

For Debate: Consensus Injury Definitions in Team Sports Should Focus on Encompassing all Injuries

Lisa Hodgson, PhD, MSc,* Conor Gissane, PhD,† Tim J. Gabbett, PhD,‡
and Doug A. King, BN§

Objective: The purpose of this paper is to highlight the most effective method of collecting injury data by using a definition that encompasses all injuries into the data collection system. The definition provides an accurate picture of injury incidence and also allows filtering of records so that data can be reported in a variety of comparable ways.

Data Sources/Synthesis: A qualitative review of literature in team sports, plus expert opinion, served as the basis for data collection strategies. Articles were retrieved from SportsDiscus and PubMed using the terms “sports injury definition” and “injury definition.” These terms were searched for the period 1966 to November 2006.

Results: One of the major results (from this paper) that supports the use of an all-encompassing injury definition is that 70% to 92% of all injuries sustained fall into the transient category—that is, by only recording injuries that result in missed matches, the majority of injuries are missed and therefore injury rates are underreported.

Conclusion: An injury definition should be the most encompassing definition that enables a true, global picture of injury incidence to be seen in participation in any team sport.

Key Words: data collection, injury definition, incidence, team sports
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INTRODUCTION

Published studies on the incidence of sporting injuries vary in 2 main areas: the definitions used and the methodologies undertaken.^{1–8} As a consequence of these variations between studies, the results and conclusions obtained often have some important differences.^{1,3–5,8–11} Therefore data that are similar in collection, analysis, and methodology are required to enable an appropriate analysis to be conducted.

Submitted for publication November 24, 2006; accepted February 19, 2007. From the *Head of Sports Medicine, The Rugby Football League, Red Hall, Leeds, UK; †Sports Rehabilitation Directorate, Department of Human Sciences, St Mary’s University College, Twickenham, Middlesex, UK; ‡Athlete and Coach Support Services, Queensland Academy of Sport, Queensland, Australia; and §Emergency Department, Otago District Health Board, Dunedin, New Zealand.

Reprints: Lisa Hodgson, PhD, MSc, RFL, Red Hall, Red Hall Lane, Leeds, LS17 8NB, UK (e-mail: lisa.hodgson@rfl.uk.com).
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A fundamental process, and typically the first step behind the injury prevention process, is ongoing injury surveillance.^{1,5,12} However, this may prove to be elusive as a result of the inconsistencies in the injury definitions used. Variations reported in injury incidence are often the result of data obtained from studies with differing injury definitions. Some focus on purely match injuries or injuries that require only a match to be missed before the injury is included,^{9,13–15} whereas others focus on all-encompassing injuries that occur in either match or training participation and do not require time loss to be included.^{8,10,16–24} Recording all injuries [including those not requiring lost game/training time (ie, transient injuries)] may place an additional burden on researchers, but it is also likely that recording injuries that only result in missed matches/sessions will underreport the actual incidence of injury. Recording all injuries will also provide answers to questions such as “What is the injury risk?” and “What is the injury risk for a given unit of exposure?” It also will allow planning from a resource–utilization perspective.²⁵

The formation of standardized injury definitions enables meaningful comparisons for all future injury surveillance data from different sports, countries, and playing levels. The purpose of this article is to review the existing literature and propose the argument for an all-encompassing, comprehensive injury data collection for team sports and to demonstrate that it has advantages over definitions that exclude a proportion of all injuries.

BACKGROUND

The primary aim of any injury surveillance study is to gain an accurate estimation of injury incidence. There are 3 different measures of incidence and 3 target audiences to this question. First, the athlete playing his or her desired sport may wish to know the true risk of obtaining an injury (ie, number of athletes at risk to injured athlete ratio). Second, a scientist may wish to know the epidemiologic incidence versus exposure (match or training), thus expressing incidence as rates rather than risk. Finally, the clinician may wish to determine how many injuries to expect to treat throughout a season.²⁵ Thus, incidence refers to the number of new injury occurrences in a given time period. Risks and rates can be used in injury surveillance but are not mutually exclusive terms.

To be able to answer all 3 questions, all injuries, including those that do not result in any time loss from training or competition (ie, transient injuries) must be recorded.^{16,17} Some studies exclude transient injuries,¹³ whereas other studies have shown^{18,26,27} that the inclusion of injuries that do

not lead to time loss is as relevant as including injuries that do because the majority of transient injuries still require medical attention.

All-encompassing injury data collection in sport can be divided further into injuries that occur in matches and injuries that occur in training. Injuries may lead to no time lost in either event or can lead to time loss in 1 or both. Not all studies include all events nor all time loss.

Injuries in sport can occur as a result of either a single inciting event, which may be the playing situation, the position on the field of play, or a skill performed by the player,²⁸ or a complex interaction of factors resulting in an injury occurrence.²⁹ Injury surveillance can assist in identifying these events and complex interactions.³⁰ Sometimes the inciting event for an injury occurs distinct from the outcome event when the injury is actually observed³¹—for example, an overuse injury.²⁸ Identification of these events and complex interactions assists in the identification of etiologic factors and the mechanism of injuries involved in injuries.³¹

DATA SOURCES

A literature search of electronic databases (years 1966 through November 2006) was initially undertaken. A PubMed search using the key words “sports injury definition” revealed 86 references, of which 36 related to team sports. A further SportsDiscus search, using the terms “injury definition,” revealed 71 articles that were further reduced to 16 articles when limited to the English language and peer review with injuries specific to sport. The authors also examined the references of published studies and included unpublished dissertations that were relevant.

DATA SYNTHESIS

In addition to the literature search and the selection of articles, expert opinions were used to promote the debate article for all-encompassing data collection.

RESULTS

Defining an Injury

Sports injuries are unique because they occur when athletes are exposed to their given sport and they occur under specific conditions at a known time and place.²⁶ Improved data collection is important for documenting the magnitude of injury problems in sports.³² However, it is recognized that there is no one widely used definition of what constitutes a sports injury.³³

Importance of an All-Encompassing Injury Definition

When formulating the methodology for rugby league injury data collection,¹⁹ considerable debate was generated on what constituted an injury and how an injury should be defined. The authors agreed on “any physical or medical condition that occurs during participation in rugby league match or training activities that requires medical treatment or results in a missed match or training participation.” Other studies in minor league

hockey and adolescent soccer players have used a similar definition, defining an injury as an event requiring medical attention, necessitating removal from or inability to complete a session, or missing a subsequent session.^{34,35} These definitions are designed to capture all injuries, including those that do and do not result in missed matches.

Research in an individual sport³⁶ suggested that missed time was not meaningful because of the prolonged time period between events. Similarly, investigators of team sport injuries have stated that injuries should be defined as “any physical complaint that is sustained by a player from a football match or training, irrespective of the need for medical attention or time loss from football activities.”¹⁷

The major problem with choosing the broader definition (all injuries) is that, because it is a sensitive measure, it requires much more effort on the part of the recorders and observers.³³ Using a system that records missed matches is a much easier system to implement, but the influence of training time on injury is ignored, thereby artificially increasing the incidence of injury.² Similarly, to not report training injuries, whether transient or otherwise, underreports all training injuries.

Missed Match Definition

The definition of missing the next match is a popular definition in team sport research.^{14,15,37-40} A study of injuries in the Australian Football League defined an injury as any physical or medical condition that caused a player to miss a match in the season. The rationale for this definition was to eliminate a tendency of subjectivity in interpreting injury definitions. However, the authors correctly concluded that this study did not produce incidence rates that were complete for all minor injuries.⁹ A similar conclusion was reached on a study into squash injuries that only recorded injuries presenting to casualty (emergency) departments.⁴¹ The authors stated that this definition has a tendency toward only recording moderate to severe injuries, thus missing an accurate picture of injury incidence. A late season bias, coupled with unequal breaks between matches, may also provide a false representation of the severity of injuries if the injury definition relies on missed matches alone.

In an attempt to overcome the discrepancy between definitions, two rugby union^{42,43} studies have used a time loss definition of 24 hours of limited rugby activity and recoded to a further definition of “all injuries resulting in a player missing at least one competitive match.” Some researchers^{10,44} recorded all injuries irrespective of missed sessions or games, but to allow comparison with other studies^{13,45} the injuries were reclassified. Recoding to another definition can be performed as long as full, comprehensive data collection exists.

Comparison Between All-Encompassing and Missed Match Definitions

It has been shown⁴⁶ that both collection systems (all injuries or purely missed match injuries) can be merged to allow data to be reported in any manner chosen as long as the original data are available. Injury studies based on missed matches alone would require the researcher to retrospectively review their data should there be a requirement to report all injuries. However, if these data have not been collected at the

outset, recall bias would distort this and the opportunity to see the entire picture would be lost.

So, investigators are left with the decision as to how to define an injury. What actually happens when 1 injury definition is chosen over the other? In Rugby League the definition of missing the next match has been applied,^{15,14} whereas other studies have used a broader definition.^{10,20,44} For example, Hodgson et al¹⁰ defined an injury as “pain, discomfort, disability or illness (new or recurrent) that a player acknowledged after participating in a rugby related activity/game.” They reported an injury rate during games of 696.8 per 1,000 hours. In comparison, a similar study using the missed match definition reported an injury rate of 50.29 per 1,000 hours.¹⁴ Studies^{10,20,44} that recorded all injuries and also used a missed game classification demonstrated that between 70%²⁰ and 92%⁴⁴ of all injuries fell into the transient (less than 1 game missed category). A further study that reported only injuries that required missing 1 game found an injury rate of 44.9 injuries per 1,000 hours,¹³ but over the study period there were 61 lacerations that required suturing. If they were added they would increase the number of injuries by 43%. In rugby union it has been reported that 54% of injuries fall within the 1 game missed category.⁴³

It has been suggested that all-encompassing injury definitions are not reliable because of large variability in rates⁴⁷; equally comparing amateur and semi-professional data for missed match rates shows great variability,²⁴ and higher playing intensity is associated with higher injury rates. Thus, depending on the playing level rates are taken from (ie, amateur or professional), injury rates will differ as a result of different playing intensities.¹¹ Data comparison should be like for like, or limitations should be acknowledged.

Importance and Relevance of Transient Injury Recording

Recording all injuries is relevant. Hodgson¹⁶ recorded 715 separate physiotherapy treatment contacts for 306 different injury cases in 1 summer season for 1 team. Of these injuries, 278 were classed as transient (the remaining included 12 minor cases, 8 moderate cases, and 8 severe cases). The number of nontransient injuries is too small to account for all the treatment contacts; thus transient injuries require medical attention and a level of input that makes them economically important, whether a player continues to train and play or not.²¹ It could also be argued that they should also be considered because any injury can have a long-term impact on an athlete's health.⁴⁸

Having surveillance systems that ensure detection of less severe trauma that have the ability to document the long-term consequences of mild injuries is important,³² although it has been suggested that the most comprehensive sports injury definitions are seldom used.⁴ The definition using missed matches alone¹⁹ may contain some inaccuracies because time between matches may not be uniform.⁴

Although the study of injuries typically focuses on the health and financial costs, injuries have the potential to also affect performance. Transient injuries that occur during the course of a match may result in compromised technique and reductions in skill.²² In rugby league, on average 9 injuries

occur per game.²¹ Injury-induced reductions in performance may occur irrespective of whether the player is forced from the field. When players sustain high transient match injury rates, physical fitness tends to decline.²³ Given that poor fitness has been shown to be a risk factor for injury in rugby league,²⁴ recording of transient match injuries is critical because they may have the physical development and subsequent injury risk of players.

Importance and Relevance of Training Injuries

All injuries have the potential to have an impact on individual playing performance and ultimately team performance.⁴⁹ It has been documented that previous injury is a risk factor for subsequent injury, and if a player is injured during a training session, this will increase his or her likelihood of being injured during a game.²⁴ Research has further shown an association between training and risk of match injury, with those who completed less training being at a greater risk of injury in a match.²⁴ Thus, collecting training injury data is as relevant as collecting match injury data, but it is acknowledged that this requires greater commitment from the researchers.

Additionally, recording training injuries has been shown to assist the identification of different risk factors to which players are exposed. Training injuries occur as a result of exposure to different demands placed on them during the training session compared with match conditions.⁴³ Recording all injuries that occur as a result of exposure to the training environment may assist in clarifying any more severe injury events in subsequent trainings and/or match environments.⁴³

It has been noted^{16,21} that, although the severity of injuries had remained the same over a 7-year study in Rugby League, the incidence of injuries leading to training days lost significantly increased by 56.26 per 1,000 hours. Missed training sessions affect the ability of the team to perform and potentially increase the risk of sustaining an injury and/or playing with suboptimal fitness.²¹ Increased loss of training time does not necessarily translate to increased injury severity because pressures on players to perform are high in any sporting environment. Players are renowned for playing with injuries that typically require rest because their salary and place in the next game hinge on appearance. Thus some injuries will fall into the transient category according to definition when “medically” they might be defined as minor or even moderate. Players are also renowned for missing training sessions but still manage to play a full game. Similarly, to not record training days lost would underreport on many sporting injuries.²¹

Athlete Exposure Time

A meaningful comparison of injury risk and rates can only be applied in the presence of athlete exposure time (ie, the time the athletes spend at risk of receiving an injury). All hours spent in training and competitive matches should be recorded in every study so that meaningful injury rates, usually expressed as rates per 1,000 hours, can be calculated. Training injury risk and match injury risk as well as results on time loss to each should always be reported separately to allow direct comparison between studies³¹ and to avoid adversely influencing incidence rates. Exposure time in training is generally

higher than match exposure, whereas the injury risk is generally lower in training. So, combining results would effectively reduce the overall incidence rate.

CONCLUSION

Injury rates have implications for players, coaches, and sports medicine practitioners. One injury is still an injury and as a result has both direct and indirect costs. The true injury picture can be seen as a result of collecting data that encompass all injuries that occur as a result of participating in match and training activities. Loss of participation time should relate to time loss in training days as well as missed matches.²⁶ These data can then be recoded, reported, or compared in any way with any other definitions that exist across the same sport, other sports, and in other countries. Athletes will challenge the healing process by participating with injuries,²⁶ and this is a confounder that must be considered in all data collection.

Although a narrow injury definition has been suggested because of its inferred reliability, we propose that an injury definition should be the most encompassing definition that enables a true global picture of injury incidence in team sport participation.

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