Kidsafe WA Childhood Injury Research Report: Sporting Injuries

Partner:

Government of Western Australia
Department of Health
### SPORTING INJURIES AT A GLANCE

Children were seen in the Princess Margaret Hospital Emergency Department (PMH ED) for a sport-related injury from July 2007 to June 2017.

#### Injuries by Sporting Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football (Australian Rules)</td>
<td>12.6%</td>
</tr>
<tr>
<td>Cycling</td>
<td>12.3%</td>
</tr>
<tr>
<td>Trampoline</td>
<td>11.6%</td>
</tr>
<tr>
<td>Soccer</td>
<td>9.0%</td>
</tr>
<tr>
<td>Scootering</td>
<td>6.9%</td>
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</table>

#### Children per year are seen in the PMH ED for a sporting injury

- **3,954**
  - **Males**: 66%
  - **Females**: 34%

Sport injuries account for **22.4%** of all injury presentations to PMH ED.

4.8% of children were using a form of safety equipment at the time of injury.

28% of injuries involved wheeled equipment.

56.5% of injuries were the result of falls or blunt force.
INTRODUCTION

Kidsafe WA

Kidsafe WA is the leading independent not-for-profit organisation dedicated to promoting safety and preventing childhood injuries and accidents in Western Australia. Injuries are the leading cause of death in Australian children aged one to fourteen, accounting for nearly half of all deaths in this age group. More children die of injury than die of cancer, asthma and infectious diseases combined. Many of these deaths and injuries can be prevented. Kidsafe WA works in the community to educate and inform parents and children on staying safe at home, at play and on the road.

Injury Surveillance Paediatric Hospital Data

Princess Margaret Hospital for Children (PMH) is the only paediatric hospital in Western Australia and is the reference centre for paediatric illness and injury for the state. Every year approximately 60,000 children present to the PMH Emergency Department (ED). The PMH Injury Surveillance System is designed to capture data related to all children presenting with an injury. This research report provides a summary of the Injury Surveillance System data collected at PMH between July 2007 and June 2017 relating to childhood sporting injuries.

Sporting Injuries

While participation in sports as a child offers benefits such as the development of self-esteem, peer socialisation and general fitness, all physical activity is associated with the risk of injury. Studies estimate that approximately one million Australians injure themselves while playing sports each year. Injury is often thought of as a barrier to participation in sport and recreational activities, and an estimated 50 percent of sporting injuries are considered to be preventable.

Sporting injuries potentially prevent children from engaging in sports and therefore reaping the health benefits associated with physical activity. Sporting injuries in adolescents have a significant impact on participation with an estimated 8 percent of Australian adolescents dropping out of recreational sport due to injury each year. Recent figures indicate 59 percent of Western Australian children aged 0-14 participate in organised sport outside of school hours at least once per week. The most popular sport in WA is swimming, followed by soccer, Australian Rules Football and basketball.

Australian Rules Football, rugby league, rugby union, soccer, basketball, cricket, netball, skateboarding, scootering, inline skating, swimming and equestrian activities all carry substantial risk of injury. Common injury risks for children participating in sport include concussions, overuse injuries, dehydration and playing injured.

Concussion

Concussion is a form of mild traumatic brain injury affecting the brain’s ability to acquire and process information. In sport it is commonly caused by collisions and falls that result in an impulsive force being transmitted to the brain. Children are especially susceptible to concussions and often present with varied symptoms due to physiological differences in their brains. Symptoms can include dazed appearance, headache, nausea, vomiting, unsteady feet, dizziness, altered consciousness, confusion, memory loss and sensitivity to bright lights and loud noises. Following a concussion worse outcomes are seen in younger groups with an added risk of further injury if play is not stopped immediately. Second impact syndrome can occur when a brain that has not healed from a previous concussion experiences additional trauma. Most reported cases of second impact syndrome that have led to death or disability have occurred in younger athletes. It is recommended that
children rest following a concussion and avoid physical activity, computers, television, reading or anything that may exacerbate symptoms. Following a head injury, some studies recommend a longer recovery time in children compared to adults. The Australian Medical Association's position statement on concussions in sport states that children under 18 years should be symptom free for a minimum of 48 hours and successfully return to school activities prior to returning to light sporting activities.

**Overuse Injuries**

Sporting injuries can affect bone and soft tissue with previous injury history a major risk factor for future injury. A child’s skeleton is still developing and injuries may result in permanent effects that gradually worsen over time. It is recommended that child and adolescent athletes avoid overtraining and limit themselves to participating in one sport for a maximum of five days per week, ensuring at least one day off from any organised physical activity. It is also suggested that junior athletes abstain from their particular sport for at least two to three months each year, take a break and do not play year round to reduce injury risks. There is increasing pressure on children to begin high intensity training or specialising in one sport in an effort to secure state, national and Olympic recognition. A focus on early intensive training rather than skill development can lead to injury with particular concern being placed in early sport specialisation as this may increase the rate of injury. Common injuries associated with sport specialisation in children may include fractures and muscle soreness caused by excessive or repetitive use.

**Hydration**

Replacement of fluids is an important part of participating in any sport or recreational activities. Staying well hydrated reduces the risks of sustaining a heat related injury and can increase performance levels. Children at young ages are more susceptible to heat stress due to lower sweat and evaporative cooling rates, with their bodies having more difficulty getting rid of heat compared to adults. Water is the best hydration choice for children participating in sports.

**Playing Injured**

The correct management of injured athletes is essential in reducing the severity of an injury, recovery time needed and most importantly prevention of further damage. Initial treatment carried out by a qualified first aid officer can reduce aggravation of the injury and recovery time. If an athlete returns to sport prematurely, they put themselves at risk of further injury. Return to play guidelines are vital tools in sports medicine, however they vary greatly between injury and sport type. Prior to returning to play, a child should be pain free, be able to move the injured area easily through a full range of movement and have regained strength in that area.
EMERGENCY DEPARTMENT SPORTING INJURY PRESENTATIONS

Over the ten year period from July 2007 to June 2017, 39,541 children presented to the PMH ED for sport related injuries (Figure 1). This accounts for almost a quarter (22.4%) of all injury presentations to the PMH ED. The proportion of sporting injuries in relation to total injuries increased from 20.5 percent during 2007/08 to 23.4 percent during 2016/17. The decrease seen in the number of sporting injury presentations to PMH ED from 2014/15 onwards may be influenced by the opening of paediatric departments at Fiona Stanley and St John of God Midland in 2015.

Age and Gender
Children aged 10 to 14 years are at a greater risk of sustaining an injury during sport, accounting for over half (57.6%, n=22,789) of all sporting injury presentations (Figure 2). Children under 5 are less likely to participate in formal sporting activities as they are still developing fine and gross motor skills. Lower rates are also seen in children 15 years and older due to a tendency for increased use of non-paediatric facilities in this age group. Males accounted for 66.0 percent (n=26,058) and females 34.0 percent (n=13,483) of sporting injury presentations.

Figure 1: Sporting Injury by Financial Year

Figure 2: Sporting Injury by Age Group
**Area of Residence**

The majority (92.8%, n=36,678) of children resided in the Perth Metropolitan region, with a small amount residing in regional areas (6.2%, n=2,450) or other (1.0%, n=413) (Figure 3). Within the Perth Metropolitan area, the highest number of injuries were seen in the North Metropolitan area (n=17,186), followed by the South (n=11,069) and East Metropolitan areas (n=8,423). Regionally, the most common areas of residence were the Wheatbelt (n=877) and Southwest (n=594). The large variation in regional numbers are impacted by distance to the PMH ED, with children from regional areas more likely to attend local facilities, unless the injury is of high severity and cannot be treated locally.

*Figure 3: Sporting Injury by Area of Residence*
INJURY DATA

Sporting Activity
Australian Rules Football accounted for the most sport-related injuries at PMH ED at 12.6 percent (n=4,993). Cycling accounted for 12.3 percent (n=4,870) and trampolining 11.6 percent (n=4,585) (Figure 4). Other sporting activities resulting in a high number of injuries include soccer (9.0%, n=3,534), scootering (6.8%, n=2,680), basketball (6.5%, n=2,573) and skate boarding (5.8%, n=2,281). These injury numbers do not take into account the participation rates of children who take part in each sport on a regular basis, however this data does offer a snapshot of injury risks.

Figure 4: Sporting Injury by Activity

Cause
The most common cause of sporting injuries were blunt force and falls, accounting for 28.3 percent (n=11,204) and 28.1 percent (n=11,124) respectively (Figure 5). Blunt force refers to collision based injuries. Other sporting injury causes include pedestrian related injury (14.4%, n=5,711), other cause (13.1%, n=5,190), bicycle related injury (12.1%, n=4,772) and other transport injuries (3.0%, n=1,193). Other cause refers to an unspecified injury cause or one that does not fit into an existing category. Physical overexertion was placed into the other cause category, however it is important to highlight that it accounted for a significant amount (6.3%, n=2,505) of sporting injuries.

Figure 5: Sporting Injury by Cause
Injury Factor
Over half (55.3%, n=21,869) of all sporting injuries were associated with an injury factor (Figure 6), with the most common injury factor being wheeled equipment (28.0%, n=11,075). Other common injury factors include trampoline (11.5%, n=4,539) and sports or recreational equipment (10.8%, n=4,288). The remainder of sporting injuries (44.7%, n=17,672) were recorded as not having an applicable injury factor.

![Figure 6: Sporting Injury by Injury Factor](image)

Safety Equipment
Of the 39,541 children injured as a result of a sporting activity, 1,400 (3.5%) were not wearing any safety equipment, 3,217 (8.1%) were recorded as not applicable and 33,049 (83.6%) were unknown. A small number (4.8%, n=1,878) were wearing a form of safety equipment at the time of injury. Safety equipment includes helmets, sport related guards, protective clothing, protective eyewear, seatbelts, pool fencing and lifejackets.

Location
The most common location for a sporting injury to occur is ‘other place’ (52.1%, n=20,590) referring to an unspecified location or one that does not fit within another category. Following this is the home (11.6%), school or residential institution (10.9%), and sports area (10.2%) locations (Figure 7).

![Figure 7: Sporting Injury by Location](image)
ASSESSMENT AND TREATMENT DATA

Time of Injury
The most common time for a sporting injury to occur was between the hours of 12:00 to 17:59 (37.3%, n=14,736) (Figure 8). This was followed by 6:00 to 11:59 (15.3%, n=6,044), 18:00 to 23:59 (10.9%, n=4,305) and 0:00 to 5:59 (0.1%, n=37). Approximately one third of injuries (36.5%, n=14,419) had an unknown time of occurrence.

Day of Injury
Saturday and Sunday have the highest occurrence of sporting injuries, accounting for 39.9 percent (n=15,783) of presentations (Figure 9). Monday and Tuesday showed the lowest number of sporting injury occurrences accounting for 11.0 percent (n=4,330) and 11.0 percent (n=4,391) respectively.
Triage Category

Every child that presents to the PMH ED is allocated a triage category based on the urgency of medical attention required (Table 1). The majority of sporting injury presentations were triaged as Semi-Urgent (76.5%, n=30,257) and Urgent (20.3%, n=8,034). A small percentage were triaged as Emergency (2.6%, n=1,027), Resuscitation (0.4%, n=148) or Non-Urgent (0.2%, n=73).

<table>
<thead>
<tr>
<th>Category</th>
<th>Seen within (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Resuscitation</td>
<td>0</td>
</tr>
<tr>
<td>(2) Emergency</td>
<td>10</td>
</tr>
<tr>
<td>(3) Urgent</td>
<td>30</td>
</tr>
<tr>
<td>(4) Semi-Urgent</td>
<td>60</td>
</tr>
<tr>
<td>(5) Non-Urgent</td>
<td>120</td>
</tr>
</tbody>
</table>

Referral Source

Most children who presented to PMH ED for a sporting injury did so based on a referral from themselves or a relative (86.2%, n=34,065). The majority of remaining presentations were referred by either a General Practitioner (6.7%, n=2,639) or another hospital (5.0%, n=1,978).

Outcome of Attendance

The majority of children who presented to PMH ED with a sporting injury departed with their treatment complete (84.3%, n=33,319) (Figure 10). A further 12.0 percent (n=4,758) were admitted to a ward or inpatient unit, while 2.5 percent (n=993) were admitted to short stay. A small quantity did not wait to be seen (0.7%, n=268) and the remainder were classified as other (0.5%, n=203).

Figure 10: Outcome of Attendance
DISCUSSION

Sport related injuries are responsible for approximately one quarter of all injury presentations to the PMH ED (22.4%). Between July 2007 to June 2017, 39,541 children presented to the PMH ED for sport related injuries. The total number of sporting injuries has steadily increased up until 2014/15. The decrease in presentations for sporting injuries seen after this may be due to the opening of paediatric departments at Fiona Stanley and St John of God Midland in 2015. Many children with sporting injuries may also present to non-paediatric facilities, their local General Practitioner or not at all. Therefore, PMH ED data provides only a snapshot of sporting injuries in WA children.

Children aged 10 to 14 years are at a greater risk of sustaining a sport related injury, accounting for over half (57.6%) of all sport related injuries to the PMH ED. This may be due to a decrease in rule modifications and higher participation rates in teenagers. Males are also at a higher risk for sport related injuries than females, accounting for 66 percent of sporting injury presentation to PMH ED, compared to 34 percent in females. Australian Rules Football, cycling, trampolining and soccer accounted for the highest rates of sporting injuries. It should be noted that this data does not take into account the number of children who participate in each sport regularly.

Almost a third (28.0%) of sporting injuries involved a form of wheeled equipment, while over half (56.5%) were the result of falls or blunt force (collision based) injury. Physical overexertion also accounted for a significant portion (6.3%) of sporting injuries. A small portion of children were wearing a form of safety equipment at the time of injury however the majority were recorded as not wearing any safety equipment, unknown or not applicable. Appropriately worn protective equipment is essential for reducing the risk of sports injury. Protective equipment (i.e. helmets, pads and mouth guards) should be worn at all times, be specific to the sport, properly fitted and regularly maintained.

As expected, the majority of children presenting to the PMH ED resided in the Perth Metropolitan area. Children from regional areas tend to present to local facilities due to distance and may only present to the PMH ED when the injury sustained cannot be treated locally or if the injury occurred when visiting Perth. Children were more likely to receive a sport related injury on the weekend, with Sunday accounting for the highest number of presentations. This coincides with competition and game days, as well as when children are not attending school.

The majority of children who presented to PMH ED with a sports related injury did so based on their own concerns or the concerns of a relative. Coaches, young athletes, parents and caregivers should be well educated in injury prevention, recognition and first aid. The correct management of childhood sporting injuries is essential in reducing injury severity, recovery time and further damage.

Prevention Strategies

Preventive measures can include adequate supervision, warm ups and suitable use of protective equipment. Training and competition areas and equipment must be suitable for the player’s size and physical ability. Protective equipment such as helmets, pads and
mouth guards should be worn at all times during training and play, be specific to the sport, properly fitted and regularly maintained.\(^{23}\)

The younger and less experienced the child, the less intense the training and competition should be, as well as a need for increased rest between sessions.\(^{23}\) Children and young people should be entered into a balanced competition based on a variety of factors such as age, gender, size, experience and maturity in order to minimise the risk of injury.\(^4\)

To minimise the risk of sporting injuries, the following preventative measures can be followed:

- Ensure children wear appropriate protective equipment for the sport they are participating in.
- Children need to stay well hydrated during physical activity.
- Make sure there is adequate shade and sunscreen available and encourage the use of appropriate clothing and hats.
- Children should always warm up before exercise and cool down after.
- Young children should participate in modified sports appropriate to their development.
- Children should participate in training sessions to learn and develop new skills before participating in competitive games.
- Children should not play sport if tired, ill or injured. Ensure that appropriate recovery time is allocated. If in doubt – DO NOT PLAY.
- Sporting grounds and facilities should be regularly checked and damaged surfaces, fencing, lights, posts, padding and rubbish should all be reported.
- Ensure the coach or manager is aware of any existing medical conditions that may affect the child during sporting activities.
- A trained and equipped first aid officer should be present during training and competitions.
- Schools should outline suitable rules and guidelines for children playing sport during recess and lunch.
- If an injury does occur, immediate medical attention should be sought.

There is a need for increased education and advocacy on childhood sporting injury prevention. Particular focus should be placed on the development of clear injury prevention guidelines, injury management procedures and return to play procedures that are specific to children and the sport they participate in.

REFERENCES


