

PREVENTING LOWER LIMB INJURIES – IS THE LATEST EVIDENCE BEING TRANSLATED INTO THE FOOTBALL FIELD?

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Abstract (236 words)

There is accumulating international evidence that lower limb injuries in sport can be prevented through targeted training but the extent to which this knowledge has been translated to real-world sporting practice is not known. A semi-structured survey of all coaches from the 9 Sydney Australian Football League Premier Division teams was conducted. Information was sought about their knowledge and behaviours in relation to delivering training programs, including their uptake of the latest scientific evidence for injury prevention. Direct observation of a sample of the coach-delivered training sessions was also undertaken to validate the survey. Coaches ranked training session elements directly related to the game as being of most importance. They strongly favoured warming-up and cooling-down as injury prevention measures but changing direction and side-stepping training was considered to be of little/no importance for safety. Only one third believed that balance training had some importance for injury prevention, despite accumulating scientific evidence to the contrary. Drills, set play, ball handling and kicking skills were all considered to be of least importance to injury prevention. These views were consistent with the content of the observed coach-led training sessions. In conclusion, current football training sessions do not give adequate attention to the development of skills most likely to reduce the risk of lower limb injury in players. There is a need to improve the translation of the latest scientific evidence about effective injury prevention into coaching practices.

INTRODUCTION

Lower limb injuries (LLI) are common in many sports and there is accumulating international evidence from both randomised controlled trials and biomechanical studies that they can be prevented through targeted training that incorporates structured warm-up, balance training, side-stepping/cutting skills and jump/landing training ¹⁻⁵. Indeed, players who have participated in pre-season training programs or received specialist coaching are significantly less likely to be injured than other players ⁶. This suggests that coaches could play a pivotal role in the provision of specific training programs to reduce injury risk in players.

Given the accumulation of knowledge about preventing LLI, it is of interest to determine the extent to which this scientific evidence base has informed the content of training programs led by coaches. This information is needed to develop future injury prevention programs, as only research that is adopted as standard sporting practice can actually prevent injuries ⁷.

A detailed understanding of the context of sport delivery is needed before research findings can be translated into real world injury prevention practice ⁷. Given this, it is somewhat surprising that coaches' attitudes to sports injury prevention have not been well explored in the peer-review literature. Exploration of coaches' knowledge of the benefits of mouthguards found that the majority believed they were important, but did not feel adequately informed to provide advice to their players ⁸. Another study found that coaches were less convinced of the efficacy of rugby headgear than players and believed that its use could actually increase injury rates, so again did not promote it widely to players ⁹. As coaches are critical to the implementation and adoption of sports injury prevention strategies, it is important to understand their attitudes and existing knowledge, as determinants of their safety orientated behaviours and that of the players they coach.

The aim of this study was to determine the knowledge, attitudes and behaviours of coaches towards LLI prevention in Australian football. This information was collected as a necessary precursor to the development of a LLI prevention program, to be delivered during coach-led training sessions.

METHODS

Each coach of the first division teams from all nine clubs in the Premier Division (i.e. the highest level of competition) of the Sydney Australian Football League (SAFL) agreed to participate. Approval for the study was obtained from the Human Research Ethics Committee at the University

of New South Wales.

Coaches were surveyed for 10-15 minutes during a nominated training session. A broad qualitative approach was adopted and a semi-structured survey was developed. Written responses were sought on all but two open-ended questions which were audio taped. Questions on attitudes and knowledge were derived from previous similar surveys of Australian Football players^{10 11}. Information was collected on coaches':

- ratings of the importance of different elements of training sessions with respect to team performance and LLI prevention;
- perceptions of how specific training programs could prevent LLIs;
- general attitudes to, and knowledge about LLI risk and prevention.

Ratings were collected on a five-point Likert scale from 'little importance' to 'utmost importance' or 'strongly disagree' to 'strongly agree'. Two additional questions about LLI risk factors and prevention strategies currently used were open-ended and the responses audio taped, transcribed and recurrent themes identified using content analysis¹².

Direct observations of the duration and focus of components of two training sessions were also made at each club. Two sessions per club were observed to examine for any differences between sessions, as traditionally the earlier session in the week tended to be more fitness focussed and the later one more game skill related. The coaches were aware that the session was being observed but were not informed about the exact content being monitored. Skills chosen for observation included: warm-up, drills/set plays, ball handling skills, kicking skills, sprinting, weight/resistance training, jumping/landing training, changing direction/side-stepping, balance training, endurance training, and cool-down.

All data were double entered and checked for accuracy. Analyses were undertaken using SPSS version 13.0. Likert scale responses were assigned a value of 1-5, with higher scores being "more desirable". For open-ended questions, the frequency of the most common answers was determined.

RESULTS

Coaches' ratings of the importance of including various elements in a training session, and their subsequent impact on team performance and injury prevention, are shown in Table 1. Coaches generally ranked the elements directly related to the game as being of most importance to training

session content. The most important elements for team performance were considered to be game-related skills of ball handling and kicking skills, as well as warm-up and cool-down. There was more variability in the coaches' ratings of training elements for injury prevention.

<Insert Table 1 here>

Figure 1 compares median rating scores across the three areas of importance for training sessions, team performance and injury prevention. Drills and set play, ball handling skills and kicking were all considered to be of least importance to injury prevention, whereas balance was considered to be most relevant to injury prevention.

<Insert Figure 1 here>

Coaches' attitudes towards, and knowledge about, LLIs are summarised in Table 2. All agreed that it was important to be familiar with current LLI prevention strategies and that injury prevention was an important part of training. While some coaches expressed doubt about implementing a training program if it only improved one of performance or injury prevention, all agreed to implement it if it benefited both.

<Insert Table 2 here>

Coaches agreed that muscle and tendon LLIs could be prevented by undertaking specific exercises. Nonetheless, they generally believed that players sustain LLIs due to a lack of preparation, their attitudes, knowledge and management of injuries, re-injury of an old injury and lack of flexibility.

All coaches identified warm-up, stretching and keeping players' core body temperatures constant, as injury prevention strategies they adopt with their players. They considered that it was the physiotherapist/medical support staff who were responsible for injury management, and who liaised with them about players' return to play. Overall, coaches acknowledged a lack of education about injury prevention strategies and were keen to be better educated.

Visual observation of the training sessions identified that most time was spent on game-related skills training (Table 3). Only one club had a structured warm-up. In contrast to the coaches' high regard for endurance training for team performance, five teams did not include this in the observed training sessions. Conversely, sprinting was observed at seven clubs, despite coaches generally indicating that they were unconvinced of its importance. Little or no time was spent on balance, jump/landing and sidestepping techniques.

<Insert Table 3 about here>

Discussion

To our knowledge, this is the first study to assess the extent to which recent scientific evidence about LLI prevention has been specifically incorporated into coaches' beliefs and practices in relation to training programs in any football code. In developing training programs for their players, our study has found that Australian Football coaches generally rank injury prevention lower than general training session needs and team performance. Furthermore, it would seem that the accumulating scientific evidence about the importance of training programs to prevent LLIs is not being translated into practice by these coaches. Balance training, for example, was only observed in one club training session and even then was given minimal time. Coaches repeatedly mentioned the importance of the warm-up and cool-down for both LLI prevention and performance. However, it was evident from the observed sessions that even this was unstructured and not completed by all players.

Sidestepping or changing direction while running is an important agility skill that enables a player to avoid the opposition in Australian Football. Poor sidestepping skill is also the main cause of anterior cruciate ligament (ACL) injury in Australian Football^{13 14} and other sports¹⁵⁻¹⁷. Balance training can also help to prevent ACL and other LLIs from occurring^{18 19}. However, coaches were unsure about the training value of these skills for either performance or injury prevention and little training time was dedicated to them. This suggests that the research findings are yet to be translated into Australian Football training practice.

Jumping and landing are further important performance skills for Australian Football, particularly in tightly contested situations. Conversely, poor jumping and landing skills can lead to LLI¹⁹⁻²¹. The surveyed coaches did not include jumping and landing exercises in their training programs to simulate the dynamic landings that commonly occur in football. Once again, there appears to be a gap in the translation of research findings into sporting practice.

Given the established risk of LLI in Australian football²²⁻²⁴, it was surprising that none of the coaches believed that they were a problem for their team. This contrasts with other beliefs that LLIs negatively influence the end of season results and their consistent acknowledgement of the importance of LLI prevention. The presence of a negative in the wording of the statement 'lower limb injuries are not a problem for my team' may have caused confusion and be a possible explanation for this response.

There was strong agreement that both coaches and players should be familiar with current knowledge of injury prevention strategies but that the responsibility for injury prevention and

management rests with club medical support staff. This raises the question of where and how the latest injury prevention strategies are best disseminated to coaches. The fact that a scientific study shows that an injury prevention measure works does not guarantee it will actually prevent injuries in the real world context of sport, if it is not adopted by players and coaches⁷. Research is needed into identifying the optimal translation of scientific findings to inform the development, implementation and uptake of injury prevention measures. This research gap has been noted in other injury contexts^{26 27}, but has been rarely discussed in the sports injury literature⁷.

The generalisability of this study is limited by the fact that it was conducted with nine coaches. Nonetheless, we obtained views from the senior coaches of all of the SAFL teams and would not expect their views to differ greatly from those of other coaches across the country. The semi-structured questions are likely to have both face and content validity given that they have been used in repeated Australian football surveys. An attempt was made to validate the coach responses with observations of training sessions. It is also possible, however, that the observed training sessions were not representative of all training sessions and that coaches had adopted a periodised training schedule for their players whereby some elements were not part of the stage of training that was observed.

In conclusion, many Australian football coaches do not think that it is important for players to attend training to prevent LLI, despite scientific evidence to the contrary²⁵. Training sessions are the ideal platform for passing on injury prevention information and performance elements can be practised without full game-level stressors.

Practical Implications

- Coaches are eager to become better equipped for lower limb injury prevention.
- Coaches would be most receptive towards implementing a training program if it concurrently improves player performance and maximises injury prevention.
- There is a need for improved processes for translating the latest scientific evidence about the most effective injury prevention strategies to coaches' knowledge base and practice.

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Table 1: Coaches' ratings of the importance particular elements for inclusion in training sessions, team performance and injury prevention (n=9)

Elements of training session	Importance for inclusion in training session			Importance for team performance			Importance for injury prevention		
	Little/No	Uncertain	Some/ Utmost	Little/No	Uncertain	Some/ Utmost	Little/No	Uncertain	Some/ Utmost
	n	n	n	n	n	n	n	n	n
Warm-up run	0	0	9	0	0	9	0	0	9
Warm-up stretching	1	0	8	1	0	8	1	1	7
Drills and set plays	0	0	9	0	0	9	2	4	3
Ball handling skills	0	0	9	0	1	8	3	4	2
Kicking skills	0	0	9	0	0	9	1	3	5
Sprint sessions	1	7	1	1	5	3	3	4	2
Weights/resistance training	2	6	1	1	6	2	0	5	4
Jumping/landing training	4	5	0	3	4	2	3	3	3
Changing direction/side-stepping	1	5	3	3	2	4	4	2	3
Balance training	**6	2	0	5	4	0	3	3	3
Endurance/fatigue training	0	1	8	0	1	8	1	2	6
Cool-down run/stretching	0	0	9	0	3	6	0	0	9
** Only 8 coaches responded to this question									

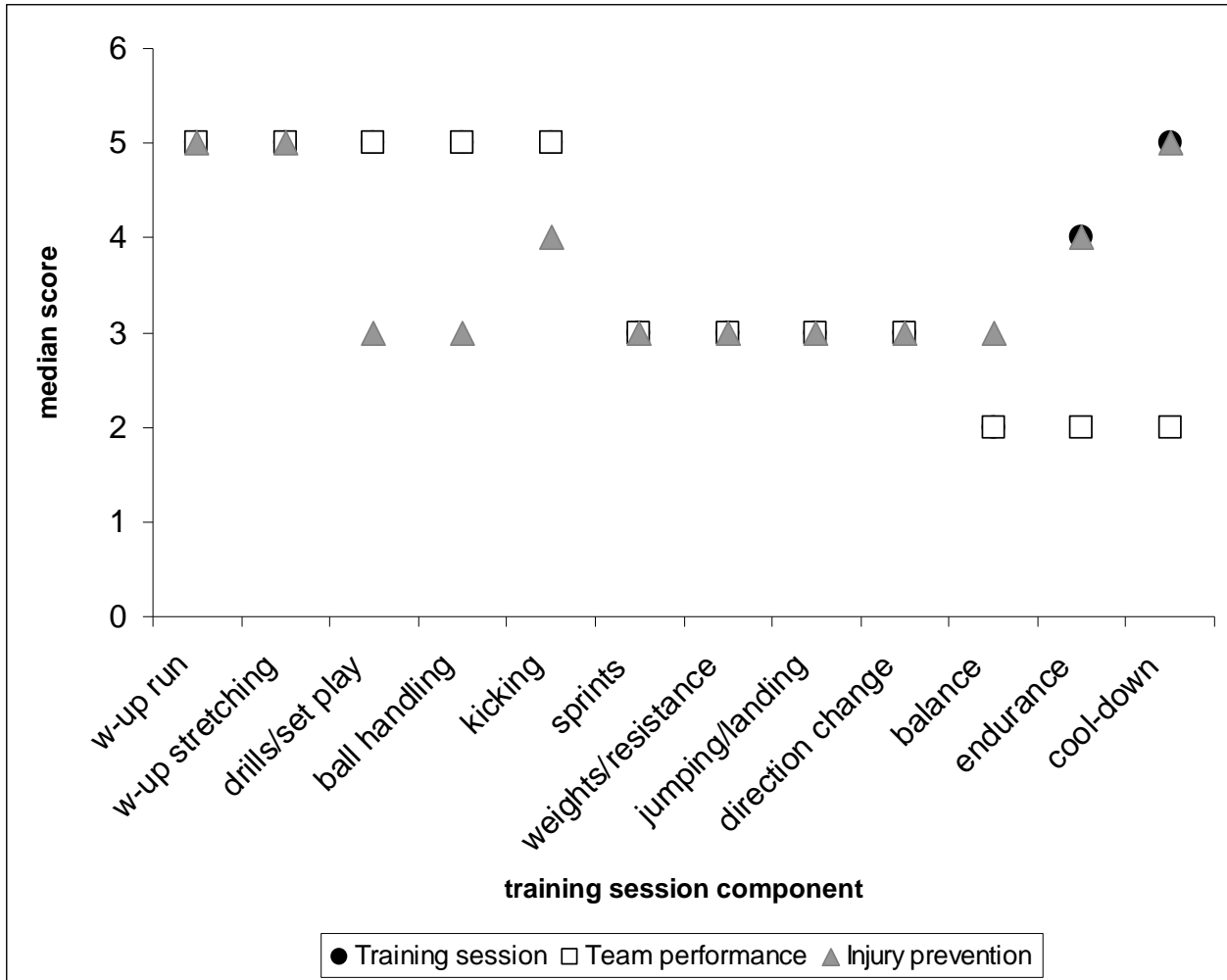
Table 2: Coaches' attitudes towards training sessions and lower limb injury prevention (n=9)

Statements	No. of coaches			Median score (range)
	Strongly Disagree /Disagree n	Uncertain n	Agree /Strongly Agree n	
It is important for players to attend training if they want to play games	0	0	9	5(4 – 5)
It is important for coaches to have current knowledge of lower limb injury prevention strategies	0	0	9	5(4 – 5)
Lower limb injuries are not a problem for my team	0	0	9	5(4 – 5)
Improving performance is important in training sessions	0	0	9	5(4 – 5)
It is important for players to have current knowledge of lower limb injury prevention strategies	0	0	9	4(4 – 5)
Lower limb injury prevention is important in training sessions	0	0	9	4(4 – 5)
I would implement specific training if it was proven to improve AFL performance and prevent lower limb injuries	0	0	9	4(4 – 5)
Lower limb injuries negatively influence game performance and end of season results	1	1	7	4(2 – 5)
I would implement specific training if it was proven to prevent lower limb injuries	1	2	6	4(2 – 5)
I would implement specific training if it was proven to improve AFL performance	3	0	6	4(2 – 5)
It is important for players to attend training if they want to prevent lower limb injuries	6	1	2	2(1 – 4)

Table 3: Observed elements of two consecutive coach-led Australian football training sessions (n=9)

Elements of Training	Number of teams not observed to undertake this element	Number of teams observed spending some time on this element	Range of observed training session elements (mins)
Warm-up	0	9	1 - 15
Stretches	0	9	1 - 10
Drills	0	9	10 – 30
Ball handling	0	9	1 – 20
Kicking skills	0	9	5 – 20
Sprints	2	7	0 – 10
Weights/resistance	5	4	0 – 10
Jump/landing	7	2	0 – 5
Balance	8	1	0 – 5
Side-step/cutting	7	2	0 – 5
Endurance	5	4	0 – 5
Cool-down	3	6	0 – 5

Figure 1: Comparison of coach summary rating scores for the importance of various training elements for a) including in training programs; b) team performance; and c) injury prevention.



Note: When the results for training sessions and team performance are the same the figure above only shows only the team performance score.