



## Original research

## Injury profiles in elite women's T20 cricket

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## ABSTRACT

**Objectives:** To Describe the injury incidence and prevalence during two years of a professional women's T20 cricket tournament.**Design:** Prospective cohort study.**Methods:** Injuries were recorded prospectively for 68 matches during a professional women's T20 tournament in 2016 and 2017. There were six teams of 15 players. Participants were female, aged between 16–38 years (mean 23.4 ± 4.8). Time-loss and non time-loss incidence and prevalence were calculated for match days, region, skill group, mode and activity at time of injury.**Results:** The greatest incidence occurred in the shoulder (1.8 injuries per 100 match days), lower back (1.7 injuries per 100 match days) and knee (1.7 injuries per 100 match days). The highest time-loss prevalence occurred in hand (1.7%), head/face (0.8%) and thigh (0.6%). All head injuries were concussion. Catching related injuries caused the most time-loss (2.5% prevalence) and throwing related shoulder injury had the highest incidence (2.3 injuries per 100 match days). Gradual onset injuries had the highest overall incidence (7.9 injuries per 100 match days).**Conclusions:** In elite female T20 cricket, time-loss injuries, particularly impact/traumatic injuries are most likely to occur during fielding, suggesting pitch side support and trauma training is a priority. The high incidence of gradual onset injuries, particularly throwing related shoulder pain, indicates that managing workload and ensuring physical preparedness is vital.

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## Practical implications

- This is the first published data from women's T20 cricket and will guide future medical provision and injury prevention strategies.
- Traumatic injuries, specifically concussion and finger injuries, cause the most time lost in women's T20 tournament cricket.
- Further work is needed in the prevention of gradual onset injuries, particularly throwing arm pain.
- As the women game continues to grow, a standardised injury surveillance system would play a key role injury prevention.

## 1. Introduction

Since the introduction of professional contracts, women's cricket has grown rapidly in popularity<sup>1</sup> and has seen a professional T20 women's tournament in Australia starting in 2015/2016,

followed by the introduction of a UK T20 professional competition in the summer of 2016. As is the case with high-profile sport, these new tournaments create associated pressure on science and medicine staff to optimise player availability for both club and Country. Accurate injury surveillance is an essential component of injury risk reduction strategy<sup>2,3</sup> and cricket was the first major international sport to publish recommended methods for injury surveillance.<sup>4</sup> Recently the consensus methods were revised and expanded, partly due to the increased prominence of T20 cricket.<sup>5</sup>

Numerous countries have published cricket injury surveillance, indicating that cricket is a relatively safe sport with injury prevalence of around 5% for batsmen, wicketkeepers and slow bowlers, increasing to between 15–20% for fast bowlers.<sup>6–11</sup> Lower back bone stress injury is the injury type that is the greatest contributor to time loss. However, these data have all been from the men's game and has only rarely included T20 cricket. Furthermore, the methodologies have not been uniformly consistent with the consensus. There is only one previous study from the 2011 men's 50 over World Cup<sup>12</sup> to report injury and illness across a stand-alone tournament and there is only one study that has included T20 cricket within multiple season surveillance across various formats

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of the game.<sup>9</sup> No previous research has looked at injury surveillance during a stand-alone T20 tournament and to date, other than conference abstracts,<sup>13</sup> there is no published injury surveillance of elite women's cricket. Therefore to inform injury management priorities, the purpose of this study was to describe the incidence and prevalence of injuries during a professional women's T20 tournament.

## 2. Methods

All players competing in the professional women's T20 competition in the UK during 2016 and 2017 were invited to participate. There were six teams of 15 players competing each year. All participants were female and aged between 16–38 years (mean  $23.42 \pm 4.82$ ) at the start of data collection. Six players declined to participate in 2016 and three in 2017, giving a total of 84 players were included in 2016 and 87 in 2017. Approximately 40–45% of players were international cricket players with the remainder of players being made up of County/international pathway players. All injuries and illness sustained (hereafter known as injuries), were prospectively recorded. If a player was injured and replaced, the new player was added to the squad list. The replaced player was then recorded as unavailable for the remainder of the tournament.

Players were classified according to skill group as either batsmen, fast bowlers, slow bowlers or wicketkeepers, as per the updated consensus guidelines.<sup>5</sup> Ethical approval was obtained from Cardiff Metropolitan University and all subjects and their guardians (for those aged under 18yrs) provided written informed consent. The physiotherapists responsible for each squad were instructed extensively by the lead researcher in the injury surveillance methodology which involved a detailed instruction booklet, a one hour face to face education session and frequent follow ups throughout and following the competition.

Data was recorded for all T20 match days. Each team played a minimum of five matches and a maximum of seven, depending on whether they reached the semi-final/final. In total data was recorded for 68 T20 matches. For each match day the squad physiotherapists were required to record the injury status of each member of the squad, regardless of whether they were playing or not, on an Excel spreadsheet. Players were categorised as follows:

- 1 = Available for match selection, no injury or illness.
- 2 = Available for match selection but with an injury or illness not causing modified activity.
- 3 = Available for match selection, but with modified activity due to injury or illness.
- 4 = Unavailable for match selection due to injury or illness.

Non time-loss injuries were category 2 and 3 and time-loss injuries were category 4. Categorisation included all new injuries, as well as any pre-existing injuries players carried into the match day. It was possible for a player to have multiple injuries at any one time. In these instances, players were coded according to their most severe injury. For each injury the squad physiotherapist was required to record the location and diagnosis, based on the Orchard Sports Injury Classification System Version 10.<sup>14</sup> They were also required to record the activity at the time of onset and the mode of injury as per the consensus guidelines.<sup>5</sup>

Exposure was calculated by multiplying the number of players in each squad during each match day by the number of match days.

*Player match days* = *daily squad size* × *number of match days*

Total, time-loss and non time-loss injury incidence and prevalence were calculated for match days, each region of the body, skill

group, squad, mode of injury and activity at the time of injury. Incidence was presented as the number of injuries per 100 player match days. The following formulas were used to calculate injury sub-types:

$$\text{Incidence (all)} = \frac{\text{number of injuries}}{\text{player match days}} \times 100$$

$$\text{Time – loss injury incidence} = \frac{\text{number of time – loss injuries}}{\text{player match days}} \times 100$$

$$\begin{aligned} \text{Non time – loss injury incidence} \\ = \frac{\text{number of non time – loss injuries}}{\text{player match days}} \times 100 \end{aligned}$$

Prevalence was the percentage of players considered injured on any given match day. The following formulas were used to calculate injury sub-types:

$$\text{Injury prevalence} = \frac{\text{total number of match days missed}}{\text{player match days}} \times 100$$

$$\begin{aligned} \text{Activity modification prevalence} \\ = \frac{\text{total number of match days requiring modification}}{\text{player match days}} \times 100 \end{aligned}$$

## 3. Results

A total of 137 injuries were recorded over the two years, 20 time-loss and 117 non time-loss. On average 4.6% of players were unavailable for match selection. There were 2.1 time loss injuries and 12.2 non time-loss injuries per 100 match days. Incidence rates were similar across skill groups. Time loss injuries (category 4) however, were more prevalent in fast bowlers (7.7%).

Regional injuries for specific injury codes can be found in [Table 1](#), along with the overall injury incidence results. The greatest injury incidence occurred in the shoulder (1.8 injuries per 100 match days), lower back (1.7 injuries per 100 match days) and knee (1.7 injuries per 100 match days). The highest time-loss prevalence (category 4) occurred in hand (1.7%), head and face (0.8%) and thigh (0.6%). All of the head and face time-loss injuries were concussions (n = 4).

Fielding related injuries had the highest overall injury incidence (5.2 injuries per 100 match days). The most time lost was from fielding related injuries with 3.3% of players being unavailable at any one time due to a fielding related injury. With regards to specific activity, the highest injury incidence occurred in throwing (2.3 injuries per 100 match days) and the delivery stride of fast bowling (2.1 injuries per 100 match days). Catching injuries caused most time lost with 2.5% of players being unavailable at any one time due to a catching related injury. The amount of non time-loss (category 2 injuries) recorded as 'no specific cause' was relatively high (6.3%) ([Table 2](#)).

Gradual onset injuries had by far the highest overall incidence (7.9 injuries per 100 match days). However, impact/traumatic injuries caused the most time lost with 2.6% of players were unavailable at any one time due to an impact/traumatic injury ([Table 3](#)).

## 4. Discussion

This study is the first injury surveillance study of women's cricket and the first presentation of detailed injury data, including the activity at time of injury and mode of onset, from a single

**Table 1**  
Injury prevalence and overall incidence by body region.

Body region	Prevalence for injured but available (category 2)	Prevalence for injured and modified activity (category 3)	Prevalence for injured and unavailable (category 4)	% of all injuries	Incidence (per 100 match days)
Ankle	4.3%	0.0%	0.0%	8.8%	1.3
Elbow	4.0%	0.0%	0.0%	8.8%	1.3
Foot	0.7%	0.0%	0.0%	8.8%	0.1
Hand	2.5%	0.0%	1.7%	8.8%	1.3
Head & Face	0.0%	0.0%	0.8%	2.9%	0.4
Hip	1.6%	0.1%	0.3%	6.6%	0.9
Knee	3.5%	0.8%	0.3%	11.7%	1.7
Leg	3.3%	0.0%	0.0%	6.6%	0.9
Lower back	4.2%	0.2%	0.0%	11.7%	1.7
Medical	0.6%	0.1%	0.3%	5.8%	0.8
Neck	0.4%	0.0%	0.1%	1.2%	0.2
Shoulder	3.8%	0.9%	0.3%	12.4%	1.8
Thigh	1.6%	0.0%	0.6%	6.6%	0.9
Thoracic	1.7%	0.3%	0.1%	4.4%	0.6
Wrist	1.9%	0.0%	0.0%	2.9%	0.4

**Table 2**  
Injury prevalence and overall incidence by activity at time of injury.

Skill group	Activity	Prevalence for injured but available (category 2)	Prevalence for injured and modified activity (category 3)	Prevalence for injured and unavailable (category 4)	Incidence (per 100 match days)
Batting	Hit by ball	0.4%	0.0%	0.2%	0.2
	Playing a shot	2.8%	0.0%	0.0%	1.0
	Running between the wickets	0.4%	0.1%	0.0%	0.2
	<b>Total</b>	<b>3.6%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>1.5</b>
Fast bowling	Delivery stride	5.7%	0.7%	0.3%	2.1
	Follow through	0.2%	0.0%	0.0%	0.1
	Run up	0.7%	0.0%	0.0%	0.3
	<b>Total</b>	<b>6.7%</b>	<b>0.7%</b>	<b>0.3%</b>	<b>2.5</b>
Slow bowling	Delivery stride	0.7%	0.5%	0.0%	0.4
	Follow through	0.0%	0.0%	0.0%	0.0
	Run up	0.6%	0.0%	0.0%	0.2
	<b>Total</b>	<b>1.4%</b>	<b>0.5%</b>	<b>0.0%</b>	<b>0.6</b>
Fielding	Catching	2.2%	0.0%	2.5%	1.5
	Diving	0.7%	0.1%	0.3%	0.5
	Running	1.5%	0.5%	0.2%	0.9
	Throwing	6.4%	0.3%	0.3%	2.3
<b>Total</b>	<b>10.8%</b>	<b>0.9%</b>	<b>3.3%</b>	<b>5.2</b>	
Medical	Total	0.7%	0.0%	0.2%	0.6
	Fitness training	2.3%	0.1%	0.1%	0.7
	Warm up activity	0.7%	0.1%	0.1%	0.4
other	Nil specific	6.3%	0.0%	0.1%	2.0
	Other sport/activity	0.6%	0.0%	0.0%	0.4
	<b>Total</b>	<b>10.0%</b>	<b>0.2%</b>	<b>0.3%</b>	<b>3.5</b>
Wicketkeeping	Catching	0.3%	0.0%	0.2%	0.2
	Diving	0.1%	0.0%	0.0%	0.1
	<b>Total</b>	<b>0.4%</b>	<b>0.0%</b>	<b>0.2%</b>	<b>0.3%</b>

**Table 3**  
Injury prevalence and overall incidence by mode of onset.

Mode of onset	Prevalence for injured but available (category 2)	Prevalence for injured and modified activity (category 3)	Prevalence for injured and unavailable (category 4)	Incidence (per 100 match days)
Gradual onset	20.5%	2.1%	1.3%	7.9
Impact/traumatic	2.9%	0.1%	2.6%	2.0
Insidious	3.3%	0.0%	0.0%	0.9
Medical	1.7%	0.1%	0.3%	1.3
Sudden onset non-contact	5.2%	0.2%	0.4%	2.2

men's or women's professional T20 tournament. This unique intelligence will be valuable not only to support staff working within the women's game, but to the wider game in terms of planning future medical provision and support. In women's elite T20 cricket, fielding related injuries, particularly catching, accounted for a significant proportion of match days lost. In addition to this, gradual onset injuries, such as throwing related injury, are a significant

problem in the women's game and should be a focus of player preparation and injury management practices.

On average, just under 5% of players were unavailable for selection for any given tournament match day. Comparison with other results from women's cricket is not possible as no previous research has included prevalence rates. However, comparison with men's data would suggest this prevalence rate is relatively low. A T20 match prevalence rate of 11.6% has been reported for Australian

domestic/international cricket<sup>15</sup> and in other formats prevalence rates has been reported as 10.2%,<sup>6</sup> 11.3% and 8.1%<sup>7</sup> and 8%.<sup>8</sup> Interestingly however, the only other study to include data from a tournament,<sup>12</sup> reported a match injury prevalence of 4.8%, which is comparable to our findings.

The relatively low injury prevalence seen in this study could be the result of reduced ball speed in comparison to men's cricket, or reduced forces in the women's game, or alternatively may reflect the nature of tournament cricket.<sup>12</sup> In a relatively short tournament duration, players may be more likely to play through injuries which under other circumstances would result in time lost. This could be influenced by financial factors, or by support staff being under pressure to manage players through a tournament. In addition to this, the short duration (3–4 weeks) means that those that were unavailable due to injury pre-tournament are unlikely to have been selected and therefore would not have been captured during data collection.

The design of previous injury surveillance studies, makes it difficult to evaluate the impact of T20 cricket specifically. This is because, although the injury may have been recorded on a T20 match day, it could be the result of cumulative workload during other formats. The fact a standalone T20 tournament was evaluated in this study, and clear exposure measures were used, may help give a clearer picture of injuries related specifically to T20.

Incidence rates were similar across skill groups, however time loss injuries were more prevalent in fast bowlers. This appears to support previous research from men's cricket that fast bowlers are the most likely to be injured.<sup>6,8,16</sup> However, on closer analysis, 55% of the time-loss injuries in fast bowlers were due to injuries not related to fast bowling such as finger fractures, medical illness and concussion. A major cause of time-loss in male and female fast bowlers is lumbar spine stress fractures,<sup>13,5,12</sup> but this was not the case in this study. Previous research has demonstrated a link between spikes<sup>17,18</sup>, and/or excessive bowling workload and injury<sup>19–21</sup> whereas bowling workloads in T20 cricket are generally low, with each bowler only being permitted to bowl four overs per match, which may at least partly explain the relatively low rates of fast bowling related injury. As previously mentioned, given the short duration of the tournament it is also possible that a proportion of bowlers may have bowled through low back pain and not reported it or were not selected for the tournament due to injury.

The greatest injury time-loss prevalence was from hand, head & face and thigh, with hand accounting for 32% of all match days lost. The impact of hand injuries on availability is consistent with data from both men's and women's cricket.<sup>7,13</sup> It may be possible to prevent these injuries by improving fielding practice, particularly among the non-international players, who may not have been previously exposed to a higher volume and quality of fielding. Other factors, such as eyesight screening has the potential to play a role in reducing the number of hand injuries.

All four head & face time loss injuries were concussion, three of which occurred fielding (including one incident of two players colliding), whilst the other was the result of a batting helmet strike. Orchard and colleagues<sup>5</sup> reported that concussion recording has increased significantly in cricket and there has been a significant increase in awareness, education and training regarding concussion, with the England and Wales Cricket Board publishing concussion guidelines, including detailed information on recognition and return to play.<sup>22</sup> The relatively high prevalence seen in this tournament could be the result of increased awareness among players and support staff. These findings support the continued use of baseline concussion testing in women's cricket moving forwards and highlights the need for high quality medical support.

In this tournament, the greatest overall injury incidence occurred in the shoulder, lower back and knee. This is in keeping

with previous data from women's cricket, which reported shoulder and lower back as two of the most common regions injured.<sup>13</sup> The highest injury incidence occurred in throwing (2.4 injuries per 100 match days). Throwing arm pain is also a common problem in men's cricket and whilst it rarely results in missed matches, can have a considerable impact on player performance.<sup>23,24</sup> The cause of throwing related arm pain in cricket is likely to be multifactorial and may include workload,<sup>25</sup> technical factors, and physical qualities. All teams involved in the study consisted of a number of international players, as well as less elite players who may only compete in the summer months. As a result, there was high variation in the levels of physical preparedness. International players will typically throw regularly throughout the year as they compete overseas and have winter training camps. Conversely, for non-international players, a T20 tournament with a busy training and match schedule is likely to represent a significant spike in throwing workload, possibly contributing to the high number of throwing related injuries.

Gradual onset injuries had by far the highest overall incidence (8 injuries per 100 match days), which is in keeping with previous research.<sup>12</sup> These injuries are potentially preventable through ensuring appropriate physical preparedness and effective monitoring and workload management. In this tournament players join up with squads very close to the start of competition with varying levels of physical preparedness and differing chronic workloads. Having a better domestic structure outside of the international pathway is imperative to improve physical preparation of female cricketers, which is likely to be important in the management and prevention of gradual onset injuries.

Previous injury surveillance from both men's and women's cricket, reported high rates of thigh injuries, particularly quadriceps and hamstring injuries.<sup>13,12,15</sup> Whilst the thigh was the body region associated with the third biggest time-loss this was due to a single long term rectus femoris tear. Further data is needed to establish if thigh injuries are problematic in T20 women's cricket.

Unsurprisingly fielding related injuries caused 73% of all match days lost, largely due to the previously mentioned concussions and finger injuries. In terms of mode of onset, it follows that impact/traumatic injuries caused the most lost match days. These results are relevant when considering medical pitch side provision for matches. Having appropriate paramedic cover and ensuring physiotherapists have sufficient quality training in trauma management is essential given the likelihood of impact/traumatic injuries, predominantly in the fielding innings.

During this tournament, numerous medical staff recorded data which could have led to some inconsistencies in injury reporting. Despite this, every effort was made to minimise this by providing a clear information sheet and delivering face to face workshops, followed up by individual visits. A limitation of this study was that the proforma used for data recording, did not clearly identify whether injuries occurred specifically in the T20 tournament games, it only recorded injury status on each match day. This should be incorporated into the surveillance system moving forwards. Another limitation was that study only included data from the UK and it would be interesting to see how this compares to other countries. In addition, future research should aim to include training days as well as match days, as this would also help to give a more detailed picture of when injuries are most likely to occur. A relatively large proportion of injuries were deemed to be 'other/nil specific' during this study. This may be due to the cause of the injury being unclear. Alternatively, tighter injury classifications or further education regarding how to record data may be required.

This was a relatively short tournament with only six teams, and although this study includes two years of data, more data is required in order to confirm these preliminary findings. As the wider game continues to grow and professionalise and medical

staff are included in the women's game, it is important that robust injury surveillance systems are introduced concurrently. Ideally this should be universal with consistent methodologies to increase the pool of data and therefore intelligence. Future studies should also ensure detailed exposure and activity specific workload can be calculated, to allow comparison with other data and gain greater insight into injury risk factors.

## 5. Conclusion

In elite female T20 cricket concussion and finger injuries cause the most lost match days. Throwing related shoulder pain is a significant issue in the women's game and greater physical preparation and workload management is needed. In T20 tournament cricket, time-loss injuries are most likely to occur whilst fielding, suggesting that appropriate pitch side support and high-quality trauma training for physiotherapists is a priority. Across the tournament, gradual onset injuries have the highest overall incidence, therefore managing workload and ensuring appropriate physical preparedness, should form an important part of injury prevention within the wider women's game.

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