all levels of competition. The development, implementation and evaluation of the training course will be presented.

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Return-to-play decision making in New Zealand "Super" rugby

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Introduction: Suggested to be one of the most popular professional team sports in the world, rugby union has significant problems with injury, that impact on most facets of the sport. Investigations of injury in rugby have identified premature return from injury as a preventable cause of injuries. This study explored the return-to-play (RTP) decision making processes of New Zealand "Super 12" rugby teams.

Methodology: Face to face interviews were conducted with team trainers, physiotherapists, doctors and coaches of the five NZ "Super" franchises. Using a guided interview method, discussions explored the concept of "full recovery" and circumstances under which a player may return to competition prior to full recovery. Participants were asked how an injured player demonstrated their fitness following injury, and the criteria that were used to evaluate player fitness after injury. We were also interested in participant descriptions of the elements considered important for an effective fitness test. A final area discussed was the decision making process; who was involved and how were decisions reached. Thirteen of a possible 20 participants consented to interviews. All interviews were conducted during the 2002/2003 off-season by one of the investigators (AB) and were audio taped and transcribed.

Results: While there were commonalities, each franchise dealt with RTP decision making in different ways that were often predicated on the perceived strengths and expertise of their management team. As noted in our previous RTP work, differences in perceptions of the RTP decision making process were often apparent within the same franchise. Full recovery appeared to be an exception rather than the norm. An earlier return was rationalised on the basis of the importance of the game, team dependency on the injured player, and the nature and severity of the injury suffered. An ethic of care was expressed by most participants when discussing return to play prior to full recovery. Such decisions were defended with sentiments such as "so long as they will not aggravate the injury or suffer long term damage". These statements were at times at odds with other sentiments either expressed at interview or that underpinned the decision making process.

Conclusions: RTP evaluations in NZ "Super" rugby do not appear to follow set or consistent procedures. At times the decision making process appears to be culturally bound to the sport. With the high incidence of reinjury in rugby union, the sport arguably would benefit from more standardised return-to-play assessment procedures.

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Injuries to the triceps surae muscle of elite rugby union front rowers: A 3 dimensional kinematic analysis of the front row during live scrimmaging

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Introduction: The increasing incidence of injury to the triceps surae muscle in high performance front row rugby union (rugby) players has stimulated a need to investigate the events surrounding this injury. Previous research has linked triceps surae muscle injuries with both scrummaging and activities which mimic those of scrummaging, but possible mechanisms of injury remain uninvestigated. In addition, limited published data exists that has reported the biomechanics of scrum technique in high performance players. Of these studies the majority have been undertaken using scrummaging machines, with research on the biomechanics of live scrummaging even less well documented. Accordingly, the purpose of this study was to investigate the lower limb kinematics during a series of scrummaging drills. It was hypothesized that analysing the biomechanics of this aspect of game play would provide greater understanding of the possible causes and mechanisms for triceps surae injury.

Methodology: Eleven high performance front row rugby players were landmarked for 16 anatomical points and then videoed during a series of 2-on-1 (attacking) and 1 -on-2 (defensive) live scrummaging drills using four digital camcorders (Panasonic NV-GS180GN) operating at 50 Hz. On completion of data collection, the 16 land marked anatomical points were digitised for each frame using APAS motion analysis software and a three-dimensional model of the trunk and lower limb developed. A series of one way ANOVA were used to determine if the spatio temporal descriptors of the lower limb kinematics differed between defensive and attacking scrummaging technique. All statistical analyses were performed using SPSS for Windows (version 17). A significance level of $P < 0.05$ was used for all analysis.

Results/conclusions: Results (presented as mean ± SD) showed numerous significant differences in a range of spatio temporal variables between defensive and attacking scrum types. Analysis indicated a clear trend towards more extended positions in the defensive scrum drills. For example, relative ankle angular displacement from foot strike to toe-off varied significantly ($P < 0.05$) between the attacking (−13° [±7]) and defensive scrum drills (3° [±8]), as did relative ankle angular displacement at peak extension velocity between the attacking (108 deg [±12]) and defensive scrum drills (97°

[±9]) during single leg stance. It was concluded that these more extended joint positions contribute to increased triceps surae load during attacking scrummaging activity. This study also showed that the scrummaging techniques of the subjects had the potential to predispose them to triceps surae injury.

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Injury patterns of provincial cricket players in South Africa over a two season period

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Introduction: To determine the incidence, nature injury patterns for elite cricketers during a two-season period.

Methods: The physiotherapists and/or doctors working with four provincial teams completed a questionnaire for each cricketer that presented with an injury during the 2004–2005 and 2005–2006 cricket seasons in order to determine (i) anatomical site of injury, (ii) month of injury during the season, (iii) the diagnosis using the OSCIS injury classification system, (iv) mechanism of injury, (v) whether it was a recurrence of a previous injury, (vi) whether the injury had recurred again during the season, and (vii) biographical data.

Results: The results showed that 180 injuries (S1–84; S2–96) were sustained. The teams spent on average 2 472 hours on matches, 4148 on practices and 1612 h on fitness during the two season period. The injury prevalence was 7.5% per match, while the incidence of injury was 29.6 injuries per 10 000 h of match, practice and training time. Bowling (29.0%), fielding and wicket-keeping (27.0%) and batting (19.0%) accounted for the majority of the injuries. The injuries were predominately to the lower limbs (S1–45%; S2–41.7%), back and trunk (S1–19%; S2–18.9%), upper limbs (S1–19%; S2–22.2%), head and neck (S1–6.0%; S2–2.8%) and illnesses (S1–11.6%; S2–14.4%). The injuries occurred primarily during first-class matches (39.0%), limited-overs matches (18.0%), practices (17.0%) and as a result of gradual onset (19.0%) early part of the season. Acute injuries made up 78.0% of the injuries. The majority of the injuries were new or first-time injuries (75.0), with 11.0% and 14. 0% recurrent injuries from the previous and the present season, respectively. The major injury during S1 were haematomas (19%), muscle strains (17%) and other trauma (14%), while during S2 the injuries were primarily muscle strains (16%), other trauma (20%), tendinopathy (16%) and acute sprains (15%). The primary mechanisms of injury occurred in the delivery stride when bowling (18.9%) and over-bowling (7.2%), impact by the ball when batting (11.1%) and sliding to field the ball (6.1%).

Conclusion: The results indicate a pattern of cause of injury, with the fast bowler most likely to sustain an acute injury to the soft tissues of the lower limb while participating in matches and practices during the early part of the season. Further, injuries in South African domestic cricket may be reduced by increasing fitness exposure time of all the players and reducing the practice time.

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REFSHAUGE LECTURE

Sports injury prevention—No longer lost in translation Australian Sports Medicine Federation Fellows Supported

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Since the publication of the first major international influential sports injury epidemiology paper in 1992, research into sports injury epidemiology and sports injury prevention have flourished both in Australia and overseas. These research fields are now recognised critical components of sports medicine research endeavours and have led to the accumulation and establishment of a strong evidence base for sports safety. Scientific and medical researchers alike have published their research in leading international sports medicine/sports science and injury prevention journals and the emerging research evidence has been disseminated. At least it has been, to our medical and scientific peers. Unfortunately, sports injuries still continue to happen. Given the accumulating prevention evidence-base, it is tempting to ask "Why doesn't anyone take up our research findings and apply them in practice to get the preventive benefits?". Surely, it must be the fault of those we aim to influence and inform that injuries still occur. It is becoming increasingly apparent, however, that it takes considerable time for scientific evidence to be put into practice and policy by those involved in delivering safe sport and that there is a need for us scientists to be creative in how we disseminate our findings. This talk will give an overview of how sports injury prevention research has moved from solely descriptive studies describing the nature and the size of the problem to very recent approaches that have begun to describe the implementation context for the delivery of safety interventions and the complexities of determining their effectiveness in real world sports delivery settings. It will conclude with the setting of priorities for the directions for future sports injury prevention research necessary for real world safety gains including: new understandings of how to translate research evidence into preventive action; new forms of information dissemination that can be easily understood and taken up by community sport; and new and enhanced partnerships with sporting bodes.

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