



2014 AFL Injury Report

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1 Summary

The 2014 AFL Injury Report represents 23 years of recording injury data by the AFL, clubs and medical officers. The highlights are:

- Substantially reduced injury incidence in season 2014 compared to season 2013
- Reduced injury prevalence with a higher rate than usual of players playing matches at state league level due to greater player availability
- A lower incidence of ACL injuries than usual in 2014, particularly early in the season
- Ongoing lower rates of hamstring, quadriceps and groin injuries compared to the last few years of no restrictions on the interchange bench. In 2014 the total incidence and prevalence of injuries in the groin/hip/thigh region were the lowest recorded in the 23 years of the injury survey
- A reduction in the number of calf injuries in 2014 compared to the previous three years, although with the rate still higher than the years prior to introduction of the substitute rule.
- A higher rate in 2014 than usual of foot stress fractures

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2 Introduction

There has been an annual Australian Football League (AFL) injury surveillance report since 1992 [1-7], making this the 23rd AFL Injury Report. Australian football has been a world leader at injury surveillance with research predating the official injury report [6-9]. The 5th annual AFL Injury Report was publicly released in 1996 [10], believed to be the first occasion worldwide that a professional sport openly tabled its injury data, which the AFL has replicated for every season since. In 2013 the AFL injury report was co-published in the *American Journal of Sports Medicine* [11] again believed to be the first time a professional sports league has done this. Most recently, an international paper has been published on the effects of rule changes on injury in the AFL [12].

Most other professional football leagues have started to follow the processes of the AFL, collecting annual injury data and occasionally publishing results (eg National Football League (NFL) [13-18], the National Rugby League (NRL) [19], Union of European Football Associations (UEFA) [20-22] and the Rugby Football Union (RFU) [23 24]). However annual public release of data is the exception rather than rule amongst professional sports leagues and hence the AFL is still a world-leader in transparency with respect to injury surveillance.

The AFL also funds additional research above the injury survey. In addition to:

- (1) Annual collection of injury data; and
- (2) Annual public release of the injury report; the AFL also
- (3) Annually funds other projects of a sports science and medicine nature;
- (4) Takes medical issues into account when setting rule changes [12]
- (5) Collects additional data regarding concussions that are not captured by the annual injury surveillance project [12].

It is an ongoing aim of the AFL and the AFL Doctors Association to remain the 'gold' standard of injury surveillance in Australia and worldwide.

3 Methods

The methods of the injury survey are now well established and have been previously described in detail [2 11 25]. However, minor changes to injury category codes are made on a regular basis. The standard AFL player contract now includes consent for players' injury records to be passed from team medical staff to the researchers for the purposes of standard injury surveillance. The methods of the survey are approved by the AFLDA and AFL Research Board. For additional studies (e.g. case follow ups of certain injuries) which require identification of players to obtain extra information, further consent from each player involved is required. Individual player injury details are not revealed in any report of the injury survey. Individual club details, and their injury rates and injury patterns also remain confidential (as the AFL and clubs believe that this confidentiality is crucial in maintaining the goodwill and honest reporting from all 18 participating clubs).

3.1 Injury definition

From 1997 onwards, the definition of an injury has been an “injury or medical condition which causes a player to miss a match”. This definition and methodology has been chosen to promote consistency across all AFL clubs and from season to season [26]. Player movement monitoring has allowed the injury survey to achieve ‘100% compliance’ for all instances of missed player games in the home and away season since 1997 [2 26]. Player movement monitoring essentially requires that all clubs define the status of each player each round to be either: (1) playing AFL football, (2) playing football at a lower level, (3) not playing football due to injury, or (4) not playing football for another reason. In 2013 all teams were required to roughly detail diagnosis (e.g. hamstring strain) and date of onset for all injuries causing players to miss games on the weekly player movement spreadsheets. Further details for these injuries were then confirmed between the injury surveillance coordinator and club contacts at the end of the season. Diagnosis was coded according to the OSICS 9 system [27-29] and onset of injury (match vs training vs other) was also recorded. The definition of a condition “causing a player to miss a match” includes illnesses and injuries caused outside football, although these injuries are considered in separate categories when grouped by diagnosis. An injury recurrence is a condition to the same body part on the same side which causes a later bout of missed matches in the same season after return to play.

3.2 Injury categories

Injury categories are amended slightly on an annual basis depending on which specific diagnoses (using OSICS codes version 9 [28 29]) are included within each category. Where changes such these have been made, they have been made



retrospectively for all previous survey years. Therefore, some of the category data presented in this report for previous years may vary slightly from previously published data.

3.3 Injury rates

The major measurement of the number of injuries occurring is seasonal injury incidence measured in units of new injuries per club per season (where a club is defined as 40 players and a season is defined as 22 rounds). Since the average club now has approximately 45 players on the list and plays for slightly over 22 rounds (including finals), the exact number of injuries occurring per club is slightly greater than the figures tabulated. For example, a hamstring injury incidence of 6 new injuries per club per season (for 40 players playing 22 weeks) would be equivalent to 7 new injuries per club per season (for 45 players over 23 weeks). The modification is required so that the year-to-year figures are comparable, because average list size changes from year-to-year.

The major measurement of the amount of playing time missed through injury is injury prevalence measured in units of missed games per club per season, or alternatively percentage of players unavailable through injury.

The recurrence rate is the number of recurrent injuries expressed as a percentage of the number of new injuries. A recurrent injury is an injury in the same injury category occurring on the same side of the body in a player during the same season. Therefore, by this definition, an injury of one type that recurred the following season was defined as a new injury in that next season.

4 Results

Key indicators for the 23 years of the survey are shown in Table 1. The injury incidence (number of new injuries per club per season) for 2014 was 36.1, a 13% decrease from 2013. Injury prevalence was 146.0 missed games per season, an 8% decrease from 2013 and more in keeping with rates of the mid to late 2000s. The rate of recurrent injuries (12%) was similar to 2013 and in keeping with the relatively low recurrence rates of the past decade.

Table 1 – Key indicators for all injuries over the 22 seasons

All injuries	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Incidence (new injuries per club per season)	35.4	30.3	33.7	38.2	38.9	40.1	40.3	36.9	37.4	35.8	34.4
Incidence (recurrent)	8.8	7.3	6.0	6.2	4.9	8.0	7.6	5.2	5.9	5.5	4.4
Incidence (total)	44.2	37.6	39.7	44.4	43.8	48.1	47.9	42.1	43.3	41.3	38.7
Prevalence (missed games per club per season)	145.9	122.5	116.3	133.1	140.0	151.2	141.9	135.9	131.8	136.4	134.7
Average injury severity	4.1	4.0	3.5	3.5	3.6	3.8	3.5	3.7	3.5	3.8	3.9
Recurrence rate	25%	24%	18%	16%	13%	20%	19%	14%	16%	15%	13%
Clubs participating	12/15	14/15	15/16	15/16	16/16	16/16	16/16	16/16	16/16	16/16	16/16
Average players per club	46.1	44.6	42.5	42.3	44.1	44.2	41.7	41.7	41.4	43.4	43.0

All injuries	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence (new injuries per club per season)	34.1	34.8	35.3	34.0	34.6	36.9	37.8	38.7	38.4	38.1	41.5	36.1
Incidence (recurrent)	4.6	3.7	4.8	4.1	5.6	5.4	3.6	4.7	3.6	3.6	5.1	4.4
Incidence (total)	38.7	38.5	40.1	38.2	40.3	42.3	41.4	43.3	42.0	41.7	46.6	40.8
Prevalence (missed games per club per season)	118.7	131.0	129.2	138.3	146.7	147.1	151.2	153.8	157.1	147.7	158.1	146.0
Average injury severity (number of missed games)	3.5	3.8	3.7	4.1	4.2	4.0	4.0	4.0	4.1	3.9	3.8	4.0
Recurrence rate	14%	11%	14%	12%	16%	15%	10%	12%	9%	9%	12%	12%
Clubs participating	16/16	16/16	16/16	16/16	16/16	16/16	16/16	16/16	17/17	18/18	18/18	18/18
Average players per club	42.2	42.8	43.3	43.9	44.2	44.6	46.1	46.4	46.9	46.7	45.4	45.1
Interchange players	4	4	4	4	4	4	4	4	3/1	3/1	3/1	3/1 (120 cap)

4.1 Injury Incidence

Table 2 (on the following page) details the incidence (new injuries only) of all defined categories. The highlighted column of 2014 reveals the following major findings:

- Injuries in the groin/hip/thigh region, including hamstring and quadriceps strains and groin injuries had relatively low incidence in 2014 compared to both recent years and all years historically in the survey

Table 2 – Injury Incidence (new injuries per club per season)

Body area	Injury type	2014	2013	2002-4	2005-7	2008-10	2011-13
Head/neck	Concussion	1.3	1.0	0.4	0.4	0.5	1.0
	Facial fractures	0.4	0.9	0.6	0.4	0.4	0.7
	Neck sprains	0.0	0.1	0.0	0.2	0.1	0.1
	Other head/neck injuries	0.1	0.1	0.2	0.1	0.1	0.2
Shoulder/arm/elbow	Shoulder sprains and dislocations	1.2	1.2	1.1	1.3	1.6	1.4
	A/C joint injuries	0.9	0.9	0.9	0.9	0.7	0.7
	Fractured clavicles	0.1	0.3	0.4	0.3	0.2	0.2
	Elbow sprains or joint injuries	0.1	0.1	0.1	0.1	0.1	0.2
	Other shoulder/arm/elbow injuries	0.4	0.3	0.5	0.4	0.2	0.5
Forearm/wrist/hand	Forearm/wrist/hand fractures	1.1	0.8	1.0	1.1	1.2	1.1
	Other hand/wrist/ forearm injuries	0.5	0.6	0.5	0.4	0.3	0.5
Trunk/back	Rib and chest wall injuries	0.5	0.8	0.8	0.6	0.5	0.5
	Lumbar and thoracic spine injuries	1.7	2.0	1.1	1.6	1.5	1.6
	Other buttock/back/trunk injuries	0.5	0.1	0.5	0.5	0.6	0.5
Hip/groin/thigh	Groin strains/osteitis pubis	2.6	2.7	3.3	3.4	3.6	2.7
	Hamstring strains	5.2	5.2	5.5	6.1	6.5	5.3
	Quadriceps strains	1.1	1.7	1.8	1.8	1.9	1.6
	Thigh and hip haematomas	0.8	1.3	0.8	0.9	0.9	0.7
	Hip joint/impingement injuries	0.3	1.1	0.3	0.4	0.8	1.1
	Other hip/groin/thigh injuries	0.0	0.0	0.0	0.0	0.1	0.0
Knee	Knee ACL	0.7	1.0	0.6	0.7	0.7	0.9
	Knee MCL	0.7	0.7	0.9	1.0	0.9	0.8
	Knee PCL	0.2	0.5	0.5	0.3	0.3	0.5
	Knee cartilage	1.0	1.5	1.4	1.2	1.7	1.3
	Knee tendon injuries	0.4	0.7	0.6	0.5	0.4	0.8
	Other knee injuries	1.3	1.4	0.8	0.9	1.1	1.2
Shin/ankle/foot	Ankle joint sprains, including syndesmosis sprains	3.1	3.7	2.5	2.3	2.8	3.1
	Calf strains	2.6	3.7	1.5	1.6	1.7	3.0
	Achilles tendon injuries	0.9	0.5	0.4	0.3	0.5	0.7
	Leg and foot fractures	0.7	0.7	0.6	0.5	0.8	0.5
	Leg and foot stress fractures	1.7	1.3	0.9	1.1	1.0	1.4
	Other leg/foot/ankle injuries	1.3	2.3	1.4	1.3	1.5	2.3
Medical	Medical illnesses	2.4	2.2	2.2	1.6	2.4	2.1
Non-football injuries		0.3	0.2	0.3	0.1	0.3	0.3
NEW INJURIES/CLUB/SEASON		36.1	41.5	34.4	34.6	37.8	39.3

- Calf strains, which had risen over the period 2011-2013, fell slightly in season 2014.
- Knee ACL and PCL injuries were also lower in season 2014 compared to seasons 2011-13.
- An increase in incidence of concussion compared to previous years of the injury survey, even though the incidence was still low (on average 1.3 player per club missing games each year due to concussion).
- Foot stress fractures increased in season 2014 compared to previous seasons.

4.2 Injury Recurrence

Table 3 shows the rate of recurrence of some of the common injury types that are prone to high recurrence rates. The overall recurrence rate for season 2014 of 12% was in keeping with the low recurrence rates of recent years. From Table 3 it can be seen that the major injuries (with respect to recurrence) have all had far lower rates of recurrence in the second 11 years of the survey compared to the first.

Table 3 – Recurrence rates (recurrent injuries as a percentage of new injuries)

Recurrence rates	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Hamstring strains	45%	40%	31%	29%	25%	38%	36%	31%	37%	25%	30%
Groin strains and osteitis pubis	29%	43%	33%	27%	22%	36%	31%	6%	16%	20%	23%
Ankle sprains or joint injuries	9%	28%	4%	9%	11%	20%	21%	9%	11%	17%	16%
Quadriceps strains	35%	19%	15%	21%	26%	35%	20%	20%	18%	10%	17%
Calf strains	28%	26%	0%	16%	15%	15%	15%	17%	32%	17%	13%
All injuries	25%	24%	18%	16%	13%	20%	19%	14%	16%	15%	13%

Recurrence rates	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Hamstring strains	27%	22%	26%	16%	22%	27%	18%	14%	12%	14%	24%	16%
Groin strains and osteitis pubis	20%	24%	23%	28%	39%	23%	19%	20%	15%	19%	11%	11%
Ankle sprains or joint injuries	6%	11%	15%	10%	20%	9%	10%	5%	13%	5%	20%	18%
Quadriceps strains	9%	6%	20%	19%	18%	15%	15%	18%	7%	3%	19%	0%
Calf strains	14%	6%	12%	7%	9%	5%	0%	12%	5%	6%	16%	16%
All injuries	14%	11%	14%	12%	16%	15%	10%	12%	9%	9%	12%	12%

4.3 Weekly player status and injury prevalence

Table 4 details player status on a weekly basis over the past ten seasons. The ‘average’ status of a club list of 45 players in any given week for 2014 was: 35 players playing football per week, 22 in the AFL; 7-8 missing through injury; and 2-3 missing due to other reasons (such as suspension, being used as a travelling emergency, team bye in a lower grade, etc).

Table 4 – Average weekly player status by season

All injuries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Playing AFL	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Playing lower grade football	12.2	11.8	11.9	11.7	12.8	12.8	12.5	12.5	11.4	13.0
TOTAL playing	34.2	33.8	33.9	33.7	34.8	34.8	34.5	34.5	33.4	35.0
Not playing because of injury	6.4	7.0	7.4	7.4	7.9	8.1	8.4	7.8	8.2	7.5
Not playing for other reasons	2.8	3.1	2.9	3.4	3.5	3.5	4.0	4.4	3.8	2.6
TOTAL not playing	9.1	10.1	10.4	10.8	11.4	11.6	12.4	12.2	11.9	10.0
Players in injury survey (per club)	43.3	43.9	44.2	44.6	46.1	46.4	46.9	46.7	45.4	45.1
Injury prevalence (%)	14.7%	15.9%	16.8%	16.7%	17.2%	17.5%	17.8%	16.8%	18.0%	16.6%

Table 5 (on the following page) details the amount of missed playing time attributed to each injury category. The injury prevalence categories tend to move with the injury incidence results, i.e. similar categories in Table 5 showing increases and decreases to those in Table 2.

The injury categories that had lower than usual prevalence (missed games) in 2014 were: groin strains, hip joint / impingement injuries, quadriceps strains, knee ACL, knee PCL and knee cartilage injuries. The injury categories that had higher than usual prevalence (missed games) in 2014 were: shoulder sprains & dislocations, concussion, Achilles tendon injuries and foot stress fractures.

The overall injury prevalence in 2014 was the lowest since 2006. By body part, groin/hip/thigh injuries and knee injuries overall had particularly lower injury prevalence in 2014, whereas shin/foot/ankle injuries were higher than usual.

Table 5 – Injury Prevalence (missed games per club per season)

Body area	Injury type	2014	2013	2002-4	2005-7	2008-10	2011-13
Head/neck	Concussion	1.6	1.3	1.0	0.5	0.7	1.7
	Facial fractures	0.9	2.6	1.5	0.9	1.0	1.9
	Neck sprains	0.0	0.3	0.2	0.6	0.4	0.6
	Other head/neck injuries	0.2	0.2	0.4	1.0	0.5	0.2
Shoulder/arm/elbow	Shoulder sprains and dislocations	9.8	7.1	5.8	8.3	9.6	9.4
	A/C joint injuries	3.2	2.0	1.9	2.0	1.4	1.8
	Fractured clavicles	0.8	1.4	2.2	1.6	0.8	0.9
	Elbow sprains or joint injuries	0.8	0.4	0.5	0.6	0.7	0.8
	Other shoulder/arm/elbow injuries	3.1	1.2	2.2	1.6	0.7	1.5
Forearm/wrist/hand	Forearm/wrist/hand fractures	3.5	2.9	3.2	3.5	3.8	3.8
	Other hand/wrist/ forearm injuries	1.5	1.7	2.1	1.6	1.1	1.7
Trunk/back	Rib and chest wall injuries	1.0	1.7	1.5	1.6	1.1	1.1
	Lumbar and thoracic spine injuries	5.9	4.7	4.4	4.9	5.5	5.5
	Other buttock/back/trunk injuries	1.4	0.1	1.8	1.2	1.2	1.2
Hip/groin/thigh	Groin strains/osteitis pubis	6.7	7.0	14.2	14.2	13.2	7.4
	Hamstring strains	20.7	20.8	18.6	21.6	22.7	19.7
	Quadriceps strains	3.5	5.1	4.8	5.8	7.1	4.9
	Thigh and hip haematomas	1.1	2.0	1.4	1.3	1.2	1.0
	Hip joint/impingement injuries	0.8	4.6	1.4	2.6	4.2	5.3
	Other hip/groin/thigh injuries	0.0	0.0	0.3	0.1	0.7	0.1
Knee	Knee ACL	11.1	17.8	12.1	12.9	11.4	14.9
	Knee MCL	2.6	2.0	2.9	3.1	2.9	2.9
	Knee PCL	1.1	3.3	3.6	2.0	2.2	3.4
	Knee cartilage	4.5	9.7	6.4	7.5	10.8	7.3
	Knee tendon injuries	2.4	3.1	2.5	1.7	0.9	2.7
	Other knee injuries	5.9	3.7	2.4	3.5	3.8	3.5
Shin/ankle/foot	Ankle joint sprains, including syndesmosis sprains	10.0	12.1	5.9	8.2	8.4	10.5
	Calf strains	8.1	10.6	3.3	3.7	3.7	7.7
	Achilles tendon injuries	4.0	2.2	1.1	2.0	3.2	3.7
	Leg and foot fractures	6.9	4.3	4.9	3.7	6.1	4.5
	Leg and foot stress fractures	14.2	10.9	5.4	7.0	9.0	10.2
	Other leg/foot/ankle injuries	4.5	6.9	3.4	4.2	5.7	7.6
Medical	Medical illnesses	3.7	4.2	3.6	2.5	3.4	3.8
Non-football injuries		0.5	0.3	1.3	0.7	1.6	1.0
MISSED GAMES/CLUB/SEASON		146.0	158.1	128.2	138.1	150.7	154.2

4.4 Analysis and discussion for significant injury categories

(a) Hamstring strain injuries

There has been a slight reduction in the number of hamstring strains over the past 4 seasons, although it clearly remains the most common and prevalent injury in the AFL. Table 6 shows that the incidence and prevalence of hamstring strains have both been generally lower in the period 2011-2014 than the period 2006-2010. Previous research of the relationship between increasing interchange movements and hamstring strains postulated that the increased speed of players who were more rested had been driving up hamstring injury incidence over the period 2003-2010 [30]. The drop in hamstring injury incidence since the implementation of the substitute rule in 2011 (which had reached statistical significance in 2013 [12]) is consistent with this theory, without necessarily proving it. Given the very similar incidence and prevalence between 2013 and 2014 of hamstring strain injuries, there does not appear to have been any influence of the 120 interchange cap on the rates of hamstring strains to date.

Table 6 – Key indicators for hamstring strains over the past decade

Hamstring injuries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence	5.2	6.4	6.7	6.6	7.1	6.0	4.8	5.7	5.2	5.2
Prevalence	18.6	21.8	24.3	25.8	21.8	20.6	16.5	21.5	20.8	20.7
Severity	3.6	3.4	3.6	3.9	3.1	3.4	3.4	3.8	4.0	3.9
Recurrence rate (%)	26%	16%	22%	27%	18%	14%	12%	14%	24%	16%

(b) Groin injuries

Groin injuries (including osteitis pubis) have been thought of as one of the “big three” injury categories that cause the most missed playing time in the AFL (along with hamstring strains and knee ACL injuries). Australian Football is one of the sports with the highest rates of groin injuries [31]. However, compared to hamstring strains and knee ACL injuries, groin injuries represent a more heterogeneous group of diagnoses. Groin injuries include adductor muscle strains, tendinopathies, osteitis pubis and sports hernias [32]. However they specifically exclude hip joint injuries (including labral tears and femoroacetabular impingement) which are seen as being distinct. A gradual increase in the incidence and prevalence of “other hip” injuries over the last decade has reflected the trend to diagnose hip pathology more often [31]. This is particularly done in cases where hip surgery has been undertaken.

Groin injuries fell significantly in the period 2011-13 compared to the previous years [12] and again stayed at a historically low level in 2014. What was noticeable was that all nearby diagnoses in the groin/hip/thigh region also exhibited low injury incidence and prevalence in 2014. The incidence and prevalence of total injuries in the groin/hip/thigh region were at their lowest

levels over the 23 years of the injury survey in 2014. This may be due to one or both of the following factors:

1. That AFL teams may have advanced to the point where they are better at preventing groin and related injuries than in the past.
2. That the rule changes applicable to 2014 (combination of substitute rule and interchange cap of 120) have been beneficial with respect to injuries in these regions (or, at the very least, have had no negative effect on these injuries if primary prevention has improved).
3. It is also possible, given that there is a relationship between groin injury history at junior level and senior level [33] that improvements in management of these injuries at underage level may have contributed.

Table 7 – Key indicators for groin and hip injuries over the past decade

Groin injuries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence	2.9	3.3	4.0	3.2	3.3	4.1	2.8	2.6	2.7	2.6
Prevalence	11.2	14.0	17.5	12.4	11.7	15.3	7.9	7.1	7.0	6.7
Severity	3.9	4.3	4.3	3.9	3.5	3.7	2.8	2.7	2.6	2.6
Recurrence rate	23%	28%	39%	23%	19%	20%	15%	19%	11%	11%
Hip/impingement	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence	0.2	0.3	0.8	0.7	1.0	0.6	1.0	1.2	1.1	0.3
Prevalence	1.0	2.3	4.4	2.8	5.4	4.5	5.7	5.6	4.6	0.8
All groin/hip/thigh	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence	11.2	12.7	14.0	12.9	14.4	13.6	10.6	11.6	12.0	10.1
Prevalence	38.7	45.0	52.9	48.8	49.7	48.8	36.8	38.6	39.6	32.8

(c) Calf strains

Calf strains were first analysed separately in the AFL Injury Report of 2013 as they had significantly increased in the 3 years from 2011-13 [12]. In 2014 the rates of calf injuries decreased compared to 2012-13 but remained at a higher level than prior to the substitute rule. Because of the consistent rise in calf strains since 2010, this represents medium-term data suggesting that the substitute rule has been associated with an increase in calf strains. Further studies on calf injuries underway in AFL players using MRI will be able to determine the percentage of soleus strains and also whether the prognosis between different muscles is different. The rate of recurrence of calf strains has been higher than usual in the past two seasons and if the relative rate of soleus strains is increasing, it may be interesting to document if the recurrence rate is higher for soleus than gastrocnemius injuries.

Table 8 – Key indicators for calf strains over the past decade

Calf strains	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence	1.9	1.6	1.2	2.0	1.3	1.7	2.1	3.0	3.7	2.6
Prevalence	4.5	3.4	3.1	4.4	3.0	3.7	5.5	7.1	10.6	8.1
Severity	2.4	2.1	2.6	2.2	2.3	2.2	2.6	2.3	2.8	3.1
Recurrence rate	12%	7%	9%	5%	0%	12%	5%	6%	16%	16%

(d) Shoulder injuries

Table 9 shows that in 2014 the incidence of new shoulder injuries was typical although prevalence and severity were higher than usual. The most interesting feature of shoulder injuries in 2014 was a particularly high recurrence rate (of 52%). In both 2013 and 2014 there were 25 new shoulder injuries. In 2013 there was one recurrence of a shoulder injury later in the same season, whereas in 2014 there were 13 recurrences. It is not clear as to the reasons for this one off particularly high recurrence rate of shoulder injuries, although further study of shoulder injuries in the AFL is underway and may lead to a greater understanding. Recurrences of other injuries (not shoulder) were not particularly high in 2014.

Table 9 – Key indicators for shoulder injuries over the past decade

Shoulder sprains & dislocations	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence	1.4	1.6	1.0	1.8	1.3	1.6	1.8	1.3	1.2	1.2
Prevalence	7.7	10.8	6.4	10.2	7.7	10.9	12.1	9.0	7.1	9.8
Severity	5.6	6.7	6.3	5.8	5.7	6.9	6.8	6.8	6.0	8.3
Recurrence rate	20%	13%	16%	9%	12%	26%	11%	14%	4%	52%

(e) Knee PCL injuries

The two major knee ligament injuries are anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL) injuries. There has been a significantly lower rates of PCL injuries since the introduction of the centre circle rule in season 2005 (Table 10) [3]. After 5 centre bounce PCL injuries in 2004, there have been only 10 in total for the 10 seasons from 2005-2014 (an average of 1 per season). There was 1 centre bounce ruck-related PCL injury in 2014.

Table 10 – Key indicators for PCL injuries over the past decade

PCL injuries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PCL incidence	0.4	0.3	0.2	0.3	0.3	0.4	0.6	0.3	0.4	0.2
PCL prevalence	2.7	1.8	1.6	2.2	1.2	3.2	4.8	2.0	2.1	1.1
Number of PCL injuries (total)	7	5	3	5	6	8	13	7	10	4
Number of centre bounce PCL injuries	1	0	0	2	1	0	4	0	1	1

(f) Knee ACL injuries

The number of knee ACL reconstructions performed was lower in season 2014 than the past three seasons (Table 11). The injury prevalence was also relatively low and reflected that many of the ACL injuries in 2014, unusually, occurred late in the season. A historical trend that was followed in 2014 was that a relatively high proportion of ACL injuries occurred in the northern state (non-Victorian) venues. This is similar to the observation, in European soccer, that competitions in warmer climates have higher rates of ACL injury [34].

Table 11 – Key indicators for ACL injuries over the past decade

ACL injuries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
ACL incidence	0.6	0.9	0.6	0.9	0.7	0.6	0.9	0.8	1.0	0.7
ACL prevalence	9.3	14.1	15.1	15.3	11.1	7.8	13.6	13.5	17.8	11.1
Number of ACL reconstructions	10	19	13	17	13	9	20	16	23	14
Number of revision reconstructions	1	4	2	4	1	0	4	1	8	5

There was again a high number of revision reconstructions in 2014. Since the first AFL player had a LARS artificial ligament reconstruction in 2008, which enabled quicker return to play, an observed trade-off with LARS graft usage has been a higher rate of ACL graft failure [35]. However, there also appears to be an increase in failure of traditional (autograft) reconstructions. For this reason, a review of techniques used by surgeons in AFL players is underway.

(g) Concussion

Concussion has been a major injury concern for all sports in recent years with further understanding that there is a possible link between concussions suffered in sport and neurodegenerative conditions in later life [36]. Reflecting these concerns, the AFL and AFLDA introduced revised Concussion Management Guidelines at the beginning of the 2011 and 2013 seasons that reinforced a more conservative approach to concussion management.

The concussion incidence in the injury survey (and hence Table 12) are those concussions that require a player to miss a match. There was only an average of 1.0 concussions per team per season over the period 2011-2013 (which caused a team to miss a match), effectively a rate of one concussion every twenty or so games that causes a player to miss a match [35]. Ultimately the AFL and AFLDA recognise that the injury surveillance provided by the annual report is not comprehensive enough for the field of concussion to provide a broad enough view of the subject, particularly relating to any long-term effects of concussion. Recent collation of data on all definite concussions (not just those which meet the injury survey definition of missing a match) found a rate of one concussion every five team games [37]. This rate suggests that there are four times as many concussions presenting to team doctors than there are cases which cause players to miss games, although the rates from 2011-13 are not markedly different from earlier surveys across the previous two decades [12 37]. This research however is outside the scope of the core injury survey.

Concussion rates in the injury survey (i.e. those missing games) have increased since recent rule changes were instituted in season 2011 (Table 12) and the concussions causing a player to miss a game again increased in 2014. This increase may in part be due to more conservative management of concussion by medical staff after increased awareness of the possible long-term effects of

concussion [38-40], with the resultant greater likelihood that a player will pass the survey threshold for a concussion injury by being held out of the next game.

One further point of note to make on the topic of concussion management has been that the substitute rule and concussion rule have both enabled concussion management to be improved and for the Zurich guidelines [36] to be best implemented. With respect to the substitute rule and interchange cap, if a player suffers a concussion early in the game and the doctor determines that he has been concussed and medically should not continue, his team (after invoking the substitute) will be less adversely affected from a rotation perspective. This also alleviates pressure on players to downplay concussion symptoms and doctors to make timely concussion assessments.

Table 12 – Key indicators for concussion over the past decade

Concussion	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Incidence	0.7	0.3	0.3	0.4	0.5	0.5	1.1	1.0	1.0	1.3
Prevalence	0.9	0.3	0.3	0.5	0.7	0.8	2.2	1.6	1.3	1.6

4.5 Potential effect of interchange cap on injury rates in 2014

It is pleasing to be able to report lowered injury incidence and prevalence in 2014. It is also tempting to try to attribute what appears to be a reversal of the trend of increasing injury rates of recent years to changes in the way the game was played in 2014. A notable change in 2014 was that an interchange cap of 120 was introduced for the first time, to work in conjunction with the substitute rule. Although the absolute numbers of interchanges did not fall dramatically with this cap, a more interesting change was probably the effect on interchange discrepancies between teams. That is, on most occasions in 2014 both teams would have used a fairly similar number of interchanges whereas in previous years there may have been instances where one team was substantially “out-rotated”. A paradox had been noted in previous years whereby the overall injury incidence (and incidence of hamstring strains in particular) had increased as total number of interchanges had increased, but that the higher interchanging teams were suffering fewer injuries than the lower interchanging teams [30]. This led to an “arms race” of constantly increasing interchanges, with more negative effects on the lower interchanging teams than positive effects on the higher interchanging teams [30]. It is therefore possible that in 2014 there has been a beneficial effect of a reduction in occasions where teams were “out-rotated”.

Notwithstanding these observations, based on a single season of data it may be premature to attribute a short-term change in the injury profile to a single season under a rule change. Further monitoring over the next few seasons is required to fully assess any attributable effects.



4.6 Conclusion

The AFL, like all professional sporting competitions, faces an ongoing challenge of delivering a free flowing, continuous and entertaining spectacle whilst trying to keep players free from injury so far as this objective can reasonably be achieved in the circumstances of a body contact sport.

Season 2014 was a successful season in terms of injury outcomes, with lower injury incidence and prevalence than in recent years. Further monitoring of injury statistics may determine whether this is the start of a trend of injury reduction.

As has been the case over the past decade, the AFL is continuing to fund other studies and is particularly researching concussion and knee ACL injuries in further detail at the present time.

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