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Surveillance Studies

Sevens World Series (Women)

Summary of Results: 2011/12 to 2014/15

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21 September 2015

1 Introduction

World Rugby is committed to implementing surveillance studies at all major World Rugby Tournaments and to disseminate the results within the Rugby community.

The aims of these studies are:

- to record and analyse injuries and illnesses sustained by male and female players at individual Tournaments,
- to identify changing patterns of injury, and
- to bring injury-related areas of concern to the attention of World Rugby's Chief Medical Officer.

Previous surveillance studies in women's Rugby Sevens reported the incidence and nature of match and training injuries sustained during the women's Sevens World Series from 2011/12 to 2013/14. This report continues the on-going study of Rugby Sevens by reporting match and training injuries and illnesses sustained during the women's 2014/15 Sevens World Series.

This review also combines the new data, from the women's 2014/15 Sevens World Series, with data reported previously in order to provide an updated review of the risks of injury and illness in elite women's Rugby Sevens.

2 Methods

All studies were conducted in accordance with the definitions and protocols described in the World Rugby approved consensus statement on definitions and procedures for injury surveillance studies in Rugby (Fuller et al., 2007).

The definition of injury was: '*Any injury sustained during a Women's Sevens World Series Tournament match or training activity that prevents a player from taking a full part in all normal training activities and/or match play for more than one day following the day of injury*'. A recurrent injury was defined as: '*An injury (as defined above) 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*'.

Specific injuries were classified using OSICS 8 (Orchard, 1995). Injury location, type and cause together with the event leading to the injury were also recorded.

The definition of an illness used in this study was: '*Any medical condition sustained while travelling to a Women's Sevens World Series Tournament, while at a Tournament or while travelling home at the end of a Tournament that prevents a player from taking a full part in all training activities and/or match play for more than one day following the day of onset of the illness*'.

Injuries and illnesses not related directly to rugby-related activities at a 2014/15 Women's Sevens World Series Tournament were not included.

Injury/illness severity was determined by the number of days a player was injured/ill: a player was deemed to be 'injured/ill' until she could undertake full, normal training and be available for match selection, whether or not she was actually selected. Medical staff were required to make an informed clinical

judgement about a player's fitness to train/play on those days when players were not scheduled to train or play. Injured/ill players were followed up after each Tournament to obtain their return to play date: the return to play dates for players with injuries/illnesses that remained unresolved 90 days after the final Tournament were estimated on the basis of the player's medical staff's clinical judgement and prognosis.

The complete lists of categories and sub-categories used for categorising injury locations and injury types are provided in the rugby injury consensus publication (Fuller et al., 2007).

Differences in players' anthropometric data were assessed using unpaired t-tests; differences in the incidences, mean severity and proportions of injuries were assessed using z-tests and differences in median severity using a Mann-Whitney U test. Differences in injury numbers were assessed using the chi-squared test. Statistical significance was accepted at the $p=0.05$ level, although it is recognised that this could identify some differences that occur by chance due to the number of statistical comparisons being made in the study.

3 Data collection

At the beginning of each Sevens World Series, the team's medical staff explained to squad players the purpose of the epidemiological study. Each player's baseline anthropometric information was recorded on a Player Baseline Information Form (playing position [back, forward]; date of birth; body mass [Kg]; stature [cm]). Players joining a country's squad at a later date were added to the list of players and the anthropometric data recorded at the time the player joined the squad.

A member of the team's medical staff recorded every injury/illness sustained during a Sevens World Series on a Tournament Summary of Injuries and Illnesses Report Form, which was returned to the study co-ordinator at the end of the Tournament. A member of the team's medical staff also recorded information about each injury and illness on an Injury/Illness Report Form (date of injury/illness, date of return to play, location and type of injury/illness, cause of injury/illness, event leading to injury/illness). Injury/illness Report Forms were returned to the study co-ordinator when the final piece of information had been entered on the Form (normally the return-to-play date).

4 Results

Results for previous Sevens World Series have been presented in earlier reports (Fuller and Taylor, 2014). The women's Sevens World Series 2014/15 consisted of 6 Tournaments in Dubai, Brazil, USA, Canada, England and Netherlands and these took place over the period 1 December 2014 to 23 May 2015. The study recorded players' anthropometric data, match and training injuries and illnesses sustained by eleven core teams (Australia, Canada, China, England, Fiji, France, New Zealand, Russia, South Africa, Spain, USA) contesting the Series.

4.1 Players' anthropometric data

Table 1 summarises the numbers and anthropometric data for players categorised as backs, forwards and all players in the 2014/15 women's Sevens World Series together with values averaged over the period 2011/12 to 2014/15.

Table 1: Players' anthropometric data: 2014/2015 women's Sevens World Series.

Series / Measure	Mean (Standard deviation, number of players)		
	Backs	Forwards	ALL players
2014/15			
Stature, cm	167.6 (5.2, 108)	170.7 (5.6, 89)	169.0 (5.6, 197)
Body mass, Kg	65.2 (5.5, 108)	70.0 (5.7, 89)	67.4 (6.1, 197)
Age, years	24.0 (3.6, 108)	24.6 (3.7, 89)	24.3 (3.6, 197)
All Series (2011/12 – 2014/15)			
Stature, cm	166.8 (5.3, 330)	170.5 (5.7, 243)	168.4 (5.8, 573)
Body mass, Kg	65.3 (5.9, 331)	70.9 (5.8, 246)	67.7 (6.5, 577)
Age, years	23.7 (3.6, 332)	24.9 (3.5, 246)	24.2 (3.6, 578)

Based on the all-series data, forwards are significantly older ($p < 0.001$), heavier ($p < 0.001$) and taller ($p < 0.001$) than backs.

4.2 Match injuries

4.2a Incidence of injury

Table 2 summarises the numbers of match injuries, match exposures and incidence of match injuries for backs, forwards and all players during the 2014/15 women's Sevens World Series and the equivalent average values over the period 2011/12 to 2014/15.

Table 2: Number, match exposure (player-hours) and incidence (injuries/1000 player-match-hours, 95% confidence interval) of match injuries: 2014/15 women's Sevens World Series.

Series / Measure	Backs	Forwards	ALL players
2014/15			
Injuries	36	22	58
Exposure	374.4	280.8	655.2
Incidence	96.2 (69.4 – 133.3)	78.3 (51.6 – 119.0)	88.5 (68.4 – 114.5)
All Series (2011/12 – 2014/15)			
Injuries	87	48	135
Exposure	839.0	629.2	1468.2
Incidence	103.7 (84.0 – 127.9)	76.3 (57.5 – 101.2)	91.9 (77.7 – 108.8)

Based on the all-series data, the incidence of injury for backs remains higher than that for forwards, but the difference does not reach statistical significance ($p=0.087$). The higher incidence of injury for backs compared to forwards reflects similar results observed in the men's game (backs: 119.5; forwards: 93.8) (Fuller and Taylor, 2015).

Although the overall incidence of injury in women's Rugby Sevens remains high, the lower incidence of injury in women's Rugby Sevens compared to men's Rugby Sevens is approaching statistical significance ($p=0.080$) (Fuller and Taylor, 2015).

4.2b Severity of injury

Table 3 summarises the mean and median severities of injuries sustained during the 2014/15 women's Sevens World Series for backs, forwards and all players and the equivalent average values observed over the period 2011/12 to 2014/15.

Table 3: Mean and median severities of match injuries: 2014/15 women's Sevens World Series.

Series / Measure	Severity (95% Confidence interval), days		
	Backs	Forwards	ALL players
2014/15			
Mean	57.8 (36.7 – 78.9)	62.5 (32.0 – 93.0)	59.7 (42.2 – 77.3)
Median	40 (24 – 55)	44 (15 – 53)	42 (26 – 50)
All Series (2011/12 – 2014/15)			
Mean	59.8 (46.9 – 72.7)	53.3 (34.9 – 71.8)	57.5 (46.9 – 68.1)
Median	43 (30 – 56)	32 (16 – 48)	35 (29 – 48)

There are no statistically significant differences in the mean or median severities of injuries sustained by backs and forwards. The severity of all injuries sustained in women's Rugby Sevens is significantly ($p=0.020$) higher than that observed in men's Rugby Sevens (Fuller and Taylor, 2015).

4.2c Location of injury

Table 4 summarises the main and sub-locations of injuries sustained by backs, forwards and all players over the period 2011/12 to 2014/15. Although the number of teams and Tournaments included in the current epidemiological study has increased compared to previous studies, the number of injuries reported in the current Series still remains too small to provide meaningful values just for the 2014/2015 Series.

The majority of injuries sustained by both backs (56.3%) and forwards (41.7%) are located in the lower limbs. Overall, the knee (27.6%), head/face (18.4%), ankle (10.3%) and hand/fingers (9.2%) are the most vulnerable locations for backs while for forwards the most vulnerable are the head/face (25.0%), knee (18.8%), ankle (12.5%) and hand/fingers (10.4%).

Table 4: Locations of match injuries: 2011/12 to 2014/15 women's Sevens World Series.

Series / Location of injury	% (95% Confidence interval)		
	Backs	Forwards	ALL players
All Series (2011/12 – 2014/15)			
Head/neck	19.5 (11.2 – 27.9)	25.0 (12.8 – 37.3)	21.5 (14.6 – 28.4)
Head/face	18.4 (10.3 – 26.5)	25.0 (12.8 – 37.3)	20.7 (13.9 – 27.6)
Neck/cerv ^l spine	1.1 (0 – 3.4)	0.0 (-)	0.7 (0 – 2.2)
Upper limbs	17.2 (9.3 – 25.2)	27.1 (14.5 – 39.7)	20.7 (13.9 – 27.6)
Shoulder/clavicle	8.0 (2.3 – 13.8)	8.3 (0.5 – 16.2)	8.1 (3.5 – 12.8)
Upper arm	0.0 (-)	0.0 (-)	0.0 (-)
Elbow	0.0 (-)	2.1 (0 – 6.1)	0.7 (0 – 2.2)
Forearm	0.0 (-)	2.1 (0 – 6.1)	0.7 (0 – 2.2)
Wrist	0.0 (-)	4.2 (0 – 9.8)	1.5 (0 – 3.5)
Hand/fingers	9.2 (3.1 – 15.3)	10.4 (1.8 – 19.1)	9.6 (4.7 – 14.6)
Trunk	6.9 (1.6 – 12.2)	6.3 (0 – 13.1)	6.7 (2.5 – 10.9)
Ribs/upper back	4.6 (0.2 – 9.0)	4.2 (0 – 9.8)	4.4 (1.0 – 7.9)
Abdomen	1.1 (0 – 3.4)	0.0 (-)	0.7 (0 – 2.2)
Low back	1.1 (0 – 3.4)	0.0 (-)	0.7 (0 – 2.2)
Sacrum/pelvis	0.0 (-)	2.1 (0 – 6.1)	0.7 (0 – 2.2)
Lower limbs	56.3 (45.9 – 66.7)	41.7 (27.7 – 55.6)	51.1 (42.7 – 59.5)
Hip/groin	1.1 (0 – 3.4)	0.0 (-)	0.7 (0 – 2.2)
Thigh, posterior	5.7 (0.9 – 10.6)	4.2 (0 – 9.8)	5.2 (1.4 – 8.9)
Thigh, anterior	2.3 (0 – 5.4)	0.0 (-)	1.5 (0 – 3.5)
Knee	27.6 (18.2 – 37.0)	18.8 (7.7 – 29.8)	24.4 (17.2 – 31.7)
L-Leg/Achilles	6.9 (1.6 – 12.2)	6.3 (0 – 13.1)	6.7 (2.5 – 10.9)
Ankle	10.3 (3.9 – 16.7)	12.5 (3.1 – 21.9)	11.1 (5.8 – 16.4)
Foot/toe	2.3 (0 – 5.4)	0.0 (-)	1.5 (0 – 3.5)

There are no statistically significant ($p=0.430$) differences between the distributions of injury locations for women's and men's Rugby Sevens.

4.2d Type of injury

Table 5 summarises the types of injuries sustained by backs, forwards and all players over the period 2011/12 to 2014/15. The number of injuries remains too small to provide meaningful values just for the 2014/2015 Series.

Joint (non-bone)/ligament injuries were the most common main injury type sustained by backs (47.1%) and forwards (45.8%). For backs, sprain/ligament (40.2%), fracture (12.6%), haematoma (12.6%) and concussion (10.3%) were the most common specific types of injury; while, for forwards, the most common specific types of injuries were sprain/ligament (31.3%), fracture (14.6%), concussion (14.6%) and dislocation/subluxation (10.4%).

Table 5: Types of match injuries: 2011/12 to 2014/15 women's Sevens World Series.

Series / Type of injury	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Series (2011/12 – 2014/15)			
Bone	13.8 (6.5 – 21.0)	16.7 (6.1 – 27.2)	14.8 (8.8 – 20.8)
Fracture	12.6 (5.7 – 19.6)	14.6 (4.6 – 24.6)	13.3 (7.6 – 19.1)
Other bone	1.1 (0 – 3.4)	2.1 (0 – 6.1)	1.5 (0 – 3.5)
CNS/PNS	11.5 (4.8 – 18.2)	14.6 (4.6 – 24.6)	12.6 (7.0 – 18.2)
Concussion	10.3 (3.9 – 16.7)	14.6 (4.6 – 24.6)	11.9 (6.4 – 17.3)
Nerve	1.1 (0 – 3.4)	0.0 (-)	0.7 (0 – 2.2)
Joint (non-bone)/lig^t	47.1 (36.6 – 57.6)	45.8 (31.7 – 59.9)	46.7 (38.3 – 55.1)
Dislocation/sublux ⁿ	2.3 (0 – 5.4)	10.4 (1.8 – 19.1)	5.2 (1.4 – 8.9)
Lesion meniscus	4.6 (0.2 – 9.0)	4.2 (0 – 9.8)	4.4 (1.0 – 7.9)
Sprain/ligament	40.2 (29.9 – 50.5)	31.3 (18.1 – 44.4)	37.0 (28.9 – 45.2)
Muscle/tendon	23.0 (14.1 – 31.8)	18.8 (7.7 – 29.8)	21.5 (14.6 – 28.4)
Haematoma/etc	12.6 (5.7 – 19.6)	8.3 (0.5 – 16.2)	11.1 (5.8 – 16.4)
Muscle rupture/etc	6.9 (1.6 – 12.2)	8.3 (0.5 – 16.2)	7.4 (3.0 – 11.8)
Tendon injury/etc	3.4 (0 – 7.3)	2.1 (0 – 6.1)	3.0 (0.1 – 5.8)
Skin	2.3 (0 – 5.4)	4.2 (0 – 9.8)	3.0 (0.1 – 5.8)
Laceration	2.3 (0 – 5.4)	4.2 (0 – 9.8)	3.0 (0.1 – 5.8)
Other injuries	2.3 (0 – 5.4)	0.0 (-)	1.5 (0 – 3.5)
Dental	1.1 (0 – 3.4)	0.0 (-)	0.7 (0 – 2.2)
Other injuries	1.1 (0 – 3.4)	0.0 (-)	0.7 (0 – 2.2)

CNS/PNS: Central and peripheral nervous systems

There are no statistically significant ($p=0.069$) differences between the distributions of injury types for women's and men's Rugby Sevens.

4.2e Most common and highest risk injuries

Based on the combined data, the three most common specific injuries sustained by backs in the period 2011/12 to 2014/15 were knee medial collateral ligament (MCL) sprains (14.0%), concussion (10.5%) and inferior tibia-fibula syndesmosis injuries (7.0%). For forwards, the three most common specific injuries were concussion (15.2%), inferior tibia-fibula syndesmosis injuries (6.5%) and posterior cruciate ligament tears (6.5%).

For backs, the three injuries causing the greatest number of days absence were knee MCL tears (13.3% of all days lost), anterior cruciate ligament (ACL) injuries (11.7%) and inferior tibia-fibula syndesmosis injuries (10.5%). For forwards, the three highest risk injuries were ACL injuries (21.3%), shoulder dislocations (10.6%) and a malleous fracture (9.4%).

4.2f Nature of onset of injury

Table 6 summarises the nature of onset of injuries sustained in the period 2011/12 to 2014/15 by backs, forwards and all players.

Table 6: Nature of onset of injury: 2011/12 to 2014/15 women's Sevens World Series.

Series / Nature of onset	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Series (2011/12 – 2014/15)			
Acute	96.6 (92.7 – 100)	93.8 (86.9 – 100)	95.6 (92.1 – 99.0)
Gradual	3.4 (0 – 7.3)	6.3 (0 – 13.1)	4.4 (1.0 – 7.9)

Ninety-six per cent of all injuries sustained were acute in nature.

4.2g Cause of onset of injury

Table 7 summarises the cause of onset of injuries sustained in the period 2011/12 to 2014/15 by backs, forwards and all players.

Table 7: Cause of onset of injury: 2011/12 to 2014/15 women's Sevens World Series.

Series / Cause of onset	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Series (2011/12 – 2014/15)			
Contact	89.4 (82.9 – 96.0)	97.8 (93.6 – 100)	92.4 (87.8 – 96.9)
Non-contact	10.6 (4.0 – 17.1)	2.2 (0 – 6.4)	7.6 (3.1 – 12.2)

Ninety-two per cent of all injuries were the result of contact activities. Although backs sustained a higher proportion of non-contact injuries than forwards, the difference did not reach statistical significance ($p=0.082$).

4.2h Match events leading to injury

Table 8 summarises the specific match activities causing the injuries sustained by backs, forwards and all players.

Table 8: Match events leading to injury: 2011/12 to 2014/15 women's Sevens World Series.

Series / Cause of onset	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Series (2011/12 – 2014/15)			
Collision	6.9 (1.6 – 12.2)	10.4 (1.8 – 19.1)	8.1 (3.5 – 12.8)
Kicking	0.0 (-)	0.0 (-)	0.0 (-)
Lineout	0.0 (-)	0.0 (-)	0.0 (-)
Maul	0.0 (-)	0.0 (-)	0.0 (-)
Ruck	6.9 (1.6 – 12.2)	4.2 (0 – 9.8)	5.9 (1.9 – 9.9)
Running	9.2 (3.1 – 15.3)	2.1 (0 – 6.1)	6.7 (2.5 – 10.9)
Scrum	0.0 (-)	0.0 (-)	0.0 (-)
Tackled	40.2 (29.9 – 50.5)	43.8 (29.7 – 57.8)	41.5 (33.2 – 49.8)
Tackling	31.0 (21.3 – 40.8)	33.3 (20.0 – 46.7)	31.9 (24.0 – 39.7)
Other	5.7 (0.9 – 10.6)	6.3 (0 – 13.1)	5.9 (1.9 – 9.9)

Being tackled (backs: 40.2%; forwards: 43.8%) and tackling (backs: 31.0%; forwards: 33.3%) are the events responsible for most injuries to both backs and forwards.

The most common activities leading to concussion were tackling (55.6%), being tackled (33.3%) and ruck (11.1%) for backs and tackling (28.6%), being tackled (28.6%) and collisions (28.6%) for forwards. The numbers involved however remain too small to reach robust conclusions.

4.2i Time of injury

Table 9 provides a summary of the period in a match when injury events take place as a function of playing position.

Table 9: Time injuries are sustained during matches: 2011/12 to 2014/15 women's Sevens World Series.

Time of injury, min	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Series (2011/12 – 2014/15)			
First half	42.7 (32.0 – 53.4)	37.8 (23.6 – 51.9)	40.9 (32.4 – 49.5)
Second half	57.3 (46.6 – 68.0)	62.2 (48.1 – 76.4)	59.1 (50.5 – 67.6)

Although more injuries are sustained in the second half of matches, the difference is not statistically significant (backs: $p=0.185$; forwards: $p=0.101$).

4.3 Training injuries

Six time-loss training injuries (forwards: 4; backs: 2) were recorded during the 2014/15 Series as a result of 6,327.3 player-training-hours: this equates to an incidence of injury of 0.95 injuries/1000 player-training-hours. The mean severity of these training injuries was 28.0 days absence.

All 6 injuries were acute in nature and 4 of the injuries were the result of non-contact training activities (rugby-skills-non-contact: 2; conditioning-non-weights: 1; conditioning-weights: 1) and two were the result of rugby-skills-contact training activities.

Further analysis of the six injuries is not justified.

4.4 Illnesses

Two time-loss illnesses were recorded during the 2014/15 women's Sevens World series (non-specific virus: 1; migraine: 1). One illness occurred while travelling to a Tournament and one while at a Tournament.

These results indicate a Series-wide time-loss illness period prevalence among the players of 1.0%.

5 Key conclusions

With the increased number of Tournaments and the increased number of teams monitored during the 2014/15 women's Sevens World Series, the quantity of data describing the women's game almost doubled. The quantity of data, however, remains small compared to the quantity of data available for men's Rugby Sevens but the conclusions from the on-going studies are now more robust. Further data are still required before some conclusions can be confirmed as being statistically significant.

Based on the combined data for the women's Sevens World Series in the period 2011/12 to 2014/15, the following general conclusions can be presented:

- Rugby-7s forwards are significantly older, taller and heavier than backs.
- The incidence of injury in women's Rugby-7s is significantly higher than that in women's Rugby-15s.
- The incidence of injury for backs is higher than that for forwards; although the difference does not quite reach statistical significance ($p=0.087$), the difference is nonetheless clinically significant.
- Injury severity in women's Rugby-7s is significantly higher than that found in men's Rugby-7s.
- The distribution of injury locations is similar for women's Rugby-7s and women's Rugby-15s, with the lower limb accounting for around half of all injuries: the knee and ankle being at the highest risk of injury.
- The distribution of injury types is also similar for women's Rugby-7s and women's Rugby-15s, with joint (non-bone)/ligament injuries accounting for almost half of all injuries.

- Overall, concussion remains the most common injury reported in women's Rugby Sevens but ACL injuries result in the most days absence – twice that of any other injury.

6. References

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7. Acknowledgements

The authors acknowledge the valuable support provided by many team physicians and physiotherapists during the collection of the data analysed in this report. Unfortunately, the authors are not always aware of the specific people providing the data, as many medical teams change from Tournament-to-Tournament and Series-to-Series. The authors would therefore like to apologise if anyone who provided data for the study is not included in the list of acknowledgements below:

Australia:	Katie Ryan, Laura Schwab, Liz Monk, Michael Moran
Canada:	Adrienne Stinson, Brad Curry, Isabel Grondin, Jason White, Kim Osland, Sandeep Nandhra
China:	Jack Lau, Li Yaping
England:	Angela Sells, Brett Davison, Penny Porter
Fiji:	Aileen Sullivan, Jennifer Khalik
France:	Philippe Bordes
Ireland:	Eimear Fallon
Netherlands:	Bas Besselink, Sven Vos
New Zealand:	Jacinta Horan
Portugal:	Goncalo Ramos
Russia:	Alexandra Smirnova, Levan Tsiklauri
South Africa:	Tanushree Pillay
Spain:	Alberto Herrero Garcia, Arturo Carrera, Carmen Rodriguez de Tembleque Buitrago, Jose Carlos Salo Cuenca, Keith Chapman, Sara Bonilla,
USA:	Nicole Titmas