



International Rugby Board

Surveillance Studies

Pacific Nations Cup

Summary of Results: 2012 and 2013

Colin Fuller and Aileen Taylor

1 November 2013

1 Introduction

The IRB is committed to implementing surveillance studies (SS) at all major IRB 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 the IRB Chief Medical Officer.

The IRB Pacific Nations Cup (PNC) is an international Tournament for the six IRB Tier 2 countries located on the rim of the Pacific Ocean. As the level of exposure each year in the Tournament is relatively small, apart from the incidence of injury and anthropometric parameters, data from all Tournaments have been combined to provide a more meaningful analysis of the available data.

2 Methods

The studies were conducted in accordance with the definitions and protocols described in the IRB approved consensus statement on definitions and procedures for injury surveillance studies in rugby union (Fuller et al., 2007).

The definition of injury was: '*Any injury sustained during a PNC Tournament match 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*'. Incidents where a player's absence from match play and/or training was caused by training activities, illness or other medical conditions not related to a PNC match were not included. 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*'. Injuries were classified using the appropriate OSICS 8 Code (Orchard, 1995). Injury location, type and cause together with the event leading to the injury were also recorded.

Injury severity was defined as the number of days a player was injured. A player was deemed to be 'injured' until he could undertake full normal training and be available for match selection, whether or not he 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 players were followed after each Tournament to obtain their return to play date.

The complete lists of categories and sub-categories used for 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 of injury were assessed using z-tests. Statistical significance was accepted at the $p \leq 0.05$ level.

3 Data collection

At the beginning of each PNC Tournament, the team's medical staff explained to each squad player 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]); any players joining a team's squad at a later date were added to the team's 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 match injury sustained during a PNC match on a Tournament Summary of Injuries 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 on an Injury Report Form (date of injury, date of return to play, location and type of injury, cause of injury, event leading to injury): the final piece of information normally entered on the Injury Report Form being the date that the player returned to normal training/match play.

4 Results

The IRB PNC 2012 involved Fiji, Japan, Samoa and Tonga and took place over the period 5 to 23 June 2012 with all but one game played in Japan. This study recorded the players' anthropometric data and match injuries sustained by players from the four teams taking part in the Tournament.

The IRB PNC 2013 took place over the period 25 May to 23 June 2013 with games played in Canada, Fiji, Japan and USA. This study recorded players' anthropometric data and match injuries sustained by four (Canada, Fiji, Japan and USA) of the five teams taking part in the Tournament.

4.1 Players' anthropometric data

Table 1 summarises the numbers and anthropometric data for players categorised as backs, forwards and all players at PNC 2012 and 2013 Tournaments. Forwards were significantly heavier ($p < 0.001$) and taller ($p < 0.001$) than backs but there were no significant differences in the ages of backs and forwards.

Table 1: Players' anthropometric data at PNC 2012 and 2013 Tournaments.

Year / Measure	Mean (Standard deviation, number of players)		
	Backs	Forwards	ALL players
2012			
Stature, cm	181.5 (7.2, 49)	186.2 (7.9, 63)	184.1 (7.9, 112)
Body mass, Kg	92.4 (9.3, 49)	110.2 (9.6, 63)	102.4 (12.9, 112)
Age, years	25.7 (3.7, 49)	26.7 (3.2, 63)	26.3 (3.4, 112)
2013			
Stature, cm	180.8 (7.0, 57)	188.0 (7.6, 64)	184.6 (8.1, 121)
Body mass, Kg	92.1 (9.1, 57)	110.6 (7.5, 64)	101.9 (12.4, 121)
Age, years	26.2 (4.3, 57)	26.8 (3.4, 64)	26.5 (3.8, 121)
ALL Tournaments			
Stature, cm	181.1 (7.1, 106)	187.1 (7.8, 127)	184.4 (8.0, 233)
Body mass, Kg	92.3 (9.2, 106)	110.4 (8.6, 127)	102.1 (12.6, 233)
Age, years	26.0 (4.0, 106)	26.8 (3.3, 127)	26.4 (3.6, 233)

4.2 Match injuries

4.2a Incidence of injury

Table 2 summarises the number of match injuries sustained, match exposure and incidence of match injuries for backs, forwards and all players at both the 2012 and 2013 PNC Tournaments.

There are no statistically significant differences in the incidences of injury between forwards and backs.

Table 2: Number, match exposure (player-match-hours) and incidence (injuries/1000 player-match-hours, 95% confidence interval) of match injuries at PNC 2012 and 2013 Tournaments.

Year / Measure	Backs	Forwards	ALL players
2012			
Injuries	5	6	11
Exposure	112.0	128.0	240.0
Incidence	44.6 (18.6 – 107.6)	46.9 (28.3 – 77.8)	45.8 (25.4 – 82.7)
2013			
Injuries	11	6	17
Exposure	149.3	170.7	320.0
Incidence	73.7 (40.8 – 133.1)	35.2 (15.8 – 78.4)	53.1 (33.0 – 85.4)
ALL Tournaments			
Injuries	16	12	28
Exposure	261.3	298.7	560.0
Incidence	61.2 (37.5 – 99.9)	40.2 (22.8 – 70.8)	50.0 (34.5 – 72.4)

4.2b Severity of injury

Table 3 summarises the mean and median severities of all injuries sustained at PNC 2012 and 2013 Tournaments as a function of playing position.

Table 3: Mean and median severities of match injuries at PNC 2012 and 2013 Tournaments.

Year / Measure	Severity (95% Confidence interval), days		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
ALL Tournaments			
Mean	35.5 (10.3 – 60.7)	50.2 (18.9 – 81.5)	41.8 (22.3 – 61.3)
Median	17 (10 - 46)	33 (10 - 60)	26 (10 - 46)

There are no statistically significant differences in the mean or median severities of injury between forwards and backs.

4.2c Location of injury

Table 4 summarises the locations of injuries sustained at PNC 2012 and 2013 Tournaments. Distributions of injuries among the sub-locations are not included because of the relatively small number of injuries recorded in the two Tournaments.

Table 4: Locations of match injuries at PNC 2012 and 2013 Tournaments.

Year / Location of injury	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
ALL Tournaments			
Head/neck	25.0 (3.8 – 46.2)	16.7 (0 – 37.8)	21.4 (6.2 – 36.6)
Upper limbs	12.5 (0 – 28.7)	33.3 (6.7 – 60.0)	21.4 (6.2 – 36.6)
Trunk	6.3 (0 – 18.1)	0.0 (-)	3.6 (0 – 10.4)
Lower limbs	56.3 (31.9 – 80.6)	50.0 (21.7 – 78.3)	53.6 (35.1 – 72.0)

Based on the combined data the majority of injuries sustained by both backs and forwards are located in the lower limbs (backs: 56.3%; forwards: 50.0%). There are no statistically significant differences between backs and forwards in the proportions of injuries sustained at each injury location.

4.2d Type of injury

Table 5 summarises the types of injuries sustained at PNC 2012 and 2013 Tournaments. Distributions of injuries among the sub-types are not included due to the small numbers of injuries recorded for each Tournament.

The majority of injuries sustained by both backs (56.3%) and forwards (41.7%) are joint (non-bone)/ligament injuries. There are no statistically significant differences in the proportions of injury types sustained by backs and forwards.

Table 5: Types of match injuries at PNC 2012 and 2013 Tournaments.

Year / Type of injury	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
ALL Tournaments			
<i>Bone</i>	6.3 (0 – 18.1)	16.7 (0 – 37.8)	10.7 (0 – 22.2)
<i>CNS/PNS</i>	18.8 (0 – 37.9)	0.0 (-)	10.7 (0 – 22.2)
<i>Joint (non-bone)/lig^t</i>	56.3 (31.9 – 80.6)	41.7 (13.8 – 69.6)	50.0 (31.5 – 68.5)
<i>Muscle/tendon</i>	12.5 (0 – 28.7)	25.0 (0.5 – 49.5)	17.9 (3.7 – 32.0)
<i>Skin</i>	6.3 (0 – 18.1)	8.3 (0 – 24.0)	7.1 (0 – 16.7)
<i>Other types</i>	0.0 (-)	8.3 (0 – 24.0)	3.6 (0 – 10.4)

CNS/PNS: Central and peripheral nervous systems

4.2e Most common and highest risk injuries

The number of injuries sustained during PNC 2012 and 2013 was relatively small, consequently there were only 2 injuries that occurred more than once (knee medial collateral ligament strain: 6, 21%; concussion: 3, 11%).

4.2f Nature of onset of injury

Table 6 summarises the nature of injury-onset at PNC 2012 and 2013 Tournaments as a function of playing position.

Table 6: Nature of the injury-onset of match injuries at PNC 2012 and 2013 Tournaments.

Year / Nature of onset	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Tournaments			
Acute	93.8 (81.9 - 100)	100.0 (-)	96.4 (89.6 – 100)
Gradual	6.3 (0 – 18.1)	0.0 (-)	3.6 (0 – 10.4)

Over 95% of all injuries sustained are acute injuries. There are no statistically significant differences between backs and forwards.

4.2g Cause of onset of injury

Table 7 summarises the cause of onset of match injuries at PNC 2012 and 2013 as a function of playing position.

Table 7: Cause of onset of injuries at PNC 2012 and 2013 Tournaments.

Year / Cause of onset	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Tournaments			
Contact	81.3 (62.1 – 100)	100.0 (-)	89.3 (77.8 – 100)
Non-contact	12.5 (0 – 28.7)	0.0 (-)	7.1 (0 – 16.7)
Other	6.3 (0 – 18.1)	0.0 (-)	3.6 (0 – 10.4)

The majority of injuries sustained by backs (81.3%) and forwards (100%) are caused by contact events. There are no statistically significant differences in the cause of injury onset for backs and forwards.

4.2h Match events leading to injury

Table 8 provides a summary of the match events leading to injury as a function of playing position.

Being tackled and tackling are the events responsible for the most injuries to backs (tackled: 50.0%; tackling: 18.8%) and forwards (tackled: 50.0%; tackling: 33.3%). There are no statistically significant differences in the events leading to injury for backs and forwards.

Table 8: Match events leading to injuries: PNC 2012 and 2013.

Year / Cause of onset	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Tournaments			
Collision	12.5 (0 – 28.7)	8.3 (0 – 24.0)	10.7 (0 – 22.2)
Kicking	0.0 (-)	0.0 (-)	0.0 (-)
Lineout	0.0 (-)	0.0 (-)	0.0 (-)
Maul	0.0 (-)	0.0 (-)	0.0 (-)
Ruck	0.0 (-)	0.0 (-)	0.0 (-)
Running	12.5 (0 – 28.7)	0.0 (-)	7.1 (0 – 16.7)
Scrum	0.0 (-)	8.3 (0 – 24.0)	3.6 (0 – 10.4)
Tackled	50.0 (21.7 – 78.3)	50.0 (21.7 – 78.3)	50.0 (31.5 – 68.5)
Tackling	18.8 (0 – 37.9)	33.3 (6.7 – 60.0)	25.0 (9.0 – 41.0)
Other	6.3 (0 – 18.1)	0.0 (-)	3.6 (0 – 10.4)

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 during matches injuries sustained in the period 2008 to 2013.

Time of injury, min	% (95% Confidence interval)		
	<i>Backs</i>	<i>Forwards</i>	<i>ALL players</i>
All Tournaments			
0-20	0 (-)	8.3 (0 - 24.0)	3.6 (0 - 10.4)
21-40+	43.8 (19.4 - 68.1)	41.7 (13.8 - 69.6)	42.9 (24.5 - 61.2)
41-60	31.3 (8.5 - 54.0)	25.0 (0.5 - 49.5)	28.6 (11.8 - 45.3)
61-80+	25.0 (3.8 - 46.2)	25.0 (0.5 - 49.5)	25.0 (9.0 - 41.0)

There are no statistically significant differences between backs and forwards in the proportions of injuries sustained in each of the quarters.

5 Summary

This first report provides preliminary information on the level and nature of injuries sustained at IRB PNC Tournaments. The small numbers of teams and matches involved in each Tournament, however, mean that it is too soon to report detailed information. The limited information available does indicate that the epidemiology of injuries sustained by international players in this Tournament is similar to that reported for players competing at the IRB 2007 and 2011 Rugby World Cup (Fuller et al., 2008, 2012).

6. References

- Fuller CW, Molloy MG, Bagate C, et al. Consensus statement on injury definitions and data collection procedures for studies of injuries in rugby union. *Br J Sports Med* 2007;**41**:328-331.
- Fuller CW, Laborde F, Leather RJ, et al. International Rugby Board Rugby World Cup 2007 injury surveillance study. *British Journal of Sports Medicine* 2008;**42**:452-9.
- Fuller CW, Sheerin K, Targett S. Rugby World Cup 2011: International Rugby Board Injury Surveillance Study. *Br J Sports Med*; published Online first 9 June 2012 doi: 10.1136/bjsports-2012-091155).
- Orchard J. Orchard Sports Injury Classification System (OSICS). *Sport Health* 1995;**11**:39-41.

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 medical teams often change from year-to-year. The authors would therefore like to apologise if anyone who provided data for the study is not included in the list of acknowledgements below:

Canada:	Isabel Grondin
Fiji:	William Koong, Jennifer Khalik
Samoa:	Shaun Mauiliu
Tonga:	Siale 'Ataongo Hausia
USA:	Kristen Douhan
Japan:	Yuji Takazawa, Takenori JR Omura