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Prospective reporting of injury in community-level cricket: A systematic review to identify research priorities

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ABSTRACT

Objectives Cricket is a popular sport enjoyed worldwide. Injuries in cricket are not well understood at community level but are important to understand for prevention to ensure the game continues to be enjoyed safely. This systematic review was designed to assess the quality of data collection and reporting, and to summarise the injury data, in studies of community cricket players.

Design Systematic review.

Methods Nine databases were searched to November 2018 using the terms "cricket*" and "injur*". A nine-item critical appraisal and three-item likelihood-of-bias evaluation was conducted on included studies. Data completeness was evaluated against recommendations in the international cricket consensus statement for recording/reporting injury and the Australian Sports Injury Data Dictionary (ASIDD). Descriptive injury data (n,%) are presented in tabular format for different subgroups (activity, position, population).

Results Thirteen studies were included, of which eight were rated as unclear, one as high and three having a low likelihood-of-bias. The mean score for completeness of data against the consensus statement was 3.5/10 (95%C.I. 2.8–4.2). The mean score for completeness of data against the ASIDD was 4.5/6 (95%C.I. 3.9–5.1). Bruising and inflammation was the most common injury in junior cricket. Stress fractures were most common in studies of bowlers. Where studies included all activities, batting accounted for most injuries (7-49%).

Conclusions The included studies inconsistently addressed recommended items for injury surveillance in community sport and cricket. Most studies focused on junior levels or adolescent bowlers, with bruising/inflammation and stress fractures being most common, respectively.

1. INTRODUCTION

Cricket is a popular bat-and-ball sport played mainly in Commonwealth countries. As with all sports, there is a risk of injury when playing cricket, which can negatively affect further participation.[1] To minimise injury associated with sport,[2] it is first necessary to understand the types of injury sustained.[3]

The need for robust data collection with regard to sporting injuries was recognised by the Australian Sports Injury Prevention Taskforce (ASIPT) in 1997 and this led to the Australian Sports Injury Data Dictionary (ASIDD). [4] Cricket was the first international sport to publish a consensus statement for the surveillance of injuries in 2005,[5] with an update published in 2016.[6] The purpose of the consensus statement was to standardise data collection in order to improve the comparability of cricket injury studies globally. The guidelines are more easily followed at elite levels of the game, where greater medical and data collection resourcing is available. In turn, at the elite level, injuries have been reasonably well-researched in countries such as Australia [7], South Africa [8], New Zealand [9], and West Indies [10] and much is known about injury rates and injury risks in this population. Much less is known on injuries that occur in community-level cricket (i.e. levels below those directly controlled by national and/or state/province/county bodies). Unfortunately, injury data from elite settings are not necessarily applicable to community players, particularly at junior levels[11, 12] where the player skill, preparation and coaching/medical support is vastly different as well as physiological differences between junior, adolescent and mature musculoskeletal systems. [13]

It is important to identify specific injury prevention priorities for community-level cricketers. A strong understanding of how injury data are collected and reported is necessary in assessing data quality as part of the injury priority development. [14] Therefore, the aims of this systematic review of original research studies in community-level cricket, were:

[1] to assess the reporting quality and likelihood of bias;

[2] to quantify the completeness of data reporting against current best practice of the cricket consensus statements [5, 6] for recording and reporting injuries and the core data items of the Australian Sports Injury Data Dictionary (ASIDD); [15]

[3] to summarise what is known about the location, nature, mechanism and severity of injuries in studies conducted.

2. METHODS

This systematic review was registered (PROSPERO https://www.crd.york.ac.uk/prospero/ CRD42017079047, last updated 25 January, 2019) and reported using Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [16] (Table S1).

Nine databases were searched: CINAHL, MEDLINE, SPORTDiscuss (all through EBSCOHost), ScienceDirect, SCOPUS, Web of Science, PubMed, Informit and Google Scholar. The search terms were "cricket*" AND "injur*" (and synonyms/derivatives, e.g. cricket, cricketing; injury, injuries) being present in the title, abstract or keywords of a paper. Variations to the search strings were used depending on the database. An example search is in Table S2 (supplementary material). The initial search was conducted by GM and included papers from inception of database to 30 September 2017. Updated searches were performed by GM in April 2018 and November 2018 with additional papers included (Figure 1).

Included studies were required to:

- Be peer reviewed with original data collection, published or In Press on 3rd November 2018 in English language
- Have used prospective, field-based, cricket/sport specific data collection methods (or drew on existing data that had been collected in this way)
- Be focused on community cricket: all organised cricket (indoor and outdoor), from junior development and club cricket up to, and including, premier level cricket (in Australia, or equivalent), school cricket, including state and national representative championships not managed by national or state cricketing bodies.

Case studies, editorials, reports, letters, books, reviews, and conference proceedings were excluded. Studies were excluded if based at high performance centres where community-level players may be training or playing temporarily under the auspices of higher cricketing bodies (i.e. where community and non-

community-level participants were combined, the study was only included when injury data could be separated for the two levels).

After the search was completed, duplicates were removed and two authors (GM, SOC) independently screened the titles/abstracts for relevance. Publications were excluded only where both reviewers agreed that the title/abstract was not related to the study aims. Where it was unclear, the article was retained to the next stage. The full text of the remaining articles was examined independently by the same two authors for inclusion. Any disagreements were resolved through discussion with a third author (LF).

Reference lists of included articles were checked for additional studies of relevance and two authors with longstanding experience in cricket injury research from a clinical and epidemiological perspective (AK and CF) ensured that all relevant studies were included.

In assessing the quality of reviewed articles, a nine question critical appraisal tool (Table 2A) was designed using elements of the Downs and Black [17] and STROBE [18] tools. A specific question regarding injury definition and injury severity was included as it was pertinent to this review's aim on reporting around the current and past cricket consensus statements. The critical appraisal tool was not formally validated, but was trialled independently by two author's (GM, SOC) and any obvious divergence in interpretation was clarified with a third author (LF) prior to final application on the reviewed articles.

Risk of bias assessment was based on three questions relating to selection, information and attrition biases.[19, 20] When all were answered 'yes', the study was considered to have a low likelihood of bias. If there was a lack of clarity in the response to any of these three questions, the study was considered to have an unclear likelihood of bias. Any 'no' response to these questions resulted in the study being considered as having a high likelihood of bias. Studies were assessed independently by two authors (GM, SOC) and where agreement could not be reached then a third author (LF) was consulted.

The data items collected were assessed by one author (GM) against 10 items adapted from the original International Consensus Statement on injury surveillance in cricket [5] (nine items) and the 2016 update (one item). [6] Two of the 11 items in the original consensus were not used as they pertained to the player's name and details of surgery or major treatment (if relevant), both of which were deemed highly unlikely to be

collected prospectively in the community setting. Similarly, the studies were also assessed against 6 core items from the ASIDD. The ASIDD is a sports injury coding manual that categorises data items as either 1) core, seen as essential for injury surveillance; 2) strongly recommended and 3) recommended. [4] A completeness rating (consensus completeness and ASIDD completeness) was given, based on similar data assessment processes in other studies,[21] with items that fulfilled the criteria given 1 point, items that partially fulfilled the criteria 0.5 point and 0 points were assigned where items were not covered.

Two authors (GM, SOC) independently extracted data on a custom form, which included: study design, country, setting and context, aims, year and timeframe, ethics, overall participant numbers, age range, gender, levels of play, facets of play (e.g. batting, bowling and or fielding), participant recruitment, data collection methods, injury definition, injury severity measure/definition, number of injuries, exposure measures, incidence, prevalence, nature/type, body part, mechanisms, severity, player drop outs, and number of injuries not defined. Any disagreement regarding study type, participant characteristics, measurement methods or main results was clarified by discussion with a third author (LF). Where data from graphs, such as point values or percentages within stacked bars, were unable to be read from the published paper, attempts were made to contact the corresponding author to clarify the number/proportion presented.

A qualitative synthesis is presented by descriptive and tabular summary of injury profiles, critical appraisal and likelihood of bias and completeness of data reporting.

3. RESULTS

Over 1200 (1,102 original search + 171 from updated searches) titles/abstracts were screened, from which 13 articles were retrieved for formal review (Figure 1). Table 1 summarises the characteristics and outcomes of the included studies. Seven studies were based in Australia [11, 22-27], five in South Africa [28-32] and one in Nigeria [33], and seven studies [11, 22-25, 27, 31, 32] were focused on junior or adolescent players (≤ 18 years).

Figure 1. Search flow to identify peer-reviewed studies using prospective methods of injury collection in community cricket.

Table 1. Overview of the design, population and injury outcomes for studies using prospective methods of injury collection in community cricket (n = 13).

Aims [1] and [2] considering data quality are reported in the following sections. Table 2, Section A summarises the critical appraisal results. Three studies were deemed to be of low likelihood of bias,[23, 32, 33] eight studies [11, 22, 24, 25, 27-31] were unclear and one was deemed to have a high likelihood of bias.[26] The overall percentage of questions answered completely for all studies was 64%. Questions one, eight and nine, looking at study aims and design, summary of key results, limitations and conclusions and ethics, conflicts and funding declarations, respectively, were most complete with 85-92% of studies fulfilling the requirements. One study [32] adequately fulfilled question four, regarding the reporting of attrition or missing data, although in the majority of studies this was deemed only a reporting issue rather than a methodological issue affecting bias. Excluding question four, all other questions were fulfilled by at least 46% of studies.

Table 2, Section B displays the studies which focused on cricket-related injury alone assessed against the cricket injury surveillance consensus guidelines.[5] Including all studies, 21 of the possible 110 items were fully covered (19%). In terms of individual consensus items, player details such as age and bowling type recorded the highest proportion of yes answers (64%). This was largely due to there being seven studies [22, 23, 28-32] looking only at bowlers. Injury diagnosis, including body region, was complete in three studies [22, 23, 25] (25%), with the majority partially covering either body region or nature of injury but not both. Injury side (i.e. left/right), was reported in two studies [23, 25] (18%). One study reported the time of onset of injury,[24] while another study implied all injuries occurred during matches as they were only observing matches.[27] Activity at onset was recorded sufficiently by two studies (18%),[23, 24] while most other studies had missing or unidentified results for the proportion of injury by activity. The mechanism of injury was reported in full for three studies, [11, 24, 27] partially in five studies, [22, 23, 29, 31, 32] and at broad level or not at all for four studies. [25, 26, 28, 30] Two studies quantified significant injury [23, 24] and one study indicated the level of medical attention for all injuries.[24] No study followed the consensus recommended method for calculating injury rates.

The consensus completeness rating for studies ranged from 2.5-6.0 with a mean of 3.5 (95% C.I. 2.8–4.2). There were four studies [11, 22, 23, 25] where the data was collected prior to the consensus publication and their

ratings ranged from 3.5-5.5 with a mean 4.3 (95% C.I. 3.5–5.0) and eight studies [24, 26-32] where the data was collected after the consensus with a range of 2.5-6.0 with a mean of 3.1 (95% C.I. 2.3–4.0).

Table 2, Section C, shows an assessment of the collected data against the ASIDD core items. The date of injury was reported in five studies [22, 23, 25, 29, 30] (45%) on the basis that there were medical personnel involved which would effectively guarantee a date was recorded. It is probable the other studies would have dates recorded but were not explicit in reporting this. Player details and broad activity at onset were fully reported by all studies. Injuries reported by body region were recorded in all but one study. [28] Fewer than half of the studies reported the mechanism of injury (36%) and nature of the injury (45%). Five studies [11, 26, 28-31] did not report any injury nature. The overall mean ASIDD completeness rating achieved was 4.5 (95% C.I. 3.9–5.1).

Table 2. Critical appraisal and data completeness. (A) Tabulation of critical appraisal of all 13 reviewed studies, (B) comparison of 12 cricket specific studies with International Cricket Consensus Statement on Injury Surveillance in Cricket, and (C) comparison of 12 cricket specific studies with the Australian Sports Injury Data Dictionary (ASIDD) core items for injury surveillance.

With the study quality and reporting completeness in mind, injury data are presented in the following sections, supported by the supplementary tables. Four studies reported injury incidence rates (IIR), three of which were in juniors and focused on positions, ground hardness and protective equipment.[11, 24, 26, 27] In U12 to U16 the overall match IIR was 3.5 (95% C.I. 2.39–4.99) per 1,000 participations and for training, the IIR was 4.3 (95% C.I. 2.44–6.93) per 1,000 participations.[24] The IIR in first grade (Premier) cricket was reported as 35.53 per 10,000 exposure-hours.[26]

Table S3 shows injury proportions ranging from 11%-62%. In junior level cricket (U16 or below) injury proportions ranged from 11%-13%,[11, 24, 27] while studies focused on bowling had injury proportions ranging from 25%-62%.[22, 23, 25, 29-32] One study looked at a range of age groups, reporting an injury proportion of 16%.[26]

Two studies that investigated injuries in junior cricket reported bruising as the highest proportion of all injuries with inflammation (and or swelling/pain) as second (Table S4).[24, 27] Other studies only reported injury

nature for bowlers. Stress fractures were consistently high (29%-47%).[22, 23, 25] together with strains[22, 25] or a combination of sprains and strains in equal proportion to stress fractures.[23] Two studies only reported overuse injuries.[31, 32] Six studies reported injury proportions by body regions (Table S5). [11, 24, 26, 27, 31, 32] Head/neck/face injuries ranged from 0%-27%, [11, 26, 31, 32] upper limb injury ranged from 15%-29%, [24, 27] lower limb injury ranged from 21%-43% [26, 31] and trunk and back injury ranged from 13%-46%. [11, 32] In bowler-specific studies, trunk and back injuries were the largest proportion (43%-46%).[31, 32]

Four studies looked at activity when injured (Table S6).[11, 24, 31, 32] In junior cricket [11, 24] almost half (49%) of injuries were during batting[11] while a second study in juniors reported similar proportions for batting (34%), bowling (33%) and fielding (32%).[35] Two other studies reported activity at onset in bowling-cohorts with the highest proportion of injuries occurring during fielding (38% and 57% respectively).[31, 32] Mechanism of injury (Table S7) was consistently reported for junior level cricket as being struck by the ball (range 53% to 64%), with falls or field-dives as second, followed by non-specific overexertion.[11, 24, 27] Two bowler-cohorts reported injuries simply as contact or non-contact.[31, 32] One study specifically reported the proportion of injury in match/practice with 66% of injuries occurring in matches and 34% at practice for junior players.[24] Another study on injuries in junior cricketers noted that 50% (95% C.I. 10% - 90%) of training injuries occurred due to contact with a moving object while 33% (95% C.I. 0% - 71%) occurred due to unspecified acute overexertion.[11]

Two papers included detailed information on injury severity.[24, 26] For junior cricketers, 2.2 injuries per 1,000 participations required the player to leave the field, 2.1 injuries per 1,000 participations required the player to receive treatment, 0.6 injuries per 1,000 participations required players to remain off the field, 0.5 injuries per 1,000 participations were advised to seek medical attention and 0.2 injuries per 1,000 participations were required to attend hospital.[24] In first grade players, severity was reported as average time loss, in weeks, with nine weeks reported for a chest/pectoral injury, followed lower back at 7.9 weeks, knee (6.7 weeks), hand/wrist (4.7 weeks), calf (3.8 weeks) and foot (3.5 weeks).[26]

4. DISCUSSION

In line with the aims of this study, many of the studies using prospective methods of injury data collection in community-level cricket were found to have an unclear likelihood of bias. Whilst most of the ASIDD [15] core items were addressed by the included studies, there was a lack of information around injury nature and mechanism. The lower back and lower limbs were typically the most reported injured body regions. Overall, there was a finding of limited, consistent injury data as prescribed by the consensus statements [5, 6] and the ASIDD, [15] for guiding community player safety. Much of what is known only addresses specific groups of bowlers or junior age groups. Despite the existence of guidelines since 2005, [5] this study has highlighted several challenges with its implementation for injury data collection and reporting, in community-level cricket

The majority of studies were found to have an unclear likelihood of bias because necessary detail was not reported in the papers. One study was rated as having a high risk of bias and this was largely attributable to the lack of clarity around recruitment and data collection. The remaining studies that were unclear were found to have issues around the description of cohort recruitment and in the case of one study there was potential of selection bias with coaches asked to recruit players for the study. There was a general lack of reporting around missing data, whether existing or not. Whilst in most cases this was deemed to be a reporting deficit only, there is scope for improved reporting practices to ensure a statement around this information is present, particularly when log books or questionnaires are relied upon for data collection. To help in planning and reporting, it is recommended that future studies utilise the recent sports injury and illness surveillance extension to the Strengthening the Reporting of Observational studies in Epidemiology (STROBE-SIIS). [34]

The general approach of the ASIDD [15] and the elite driven focus of the cricket consensus guidelines [5, 6] were reflected in the completeness of items addressed by the studies included in this review. Most studies included around 80% of the core data items of the ASIDD. [15] The major limitations from assessment against the ASIDD [15] were the lack of reporting on mechanism and injury nature. In comparison, most studies fared poorly against the standards outlined for the international consensus statement on cricket injury surveillance. [5, 6] Key areas that lacked completeness against the consensus statements were:

- Injury diagnosis. Many studies included the body region but not the injury nature. Where they did, there was often no mapping of nature against region. Having this information together would be more informative from a preventative point of view.
- Player role when injured. As mentioned previously, in cricket players have specialist roles but still need to participate in most aspects of the game. It is crucial from an injury prevention perspective to understand whether, for example, bowlers are being injured while bowling, while fielding or batting.
- Injury mechanism. Several studies used broad terms for the injury mechanism, such as contact or non-contact injuries while others were slightly more specific with descriptions such as contact with moving object, although this still does not differentiate between the ball, a bat or a collision with another player.

We recommend that all future studies on community level cricket, whether or not injury reporting is the primary or secondary objective, should seek to adhere to the core elements of the ASIDD [15] and consensus statements. [5, 6] To do so will greatly enhance the prospect of identifying injury risks and provide a more solid basis for injury prevention strategies.

Overall, there was a distinct lack of prospective injury surveillance studies that included all player positions/activities. While it is evident from the bowling-only studies [22, 23, 25, 28-32] that injuries to the lower back, and in particular, stress fractures of the lower back, are of concern, two studies indicated that fielding may also be a high-risk activity for bowlers at the community level.[31, 32] Of the four studies that reported on injury in all activities of the game,[11, 24, 31, 32] three were published six years prior to when the search for this review was conducted and using data collected at least four years prior to that. Only one of these studies collected data over multiple seasons[11] and while the injury reporting was lacking in specificity on activity at onset and injury nature, the resulting finding of fewer head injuries to batters following mandatory helmet regulations demonstrated the benefits of longitudinal surveillance.

Based on this review, and the largely unclear level of bias within the studies reviewed, the basic knowledge on when, where and in whom injuries occur is limited to the following key findings:

- One study showed that in junior cricketers, the overall proportion of injuries occurred during fielding (32%) and batting (34%) almost as often, if not more often, than when bowling (33%).[24] It is not clear whether this finding can be generalised into older age groups in community cricket or to other groups of junior cricketers.
- Being hit by the ball is the most frequent mechanism of injury in junior players.
- Lower back injuries are a concern, as well as lower limb injuries, for all ages of community players. However, there is not enough information around the nature and mechanism of these injuries to help inform preventative strategies.

One reason for the lack of clear guidance for injury prevention from the published studies is the distinct player roles that need to be considered: batting, bowling and fielding, as well as sub-specialisations within each of these, such as pace/spin bowling or wicket-keeping. Each of these roles has their own risk profiles for injury and exposure.[35] Traditionally, research in elite players have reported bowling as having the highest proportion of injuries [7-9, 36] and have subsequently been a focus of numerous biomechanical and workload studies.[37-40] Noted above, a relatively large number of the prospective community-level studies have also investigated injury in bowlers and several have also shown a relatively high proportion of stress fractures to the lower back when compared to strains and sprains. [23, 25] Most cricket teams will have four to five specialist bowlers in the side at any one time, although it is more likely at community levels that more players will be considered all-rounders, and at junior levels it is encouraged for players to be given opportunities in all facets of the game. Further, specialised bowlers also have other roles in cricket: when not bowling they are fielding, and they are also required to bat. Two studies in this review showed that, based on activity at injury onset, the bowling cohort were more commonly injured while fielding than when bowling.[31, 32] Possible factors for this may include level of competency and fielding position when injured and therein highlights the importance of knowing fielding positions at the time of injury.

There are several potential limitations of this review. Firstly, the search was limited to publications in English and, although unlikely, it is possible that other countries with high cricket participation, such as those in the South-Asian region, may have national published research in local languages. Instead, almost all the studies in this review were produced out of Australia or South Africa, therefore, these results can only be generalised to

these countries. There may be particular aspects in the environment and nature of how cricket is organised/resourced and played in South-Asia regions that may alter injury risk. [41] Secondly, the definition used for community-level cricket may have excluded articles that had community-level players within their cohorts but data were not separable. Separating out injury data for community-level players in future research is recommended as it appears the injuries differ and certainly the ability to collect information on these injuries differs.

The use of a self-designed tool for quality assessment, and choice of items for determining risk of bias, was required to meet the aims of the study and efforts were made to trial and review its application for this purpose. However, this tool was not formally validated and may have unintentionally over- or under-estimated the quality of the included studies. The search criteria specified inclusion of all community cricket studies that reported injury data. This included some studies in which injuries were an outcome but the primary aim of the study was a specific biomechanical query. Therefore, it might not be surprising that the collected injury data component would not necessarily meet gold standard epidemiological guidelines such as the ASIDD [15]. As suggested for other sports, stronger collaboration with injury epidemiologists can support improved injury data methods to answer the important questions posed by other relevant professionals and clinicians.[2] The timeframes for inclusion of studies in this review pre-dated the development of the first international cricket injury surveillance consensus statement, [5] which could also unfairly bias these studies as there was no documented 'best practice' at the time. However, the eight studies [24-32] that collected data after the consensus statement was published had lower overall completeness ratings than did the studies that collected data prior to the consensus statement, perhaps reflecting difficulties in adopting its recommendations.

5. CONCLUSIONS

The steps toward successful injury prevention begin with good quality injury surveillance. High standards of injury data collection are critical, whether a study is epidemiological in nature or where injury is used as an outcome measure. However, in general, the identified literature describing prospectively collected

community-level cricket injuries was found to be lacking in consistency in reporting on the essential core items required for good injury surveillance in sport. The majority of prospective injury data in community cricket, has focused on junior levels and adolescent bowlers, with little information on adult community cricketers. Longitudinal studies in community cricket, inclusive of all playing positions, incorporating collection of injury diagnosis and mechanism over multiple seasons, are required. Such studies should also consider both match and training settings, in order to gain a more complete understanding of injury at this cricket level.

Practical Implications:

- There is a need to assess the relevance of current injury surveillance data collection items for community level cricket. A community based, context driven, injury surveillance guideline is needed for future community cricket injury research.
- Until a more targeted community cricket injury surveillance guideline exists, research should adopt the existing consensus statements for minimum standards of injury data collection and reporting.
- The majority of injury studies in community cricket have been focused on junior and or adolescent age groups. More research into adult and older age groups is required.

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COMPLIANCE WITH ETHICAL STANDARDS

Conflicts of Interest

Authors Geordie McLeod, Siobhán O'Connor, Damian Morgan, Alex Kountouris, Caroline F Finch and Lauren Fortington declare that they have no conflict of interest.

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Figure 1. Search flow to identify peer-reviewed studies using prospective methods of injury collection in community cricket

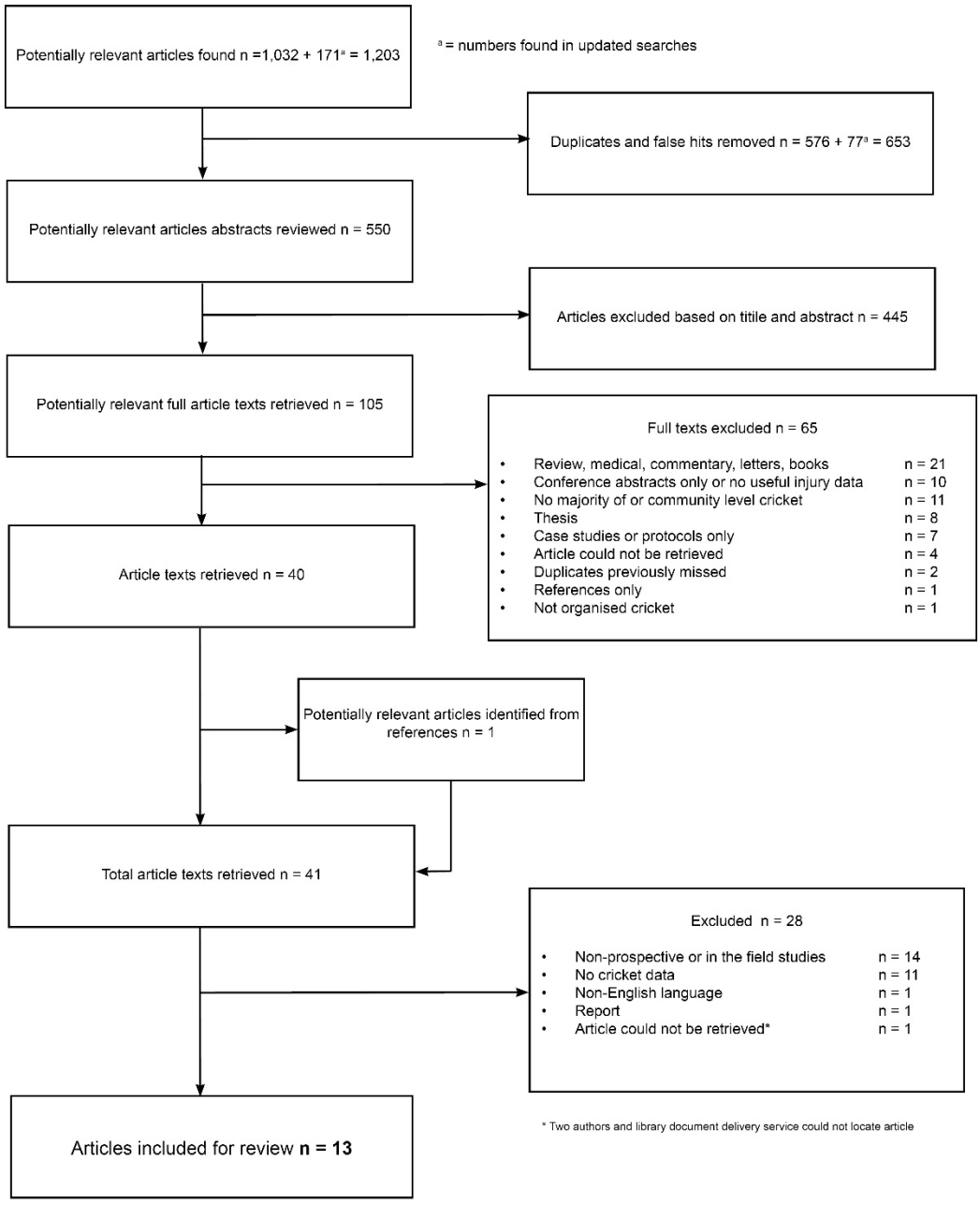

Table 1. Overview of the design, population and injury outcomes for studies using prospective methods of injury collection in community cricket (n = 13)

First Author, Year and Reference	Setting / Context & Aims	Overall Participants (n), Age & Gender	Injury Data Collection Methods and Duration	Injury Definition (ID) & Severity Measure (SM)	Number of Injured (n_p) & Injuries (n_i)	Injury Rate (IR), Incidence / Prevalence	Nature of injuries	Body region/part Injured	Specific cricket activity at Injury Onset	Mechanism of Injuries	Severity of Injuries	Other Information
Soomro 2018 [26]	To conduct injury surveillance across all premier 1st grade teams playing in the Sydney Grade Cricket competition in NSW, Australia, over the 2015/16 season as a basis for reporting injury epidemiology of premier level cricketers.	n = 408 from 20 teams. Age range for all participants 18 – 53 years. Age range for injured participants 18 – 43 years. Mean age injured = 24.1 years, SD = 5.3 years. 100% male	Team selections were checked via MyCricket website and changes were followed up at club level by Cricket NSW physio to assess if changes were injury based.	ID = MTL SM = TL	n_p = 65 n_i = 86	IR = per 10,000 exposure hours for match time. Overall IR = 35.54 per 10,000 exposure hours Prevalence = 4.06%	NR	Lower back n = 17 (19.8%), Foot n = 12 (14%), hand/wrist n = 11 (12.8%), knee n = 9 (10.5%), abdomen n = 8 (9.3%), calf n= 6 (7%), hamstring n = 6 (7%), illness n = 5 (5.8%), elbow n = 3 (3.5%), groin n = 2 (2.3%), hip n = 2 (2.3%), shoulder n = 2 (2.3%), chest/pecs n = 1 (1.2%), unidentified n = 2 (2.3%)	NR	NR	Average severity in TL (weeks): Chest/pecs = 9 Lower back = 7.88 Knee = 6.67 Hand/wrist = 4.27 Calf = 3.83 Foot = 3.58 Elbow = 3.33 Hamstrings = 3 Abdomen = 2.87 Shoulder = 2.49 Hip = 1.51 Illness = 1.22 Groin = 1 Unidentified = 1	Injuries by match type: 20/20 n = 11 (12.8%) 1-day n = 31 (36%) Long form n = 44 (51.1%)
Martin 2017 [31]	Schoolboy cricketers playing high school cricket in South Africa during pre-season and 3 months of the 2014 season. Investigate association of rested and activated thickness and side to side symmetry of the lateral abdominal muscles and prospective injury in adolescent pace bowlers	n = 28 Age range: 13-18 years. Mean age ~ 16.5 years. 100% male	Self-reporting questionnaire	ID = MA & TL Contact injuries defined as injuries sustained due to collision with player or object SM = NR	n_p = 11 n_i = 14	IR = NR 39% of participants injured	Contact injuries = 5 Non-contact injuries = 6	Upper limb: 3 (21.4%) - 100% contact injuries Lower limb: 3 (21.4%) - 33% contact injuries Lower back: 6 (42.8%) - 33% contact injuries Other: 2 (14.3%) - 100% non-contact	Fielding: 38.5% Bowling: 30.8% Batting: 8% 22.7% could not be specifically identified	NR	NR	23 (82%) had suffered 44 previous injuries: Upper limb: 40.9% Lower limb: 27.3% Lower back: 22.7% Other: 14.3% Of the previously injured 60.9% did not sustain an in-season injury
Martin 2017 [32]	Functional Movement Screen (FMS) of schoolboy cricketers in one geographical region of South Africa to determine if FMS is a predictor of injuries in adolescent pace bowlers.	n = 27 Age range 13-18 yrs Mean age = 16.82 yrs (SD 1.70 yrs) 100% male	Self-reporting questionnaire	ID = TL and or MA Contact injuries defined as injuries sustained due to collision with player or object SM = NR	n_p = 10 n_i = 13	IR = NR 37.1% of participants injured	5 players had 6 contact injuries, 5 players had 7 non-contact injuries	Upper limb: 3 (23.1%) – 100% contact injuries Lower limb: 3 (23.1%) – 33% contact injuries Lower back: 6 (46.2%) – 33% contact injuries Other: 1 (7.6%) – 100% non-contact injury	Fielding: 57.1% Bowling: 21.1% Batting: 7.1% 14.7% unknown		NR	No relationship between FMS and injury
Olivier 2016 [30]	Premier club cricketers in South Africa. Investigate side to side symmetry of lumbar multifidis cross-sectional area as a potential precursor of injury in fast bowlers	n = 26 18-26 years Mean 21.8 years SD 1.8 years 100% male	Self-reported questionnaire	ID = MA & TL Only non-contact injuries SM = NR	n_p = 16 n_i = 34	IR = NR 61.5% of participants injured	NR	Lower back: 11 Lower limb: 5	Bowling: 15 Others not reported	NR	NR	Relative risk of lower back and or lower limb injury if >= 10% LM CSA asymmetry: RR = 1.429 (95% CI 0.742 – 2.752)
Olivier 2015 [29]	Premier league cricketers from Gauteng region, South Africa. Investigate the relationship between static and dynamic balance ability, lumbo-pelvic control and injury in pace bowlers at the start and end of season	n = 32 18-26 years Mean age 21.8 years SD 1.8 years 100% male	Monthly self-reported questionnaire	ID = TL & MA SM = NR	$n_p = n_i$ = 17	IR = NR 53% of participants injured	NR	Lower back: 4 (24%) Lower Quarter: 13 (76%) (defined as lower back and lower limb) No. of injured anatomical areas: One: 7 (41%), two: 5 (29%), three: 5 (29%)	Bowling: 16 (94%) Others not reported	NR	NR	Previous injury: n = 28 Injury sustained during bowling: 18 (64%), injury to lower back: 4 (14%)

Table 1. Continued

First Author, Year and Reference	Setting / Context & Aims	Overall Participants (n), Age & Sex	Injury Data Collection Methods	Injury Definition (ID) & Severity Measure (SM)	Number of Injured participants (n_p) & Injuries (n_i)	Injury Rate (IR), Incidence / Prevalence	Nature of injuries	Body region/part Injured	Specific cricket activity at Injury Onset	Mechanism of Injuries	Severity of Injuries	Other Information
Olivier 2013 [28]	Premier club cricketers in South Africa. Establish whether lumbar proprioception in the neutral lumbar spine position and at front foot and ball release positions of the pace bowling action were related to previous or new injury, specifically lower back injury.	n = 17 18-26 years 100% male	Self-reported questionnaire – preseason, post season and monthly during season	ID = MA & TL SM = NR	$n_p = n_i = 8$	EM = NR 47% of participants injured	NR	NR	Bowling 100%	NR	NR	Previous injury: n = 13 players (76%) had sustained general injuries and 3 (23%) had sustained lower back specific injuries
Twomey 2012 [27] Nested case series from same population as Finch et al [24]	U14 and U16 players in BCA junior club competition, Victorian, Australia during the 2007-08 season. Establish if an association exists between ground hardness and injury risk in junior community-level cricket and objective measurement of ground hardness on a subset of fields where some matches were played. Also examine the nature, body region and mechanisms of injuries	n = 323 n_{U14}: 203 n_{U16}: 120 Gender NR	PDCs using standardised participation and injury incidence forms	ID = MA & TL SM = NR	n_p = unknown n_i = 31	IR = per 1000 match exposures IR = 3.49 (95% CI 2.26-4.72)	Bruise: 12 (39%) Inflammation/swelling = 5 (16%) Strain = 4 (13%) Cut/laceration = 3 (10%) Abrasion/graze = 2 (6%) Sprain = 2 (6%) Concussion = 1 (3%) Overuse = 1 (3%) Other = 1 (3%)	Head/neck & face: 5 (16%) Upper limbs: 9 (29%) Lower limbs: 12 (39%) Torso/back: 5 (16%)	NR	Struck by ball: 20 (65%) Overexertion: 3 (10%) Dive for catch: 2 (6%) Slip/trip: 2 (6%) Overuse/gradual onset: 2 (6%) Mishandling ball while fielding: 1 (3%) Twisting to change direction: 1 (3%)	1 participant required visit to hospital with facial bruising/swelling and concussion	Injuries related to ground hardness: Likely to be related: 2 (7%) – 1 each to upper and lower limbs and were either cuts/abrasions or lacerations and both due to diving for a catch) Possibly related: 5 (16%) Unlikely to be related: 23 (74%) Unknown: 1 (3%)
Kountouris 2012 [25]	Australian junior male fast bowlers followed through the 2002/03 season. Evaluate the link between Quadratus Lumborum (QL) asymmetry and lumbar spine injury in adolescent fast bowlers	n = 38 12-17 years Mean 14.9 yrs SD 1.34 yrs 100% male	Self-reported with follow up medical assessment	ID = Musculoskeletal injuries to the lumbar spine: bone stress injury, soft tissue injury. SM = NR	$n_p = n_i = 17$	IR = NR 44.7% of participants injured (21.1% bone stress, 23.7% soft tissue)	Bone stress = 8; (Bilateral bone stress = 4 Non-bowling side bone stress = 3 Dominant bowling side bone stress = 1) Soft tissue lower back injuries = 9	100 % lower back Bone stress injuries: L4 level = 2 L5 level = 5 L4 & L5 levels = 1	NR	NR	NR	Of the bone stress injuries, 50% (n=4) had asymptomatic radiological evidence of Lx bone stress at baseline and 12.5% (n=1) had asymptomatic evidence of soft tissue injury.
Finch 2010 [24]	Junior level cricket in the BCA, Victoria, Australia 2007-08 season. Estimate the rates and patterns of injury across player age groups	n = 411 U12 = 88 U14 = 203 U16 = 120 M = 405, F = 6	PDCs using standardised participation and injury incidence forms	ID = MA SM = TL from match and/or level of MA	$n_p = n_i = 47$ U12 = 1 U14 = 28 U16 = 18	IR = Per 1000 participations. Overall IR (match IR (95% CI) / training IR (95% CI)): Batting 3.98 (1.90-7.32) / 1.60 (0.59-3.48) Bowling: 2.15 (0.79- 4.69) / 1.87 (0.75-3.84) Fielding: 4.27 (2.39 – 7.04) / 0.80 (0.00 – 1.70) All positions: 3.52 (2.39 – 4.99) / 4.26 (2.44 – 6.93)	Bruise = 32% Inflammation/swelling = 23% Muscle/tendon strains = 17%	Upper leg = 17% Hand/fingers = 15% Back = 13% Lower leg = 11% Pelvis/groin = 10%	Injuries occurring in matches/training = 66% / 34% Batting O/A = 34% U12 = 0%, U14 = 81%, U16 = 19% Bowling O/A = 33% U12 = 0%, U14 = 54%, U16 = 46% Fielding O/A = 32% U12 = 1%, U14 = 44%, U16 = 55%	Struck by ball = 53% Slip//trip/dive in field = 15% Overexertion = 13% Overuse/gradual onset = 6%	IR per 1000 participations: Left the field = 2.15 Received treatment = 2.07 Remained off field = 0.64 Advised to seek medical assistance = 0.48 Taken to hospital = 0.24 (n = 1)	Injury rate ratios (IRR) compared to bowling: U14 batting = 2.78 U14 fielding = 0.81 U16 batting = 0.44 U16 fielding = 2.47

Table 1. Continued

First Author, Year and Reference	Setting / Context & Aims	Overall Participants (n), Age & Sex	Injury Data Collection Methods	Injury Definition (ID) & Severity Measure (SM)	Number of Injured participants (n_p) & Injuries (n_i)	Injury Rate (IR), Incidence / Prevalence	Nature of injuries	Body region/part Injured	Specific cricket activity at Injury Onset	Mechanism of Injuries	Severity of Injuries	Other Information
Owoeye 2010 [33]	National Sport Festival (NSF) – a biennial sporting competition held February 15th -25th, 2009 in Kaduna, far North Nigeria. Investigate patterns of injury sustained by Lagos athletes during the NSF and treatment modalities used in managing such injuries	n = 655 athletes across all sports on Lagos team. Cricket numbers = 22*. Age range = 15-38 years, mean 23.3 years (SD =3.9) not specific to cricket. M: 395, F: 260 not specific to cricket	Medical team complied structured log books of assessment and treatments given to athletes on and off site	ID = MA SM = Minor –return to game immediately after treatment Moderate – unable to return to game after treatment on-site or next game after off-site treatment. Major – potentially life threatening injury requiring immediate referral	n_p = unknown n_i = 19	IR = NR Injury risk = number of injuries / total of players for each sport. Cricket injuries = 13.6% of all injuries in Lagos team. Injury risk = 0.86 within cricket team.	NR	NR	NR	NR	NR	-
Shaw 2008 [11]	Junior club cricket in Sutherland Shire Junior Cricket Association, NSW, Australia. Describe the most common injuries and their mechanisms in junior cricket over three consecutive seasons 2002-03 to 2004-05 and assess the effect of compulsory headgear use on injury frequency both overall and specifically in batters	$n_{2002-03}$ = 1146 reg. players $n_{2003-04}$ = 1261 reg. players $n_{2004-05}$ = 1215 reg. players U8 (7% of reg. players), U10, U12, U14, U16 (19% of reg. players) Gender not reported	Original data was collected by match scorers with the Sutherland Shire Junior Cricket Association which then later provided data for this study.	ID = Any acute injury SM = NR	n_p = unknown n_i = 155	IR = IR per 100 registered players. Incident proportions: U8: 0 (0%) U10: 28 (18%) U12: 47 (30%) U14: 32 (21%) U16: 48 (31%) IR: 2002/03: 4.36 2003/04: 4.76 2004.05: 3.70	NR	Head, neck & face: 27% (95%CI 20-34%) of which 20% to the face Upper limb: 24% (95%CI 17-31%) of which 14% to the hand Lower back & Pelvis: 5% (95%CI 2-8%) Lower limb: 30% (95%CI 23-37%) Regional injury over time: Lower limb 02/03: 20%, 03/04: 33.3%, 04/05: 35.6% Upper limb 02/03: 14%, 03/04: 31.7%, 04/05: 24.4% Head/face/neck 02/03: 44%, 03/04: 18.3%, 04/05: 20%	Across all grades: Batting: 45-53%, Fielding: 24-32%	Contact with moving object: 57-70% - primary cause of injury for U10-14 and 35% (95%CI 22-48%) in U16, 100% of all wicket keeping injuries, 65% (95%CI 54-76%) of batting injuries, 47% (95%CI 32-62%) fielding injuries and 50% (95%CI 10-90%) of training injuries. Unspecified acute overexertion: 58% (95%CI 30-86%) of bowling injuries and 33% (95%CI 0-71%) of training injuries	NR	Head/neck & face injures adjusted for batting only over time: 2002/03: 62% (95%CI 49-76%) 2003/04: 35% (95%CI 22-48%) 2004/05: 4% (95%CI 0-9%) Type of cricket played: Traditional cricket had 80% (95%CI 74-85%) of all injuries from 67% registered players. Introductory & preliminary cricket had 4% (95%CI 1-7%) of all injuries from 16% registered players
Dennis 2005 [23]	Club & District (Premier) cricket in NSW, Australia, 2002-03 season. Investigate bowling workload as a risk factor for injury and evaluate bowling guidelines.	n = 44 12-17 years Mean 14.7 yrs SD 1.4 yrs 100% male	Self-recorded log books	ID = MTL & MA SM = NR	$n_p = n_i$ = 11	IR = NR 25% of participants reported injury	Stress reactions = 4 Lumbar musculo-ligamentous strains = 2, bi-lateral stress fractures = 1, others = 4 (muscular strains and apophysitis)	Lower back = 7 Others = 4 (1 calcaneal apophysitis)	100% Bowling	NR	NR	Lower back pain reported by 52% (n = 23) of bowlers at some stage during the season.
Foster 1989 [22]	Potential high performance bowlers from club and school cricket in Australia, 1986-87 season. Investigate the relationship between back injuries in cricket with biomechanical, physiological and kinanthropometric characteristics of young fast bowlers	n = 82 Age range 15-22 yrs Mean age 16.8 yrs 100% male	Injuries assessed during season by sports physician	ID = Lower back injuries SM = Grouped into vertebral fractures, disabling soft tissue and mild ST	$n_p = n_i$ = 31	IR = NR Prevalence = 38%	Stress fractures = 29% (n=9) Soft tissue injury = 71% (n=22)	Stress fractures L4 = 1, L5 = 7, S1 = 1, tibia = 1 Soft tissue injury = 100% lower back	100% Bowling	NR	38% had at least one disabling injury and 27% of bowlers missed at least one match due to soft tissue injury	Single tibia stress fracture noted but not technically part of study outcomes

NR = Not Reported, MA = Medical Attention, MTL = Match Time Loss, TL = Time Loss, IR = Injury Rate, PDC = Primary Data Collector

Table 2. Critical appraisal and data completeness. (A) Tabulation of critical appraisal of all 13 reviewed studies, (B) comparison of 12 cricket specific studies with International Cricket Consensus Statement on Injury Surveillance in Cricket, and (C) comparison of 12 cricket specific studies with the Australian Sports Injury Data Dictionary (ASIDD) core items for injury surveillance.

		Study (first author, year)													
A	**Critical appraisal question**	Soomro 2018 [26]	Martin 2017 [32]	Martin 2017 [31]	Olivier 2016 [30]	Olivier 2015 [29]	Olivier 2013 [28]	Twomey 2012 [27]	Kountouris 2012 [25]	Finch 2010 [24]	Owoeye 2010 [33]	Shaw 2008 [11]	Dennis 2005 [23]	Foster 1989 [22]	**Overall % of Yes by question**
1	Were the study aims and design described adequately & are they compatible?	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	92%
2	Was the study setting, subjects, source, target population and size described adequately?	P	Y	Y	P	P	P	Y	P	P	Y	Y	Y	P	46%
3	Was the method of data collection described adequately and did it seek to minimise information bias?	P	Y	Y	P	Y	P	P	Y	Y	Y	P	Y	Y	62%
4	Has there been appropriate reporting of attrition of subjects or missing data?	P	Y	P	P	P	P	P	P	P	P	P	P	P	8%
5	Was there an injury definition and or injury severity measure/ definition provided and were they suitable for the study design?	Y	Y	Y	P	Y	P	Y	P	Y	Y	P	Y	P	62%
6	Were the injury outcomes and exposure measures reported in a standardised, justified and reasonable manner?	Y	Y	Y	P	P	P	Y	Y	Y	P	Y	P	P	54%
7	Were limitations to the study discussed adequately?	P	Y	Y	P	P	P	Y	Y	Y	Y	Y	Y	N	62%
8	Is there a summary of key results, their potential generalisability and whether they and any conclusions match the aims and/or reflect the limitations of the study?	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	92%
9	Does the study explain any ethics requirements, author conflicts of interest and or funding arrangements?	Y	Y	Y	Y	Y	Y	Y	Y	Y	P	P	Y	Y	85%
	Likelihood of bias[a]	High	Low	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Unclear	Low	Unclear	

		Study data collected pre-2005 consensus statement (first author, year)				Study data collected post-2005 consensus statement (first author, year)								
B	**Consensus Item/Intent**	Foster 1989 [22]	Dennis 2005 [23]	Kountouris 2012 [25]	Shaw 2008 [11]	Finch 2010 [24]	Twomey 2012 [27]	Olivier 2013 [28]	Martin 2017 [31]	Olivier 2015 [29]	Olivier 2016 [30]	Soomro 2018 [26]	Martin 2017 [32]	Overall % of yes by item
	Data collection period	1986/87	2002/03	2002/03	2003/05	2007/08	2007/08	< 2013	2014	< 2015	< 2016	2015/16	< 2017	
1	Player details (Age., bowler type)	Y	Y	Y	P[6]	P[6]	P[6]	Y	Y	Y	Y	P[6]	Y	67%
2	Injury diagnosis including body region.	Y	Y	Y	P[7]	P[10]	P[10]	N	P[13]	P[7]	P[7]	P[7]	P[13]	25%
3	Injury side (left, Right, Bilateral, NA)	N	Y	Y	N	N	N	N	N	N	N	N	N	17%
4	New Injury/Recurrent injury	N	P[2]	P[5]	N	N	N	P[14]	P[14]	P[14]	N	Y	N	8%
5	Time of onset (match/training/other/gradual) including match details	N	P[3]	N	P[8]	Y	P[11]	N	N	N	N	N	N	8%
6	Activity at onset (batting/bowling/fielding/gradual) including fielding position	P[1]	Y	N	P[9]	Y	N	Y	P[15]	P[15]	P[15]	N	P[15]	25%
7	Mechanism description	P[1]	P[4]	N	Y	Y	Y	N	P[16]	P[17]	N	N	P[16]	25%
8	Qualification as a significant injury	Y	N	N	N	Y	P[12]	N	N	N	N	P[18]	N	17%
9	Details of surgery or other major treatment (if relevant)	N	N	N	N	Y	P[12]	N	N	N	N	N	N	8%
10	Injury rates calculated as per consensus methods	N	N	N	N	N	N	N	N	N	N	N	N	0%
	Consensus completeness rating [a]	4.0	5.5	3.5	4.0	6.0	3.5	2.5	3.0	3.0	2.0	2.5	2.5	

		Study data collected pre-2005 consensus statement (first author, year)				Study data collected post-2005 consensus statement (first author, year)								
C	**ASIDD Item/Intent**	Foster 1989 [22]	Dennis 2005 [23]	Kountouris 2012 [25]	Shaw 2008 [11]	Finch 2010 [24]	Twomey 2012 [27]	Olivier 2013 [28]	Martin 2017 [31]	Olivier 2015 [29]	Olivier 2016 [30]	Soomro 2018 [26]	Martin 2017 [32]	Overall % of yes
	Data collection period	1986/87	2002/03	2002/03	2003/05	2007/08	2007/08	< 2013	2014	< 2015	< 2016	2015/16	< 2017	
1	Date of injury	Y	Y	Y	P[2]	P[2]	P[2]	P[3]	P[3]	Y	Y	P[7]	P[3]	42%
2	Player details (Age., Gender)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
3	Activity at onset (broad areas)[b]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
4	Mechanism	P[1]	Y	N	Y	Y	Y	N	P[4]	P[5]	N	N	P[4]	33%
5	Body region	Y	Y	Y	Y	Y	Y	N	Y	Y	P[6]	Y	Y	83%
6	Nature	Y	Y	Y	N	Y	Y	N	N	N	N	N	P[8]	42%
	ASIDD completeness rating [a]	5.5	6.0	5.0	4.0	5.5	5.5	2.5	4.0	4.5	3.5	3.5	4.5	

Notes (A):
[a] = questions 2, 3 and 4 used to assess the likelihood of bias. Y = Yes, P = Partial, N = No

Notes (B):
a. Score 1 for Y, 0.5 for P, and 0 for N
1. Stress fractures found deemed to be probably the result of repetitive bowling.
2. Recurrent injuries in the season of interest were not recorded as only workload prior to original injury noted.
3. Study focused only on injuries of gradual onset.

4. 100% of injuries were reported as bowling related overuse.
5. Participants had baseline MRI which indicated whether there was pre-existing lumbar soft tissue, bone stress or no injury on radiological examination. All participants were reported injury free and had no pain at the start of the trial.
6. Age groups provided, but no specific bowler types (e.g. spin/pace) were differentiated.
7. Body regions injured provided but no injury diagnosis.
8. Some proportions referenced to training injuries.
9. Ranges of proportions of injury by player position given.
10. General injury diagnosis provided (i.e. nature/type) and body regions provided, but not collated.
11. Injuries were recorded at matches only.
12. Reported single injury required hospitalisation.
13. Broad terms for nature of injury (contact / non-contact).
14. Reference to previous season injury amongst cohort, but not within surveillance period.
15. Activity at onset recorded, but not all proportions identified.
16. Contact injuries defined as those where an injury was sustained from collision with the ball, another player or object.
17. Only 'non-contact' injuries included.
18. Significance proportioned to number of weeks missed (match time loss).

Notes (C):

a. Score 1 for Y, 0.5 for P, and 0 for N, b. In reference to organised or recreational cricket in this case.
1. Bowling assumed to be the casual factor, but not specific mechanism provided.
2. Personal Data Collectors (PDCs) used, so in theory date was recorded but no specific mention of it.
3. Questionnaires used to collect injury data, likely date of injury is included but not stated, and also injury definition was not wholly dependent on medical attention.
4. Contact injuries defined as those where an injury was sustained from collision with the ball, another player or object.
5. Only 'non-contact' injuries included.
6. Only reported lower back injuries (76% not reported).
7. Injury investigated through proxy, so unclear if actual date of injury was recorded.
8. Non-contact injuries grouped as overuse, acute ligament sprain, or muscle strain.

Prospective reporting of injury in community-level cricket: A systematic review to identify research priorities

Supplementary material

Table S1. PRISMA checklist (adapted from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Section/topic	#	Checklist item	Reported on page #	Comments
TITLE				
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Title page	
ABSTRACT				
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2	
INTRODUCTION				
Rationale	3	Describe the rationale for the review in the context of what is already known.	4	To understand the existing knowledge of prospectively collected injuries in community cricket and the completeness of the data collection in comparison to consensus statements and the ASIDD
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5	P = community cricketers, I = prospectively recorded, C = data reporting with consensus statements and the ASIDD, O = injury profiles, S = any published peer reviewed studies (excluded case studies).
METHODS				
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	5	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5	Refer to Table S2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6-7	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6-7	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7	Descriptive synthesis of study results
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	7	Descriptive synthesis of study results
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6	

Section/topic	#	Checklist item	Reported on page #	Comments
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A	
RESULTS				
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7	Flow diagram provided, Fig 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-10	Table 1 – study characteristics
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	7-8	Table 2 (A)
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	12 – 15	Table 1 and descriptive summaries of injury incidence rates, injury proportions, injury type, body region injured, mechanism and severity of injury with tabular summaries (Tables S3-S7).
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	7-8	Table 2 (A)
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A	
DISCUSSION				
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	10-13	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	13	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	14	
FUNDING				
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	15	

Table S2. Search example, SCOPUS.

	Initial search to October 2017			2nd search from November 2017 – April 2018			3rd search from March 2018 to November 3rd 2018		
Search	Terms	Limiters	Results	Terms	Limiters	Results	Terms	Limiters	Results
S1	(TITLE-ABS-KEY (cricket*) AND TITLE-ABS-KEY (injur*))	-	357	(TITLE-ABS-KEY (cricket*) AND TITLE-ABS-KEY (injur*))	Date range 2017 to present	43	(TITLE-ABS-KEY (cricket*) AND TITLE-ABS-KEY (injur*))	Date range 2018 to present	30
S2	(TITLE-ABS-KEY (cricket* OR cricketing or cricket) AND TITLE-ABS-KEY (injur* OR injury OR injuries))	-	357						
		Overall results retrieved from 1st search	357		Overall results retrieved from 2nd search	43		Overall results retrieved from 3rd search	30

Table S3. Proportion of injured players, overall and by age where reported

Proportion of Injured Players												
		All players			By Age Group							
Study (first author, year)	Age Range	n participants	n_p injured participants	n_p / n	U8	U10	U12	U14	U15	U16	U17	U18
Soomro 2018 [27]	14 – 53 years	408	65	15.9%								
Martin 2017[a] [32]	13 – 18 years	28	11	39.3%								
Martin 2017[a] [25]	13 – 18 years	27	10	37.0%								
Olivier 2016[a] [33]	18 – 26 years	26	16[b]	61.5%								
Olivier 2015[a] [34]	18 – 26 years	32	17[d]	53.1%								
Olivier 2013[a] [44]	18 – 26 years	17	8	47.0%								
Twomey 2012 [29]	U8 – U16	203	31	13.4%								
Kountouris 2012[a] [31]	12 – 17 years	38	17[c]	44.7%								
Finch 2010 [28]	U12 – U16	411	47	11.4%	-	-	1.1%[h]	13.8%[h]	-	15.0%[h]	-	-
Owoeye 2010 [24]	15 – 38 years[f]	22	NR[g]	-								
Shaw 2008 [16]	U8 – U16	1207[e]	155	12.8%	0%[i]		12.0%[i]		21.0%[i]		-	-
Dennis 2005[a] [26]	12 – 17 years	44	11[b]	25.0%								
Foster 1989[a] [30]	15 – 22 years	82	31[c]	37.8%								

a. Bowler cohort only, b. > 60% of cohort had lower back injury, c = 100% of cohort had lower back injury, d = unclear how many of cohort had lower back injury, e = average number of registered players over 3 years, f = not specific to cricket participants, g = 19 injuries reported in cricket but not specific to participants, h = U12: 1 injury in 88 participants, U14: 28 injuries in 203 participants, U16: 18 injuries in 120 participants, i = no (n =0) U8 players injured of the 7% registered players, 77% of registered players were within the U10 to U14 age bracket with n = 107 injuries, 16% of registered players with in the U16 age group with n = 48 injuries, NR = Not Reported

Table S4. Injury nature reported as % of total injuries

Study (first author, year)	n injuries	Concussion	Stress fracture	Rupture / Tear	Sprain	Strain	Bruising	Overuse	Inflammation	Cuts / Lacerations	Other / NR
Martin 2017[a] [32]	14							42.9%			57.1%
Martin 2017[a] [25]	13							53.8%			46.2%
Twomey 2012 [29]	31	3.2%			6.5%	12.9%	38.7%	3.2%	16.1%	9.7%	9.7%[b]
Kountouris 2012[a] [31]	17		47.1%			52.9%					
Finch 2010 [28]	47					17.0%	31.9%		23.4%		27.7%
Dennis 2005[a] [26]	11		45.5%	9.1%	18.2%	27.3%					
Foster 1989[a] [30]	31		29.0%			71.0%					

a = study that looked at bowling cohort only. b = includes 6.5% represented by 'abrasions/grazes'

Table S5. Studies reporting injury proportions by broad body region (% of n injuries)

Study (first author, year)	Year/Season	n injuries	Head/Face/Neck %	Upper Limb %	Trunk/Back %	Lower Limb %	Other/Unspecified %
Soomro 2018 [27]	2015/16	86	0.0	18.6	30.2	43.0	8.2[b]
Martin 2017[a] [32]	2014 (3 months)	14	0.0	21.4	42.9	21.4	14.3
Martin 2017[a] [25]	NR	13	0.0	23.1	46.2	23.1	7.6
Twomey 2012 [29]	2007/08	31	16.1	29.0	16.1	38.7	0.1
Finch 2010 [28]	2007/08	47	12.7	14.8	19.1	31.0	22.4
Shaw 2008 [16]	All	155	27.0 (20.0 – 34.0)	24.0 (17.0 – 31.0)	5.0 (2.0 – 8.0)	30.0 (23.0 – 37.0)	14.0 (NR)
	2002/03	50	44.0 (30.2 – 57.8)	14.0 (9.0 – 19.0)	NR	20.0 (14.0 – 26.0)	22.0 (NR)
	2003/04	60	18.3 (13.0 – 23.0)	31.7 (26.0 – 38.0)	NR	33.3 (27.0 – 39.0)	16.7 (NR)
	2004/05	45	20.0 (14.0 – 26.0)	24.4 (18.0 – 30.0)	NR	35.6 (29.0 – 43.0)	20.0 (NR)

a. Bowler cohort only, b. Illness contributed 6 %, numbers in parentheses represent 95% confident intervals reported, NR = not reported

Table S6. Studies reporting injury proportions by facet of game (% of n injuries) (at least two of three of batting, bowling or fielding).

Study (first author, year)	n injuries	Bowling	Batting	Fielding	Other / NR
Martin 2017[a] [32]	14	30.8%	8.0%	38.5%	22.7%
Martin 2017[a] [25]	13	21.1%	7.1%	57.1%	14.7%
Finch 2010 [28]	47	33.0%	34.0%	32.0%	-
Shaw 2008 [16]	155	-	49.0%[b]	27.7%[c]	23.2%

a. Bowler cohort only, b = average of range reported (45% -53%), c = average of range reported (24% - 32%)

Table S7. Studies reporting specific injury mechanism (% of n injuries)

Study (first author, Year)	n injuries	Struck by Ball	Contact with moving object [b]	Fall / Dive in Field	Cutting / tearing	Sudden change in direction	Non-specific Overexertion	Non-contact / Non-specific Overuse	Other / NR
Martin 2017[a] [32]	14		57.1% [c]					42.9%	
Martin 2017[a] [25]	13		46.2% [c]					53.8%	
Twomey 2012 [29]	31	64.5%		19.4%			9.7%	6.5%	
Finch 2010 [28]	47	53.2%		14.9%			12.8%	6.4%	12.8%
Shaw 2008 [16]	155		54.8%[b]		2.6%	3.2%	14.2%		25.2%

a. Bowler cohort only, b. includes collision with ball, player, equipment, c. 'contact injuries' may also include collision with ground in this study.