Abstract

The aim of this study was to compare occasions where players left the field due to injury at a National Rugby League (NRL) club before and after a change to the interchange rule. There were 141 games assessed under unlimited interchange and 94 games after the introduction of the rule limiting teams to 12 interchanges per game. There was a significant reduction in the rate of players leaving the field due to injury after the institution of the limited interchange rule (from 1.9 to 1.2 players per team per game). Facial injuries, such as broken noses and lacerations, were the injury categories most responsible for the reduction in players leaving the field. The rate of players leaving the field through injury and being unable to return was essentially unchanged (0.76 to 0.86 players per team per game). There was no occasion under the new rule where a player was injured after all 12 interchange replacements had been used, which would have forced the team to either play with one less player or keep a player on the field against medical advice. There were also no occasions in any game where more than 4 players were injured and unable to return, forcing the team to play 'a man short'. However on 3 occasions (twice under the old rule and once under the new rule), 4 players sustained an injury which prevented them from returning and therefore no further interchanges were possible after the fourth player became unfit to return. The new rule has resulted in a significant decrease in the number of players leaving the field with a minor upper body injury to be checked by the medical staff. This consequence does theoretically increase the risk that a player may continue to play with a serious upper body injury without being assessed by the medical staff.

Effect of the limited interchange rule on players leaving the field at an NRL club

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Introduction Rugby league, a similar game to rugby union, is played between two teams of 13 players with 4 players on an interchange bench, and leads to high rates of injury [1, 2, 4]. The National Rugby League (NRL) is the world's premier rugby league competition, contested between 15 teams based in cities in Australia and New Zealand. The NRL was formed in 1998 after a merger between two rival competitions which had split for season 1997. For the period 1998-2000 inclusive, NRL rules allowed for teams to make unlimited interchanges between players on the field and those on the bench. After agreement from the majority of teams, from season 2001 onwards this rule was changed to allow teams a maximum of 12 interchange movements over the course of the match (Figure 1). The rationale was that the increasing use of unlimited interchange was diminishing the quality of the game as a spectacle. A typical criticism was that star players who played the entire 80 minutes were being forced to do this in a fatigued state relative to fringe players who could constantly rotate on-and-off the interchange bench.

The limited interchange rule includes the provision that if a player needs to leave the field after 12 interchanges have been used then his team must play with a man short for the time he is off the field. The only exception to a team being charged for an interchange movement under the new rule is where a player is injured directly as a result of illegal play by the opposition. In this circumstance, the referee signals to the interchange steward that the player may be replaced without charging an interchange movement to his team. It is notable that on occasions where a referee forces a player

Rugby League: 13 players on the field, 4 on the interchange bench
Old rule (1998-2000) **Unlimited interchange** between players
New rule (2001-2002) **Limited interchange** maximum of 12 movements per team per game between the field and the interchange bench

Figure 1 – Summary of rule change parameters

John Orchard and Liz Steet escort an injured Rooster off the field. Picture Courtesy of John Orchard

	Players leaving field injured per team game			
Injury Category	**Unlimited Interchange**	**Limited Interchange**	**Odds Ratio**	**95% Confidence Interval**
Concussion	0.18	0.13	0.72	(0.34-1.50)
Facial fractures	0.14	0.02	0.15	(0.03-0.66)*
Neck sprains	0.04	0.01	0.25	(0.03-2.11)
Head and neck lacerations & other soft tissues injuries	0.31	0.15	0.48	(0.25-0.92)*
Shoulder sprains and dislocations	0.06	0.16	2.81	(1.15-6.90)#
Other upper limb injuries	0.21	0.06	0.31	(0.12-0.78)*
Rib and chest wall injuries	0.15	0.06	0.43	(0.17-1.10)
Other trunk & back injuries	0.08	0.00	0.00	
Thigh and hip haematomas	0.16	0.09	0.52	(0.22-1.22)
Hamstring/quadriceps/calf strains	0.06	0.09	1.33	(0.50-3.58)
Knee injuries	0.16	0.19	1.17	(0.60-2.29)
Ankle injuries	0.09	0.07	0.81	(0.31-2.10)
Other lower limb injuries	0.23	0.14	0.59	(0.30-1.18)
Illness/medical problems	0.03	0.01	0.38	(0.04-3.41)
ALL INJURIES	**1.91**	**1.18**	**0.62**	**(0.44-0.87)***

* Significantly (p<0.5) fewer players leaving the field injured under limited interchange

Significantly (p<0.5) more players leaving the field injured under limited interchange

Table 1 – Comparison of rates of players leaving the field through injury

	Players leaving field injured per team game			
Injury Category	**Unlimited Interchange**	**Limited Interchange**	**Odds Ratio**	**95% Confidence Interval**
Concussion	0.10	0.09	0.86	(0.35 - 2.12)
Facial fractures	0.04	0.02	0.50	(0.10 - 2.53)
Neck sprains	0.01	0.01	0.75	(0.07 - 8.39)
Head and neck lacerations & other soft tissues injuries	0.05	0.07	1.50	(0.51 - 4.42)
Shoulder sprains and dislocations	0.02	0.13	**6.00**	**(1.65 - 21.84)#**
Other upper limb injuries	0.06	0.04	0.67	(0.20 - 2.23)
Rib and chest wall injuries	0.05	0.05	1.07	(0.33 - 3.48)
Other trunk & back injuries	0.04	0.00	0.00	
Thigh and hip haematomas	0.06	0.06	1.00	(0.34 - 2.90)
Hamstring/quadriceps/calf strains	0.05	0.07	1.50	(0.51 - 4.42)
Knee injuries	0.09	0.14	1.50	(0.51 - 4.42)
Ankle injuries	0.06	0.07	1.17	(0.42 - 3.24)
Other lower limb injuries	0.10	0.10	0.96	(0.40 - 2.32)
Illness/medical problems	0.01	0.00	0.00	
ALL INJURIES	**0.76**	**0.836**	**1.14**	**(0.77 - 1.68)**

Significantly (p<0.5) more players leaving the field injured under limited interchange

Table 2 – Comparison of rates of players leaving the field through injury who were unable to return

to leave the field because of uncontrolled bleeding (unless this was directly caused by illegal play), that the team must either surrender an interchange to replace him or play with one less player until he can return.

The aim of this study was to compare occasions where players left the field due to injury at an NRL club before and after the change to the interchange rule, to assess the impact that the rule change has had on the on-field management of injuries.

Methods The medical staff at the club recorded all injuries presenting for treatment into an injury database. Included in the database were all occasions of players leaving the field (and being replaced) due to injury or illness and whether the player was subsequently able to return to the field or not. The scope of the study was all games for the club's two senior grades (National Rugby League and New South Wales Rugby League First Division) over the regular season and finals.

There were 141 team games assessed before and 94 team games after the introduction of the limited interchange rule. A comparison was made between the rates of players leaving the field through injury before and after the rule change, and then also the rates of players leaving the field *and* being unable to return before and after the rule change.

Results Table 1 and 2 list the rates of players leaving the field before and after the introduction of the new interchange rule. In table 1, all instances of players leaving the field are included. In Table 2, only those instances where a player left the field and *was assessed as unfit to return* are included.

Table 1 shows that there was a significant reduction in the rate of players leaving the field due to injury after the institution of the limited interchange rule (from 1.9 to 1.2 players per team per game). Expressed as a risk reduction, players were 38% less likely to leave the field due to injury after the institution of the new limited interchange rule.

The specific injuries that were most responsible for the decrease in players leaving the field through injury were facial fractures, head and neck lacerations and 'other' upper limb injuries.

On the other hand, table 2 shows that the rate of players leaving the field and being unable to return was very similar for most categories. There was no category of injury that saw a significant decrease in players being unable to return to the field due to injury. Shoulder sprains and dislocations were significantly more likely to prevent a player returning to the field after the institution of the new rule.

There was no occasion under the new rule in this study where all 12 interchange replacements had been used and an injury forced the team to either play with one less player or keep a player on the field against medical advice. There were also no occasions under either rule where more than 4 players were injured and unable to return, forcing the team to play 'a man short'. There were two occasions under the old rule and one under the new rule where 4 players sustained an injury which prevented them from returning. In these 3 games, no further interchanges were possible after the fourth player became unfit to return.

Discussion The advent of limited interchange has led to a significant decrease in players leaving the field due to injury at one NRL club. However, this decrease has not led to a significant change in the number of players who are injured and unable to return. That is, players who under

unlimited interchange were coming off the ground to have minor injuries checked (particularly to the upper body), and are now successfully staying on the ground. There does not appear to be a major negative effect on the overall rate of serious injuries due to this rule change.

The one injury category that had a significant increase ($p<0.05$) subsequent to the rule change is shoulder sprains and dislocations. It is difficult to assess whether this is just due to confounding factors or chance or whether the style of the game has changed in the years subsequent to the rule change leading to a higher rate of shoulder injury. It is possible that players who are more fatigued under the current rules are tackling with poorer technique and are therefore more likely to injury their shoulder. It is also possible that other confounding factors (including chance) are responsible for the increase at this club over this time period.

The most controversial aspect of the new rule from a medical viewpoint is the hypothetical situation where a team has run out of interchanges and a player is seriously injured (e.g. fractured spinal vertebrae) but he does not leave the field as he does not want to leave his team a player short. Obviously, if this situation occurred then medical staff would be powerless to properly assess the player. This is particularly the case under current NRL rules where doctors and physiotherapists are not allowed to come on to field during play unless called on by the referee. Coaches have a responsibility under the new system to always keep a spare interchange available (using a maximum of eleven interchanges voluntarily) in case of serious injury.

A further controversy of the current NRL rules is the charging of an interchange to a team who replaces a bleeding player. If a player is required to leave the field by the referee because of bleeding, teams have the option of not using a replacement. In this case, medical staff can attempt to arrest the bleeding wound on the sideline whilst playing with one less player. The data presented in this study shows a substantial decrease in players leaving the field due to head and facial lacerations. Under the limited interchange rule the club has more frequently repaired head and facial lacerations on the sidelines with a staple gun [3], to minimise the time that the player is unavailable and without necessitating the use of two interchange movements to substitute the player off and then back on.

Until season 2003, the British Super League, the world's other major professional rugby league competition, had an otherwise similar limited interchange rule except that interchanges did not count where the player was forced to leave the field through bleeding. The Super League has for 2003 changed its rule to charge instances of bleeding as per the NRL rule. The argument for the NRL stance and for the change in Super League is that it was previously alleged in the Super League competition that on occasions players and trainers deliberately failed to stop a tired player from bleeding in order to be granted a 'free' interchange by the referee for the 'blood bin'. In Australia, rugby league played at the community level continues to generally use an unlimited interchange rule.

Conclusion At the club studied, there does not appear to have been a negative impact on injury overall from the change made by the NRL to introduce a 'limited interchange' rule. A very similar number of players were unable to return to the field due to injury in the period before and after the rule change. However, there has been a marked decrease in the number of players leaving the field with a minor upper body injury to be checked by the medical staff. This documented reluctance of players to leave the field to have minor injuries checked under the new rule theoretically increases the risk that in the future on a rare occasion a player may refuse to leave the field with a serious injury due to the new rule.

For correspondence and further information on NRL injuries, visit www.injuryupdate.com.au

References

1. Gibbs N. Injuries in professional rugby league. A three-year prospective study of the South Sydney Professional Rugby League Football Club. *Am J Sports Med 21(5)*: 696-700, 1993.
2. Gissane C, Jennings D, White J, Cumine A. Injury in summer rugby league football: the experiences of one club. *Br J Sports Med 32(2)*: 149-52, 1998.
3. Orchard J. Video illustration of staple gun use to rapidly repair on field laceration. *British Journal of Sports Medicine*, accepted for publication.
4. Phillips LH, Standen PJ, Batt ME. Effects of seasonal change in rugby league on the incidence of injury. *Br J Sports Med 32(2)*: 144-8, 1998.