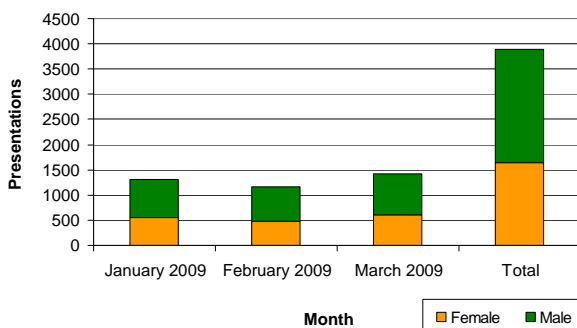


Sporting Injuries to Children

Childhood Injury Presentations: January to March 2009

- There were 12,564 presentations to the Princess Margaret Hospital Emergency Department (PMH ED) between January and March 2009.
- Injury presentations accounted for 30.99% (n=3,893) of the total number of presentations to PMH ED during this time period.
- This is considerably higher than the long term average of 25%.
- These figures represent a 23.48% increase in injury presentations and a 6.12% increase in injuries as a percentage of total presentations compared to the same quarter in 2008.

Number of Injury Presentations by gender, January to March 2009.



- Falls were the leading cause of injury (n=1,388; 35.65%). A further 736 were caused by blunt force
- A total of 2.18% of injury presentations were classified as intentional (alleged assault or intentional self harm) with the remainder being unintentional (96.02%) or undetermined (1.80%).
- Of the presentations, 19.23% (n=749) occurred during sporting activities. 134 of these were cycling related (17.89%) and a further 87 (11.16%) were skate-board related
- Aboriginal children represented 4.98% of children attending the PMH ED during these three months.
- 20.22% of injury presentations resulted in admission for further treatment.

Introduction – Sporting Injuries to Children

- Between July 2005 and June 2008, there were a total of 35,281 injury presentations to Princess Margaret Hospital Emergency Department (PMH ED).
- Of these presentations, 5,811 were sports related (16.47%)
- The highest number of injuries were caused by small wheeled devices (n=1,677). Of these, skateboards accounted for 1,292, scooters 225 and rollerblades/skates 160
- Cycling injuries comprised 17.81% of presentations (n=1,035), while trampolines were involved in 526 of injuries (9.05%)
- There were 163 injury presentations from athletic sports
- Of the team sports, Australian Rules Football (AFL) was associated with 860 presentations, soccer with 507, netball 330, basketball 325, rugby 320 and hockey 114
- Boys accounted for 70.69% of presentations, which is considerably more than the 60% seen in PMH ED for total causes of injury
- Children aged 10-14 years were most likely to sustain a sporting injury (n=3,509, 60.38%). Only 6.4% of children were aged 0-4 years; this group is usually most at risk for total causes of injury
- 42.75% of injuries occurred over the weekend, with 1,913 (32.92%) occurring in the autumn months. 19.29% of presentations were subsequently admitted.
- Helmets were worn in 463 cases, sport related guards 20, mouthguards 21, protective clothing 7 and other specified 37. For 90.40% of presentations, either no safety equipment was used, usage was not applicable or was unknown



Results

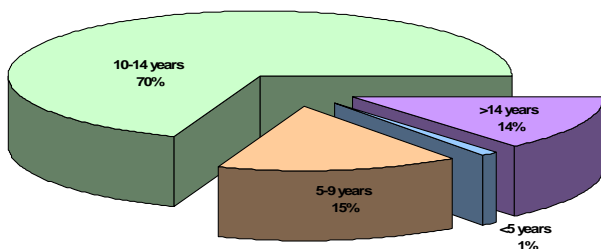
This edition of the WA Childhood Injury Surveillance Bulletin features sports-related injuries to children. It looks at all children presenting to Princess Margaret Hospital (PMH) Emergency Department (ED) between the three year period; July 2005 to June 2008.

Six sports were chosen for analysis; soccer, Australian Rules football (AFL), netball, basketball, cricket and hockey. These sports were chosen as they are popular team sports for Western Australian children. Most also have modified versions designed specifically for children.

During the study period, 2,918 children presented to PMH ED with an injury that was recorded as being related to these sports. This represents 8.27% of all presentations during this time.

The age distribution of sport-related injuries showed that children aged 10 to 14 years are most at risk (n=2,025, 69.37%). This was followed by children aged 5-9 years (15.49%). Children over 14 years of age accounted for 13.94% of presentations. This age group start to attend adult care hospitals, so the number of presentations for this age group may not accurately reflect sport injuries for the age group. The youngest age group, 0-4 years were least likely to present with sport-related injuries (1.2%). Children of this age are least likely to participate in sporting activities as they are still developing gross and fine motor skills as well as cognitive skills.

Figure 1: Number of Sports-Related Injury Presentations to PMH ED by Age Group: July 2005 to June 2008



The number of injury presentations by boys (91.09%) greatly outnumbered those by girls (8.91%). The exception to this was netball, where 97.86% of presentations were by girls.

Of the presentations, 11 were recorded as being of Aboriginal descent (3.3%). This is lower than the proportion of total injury presentations that are recorded as Aboriginal descent (5.0%).

The majority of injuries occurred over the summer months (87.05%). This is due to the seasonal nature of competitive sports and the fact that all of the sports except cricket are played competitively during the winter months.

Cricket is a summer sport and the injury presentations reflected this, with 43.66% of cricket-related injuries happening between December and February.

Injuries peaked over the weekend, with 19.91% of presentations occurring on Saturdays and 21.17% on Sundays. This was followed by a low on Monday of just 9.38% of injury presentations. Children's competitive sports are most frequently played over the weekend as it does not interfere with school or result in late nights. Sports are also played recreationally on the weekend as children have more free time.

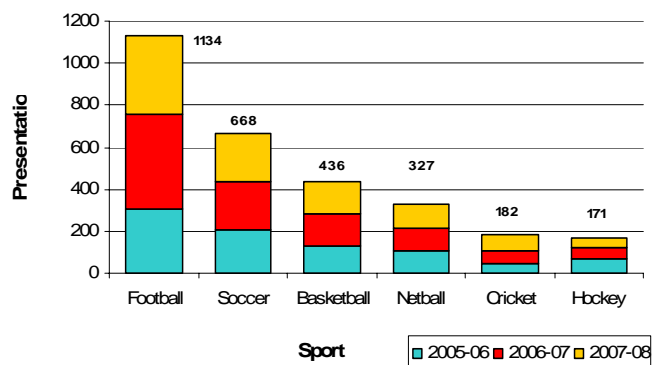
Blunt force trauma was the most common cause of sporting injury (51.95%), which included being hit by balls, sticks and bats, as well as colliding with other players and goals. Falls were the next most common cause of injury (39.14%), most of which were from the same level as the child (ie. ground level). Physical over exhaustion accounted for 138 presentations.

During the study period, 11.41% of sport-related injury presentations were subsequently admitted (n=333), while a further 18 were transferred to other hospitals. 86.39% departed after treatment received in the ED.

Only 1.85% of children who presented with injuries from the featured sports were using safety equipment at the time of injury (n=54). This consisted of 19 using mouthguards, 14 sport related guards, 7 protective clothing, 1 helmet and 13 specified other. This is a concern as safety equipment may have prevented a number of the injuries.

The most common sport associated with injury was Australian Rules football (38.86%). This was followed by soccer (22.89%), then basketball (14.94%), netball (11.21%), cricket (6.24%) and lastly hockey (5.86%). These figures reflect the popularity and participation levels in each of the sports by children in Western Australia, as well as the inherent danger of the sports. Each of these sports is examined further in the coming section.

Figure 2: Number of Sports-Related Injury Presentations to PMH ED: July 2005 to June 2008



Australian Rules Football

Australian Rules Football (AFL) is a uniquely Australian sport that is somewhat of a national icon. When measured by average domestic sport attendance, it is the most popular sport in Australia¹. Children usually learn how to play in primary school and many continue to play in the Junior leagues.

In the three year study period, there were 1,134 children who presented to the Princess Margaret Hospital Emergency Department with an injury sustained while playing Australian Rules football. This equates to approximately 378 injury presentations per year.

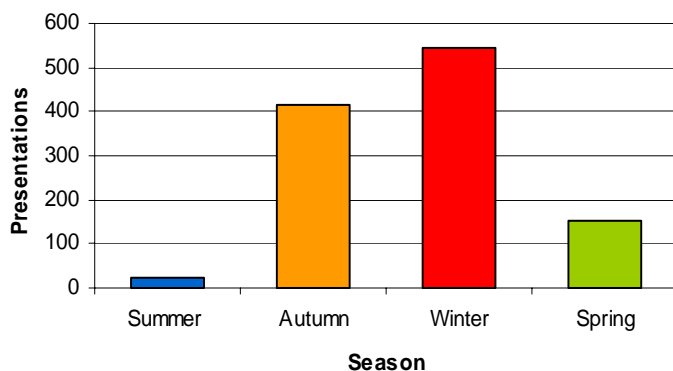
Children aged 10-14 years were most likely to present with an AFL related injury. This is consistent with the age distribution for combined sports injury presentations. 794 children (70%) of children were aged 10-14years, 178 (15.7%) were 5-9 years, 156 (13.76%) were over 14 years and 8 (0.7%) were under 5 years.

Boys greatly outnumbered girls, accounting for 92.86% of presentations (n=1,053). Australian Rules football is a male dominated sport, with no female teams or players participating at the elite level. Although there are female teams and players in the Amateur and Junior levels, they are not common.

Of the 1,134 presentations, 46 (4.61%) were recorded as being Aboriginal. This is similar to the proportion of injury presentations for total causes of injury that are of Aboriginal ethnicity (5%).

The majority of presentations occurred during the winter months (n=543, 47.88%). This reflects the seasonal nature of AFL, with Junior competitions traditionally starting in late April and running through until the end of October. There were still 233 (20.54%) injury presentations outside of this period however, which indicates that the sport is popular year round and not only in a competitive nature.

Figure 3: Australian Rules Football-Related Injury Presentations by Season: July 05 to June 08



Nearly half of all injuries occurred on the weekend (46.82%). This reflects the fact that competitive AFL usually takes place on the weekend, and also that children are often more active over the weekend. There were still however, over 120 presentations that occurred on weekdays.

Most AFL injuries were sustained in Sporting Areas (n=703, 61.99%) or at School (n=320, 28.22%). Only 68 (5.34%) occurred at home, which is generally the most common location for total causes of child injury.

Blunt force were the most common cause of injury on the football field (n=648, 57.14%), consisting of bodily contact with other players, colliding with goal posts or fencing, and being hit by the football. A further 419 (36.95%) of injuries were due to falls. The majority of these were coded as being falls from the same level (n=340). However, 74 were coded as being from <1m and 5 from >1m, suggesting that the fall was sustained after jumping to mark the ball.

There was only one injury identified as an alleged assault and a further three as of undetermined intent. The majority (99.65%) were unintentional injuries sustained due to the normal risks of the sport.



Over the three year study period, there were 162 AFL presentations admitted to PMH, on average 54 children per year who sustained a serious enough injury whilst playing Australian Rules football to warrant admission to hospital. These included abdominal and internal injuries, head, neck and spinal injuries, eye and facial injuries and loss of consciousness.

Only 13 of the children presenting to PMH ED with AFL related injuries were wearing mouthguards. Another 2 were using some form of sport related guard. This leaves 1,119 children who were not using any safety equipment, or it was unknown (98.68%).

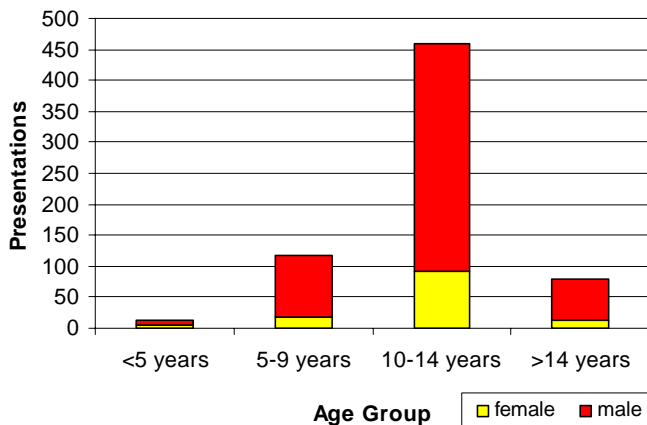
Soccer

Soccer is the world's most popular sport, with male and female teams competing at amateur, league and national levels. Junior teams in Australia start children as young as three years old. It is a sport enjoyed by children of a range of backgrounds, ages and abilities and is played socially as well as competitively.

There were 668 presentations to the PMH by children with soccer-related injuries. This equates to approximately 223 presentations per year.

The majority of children who presented were aged 10-14 years (68.56%), as was the norm for total sporting related injuries. A further 17.66% of children were aged 5-9 years and 11.68% over 14 years. Only 2.1% of presentations were made by children aged under 5 years old.

Figure 4: Soccer-Related Injury Presentations by Age Group: July 05 to June 08



Nearly one fifth of presentations were by girls (19.46%). This is nearly three times the proportion of girls in other "football" sports such as AFL.

Children identified as being of Aboriginal descent accounted for only 1.86% of presentations. A further 1.6% were recorded as having unknown ethnicity, leaving 96.55% children being of "other" ethnicity.

As soccer is played competitively as a winter sport in Australia, it is understandable that the majority of injuries were sustained during the winter months (40.72%). There was a peak in July of 127 presentations and a lull in January of 10 injuries.

Sunday was the most common day for injury, with 156 presentations. A high proportion of injuries also occurred on Thursdays with 113 presentations and 107 on Fridays. Saturday had the least number of presentations, with just 51 cases.

Sports Areas were the most common location for soccer-related injuries to occur (53.14%), followed by School and Educational Facilities (34.43%). The home was the next most common location, with 44 injuries (6.59%). Other places where injuries occurred included Public Recreation Areas and Open Nature Areas.

Nearly half (48.20%) of all injuries were due to blunt force, while a further 41.92% were the result of falls. 227 of falls were from ground level, 48 were from <1m and 5 were from >1m. There were 28 cases of physical over-exhaustion.



99.7% of injuries were classified as being of unintentional intent. There was 1 classified as being an alleged assault during a soccer game and 1 that was of undetermined intent.

There were 76 children admitted to PMH in the three year period due to a soccer related injury. An additional 4 were transferred to another hospital. The majority, 574 (85.94%), were treated and discharged from the Emergency Department.

The use of safety equipment by children presenting to the PMH ED with soccer-related injuries was low, with 1 reportedly wearing a mouthguard at time of injury, 2 wearing protective clothing and 14 wearing some other form of protective guards. This means that 97.46% were either not using any items of safety equipment or usage was unknown.

Basketball

Basketball is a popular sport for both boys and girls and is played socially and competitively.

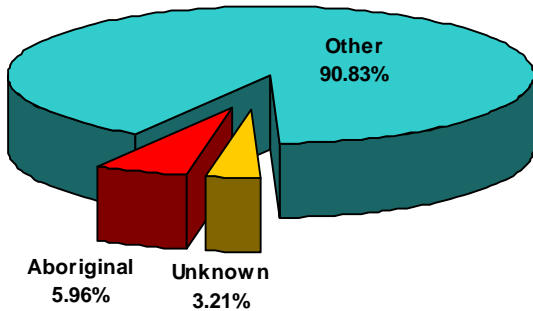
In the three year study period there were 436 presentations to PMH ED by children with basketball-related injuries. This means that approximately 145 children presented to the ED each year, or one every two and a half days.

There were 2 presentations by children under five years of age and 48 by children aged 5-9 years. Children aged 14 years were the most likely to sustain a basketball-related injury (n=84), with the age group 10-14 years accounting for 72.25% of all presentations (n=316). There was a decrease in presentations for children over 14 years of age (n=70), however this may be due to the tendency of older children to begin attending non-paediatric hospitals.

The male: female gender ratio for basketball-related injuries was approximately 3:2. This is the same as the ratio for total cases of child injury and is considerably closer than that for combined causes of sporting injury (7:3). This reflects the fact that basketball is a sport played by both males and females.

Children of Aboriginal ethnicity accounted for 5.96% of basketball-related injury presentations. This proportion is approximately one sixth greater than the proportion for total causes of child injury (5%) and considerably greater than the proportion for combined causes of sporting injury (3.36%).

Figure 5: Basketball-Related Injury Presentations by ethnicity: July 05 to June 08



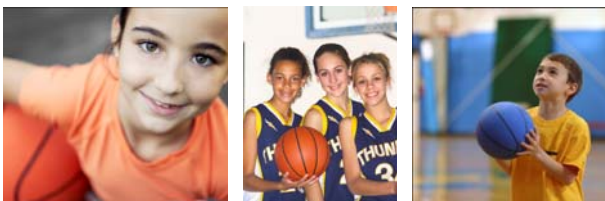
Injuries peaked in autumn with 30.28% of presentations. March was the month with the greatest number of presentations (n=57). The fewest number of presentations occurred in January (n=9).

Children most frequently injured themselves playing basketball on Saturdays, which accounted for 101 of presentations. For all other days, including Sunday, there were approximately 55 presentations.

Sporting Areas were the most common location for basketball-related injuries (56.19%), followed by School and Education Facilities (30.50%). There were also 38 injuries that occurred at home, 16 in Public Recreation Areas, 2 in Commercial Areas and 3 in Other Places

Falls were the most common cause of injury while playing basketball. There were a total of 199 fall related injuries (45.64%), 165 of these from ground level, 29 from less than one metre and 5 from greater than one metre. A further 41.97% of injuries were from blunt force, and 8.72% from physical over-exertion.

Of the 436 presentations, 433 were deemed as being of undetermined intent.



The majority of children were treated in the Emergency Department and sent home (88.76%). However, 7.57% of children were admitted to hospital and 1.15% were transferred to other hospitals.

Only 1 child was recorded as using some form of sport related guard at the time of their injury. Safety equipment was deemed not applicable in 291 cases, no safety equipment was used in 6 cases and the use of safety equipment was unknown in 138 cases.

Netball

Netball is a sport that derived from women's basketball and although is predominantly played by females, also has male and mixed competitions.

Between July 2005 and June 2008 there were 327 injury presentations recorded as being netball-related. This equates to approximately 109 presentations per year.

Over three quarters (77.37%) of children who presented to the PMH ED with a netball-related injury were aged 10-14 years. There were also 12.84% presentations by children over 14 years and 9.48% by children 5-9 years. There was only 1 presentation by a child less than 5 years.

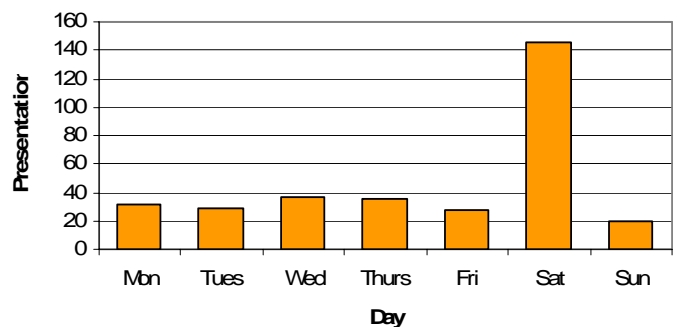
In contrast to the other sports featured in this report and to combined causes of sport-related injury, presentations by girls outnumbered those by boys. There were only 7 presentations by boys during the three year study period (2.14%), 5 of whom were aged 10-14 years old.

There were 11 children of Aboriginal ethnicity who presented with netball-related injuries. All were female and all were from the Perth metropolitan area.

With most competitions running between April and August, winter was the most common season for injuries (n=144). The least injuries occurred during the summer months (n=12).

Netball-related injuries most commonly occurred on a Saturday (44.65%) and least commonly on a Sunday (6.12%). Presentations during the week ranged from 27 to 37.

Figure 6: Netball-Related Injury Presentations by Day of the Week: July 05 to June 08



Sports Areas were again the most common location for injuries to occur (80.12%). A further 15.9% occurred in Schools and 2.45% in the home.

Causes of injury were predominantly falls (61.45%), with 182 from ground level and 19 from a height of less than one metre. Blunt force injuries totalled 75 and there were 37 cases of physical over-exertion.

There were no intentional injuries recorded, leaving 2 as of undetermined intent and 325 as unintentional.



Twenty two children were admitted after presenting to the PMH ED. Their injuries included 19 fractures to the upper limb, 1 fracture to the lower limb, 1 sprained neck and 1 head injury following a fall which resulted in loss of consciousness.

There were only 2 children who were reportedly using some form of safety equipment at the time of injury. Safety equipment was deemed not applicable in 208 cases, was not used in 2 cases and was unknown in 115.

Cricket

Cricket is a sport that is played professionally in most Commonwealth countries since the 17th Century. It is a game enjoyed by both males and females, with professional female competitions running in Australia since 1874¹.

Between July 2005 and June 2008 there were 203 presentations to PMH ED for cricket-related injuries; an average of over 67 presentations per year.

The majority (57.63%) of presentations were children aged 10-14 years. Approximately one quarter of presentations were children aged 5-9 years and 12.8% were over 14 years of age. Of all the sports featured in this report, cricket had the highest proportion of presentations by children under 5 years of age (4.44%).

Approximately one eighth of presentations were by girls (n=26). These ranged from 1 to 15 years old, with 6 aged eight years of age.

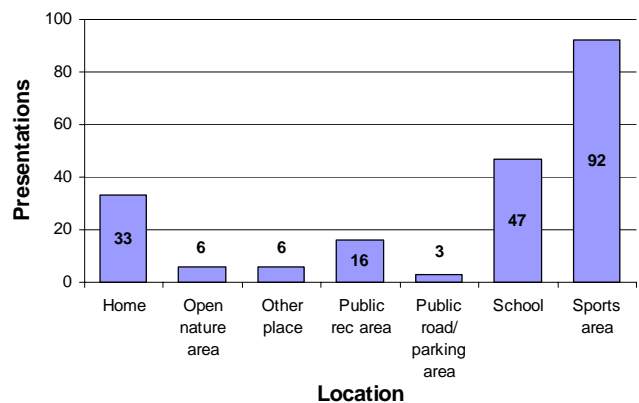
Children of Aboriginal ethnicity accounted for 1.48% of presentations (n=3). There were a further 2 presentations by children of unknown ethnicity, meaning that 97.54% of children were classified as being of "other" ethnicity.

Competitive cricket is a summer sport, which is reflected in the injury presentations to PMH ED. In contrast to the other sports featured in this report, the majority of injuries occurred in the summer months (42.36%). The month with the greatest number of injuries was February (n=40), while May and August had the least (n=3).

Saturdays were the most common day for cricket-related injuries to occur (n=42, 20.69%). Thursdays were the next most common day (n=36), while Monday had the least presentations (n=20).

Cricket-related injuries occurred in a variety of locations, reflecting the fact that it is a sport played both competitively and recreationally. Both "beach cricket", "backyard cricket" and "indoor cricket" are common variations on the sport which are enjoyed by children and adults alike. The highest number of injuries still occurred in Sporting Areas (45.32%), followed by School and Education Facilities (23.15%) and Home (16.26%). Open Nature Areas, Public Recreation Areas, Public Roadways and Other Areas also recorded presentations.

Figure 7: Cricket-Related Injury Presentations by Location: July 05 to June 08



Causes of injury were dominated by blunt force injuries (78.33%). These included 77 cases where the child was hit by the cricket ball and 63 cases by the cricket bat. The remaining 19 included collisions with other players, the cricket stumps and objects such as fences.

There were also 30 fall injuries that were due to children tripping, "diving" to catch the cricket ball and swinging off of cricket nets. Physical over exertion accounted for a further 3 cases and there was 1 burns case caused by sunburn.



Twenty three children were admitted to Princess Margaret Hospital after presenting to the Emergency Department. Their injuries included 9 facial injuries, 4 upper limb injuries, 3 lower limb injuries, 3 head injuries, 2 genital injuries, 1 abdominal injury and the 1 case of sunburn.

Of all children who presented with a cricket-related injury, only 2 were using some form of safety equipment at the time of their injury. One of these was wearing a helmet and the other protective clothing.

Hockey

Field Hockey is popular amongst both males and females, and can be played with either single-sex or mixed teams. Competitive matches in Australia began at the start of the 1900's with the Australian Women's Hockey Association².

There were approximately 50 hockey-related injury presentations each year to PMH ED during the study period (n=150).

One child aged less than five years of age presented to the ED with a hockey-related injury caused by contact to the head with a hockey stick. There were 25 children aged 5 to 9 years old and 35 aged over 14 years. The dominant age group was again 10-14 years with 59.33% of injuries (n=89).

The male: female gender ratio of 2:1 was closer than for combined sporting injuries and for total causes of child injury (3:2). This is indicative of the fact that Hockey is a sport played by both girls and by boys.

No children were recorded as being of Aboriginal ethnicity. 5 was recorded with an ethnicity of "other", while 145 were "unknown" or not recorded ethnicity.

Competitive hockey is another winter sport; the majority of injury presentations again occurring in the winter months (n=74). There were only 3 presentations over the summer months.

Saturday was the most common day for hockey related injury presentations to occur (n=60, 40%). The next most common day was Sunday (n=23, 15.33%), while the fewest injuries occurred on Mondays (n=5, 3.33%).

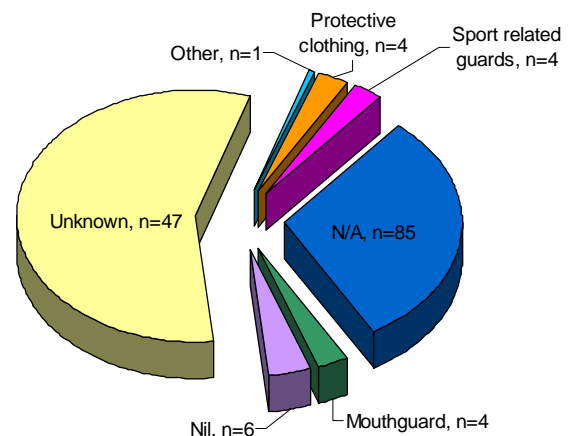
Three quarters of injuries occurred in Sports Areas (n=115). School and Education facilities were the location for a further 24 injuries and 5 injuries occurred at home.

The majority of hockey-related injuries were caused by blunt trauma (85.33%). These included being hit by the hockey ball (n=42), with a hockey stick (n=66), as well as colliding with other players and with the hockey-goals. An additional 17 children injured themselves falling during a hockey game. Two children were recorded as suffering physical over exertion and 7 with other causes of injury.



Of the 150 presentations, 130 were treated in the Emergency Department and released home. Upper limb fractures, dislocations and lacerations, lower limb fractures and head injuries resulted in 17 children being admitted to Princess Margaret Hospital and 2 were transferred to another hospital.

Figure 8: Hockey-Related Injury Presentations by Safety Equipment: July 05 to June 08



Of all the sports featured in this report, children were most likely to have been using safety equipment while playing hockey (8.66%). Mouthguards were worn by 4 children, 4 were wearing protective clothing at the time of their injury and 4 using a sport-related guard.

Discussion

Sport is part of the Australian lifestyle and plays an important part in children staying healthy and building social skills.

Parents need to be aware of common sports injuries and the top sports injury tips. There are countless benefits to getting young children involved in sports. Playing on a team can boost self-esteem, teach the value of teamwork, and teach kids how to be a gracious loser or winner. Being active in a sport can also help children become more physically fit, improve coordination, and teach them the importance of self-discipline.

However when children play sports, there is also some risk of sports-related injuries. Younger school-age children are particularly at risk for a sports injury. Children aged 5 - 14 years account for as much as 40 percent of all sports-related injuries. This likely to be because younger children tend to have slower reaction times and their coordination isn't fully developed yet³.

To reduce a child's risk of injury, there are a number of things you can do to keep kids safe so they can stay in the game.

Preventing Sports Injuries

Enrol your child in organised sports through schools, community clubs, and recreation areas where there may be adults who are certified trainers. Look for sports with modified rules & equipment specifically for children such as Auskick football & Minkey Hockey.

Make sure your child uses the proper protective equipment, such as helmets, mouth guards, protective pads or eye protection for the particular sport. This may reduce the risk or severity of being injured.



Warm up Before Exercise, This can help minimize the chance of muscle strain or other soft tissue injury during sports. Warm up exercises make the body's tissues warmer and more flexible.

- Wear sunscreen and a hat (where possible) to reduce the chance of sunburn (classed as a burn injury);
- Stay properly hydrated while playing; and
- Know the warning signs of a serious injury.

Specific Safety Tips

- **AFL Football:** wear a mouthguard (preferably one that is custom fitted) and always warm up before a game. Encourage children to start with Auskick programs
- **Soccer:** Check out the safety requirements for portable soccer goal posts & never use regulation soccer balls when teaching children to contact the ball with their head.
- **Basketball:** Never hang or swing on a basketball ring, and follow the recommendations for ensuring they are securely fastened. Encourage children to participate in "Aussie Hoops".
- **Cricket:** Whilst batting, wear helmet, body padding including gloves, leg pads, boxes and forearm guards. When wicket keeping or fielding in close, wear a cricket helmet with a faceguard and gloves where appropriate.
- **Netball:** Encourage children to participate in a Net Set GO! program (incorporating FunNet and Netta) to develop good skills and techniques.
- **Hockey:** Always wear a mouthguard and shin guards – goal keepers will require additional padding and face guards for added protection.

For more information or safety tips for each individual sport visit:

Kidsafe WA: www.kidsafewa.com.au

Sports Medicine Australia: www.smartplay.com.au

References

¹ Cricket Australia. 2010. History of Women's Cricket. Retrieved July 7th 2010 from <http://cricket.com.au/womens-history>

² Hockey Australian. History. Retrieved July 7th 2010 from <http://www.hockey.org.au/index.php?id=58>

³ Sports Medicine. Retrieved July 7th 2010 from <http://childparenting.about.com/od/sportsfitness/a/sportsinjuries.htm>

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The WA Childhood Injury Surveillance Bulletins are developed by Kidsafe WA in consultation with the Princess Margaret Hospital Emergency Department Injury Surveillance Officer and Department of Health (Clinical Network Development Team – Injury).

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