

CONCUSSION MANAGEMENT IN A  
PROFESSIONAL SENIOR AFL TEAM  
OVER 10 YEARS:  
ASSESSING RE-INJURY RATE AND  
PERFORMANCE

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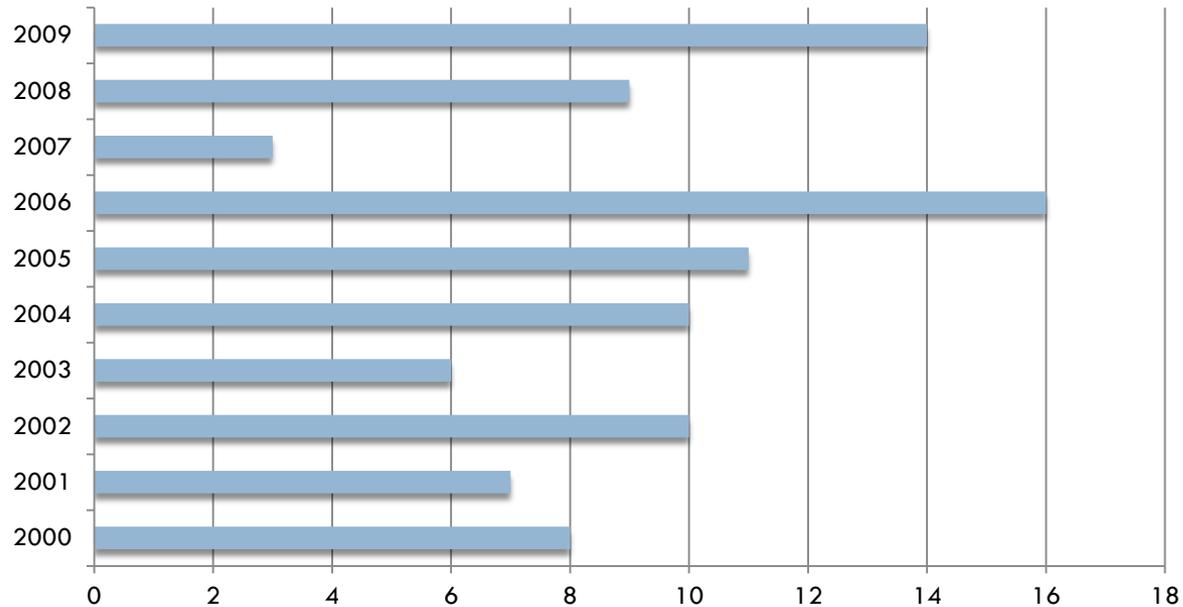
# Questions:

- What is the incidence of concussion as the Sydney Swans?
- How many games are missed due to concussion?
- What is the incidence repeat concussion within the season?
- Are players that continue, or come off and go back on, at
  - ▣ At increased risk of repeat concussion?
  - ▣ At increased risk of injury?

# Questions:

- In the return game (next week) are concussed players at
  - ▣ At increased risk of injury,
  - ▣ At increased risk of repeat concussion
  - ▣ At risk of decreased performance
  
- In the return game (next week), are players that continue, or come off and go back on
  - ▣ At increased risk of injury,
  - ▣ At increased risk of repeat concussion
  - ▣ At risk of decreased performance

# Incidence of concussion 2000-2009



<b>Concussed 2000-2009</b>	<b>Average per year</b>	<b>New concussion/1000pgh</b>
94	9.4	13

# Inclusion in the analysis:

	Concussed	No performance data	Concussed in final game	Did not play due to injury	Total included
Players	94	7	3	3	81

## No performance data

- 7 dropped from the senior team and no performance data was available for the next week.
- All 7 players played in reserves
- 0 players suffered a recurrent concussion in that week.

# Game day management:

## Return to play in same game criteria:

- ▣ Resolution of symptoms
- ▣ Symptom-free off-field exertion test.
- ▣ Sideline neuropsychometric testing was not performed.

	Concussed	Did not return	Go off and come back on	Continued	Go off and come back on or continued
Players	81	21	36	24	60
% of players	100%	26%	44%	30%	74%

# Post concussion management:

- Gradual RTP program over 6-8 days – 24 hours between each stage
  - Day 1: Observation for 4-6 hours
  - Day 2: Review
  - Day 3-4: Rest for 2-3 days until resolution of all symptoms
  - Day 4/5: 30 minute bike session (symptom free)
  - Day 5/6: Low intensity weights session (symptom free)
  - Day 6/7: Full team training with avoidance of contact drills (symptom free)
  - Day 7/8: Game

# Missed games Post-Concussion

	Missed following weeks game due to Concussion	Missed following weeks game due to injury
Players	0	3

- Injuries
  - Broken Jaw
  - Ankle sprain
  - Hamstring tear

# Repeat concussion – same season

	<b>Total concussion</b>	<b>Concussion following week</b>	<b>2<sup>nd</sup> concussion same season</b>	<b>3<sup>rd</sup> concussion same season</b>
<b>Players</b>	94	0	17 (19.3%)	3 (3.4%)

# Are concussed players more likely to be re-injured in the Return Game (next week)?

## Total number of injuries 2000-2009 + Return Game injuries for concussed players

	Not concussed	Concussed
Significant injury	132	2
Non-significant injuries	527	11
Total	659	13

Significant injury = At least 1 game missed

Non-significant injury = No games missed

# Are concussed players more likely to be re-injured in the Return Game (Next week)?

## Injuries 2000-2009 + Return Game injuries for concussed players Per 1000pgh

	Not concussed	Concussed	Significance
Significant injury (per 1000pgh)	23.5	17	P = 0.86
Non-significant injury (per 1000pgh)	93	77	P = 0.86

**Statistical test = Fisher's Exact test**

**Result:** There is no statistical difference in injury rate in between concussed and non-concussed players in the week following concussion.

# Are concussed players who continued, or go off and go back on likely to be re-concussed or injured?

	Concussed	Continued/Go off and come back on	Repeat concussion	Significant injuries	Non-significant injuries
Players	81	60	0	2 (20/1000pgh)	2 (20/1000pgh)

- Injury rate were too low for statistical analysis so descriptive stats have been used
- Injury rates of those returning to play are comparable to the non-concussed injury rates
- No Repeat concussions
- No Second impact syndrome
- No Structural intracranial injuries

**Result:** There does not appear that there is an increased injury risk for players who continue on in or return to the game on the same day.

# Does concussion affect performance in the Return Game (Next Week)?

## Performance measure

- Coach rated match performance (CRMP):
  - ▣ Standardised rating out of 50 of player performance
  - ▣ Relies on the player performing their role in the team not on number of touches or game statistics.

# CRMP of return game post-concussion Vs season average

## CRMP in same player:

	CRMP – Season average	CRMP – Return game	Significance
Concussed player	42.2 +/- 14.00	43.4 +/- 23.93	P= 0.568

## Statistical test: paired t-test

**Result:** There is no statistical difference between return game and season average CRMP

# CRMP return game post-concussion Vs non-concussed players

- Mann-Whitney U test to compare groups
- **Results:** No significant difference in performance except 2005 and 2008 where concussed players played better the following week.

# Did players perform worse the following week if they stayed off, continued, or came off and went back on after concussion?

Group	Players	Mean $\pm$ SD
Continued	24	37.2 $\pm$ 25.2
Go off and come back on	36	50.2 $\pm$ 22.1
Did not return	21	38.5 $\pm$ 23.3
Total	81	43.4 $\pm$ 23.9

One-way ANOVA with Bonferroni post-hoc analysis.

## Results:

- No significant differences between treatment methods  $p=0.066$
- Trend for a higher match rating from the 'go off then come back on' treatment ( $p=0.07$ ).
  - Size effect :  $<0.3$  = trivial,  $0.5$  = moderate,  $>0.7$  = large

# Conclusions and short discussion:

- Concussion is a common injury in AFL
  - ▣ 13/1000pgh Vs 4.1 (Rugby Union), 3.0 (Rugby League) 5.5 (Ice Hockey)
  - ▣ 9.4/season Vs 6.7/season new hamstring injuries
  
- Concussion is likely underreported in the AFL
  - ▣ 0.3-0.7/season - AFL injury report 2007
  - ▣ 199 over 2000-2003 (Makdissi et al, 2009)
  - ▣ Swans 33 concussions over same years = 528 across competition.
  
- Players commonly stay on or RTP in the same game.
  - ▣ Swans – 74%
  - ▣ AFL – 43% (McCory et al, 2000)
  - ▣ NFL – 49.5% (Pellman et al, 2005)
  - ▣ Rugby Union - 58% stayed on or removed later (Kemp, et al, 2008)

# Conclusions and short discussion:

- Players can return to play in the same game without increase in risk of injury
  - 0 structural or intracranial injury
  - 0 recurrent concussions
  - 0 second impact syndrome
  - 2 MSK injuries
  
- Pellman et al, 2005 concluded that the concern regarding RTP in the same game may be unfounded following analysis of 887 concussions
  - 0 intracranial lesions
  - 0 second impact syndrome
  - 0 repeat concussion
  - No increase in the rate of concussion in those that RTP in the same game, later in the season

# Conclusions and short discussion:

- Concussion is commonly a minor injury with short recovery and return to play within a week
  - ▣ NFL – 98% players return to the next game (Pellman et al, 2005)
  
- Players can return to sport following symptom free gradual RTP program with no alteration in
  - ▣ Performance
  - ▣ Repeat concussion rate
  - ▣ Injury rate
  
- Game day management strategy (the player stays on, comes off and goes back on, comes off and stays off) for the following week, does not effect
  - ▣ Performance
  - ▣ Repeat concussion rate
  - ▣ Injury rate

# Conclusions and short discussion:

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- There is a trend for players who “come off and go back on” to perform better the following week.
  - ▣ This provides medical support maintenance of the free interchange rule

# Limitations:

- Retrospective study
  - ▣ Prospective study to be performed
  
- Limited numbers
  
- No long term effect data
  - ▣ With concussion the most common injury in AFL
  - ▣ High recurrence rate in the same season (19.3%)
  - ▣ Long term study into the outcomes of concussion in AFL players should be prompted.