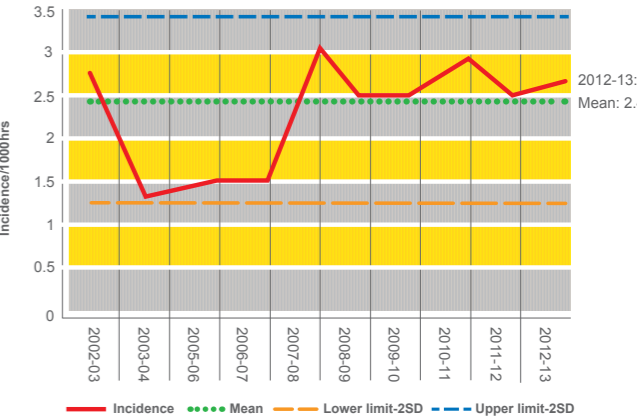


Figure 2b: Severity of training injuries over the study period with mean ± 2 x standard deviation shown

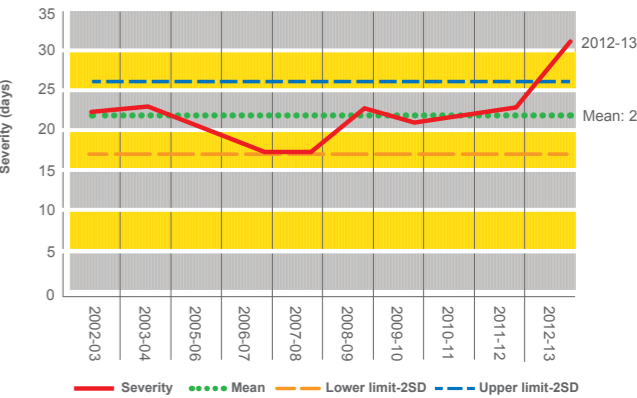
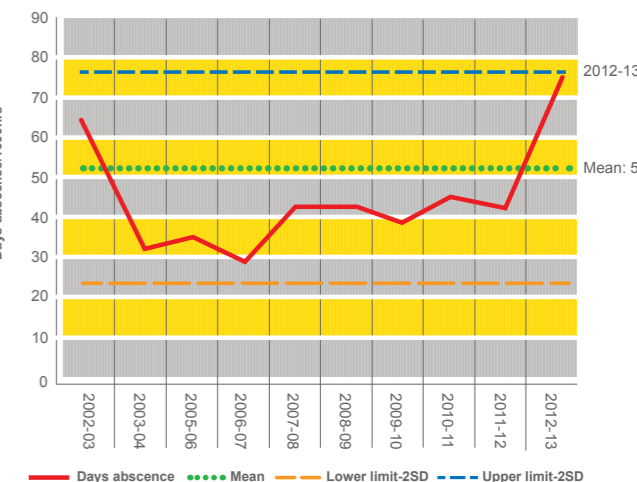


Figure 2c: Days absence/1000hrs for training injuries over the study period with mean ± 2 x standard deviation shown



Injury burden and performance

Summary of match injury risk

We have explored the association between injury burden and league performance in the Premiership from 2006-2012. It has been suggested that there are two major components of sports team performance; player skill and player durability, and that player durability may be an under-recognised facet of team success. This is the first investigation of the association between injuries and team performance in elite Rugby Union.

The relationship between team season performance (Premiership league points tally) and injury burden (‘overall injury incidence × mean absence per injury’) for match and training injuries combined was determined. Team squad size was also included in the analysis to determine whether the effect of injury burden on team performance depended on squad size. The threshold for smallest worthwhile change was set at three league points.

A clear association between injury burden measures and team performance was found with a lower injury burden associated with a higher league points tally. A change of 42 injury days per 1000 player hours (95% CI; 26 to 111) was associated with a change in league points tally of 3 points. There was also a significant interaction between injury burden and squad size, such that the relationship between injury burden and team performance decreased with each additional squad member. These findings highlight the important role that medical, physiotherapists and fitness staff have in reducing the incidence and/or severity of injuries in order to improve team performance. More detailed results of this analysis will be published separately to this report.

Worked example 1

The average club in 2012-13 sustained 77 injuries (49 match and 28 training) with an average severity of 27 days. The combined incidence for each club was 6.7/1000 player hours, meaning the injury burden for the average club is 182 days/1000 hours. This means that a reduction of a single injury leads to a reduction in 2.4 days/1000 hours of injury burden. For 2012-13 if a club reduced their total number of injuries by 18 this would give rise to a reduction in burden of 42 days/1000 hours, and therefore, based on the model would be attributed to an additional 3 league points.

Worked example 2

Reducing the average severity of injury (due to a ‘real’ change caused by improvements in the treatment and management of a player, rather than rushing a player back to competition before full recovery has occurred) can also influence performance (as injury burden is the product of incidence and severity). In 2012-13, a 1 day reduction in average severity caused a 6.7 days/1000 hour reduction in injury burden. To achieve a worthwhile change in performance (3 league points) the average severity would need to be reduced by 6 days.

The two examples above deal exclusively with the reduction of incidence or severity to highlight their effect, but the most likely outcome would be a simultaneous change in both variables leading to a worthwhile change in performance.

Reporting variability

Following comments made as part of the scientific peer-review process for papers recently published by the group, and for internal quality assurance we investigated the variability in reporting of time loss (i.e., one day or more) and match time loss (i.e. eight days or more) within and between clubs for the period 2002-13. It has previously been stated that the reliability in the reporting of injuries with a severity of less than 7 days is not as good as those injuries that are more severe (≥ 8 days).

There was no clear difference in the variability of reporting when using a one-day versus an eight-day definition of injury. This indicates that the reliability of reporting of injuries that are mild (according to the IRB consensus statement) is as good as moderate injuries. Clinically, injuries that carry a severity of less than eight days represent a large proportion of treatment time and burden upon club medical staff and thus, we will continue to collect data on this basis. More detailed results will be published in a short paper separately to this report.

Injury recurrence

Summary of recurrent injury risk

Recurrent injury risk for match and training in 2012-13 remains within the expected limits of natural season-to-season variation based on the data since 2002 (although season 2002-03 falls outside of what is expected). There has however, been a decrease every year since 2008-09. The 2012-13 incidence rate for recurrent match injuries (4.2/1000 player hours) was below the mean incidence of 9.1/1000 player hours for the period 2002-12.

For new injuries the severity was 20 days for both 2002-12 and 2012-13 and for recurrent injuries 28 days and 26 days respectively. The severity of match new vs. recurrent injuries by season can be seen in **table S5**.



The most commonly reported recurrent match injury for season 2012-13 was Hamstring muscle injury (4 injuries). More detail of the most common recurrent match injuries can be seen in **table S6**.

NB. Concussion was not included in the analysis of recurrent injury as subsequent concussions are considered as a repeat injury rather than a recurrence of the same index injury.

Of recurrent match injuries in 2012-13, 52% occurred within one month of return to play, 32% within 1-6 months, 3% greater than a year and 12% were not specified. This is a similar proportion of reported recurrent injuries occurring within one month of return to play when compared to previous seasons (61% in the period 2008-2012).

Between 2007-08 and 2010-11 there was a decrease in the incidence of recurrent training injuries and this incidence has remained the same for the last 3 seasons. The incidence of recurrent training injuries in 2012-13 (0.1/1000 player hours) was below the incidence observed in 2002-12 (0.28). In addition the severity of new vs. recurrent training injuries can be seen in **table S7**.

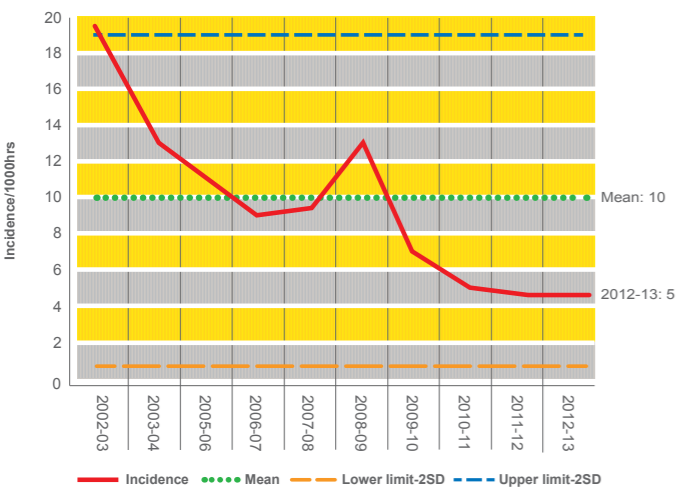
Work defining practical tools to help medical teams and coaches evaluate when a player is appropriately rehabilitated from common and high risk injuries should continue. The surveillance project uses the IRB consensus definition of what constitutes a recurrent injury (an injury of the same type and at the same site as an index injury and which occurs after a player’s return to full participation from the index injury).

CONCUSSION WAS THE MOST COMMON PREMIERSHIP MATCH INJURY



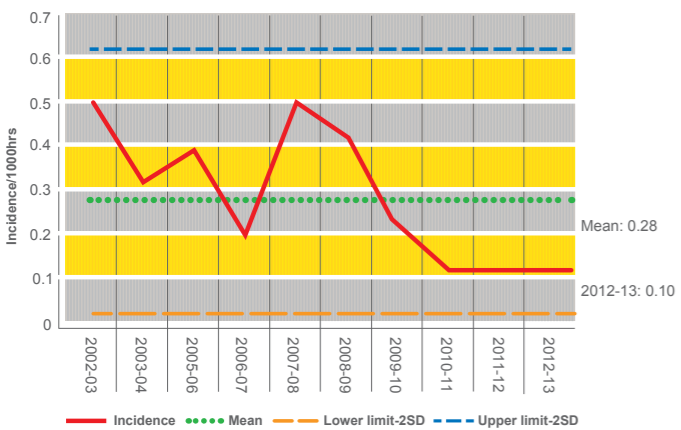
Match injuries

Figure 4a: Incidence rates of recurrent match injuries over the study period with mean ± 2 x standard deviation shown



Training injuries

Figure 4b: Incidence rates of recurrent training injuries over the study period with mean ± 2 x standard deviation shown



Injuries leading to retirement

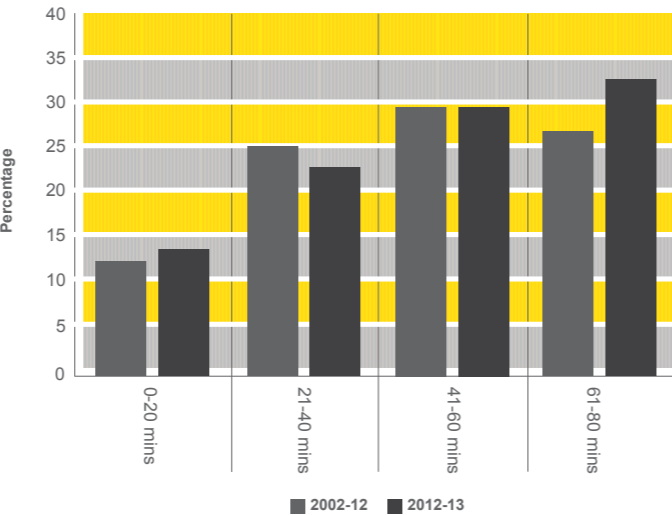
The numbers of players retiring with a reportable injury from which a player did not return to full fitness have been collected each season. Five players retired in the 2012-13 season with an unresolved injury. The locations of these injuries were 2 – Cervical spine, 2 – Shoulder & 1 – Concussion.

The number of retirements as a result of injury from which the player had been deemed to have returned to full fitness before retirement are not reported in the surveillance project and therefore are not included in this report. The figures in this report therefore do not reflect the total number of players who retire as a result of injury.

Time of injury

The profile for the timing of injuries within a match remained similar to the period 2002-12. The percentage of injuries for which no precise time of injury was identified was identical to that reported in 2011-12 at 10% of all match injuries. This remains similar to the proportion of injuries for which no known associated event is identified.

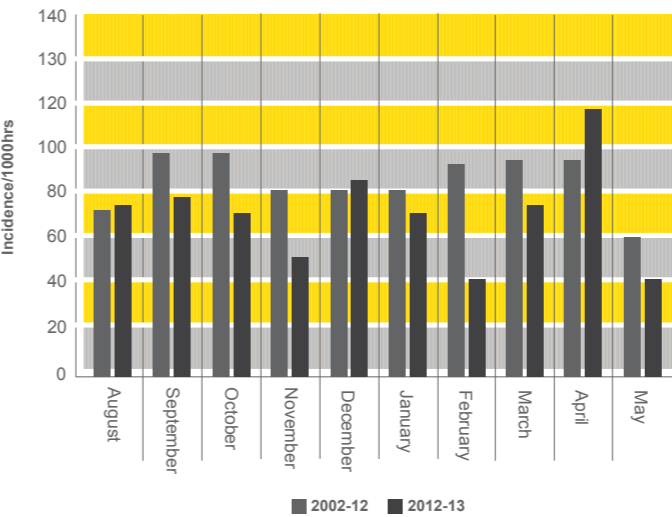
Figure 5: Percentage distribution by match quarter



Time in season

There has been no significant change over the study period in the time during the season when injuries occur. This season saw a significant difference in the incidence of injuries reported in November and February, and will be examined further next season. Injuries were sustained throughout the season with a peak in injury incidence seen in April, the last full month of the season in 2012-2013.

Figure 6: Incidence rates of match injuries by month of the season



Match injury event

The profile of injury causation leading to match time-loss injury remains very similar when compared to the period 2002-12. The tackle remains the most common match event resulting in injury. The most common injuries as a result of the tackle in 2012-13 were:

Ball carrier: ankle lateral sprain, MCL injury, concussion, inferior tibiofibular syndesmosis injury, and costochondral/sternal injury

Tackler: concussion, Acromioclavicular joint injury, inferior tibiofibular syndesmosis injury and cervical stinger/burner injury

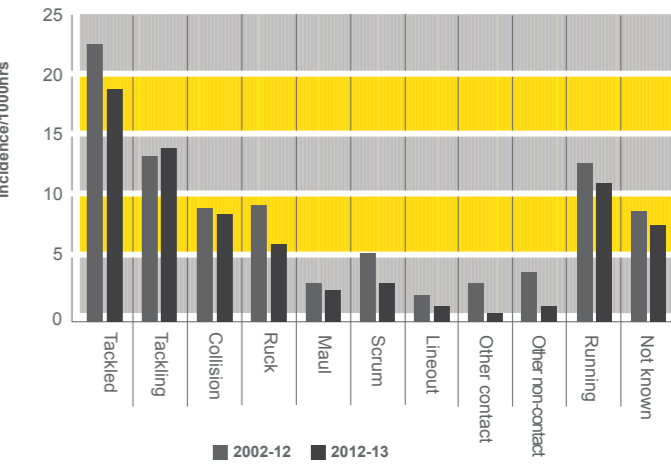
These findings remain similar to the past three seasons.

Running remains the second most common match event associated with injury, (15% of all match injury events). The most common match injuries as a result of running are calf muscle injury and hamstring muscle injury, these two groupings alone combined to make up 60% of all injuries related to running.

The incidence of injury associated with collision events was similar for 2012-13 when compared with 2002-12, of the total number of injuries resulting from collisions; the proportion of those resulting from perceived accidental collision was 70% in 2012-13, less than the 82% reported in seasons 2011-12 and 2010-11.

The incidence of injuries for which the associated event was not identified was the same in 2012-13 as 2011-12 (10%) and very similar to 2010-11 (11%).

Figure 7: Incidence rates of match injuries by injury event



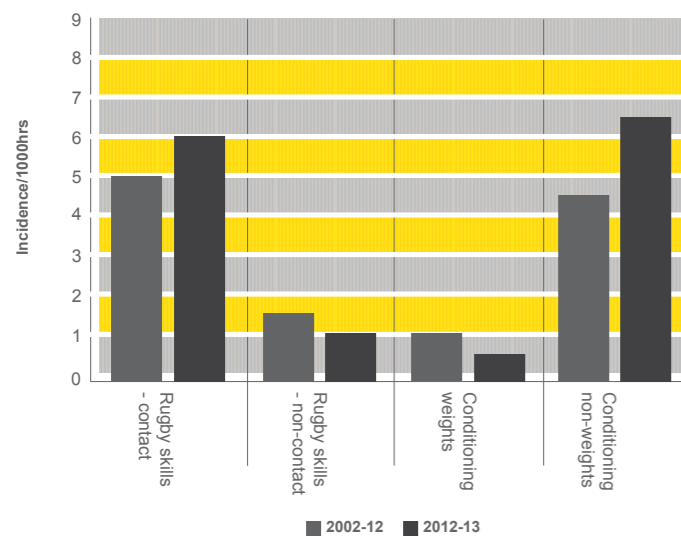
Training injury event

When compared to the period 2002-12 there was no significant change in the incidence rates for any training modality.

Since the study began in 2002, the likelihood of sustaining a training injury during strength and conditioning sessions (weights and non-weights) has varied from a lower limit of 1.3 injuries per 1000 hours and an upper limit of 2.7 injuries per 1000 player hours, with an average severity of injury between 13 and 24 days and the total days absence/1000 hours between 23 and 49 days (a breakdown of incidence by severity grouping can be seen in **table S4**).

During conditioning non weights training sessions, most injuries were as a result of running related activities (75%). During rugby skill contact sessions, most injuries (30%) resulted from running related activities, with the tackle being the second most common cause of injury (16%).

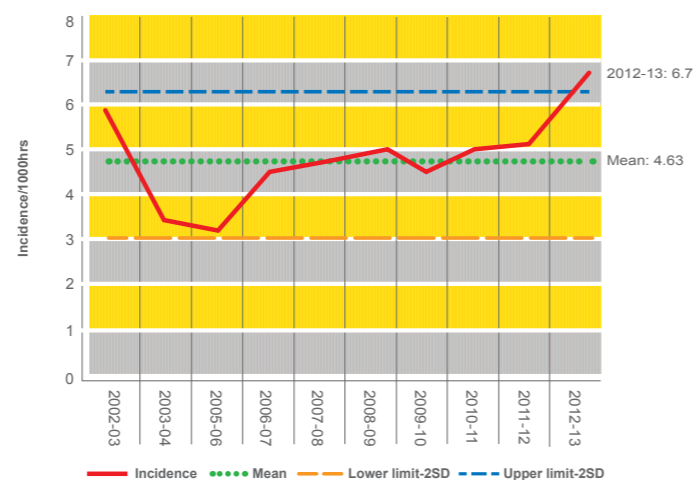
Figure 8: Incidence rates of training injuries by session type



Concussion

During 2012-13 there were 54 reported match concussions (35 Premiership, 10 European Competition & 9 National cup competition) and 5 training concussions. During the 2012-13 season 91% of reported concussions occurred in match play and 9% in training. 90% of players went through the season without sustaining a concussion. 10% of players sustained 1 or more concussions with no player sustaining more than 2 separate concussive events within the season.

Figure 9: Incidence per 1000 player hours of match concussions by season



The mean incidence for match concussions during the study period was 4.6/1000 hours. The incidence for 2012-13 fell outside the expected variation for the first time during the study period. It is thought that this increase is caused by an increased awareness of concussion and thus a greater focus and understanding of diagnosis. The IRB preliminary data from the PSCA trial shows a 25% increase in the number of concussed players being removed from play when compared with previous seasons. As mentioned earlier in this report, more detailed results focusing on concussion and subsequent player management and recovery will be published separately.

Hamstring injuries

Hamstring injuries remain the most common and highest risk training injury across the study period, the majority of which are thought to be preventable. There was no change in the incidence of hamstring training injuries in 2012-13 when compared to 2002-12 (0.39/1000 hours). The difference in days absence/1000 hours was also not significant (9.5 vs. 6.1). A common viewpoint is that training offers a controllable environment where injuries can be reduced. It is clear from the data that this has not yet been achieved. A season by season breakdown can be seen in **table S9**.

Training volume

The total training volume per player at Premiership clubs in 2012-13 was lower than that for the period 2002-12 (5.9 hours/week vs. 6.6 hours/week). Training volume for strength and conditioning and rugby skills were both less than seen in the period 2002-12 (3.1 vs. 3.7 hours/week and 2.7 vs. 2.9 hours/week respectively) although none of these differences were statistically significant. A similar proportion of time spent in contact and non-contact sessions means that change in incidence does not appear to be related to change in type of training. A season by season breakdown can be seen in **table S8**.

The risk of injury during training is a function of the content/activity, the volume and the intensity. It is hoped that the training load pilot study mentioned above will give valuable insight into the role of the intensity of the training session on injury risk which currently remains unclear.

Injury diagnosis

Summary of the most common and highest risk match injuries

Concussion was, for the second consecutive season, the most common match injury with the highest incidence seen since 2002. This rise in incidence is likely due to a combination of increased awareness through the RFU concussion audit & PSCA trial, increasing education and awareness activities from the IRB and RFU and greater media attention. The PSCA trial is on-going and thus, the direct impact of the tool on player removal cannot be commented upon.

The 2012-13 season also saw a large rise in incidence of inferior tibiofibular syndesmosis injuries, possibly due to an increased awareness of the signs and symptoms amongst medical practitioners nationally. MCL injuries are seen in the top 5 most common match injuries again in 2012-13. High haematoma dropped out of the 3 most common injuries for the first time since 2002.

Inferior tibiofibular syndesmosis injuries was the highest risk match injury for the first time in 2012-13, after dropping out of the top 5 match highest risk injuries in 2011-12 (they were second highest ranked in 2010-11).

Overall there has been very little change in the highest risk match injuries over the study period.

1/3 OF ALL REPORTED INJURIES OCCUR IN TRAINING (RUGBY SKILLS AND CONDITIONING)

Most common match injuries

2009-10		Thigh haematoma	4.9
		Hamstring muscle	4.9
		Ankle lateral ligament	4.0
		Concussion	3.9
		Calf muscle	3.7
2010-11		Thigh haematoma	5.4
		Hamstring muscle	4.6
		AC joint	4.8
		Concussion	3.9
		Calf muscle	3.7
2011-12		Concussion	5.1
		Hamstring muscle	5.0
		Thigh haematoma	4.9
		Calf muscle	4.8
		MCL	4.0
2012-13		Concussion	6.7
		Hamstring muscle	4.9
		Syndesmosis	3.8
		MCL	3.6
		Thigh haematoma	3.3

Figure 10. Incidence rates (incidence/1000 hours) and movement of the top 5 most common match injuries each season for 2009-13

Highest risk match injuries

2009-10		Knee cartilage	124
		Shoulder dislocation	114
		Foot fracture	104
		Hamstring muscle	102
		MCL	97
2010-11		ACL	184
		Syndesmosis	131
		MCL	108
		Tib/fib fracture	97
		AC joint	92
2011-12		ACL	186
		MCL	148
		Hamstring muscle	119
		Shoulder dislocation	108
		PCL/LCL	92
2012-13		Syndesmosis	145
		MCL	141
		Hamstring muscle	130
		ACL	108
		Clavicle fracture	95

Figure 11. Days absence/1000hours and movement of the top 5 highest risk match injuries across the study period

Summary of the most common and highest risk training injuries

The profile of the most common training injuries is very similar to that seen across this study period. The only change in 2012-13 is the decreased incidence/rank of Hip flexor/Quadriceps injury and a first appearance into the top 5 most common training injuries for lumbar soft tissue injury.

Hamstring muscle injuries remained the most common training injury throughout the study. Hamstring muscle, ACL injuries and Lumbar disc/nerve root injuries remain the highest risk training injuries throughout the study period.

Most common training injuries

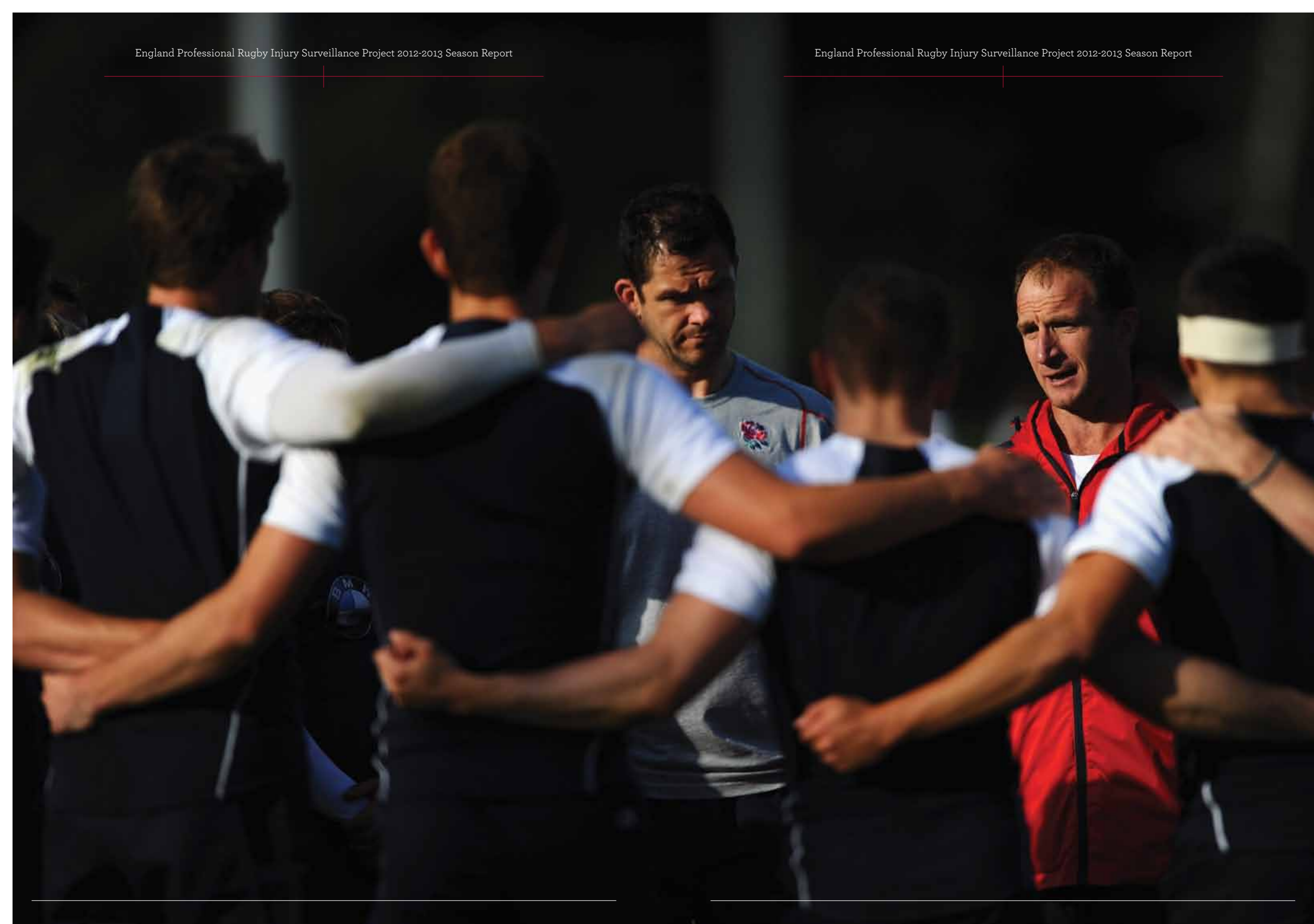
2009-10		Hamstring muscle	0.38
		Calf muscle	0.20
		Ankle lateral ligament	0.12
		Abductor muscle	0.11
		Hip flexor/quad muscle	0.09
2010-11		Hamstring muscle	0.45
		Calf muscle	0.30
		Hip flexor/quad muscle	0.15
		Abductor muscle	0.14
		Ankle lateral ligament	0.11
2011-12		Hamstring muscle	0.42
		Calf muscle	0.24
		Hip flexor/quad muscle	0.11
		Abductor muscle	0.10
		Ankle lateral ligament	0.09
2012-13		Hamstring muscle	0.39
		Calf muscle	0.29
		Abductor muscle	0.18
		Ankle lateral ligament	0.10
		Hip flexor/quad muscle	0.09

Figure 12. Incidence rates and movement of the top 5 most common training injuries across the study period

Highest risk training injuries

2009-10		Hamstring muscle	6.1
		Knee cartilage	3.8
		Archilles tendon	3.3
		Lumber disc/nerve root	2.8
		Syndesmosis	2.6
2010-11		Hamstring muscle	6.9
		ACL	6.8
		Calf muscle	3.8
		Ankle lateral ligament	3.7
		Knee cartilage	3.1
2011-12		Hamstring muscle	7.3
		Lumber disc/nerve root	6.5
		Calf muscle	3.4
		Ankle lateral ligament	2.1
		Tib/fib fracture	2.1
2012-13		Hamstring muscle	9.5
		ACL	6.3
		Lumber disc/nerve root	5.3
		Calf muscle	4.9
		Lumber soft tissue	4.5

Figure 13. Days absence/1000hours and movement of the top 5 highest risk match injuries across the study period



England Senior side

England match and training injury risk

No statistically significant change in risk was seen in 2012-13.

The likelihood of sustaining an injury whilst playing for the England senior side increased for the first time since 2007-08, however the average severity of injuries in match and training decreased. These changes were not statistically significant.

Note: the relatively small number of senior England training sessions in the study makes the differences seen in this group much more likely to have arisen “by chance” rather than to be the result of a “true” difference, reflected in the wide 95% Confidence intervals and the lack of statistical significance in the results.



Match Injuries

Table 3: England match injury incidence, average severity & days absence since 2002-03

	Total number of injuries	Injuries / 1000 hrs (95% CI)	Injuries per match	Average severity, days	Days absence / 1000 hrs (95% CI)	Days absence per match
2002-03	53	221 (169-289)	4.4	19	4264 (4010-4533)	85
2003-04	83	207 (167-256)	4.1	11	2371 (2225-2527)	47
2005-06	30	136 (95-195)	2.7	10	1391 (1243-1556)	28
2006-07	30	136 (95-195)	2.7	28	3836 (3586-4104)	77
2007-08	55	162(119-205)	3.2	24	3876(2852-4901)	78
2008-09	23	96 (57-135)	1.9	8	813(480-1145)	16
2009-10	23	88(52-125)	1.8	19	1712(1012-2411)	34
2010-11	14	78(37-119)	1.5	23	1789(852-2726)	36
2011-12	16	62 (31-92)	1.2	29	1754(894-2613)	35
2012-13	31	111(78-158)	2.2	24	2618(1841-3722)	52

Training injuries

Table 4: England training injury incidence, average severity & days absence since 2002-03

	Rugby skills			Strength and conditioning		
	Injuries / 1000 hrs (95% CI)	Average severity, days	Days absence / 1000 hrs (95% CI)	Injuries / 1000 hrs (95% CI)	Average severity, days	Days absence / 1000 hrs (95% CI)
2002-03	4.5(2.6-8.0)	15	69(60-80)	4.0(1.0-15.9)	4	16(8-32)
2003-04	7.6(5.3-11.0)	12	89(80-99)	6.3(3.8-10.3)	13	79(68-90)
2005-06	0.6(0.1-4.0)	4	2(1-6)	-	-	-
2006-07	9.8(5.9-16.3)	15	149(131-169)	-	-	-
2007-08	7.3(4.5-10.1)	9	74(46-103)	2.5(0.5-4.6)	12	34(7-61)
2008-09	6.5(3.0-10.0)	20	135(62-209)	12.1(4.2-20.0)	18	233(81-385)
2009-10	5.3(3.4-8.3)	8	46(30-73)	4.0(2.0-8.6)	6	26(12-55)
2010-11	1.7(0.8-3.5)	7	12(5.7-26)	4.4(1.8-10.5)	5	22(9.1-52.5)
2011-12	3.2(1.4-5.1)	22	70(31-110)	2.8(0.4-5.3)	18	51(6-95)
2012-13	3.7(1.6-9.0)	20	58(24-139)	1.1 (0.2-7.8)	9	10(1-71)



RFU injury surveillance project methods



Written informed consent was obtained from 591 registered Premiership squad players for the 2012-13 season. Three players did not give consent and as such their data were not recorded. A total of 405 games were included in the analyses for the 2012-2013 season.

Injuries sustained in training and in all matches in the Aviva Premiership, LV Anglo-Welsh cup and European Competitions (Heineken and European Challenge Cup) were included.

Injuries sustained while players represented England were reported separately and are analysed separately in this report.

Match and training injury data, and training exposure data, were provided by all 12 Premiership clubs in 2012-2013. A complete set of data were collected.

Medical personnel at each Premiership club and the England senior team reported the details of every injury sustained by a player at their club/team that were included in the

study group together with the details of the associated injury event using a standard injury report form. Strength and conditioning staff recorded the squad's weekly training schedules and exposure on a standard training report form. Team match days were also recorded by strength and conditioning staff.

Injury diagnoses were recorded using Orchard codes (OSICS). This sports specific injury classification system allows detailed diagnoses to be reported and injuries to be grouped by body part and injury pathology.

The injury definitions and data collection methods utilised in this study are aligned with the IRB Consensus statement on injury definitions and data collection procedures for studies of injuries in rugby union

Current publications

Further detailed information on injury risk in this cohort of players can be obtained from the following peer reviewed publications that analyse data collected as part of the surveillance project

Abstracts/presentations

JHM Brooks, CW Fuller, SPT Kemp & DB Reddin. The Incidence, Severity and Nature of Injuries Caused by Tackling in Professional Rugby Union Competition. Presented (poster) at The American College of Sports Medicine Annual Meeting, 1st June 2006. Published in: *Medicine and Science in Sports and Exercise* 2006; 38(5) S351-352.

JHM Brooks, CW Fuller, SPT Kemp. The Incidence, Severity and Nature of Groin Injuries in Professional Rugby Union. Presented at The American College of Sports Medicine Annual Meeting, 1st June 2006. Published in: *Medicine and Science in Sports and Exercise* 2006; 38(5) S351.

JHM Brooks, CW Fuller, SPT Kemp & DB Reddin. The incidence, severity and nature of injuries caused by being tackled in professional rugby union. Presented (oral) at The Faculty of Sports and Exercise Medicine, Royal College of Physicians Ireland (RCPI) and Royal College of Surgeons, Ireland (RCSI) Annual Scientific Meeting, Dublin, 5th September 2005

JHM Brooks, CW Fuller, SPT Kemp. The incidence, severity, and nature of scrummaging injuries in professional rugby union. Presented (poster) at 1st World Congress of Sports Injury Prevention, Oslo, Norway 23rd-25th June 2005. Published in: *Br J Sports Med* 39: 377.

Publications

S Williams, G Trewartha, SPT Kemp & KA Stokes A meta-analysis of injuries in senior men's professional rugby union. *Sports Medicine* 2013; 43(10) 1043-1055.

CW Fuller, AE Taylor JHM Brooks & SPT Kemp Changes in the stature, body mass and age of English professional rugby players: A 10-year review, *Journal of Sports Sciences* 2012 DOI:10.1080/02640414.2012.753156

SC Cheng, ZK Sivardeen, WA Wallace, D Buchanan, D Hulse, KJ Fairbairn, SP Kemp & JH Brooks. Shoulder instability in professional rugby players-the significance of shoulder laxity. *Clinical Journal of Sports Medicine* 2012 Sep; 22(5):397-402

CJ Pearce, JHM Brooks, SP Kemp & JD Calder. The epidemiology of foot injuries in professional rugby union players *Foot & Ankle Surgery*. 2011 Sep; 17(3):113-8. Epub 2010 Mar 5.

JHM Brooks & SPT Kemp Injury prevention priorities according to playing position in professional rugby union players. *British Journal of Sports Medicine* 2011 Aug;45(10):765-75. Epub 2010 May 19

RA Sankey, JHM Brooks, SPT Kemp & FS Haddad The epidemiology of ankle injuries in professional rugby union players. *American Journal of Sports Medicine* Dec 2008; 36:2415-2424

CW Fuller, T Ashton, JHM Brooks, RJ Cancea, J Hall, & SPT Kemp Injury risks associated with tackling in rugby union. *British Journal of Sports Medicine* 2010; 44(3): 159-167

JHM Brooks, CW Fuller, SPT Kemp & DB Reddin An assessment of training volume in professional rugby union and its impact on the incidence, severity and nature of match and training injuries. *Journal of Sports Sciences* 2008 26:8, 863-873

SPT Kemp, Z Hudson, JHM Brooks & CW Fuller. The epidemiology of head injuries in English professional rugby union. *Clinical Journal of Sports Medicine* 2008; 18:227-234

CW Fuller, JHM Brooks, RJ Cancea, J Hall, & SPT Kemp Contact events in rugby union and their propensity to cause injury. *British Journal of Sports Medicine*, Dec 2007; 41: 862 - 867

J Headey, JHM Brooks & SPT Kemp. The epidemiology of shoulder injuries in English professional rugby union. *American Journal of Sports Medicine*, Sep 2007; 35: 1537 - 1543

RJ Dallana, JHM Brooks, SPT Kemp & AW Williams. The epidemiology of knee injuries in English professional rugby union. *American Journal of Sports Medicine*, May 2007; 35: 818 - 830

CW Fuller, JHM Brooks & SPT Kemp. Spinal injuries in professional rugby union: a prospective cohort study. *Clinical Journal of Sport Medicine*, 2007; 17 (1): 10-16

JHM Brooks, CW Fuller, SPT Kemp & DB Reddin. Incidence, risk and prevention of hamstring muscle injuries in professional rugby union. *American Journal of Sports Medicine*, 2006; 34: 1297-1307

JHM Brooks, CW Fuller, SPT Kemp & DB Reddin. Epidemiology of injuries in English professional rugby union: part 1 match injuries. *British Journal of Sports Medicine*, Oct 2005; 39: 757 - 766

JHM Brooks, CW Fuller, SPT Kemp & DB Reddin. Epidemiology of injuries in English professional rugby union: part 2 training injuries. *British Journal of Sports Medicine*, Oct 2005; 39: 767 - 775.

JHM Brooks, CW Fuller, SPT Kemp & DB Reddin A prospective study of injuries and training amongst the England 2003 Rugby World Cup squad *British Journal of Sports Medicine*, May 2005; 39: 288 - 293

Supplementary data

Table S1 : Match injury incidence, average severity and days absence since 2002-3

Season	Total number of match injuries	Injuries / 1000 hrs (95% CI)	Injuries per club per match	Average severity, days (95%CI)	Days absence / 1000 hrs (95% CI)	Days absence per club per match
2002-03	748	100(92-107)	2.0	16(15-17)	1556(1444-1667)	31
2003-04	653	88(82-95)	1.8	20(19-22)	1773(1637-1909)	35
2005-06	482	75(68-82)	1.5	21(19-23)	1591(1449-1733)	32
2006-07	755	90(84-97)	1.8	21(20-23)	1879(1745-2013)	38
2007-08	660	83(77-89)	1.7	19(18-21)	1613(1490-1736)	32
2008-09	769	100(93-107)	2.0	23(21-25)	2285(2123-2446)	46
2009-10	636	80(73-86)	1.6	22(20-24)	1722(1588-1856)	34
2010-11	746	93(86-99)	1.9	21(20-23)	1917(1779-2054)	38
2011 -12	655	82(76-88)	1.6	27(25-29)	2222(2052-2392)	44
2012-13	588	73(67-79)	1.5	25(23-27)	1784(1645-1936)	35

Table S2 : Match injury severity since 2002-03

Season	Incidence /1000 hrs						
	2 - 3 days	4 – 7 days	8 - 21 days	22 - 28 days	29- 84 days	> 84 days	All
2002-03	24	33	26	4	9	3	100
2003-04	19	26	23	3	14	4	88
2005-06	10	19	24	5	13	3	75
2006-07	17	30	22	6	11	5	90
2007-08	15	24	26	4	10	4	83
2008-09	18	30	26	5	14	6	100
2009-10	15	21	25	4	10	4	80
2010-11	17	27	27	5	11	5	93
2011-12	13	21	22	6	13	7	82
2012-13	6	20	24	6	13	4	73

Table S3 : Training injury incidence, average severity and days absence since 2002-3

Season	Total number of training injuries	Rugby skills			Strength and conditioning		
		Injuries / 1000 hrs (95% CI)	Average severity, days	Days absence / 1000 hrs (95% CI)	Injuries / 1000 hrs (95% CI)	Average severity, days	Days absence / 1000 hrs (95% CI)
2002-03	159	3.3 (2.7-4.0)	28	93 (90-97)	2.3 (1.7-3.0)	13	29 (27-31)
2003-04	217	1.7 (1.4-2.0)	26	44 (42-45)	1.3 (1.1-1.6)	17	23 (22-24)
2005-06	203	2.2 (1.9-2.6)	22	49 (47-51)	1.5 (1.2-1.9)	16	24 (22-25)
2006-07	209	2.1 (1.7-2.5)	18	37 (35-38)	1.6 (1.3-2.0)	16	25 (24-27)
2007-08	318	3.2 (2.7-3.7)	19	60 (51-68)	2.7 (2.2-3.1)	15	44 (36-52)
2008-09	258	2.5 (2.1-2.9)	26	63 (53-73)	2.4 (2.0-2.9)	17	41 (34-49)
2009-10	298	2.8 (2.4-3.2)	21	59 (50-67)	2.1 (1.7-2.4)	18	37 (30-43)
2010-11	340	3.1 (2.7-3.5)	25	76 (66-87)	2.6 (2.1-3.0)	17	41 (34-48)
2011-12	323	2.7 (2.4-3.1)	26	68 (59-78)	2.2 (1.8-2.6)	18	39 (32-46)
2012-13	335	3.2 (2.9-3.6)	33	106 (93-121)	2.0 (1.7-2.4)	24	49 (41-60)

Table S4 : Training injury incidence in severity classifications since 2002-03

	Incidence / 1000 hrs						
	2 - 3 days	4 – 7 days	8 - 21 days	22 - 28 days	29- 84 days	> 84 days	All
2002-03	0.64	0.49	1.11	0.18	0.42	0.18	3.0
2003-04	0.21	0.40	0.52	0.11	0.30	0.08	1.6
2005-06	0.46	0.58	0.60	0.10	0.35	0.10	2.2
2006-07	0.57	0.42	0.51	0.10	0.20	0.07	1.9
2007-08	0.50	0.76	0.94	0.14	0.38	0.07	2.8
2008-09	0.43	0.57	0.77	0.17	0.31	0.10	2.4
2009-10	0.33	0.76	0.70	0.19	0.34	0.07	2.4
2010-11	0.48	0.76	0.91	0.21	0.32	0.13	2.8
2011-12	0.25	0.62	0.82	0.15	0.30	0.14	2.3
2012-13	0.35	0.55	0.79	0.19	0.49	0.21	2.6

Table S5 : New and recurrent match injury incidence, average severity and days absence

	New injuries			Recurrent injuries		
	Injuries / 1000 hrs	Average severity, day	Days absence / 1000 hrs	Injuries / 1000 hrs	Average severity, days	Days absence / 1000 hrs
2002-03	/ 1000 hrs	14	1084	17	24	436
2003-04	72	18	1333	12	34	433
2005-06	67	20	1372	9	31	277
2006-07	76	21	1574	7	33	260
2007-08	74	19	1444	8	21	167
2008-09	85	21	1800	13	34	483
2009-10	72	21	1515	7	29	206
2010-11	87	21	1776	5	26	140
2011-12	77	27	2106	4	23	114
2012-13	68	25	1659	4	26	122

Table S6 : The five most common match injury recurrences during 2012-13

Diagnosis	Number of injuries	Average Severity
Hamstring muscle injury	4	33
Ankle syndesmosis injury		4
Calf muscle	3	37
Tibial Stress Injuries	3	6
2007-08	0.50	0.76
2008-09	0.43	0.57
2009-10	0.33	0.76
2010-11	0.48	0.76
2011-12	0.25	0.62
2012-13	0.35	0.55

Table S7 : New and recurrent training injury incidence, average severity and days absence

	New injuries			Recurrent injuries		
	Injuries / 1000 hrs	Average severity, day	Days absence / 1000 hrs	Injuries / 1000 hrs	Average severity, days	Days absence / 1000 hrs
2002-03	2.5	21	54	0.5	34	15
2003-04	1.3	21	27	0.3	36	11
2005-06	1.8	19	35	0.4	21	8
2006-07	1.7	17	30	0.2	16	3
2007-08	2.3	17	39	0.5	24	11
2008-09	2.0	21	41	0.4	27	10
2009-10	2.2	20	44	0.2	22	4
2010-11	2.7	20	53	0.1	58	7
2011-12	2.2	22	49	0.1	47	4
2012-13	2.6	29	69	0.1	34	4

Table S8 : Average player training hours per week

Year	Training Hrs per week		
	Rugby Skills	Strength & Conditioning	Total
2002-03	3.9	2.5	6.4
2003-04	5.0	3.7	8.7
2005-06	4.3	3.1	7.4
2006-07	4.1	3.1	7.2
2007-08	3.0	2.7	5.7
2008-09	3.2	2.6	5.8
2009-10	3.2	2.9	6.1
2010-11	3.1	2.8	5.9
2011-12	3.6	2.8	6.4
2012-13	3.1	2.7	5.9

Table S9 : Hamstring training injuries, incidence and days absence per 1000hrs 2002-2011

Year	Incidence/1000hrs	Days Absence/1000hrs
2002-03	0.45	6.4
2003-04	0.21	4.2
2004-05	0.36	4.6
2006-07	0.32	5.1
2007-08	0.59	9.5
2008-09	0.36	5.0
2009-10	0.38	6.1
2010-11	0.45	6.9
2011-12	0.42	7.3
2012-13	0.39	9.5



Rugby Football Union, Rugby House, Twickenham Stadium,
200 Whitton Road, Twickenham TW2 7BA
Tel: 0871 222 2120 Fax: 020 8892 9816 rfu.com

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