

# Injuries, Matches Missed and the Influence of Minimum Medical Standards in the A-League Professional Football: A 5-Year Prospective Study

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**Background:** Epidemiological data on the occurrence of time-loss injuries over several A-League seasons remains lacking, while the effect of the mandatory implementation of 'Minimum Medical Standards' as a part of the collective bargaining agreement (CBA) needs to be explored.

**Objectives:** To explore the 5 year evolution of hamstring, groin, knee, ankle and total time-loss injuries among professional footballers in the A-League; to evaluate the consequences of these time-loss injuries in terms of total matches missed and costs incurred; and to explore whether the mandatory implementation of 'Minimum Medical Standards' in the A-League had led to a decrease in the occurrence of total time-loss injuries and total matches missed.

**Patients and Methods:** An observational prospective study has been carried out since 2008. Data were collected weekly during the seasons 2008 - 2009 to 2012 - 2013 through official match previews/reviews, official media releases, official websites and/or self-reports by players. Total and specific (hamstring, groin, knee and ankle) numbers of time-loss injuries and matches missed were obtained for each season and the related financial costs calculated.

**Results:** The total number of time-loss injuries and matches missed rose from 129 and 506 respectively in 2008 - 2009 to 202 and 1110 in 2010 - 2011. Following the introduction of 'Minimum Medical Standards', both categories decreased (significantly for matches missed). These time-loss injuries and matches missed led to high costs of up to AUD\$ 37,317,029.29 (2012 - 2013 season). The same trend was found for knee injuries, while hamstring and ankle injuries remained almost the same. However, time-loss due to groin injuries increased despite the introduction of "Minimum Medical Standards".

**Conclusions:** The introduction of "Minimum Medical Standards" in the A-League had a favorable effect on the number of total, hamstring, knee and ankle injuries and on the number of matches missed due to these injuries, but not on the number of groin injuries. The costs related to time-loss injuries and related matches missed remained high.

**Keywords:** Epidemiology; Soccer; Wounds; Injuries Guideline Adherence

## 1. Background

During training and competition, professional football (soccer) players are cumulatively exposed to high energetic load (aerobic and anaerobic) and heavy physical demands, resulting regularly in injuries of the musculoskeletal system (1-3). Hamstring, groin, knee and ankle injuries are especially common among professional football players (3-5). If injuries are recurrent and severe, both during and across seasons, they might lead to long-lasting disability periods, surgical treatments, and high medical costs (3-5). In very serious cases, they may even lead to early or forced retirement from professional football (3-5). Consequently, clubs, football federations and players' unions have been striving to prevent the occurrence and recurrence of musculoskeletal injuries. To this

end, preventive measures as well as evidence-based medical guidelines and regulations have been developed and implemented (6).

Since the beginning of the A-League season 2005 - 2006, the Professional Footballers Australia (PFA) has initiated the yearly collection of information related to the occurrence of time-loss injuries to provide the insight necessary, within the sequential framework of van Mechelen et al. (7) for sports injury prevention. "Minimum Medical Standards" were made mandatory as a part of the collective bargaining agreement (CBA) between the PFA and the Football Federation Australia (FFA) and were implemented nationwide in the A-League prior to the 2011 - 2012 season (8). The 'Minimum Medical Standards' relies,

among other things, on appropriate medical testing and the mandatory employment of medical physicians and physiotherapists at the club (8). The assumption was that such a measure would lead to improved medical care and support of professional players and would empower the potential prevention of time-loss injuries.

## 2. Objectives

The purpose of this study was threefold: (i) to explore the 5 year evolution of hamstring, groin, knee, ankle and total time-loss injuries and matches missed among professional football players in the A-League; (ii) to calculate the costs of these time-loss injuries; and (iii) to explore whether the mandatory implementation of “minimum medical standards” in the A-League had led to a decrease in the occurrence of total time-loss injuries and total matches missed.

## 3. Patients and Methods

### 3.1. Design

An observational prospective study has been carried out since 2008, including all official A-League (Australia) competition games over five consecutive seasons.

### 3.2. Data Collection

From the 2008 - 2009 season up to the 2012 - 2013 season, the PFA collected and recorded the occurrence of time-loss injuries for all professional football players ( $n = 184 - 253$ ), including injuries to the hamstring, groin, knee and ankle. All clubs from the A-League, with all professional players included, were invited to participate in the study and were monitored over five consecutive seasons from 2008 to 2013. Definition of time-loss injury was slightly adapted from the accepted consensus statement (9). In our study, time-loss (hamstring, groin, knee, and ankle) injury was defined as any physical complaint (in hamstring, groin, knee and ankle) which was sustained during a competitive match or training that resulted in a player being unable to take part in, at a minimum, the players' next official match. Data were collected weekly based on official match previews, official match reviews, official media releases and official websites. In addition, accuracy of the data collection was controlled when necessary through self-report by the PFA members. The total number of time-loss injuries and matches missed were obtained for each season for each club, as well as the number of hamstring, groin, knee and ankle time-loss injuries and related missed matches. The financial impact of time-loss injuries was conservatively estimated (excluding losses from A-league finals series, payments outside the salary cap and cost of medical care i.e. treatment) by

calculating costs related to missed matches based on the salary cap applied in the whole Australia A-league (mid-5 year period; AUD\$ 2,478,592.00). The present research was conducted in accordance with the Declaration of Helsinki (2008).

### 3.3. Statistical Analyses

All data were tabulated and descriptive data analyses (mean, standard deviation, frequency, range) were performed for the descriptive variables and the number of injuries and matches missed (total, per player, per team). Epidemiologic incidence proportion (also referred to as clinical incidence) and related 95% confidence interval (95% CI) was calculated for each season as the proportion of the number of new players injured during a season relative to the total number of players without injury at the start of the season (10). Repeated measures ANOVA was conducted to examine mean differences in time-loss injuries and matches missed (dependent variables) over five seasons (time as within-subjects factor), computing Bonferroni pairwise comparisons to identify specific differences between seasons (especially for the introduction prior to the start of the 2011 - 2012 season of the “minimum medical standards”). All data analyses were performed using the statistical software IBM SPSS statistics 22.0 for windows.

## 4. Results

The total and specific numbers of time-loss injuries, incidence proportions (IP) and matches missed, as well as related costs, are presented in Table 1. The number of total time-loss injuries rose from 129 in 2008 - 2009 (IP = 0.57) to 202 (IP = 0.55) in 2010 - 2011, decreasing to 162 (IP = 0.53) in 2012 - 2013 (repeated measures ANOVA not statistically significant). The number of total matches missed rose from 506 in 2008 - 2009 to 1110 in 2010 - 2011, decreasing to 542 in 2012 - 2013. This difference in matches missed over five seasons was found to be statistically significant ( $P < 0.01$ ) through repeated measures ANOVA. Computed Bonferroni pairwise comparison between 2010 - 2011 (before 'Minimum Medical Standards') and 2012 - 2013 (after 'Minimum Medical Standards') in matches missed was statistically significant ( $P < 0.05$ ). The number of knee time-loss injuries rose from 37 in 2008/2009 to 78 in 2010/2011, decreasing to 37 in 2012/2013 following the introduction of 'Minimum Medical Standards'.

Injuries rose from 37 in 2008 - 2009 to 78 in 2010 - 2011, decreasing to 37 in 2012 - 2013 following the introduction of 'Minimum Medical Standards'. Hamstring and ankle time-loss injuries remained almost the same after 2009 - 2010, while groin time-loss injuries increased despite the introduction of “minimum medical standards”. Over five A-League seasons, the total time-loss injuries and matches missed led to high costs of up to AUD\$ 3,317,029.29 for 2012 - 2013.

**Table 1.** Evolution Between 2008 and 2013 of Total and Specific Time-Loss Injuries and Related Matches Missed in the A-League

| Season   | 2008 - 2009        | 2009 - 2010        | 2010 - 2011        | 2011 - 2012        | 2012 - 2013        |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|
| <b>No. of teams</b>                                    | 8                  | 10                 | 11                 | 10                 | 10                 |
| <b>No. of players</b>                                  | 184                | 230                | 253                | 230                | 230                |
| <b>Exposure, no. of matches</b>                        | 84                 | 135                | 165                | 135                | 135                |
| <b>No. of time-loss injuries</b>                       | 129                | 186                | 202                | 166                | 162                |
| <b>No. of injured players</b>                          | 104                | 134                | 139                | 127                | 121                |
| <b>Season incidence proportion (95% CI)</b>            | 0.57 (0.50 - 0.64) | 0.58 (0.52 - 0.64) | 0.55 (0.49 - 0.61) | 0.55 (0.49 - 0.61) | 0.53 (0.47 - 0.59) |
| <b>No. of time-loss injuries per team (25 players)</b> | 17.5               | 20.0               | 20.0               | 18.0               | 17.6               |
| <b>No. of matches missed <sup>a</sup></b>              | 506                | 855                | 1110               | 760 <sup>b</sup>   | 542                |
| <b>No. of matches missed per player</b>                | 2.8                | 3.7                | 4.4                | 3.3                | 2.4                |
| <b>No. of matches missed per team (25 players)</b>     | 68.8               | 92.9               | 109.7              | 82.6               | 58.9               |
| <b>Costs (AUSS)</b>                                    | 3,981,484.29       | 5,232,583.11       | 6,031,240.53       | 4,651,184.98       | 3,317,029.29       |
| <b>Hamstring</b>                                       |                    |                    |                    |                    |                    |
| No. of time-loss injuries                              | 12                 | 24                 | 22                 | 22                 | 20                 |
| No. of time-loss injuries per team (25 players)        | 1.6                | 2.6                | 2.2                | 2.4                | 2.2                |
| No. of matches missed                                  | 48                 | 111                | 118                | 96                 | 68                 |
| <b>Groin</b>   |                    |                    |                    |                    |                    |
| No. of time-loss injuries                              | 14                 | 12                 | 14                 | 25                 | 23                 |
| No. of time-loss injuries per team (25 players)        | 1.9                | 1.3                | 1.4                | 2.7                | 2.5                |
| No. of matches missed                                  | 57                 | 53                 | 75                 | 112                | 76                 |
| <b>Knee</b>  |                    |                    |                    |                    |                    |
| No. of time-loss injuries                              | 37                 | 65                 | 78                 | 35                 | 37                 |
| No. of time-loss injuries per team (25 players)        | 5.0                | 7.1                | 7.7                | 3.8                | 4.0                |
| No. of matches missed                                  | 145                | 299                | 424                | 162                | 125                |
| <b>Ankle</b>   |                    |                    |                    |                    |                    |
| No. of time-loss injuries                              | 23                 | 24                 | 18                 | 18                 | 19                 |
| No. of time-loss injuries per team (25 players)        | 3.1                | 2.6                | 1.8                | 2.0                | 2.1                |
| No. of matches missed                                  | 89                 | 102                | 96                 | 81                 | 62                 |

<sup>a</sup> Statistically significant over 5 seasons ( $P < 0.01$ ).

<sup>b</sup> Statistically significant from previous season ( $P < 0.05$ ).

## 5. Discussion

Time-loss injury is generally defined as any physical complaint sustained during training or competition that results in a player being unable to take full part in future football activity (training or match), the severity of such an injury being related to the number of days until return to play (9). In our study, we defined time-loss injury with regard to the player's inability to take part in the next official match or matches. Some might argue with our definition since it does not concur with the scientifically accepted consensus statement and impairs any comparison with other epidemiological studies conducted among players from other continents. Nevertheless, we strongly believe that our definition is in line with the thoughts of both players and trainers: in professional football, missing an official match is the only matter of

interest for players or trainers, even if training sessions during the preparation of such a match were missed.

As a result of the CBA between the PFA and FFA, 'Minimum Medical Standards' was implemented prior to the start of the 2011 - 2012 season in order to reduce the occurrence of time-loss injuries and related missed matches (8). This measure was observed to be beneficial since the number of missed matches fell (statistically significant) from 2010 - 2011 to 2012 - 2013. By contrast, such a measure did not lead to a statistically significant decrease in number of injuries. A potential explanation could be the definition of injury used in our study. A particular observation in our study is especially the increase in the number of groin injuries through the years despite the introduction of "minimum medical standards". Al-

though this is difficult to interpret, the increased physical burden related to strength and speed on the players might be a potential reason for the tendency observed as groin injuries occur especially as a consequence of successive accelerations, decelerations and sudden changes of direction. Our findings suggest also that the introduction of, among other things, an appropriate medical testing and the mandatory presence of club physicians and physiotherapists has significantly improved the overall medical counseling in the A-League. Of course, regular assessment of whether the “minimum medical standards” concur with the actual evidence-based medical knowledge is required. Additionally, an important step that should be taken is to monitor the application of the “minimum medical standards” in order to preserve a high consistency in medical counseling from one club to another in the A-League. By contrast, a study in Dutch professional football showed that the medical examinations are diverse in nature and not consistent from one club to another, being difficult to explain why employees from the same occupational category are assessed differently from one club to another (11).

Both world players’ Union (FIFPro) and the PFA strive to convince all key stakeholders to implement the rights of the world’s professional football players as workers. When it comes to the health and safety of the players, the expectation is that regulations should be in line with the world health organization and international labour organization, which state that “protection, promotion, surveillance and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations long after they enter their retirement years” is a labour right and a fundamental human right that should be facilitated by social partners and stakeholders (12). Despite this statement, studies have shown that the current medical health care and support in professional football has been exclusively directed towards physical problems (musculoskeletal injuries) occurring during a career (11, 13, 14). Current and former Dutch professional football players, as well as their club physicians, recently acknowledged the lack of any information and support related to mental and psychosocial health problems, while former English players found the provision of medical care in professional football inadequate (13, 14). Additionally, information and support related to long-term health problems occurring after retirement from professional football remains unavailable (13). Consequently, any health and safety regulation for professional footballers, such as the ‘Minimum Medical Standards’ in Australia, should also focus attention on the medical care and support related to mental and social health problems, as well as the long-term consequences such as osteoarthritis (15-17).

The introduction of ‘Minimum Medical Standards’ in the A-League had a favorable effect on the number of total, hamstring, knee and ankle injuries and on the number of matches missed due to these injuries, but not on the number of groin injuries. With regard to the find-

ings of this study, further studies should be conducted in order to explore whether the “minimum medical standards” still concur with actual evidence-based medical knowledge, which might lead to potential alterations and improvements. In addition, medical support related to mental illness and adverse long-term health effects should be developed and implemented.

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## Authors’ Contributions

Study concept and design: Vincent Goutteborge, Gino M. M. J. Kerkhoffs. 2- Acquisition of data, 3- Analysis and interpretation of data: Vincent Goutteborge, Brendan A. Hughes Schwab, Adam Vivian, Gino M. M. J. Kerkhoffs. 4- Drafting of the manuscript: Vincent Goutteborge. 5- Critical revision of the manuscript for important intellectual content: Brendan A. Hughes Schwab, Adam Vivian, Gino M. M. J. Kerkhoffs. 6- Statistical analysis: Vincent Goutteborge. 7- Administrative, technical and material support: Brendan A. Hughes Schwab, Adam Vivian. 8- Study supervision: Vincent Goutteborge, Brendan A. Hughes Schwab, Adam Vivian, Gino M. M. J. Kerkhoffs.

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