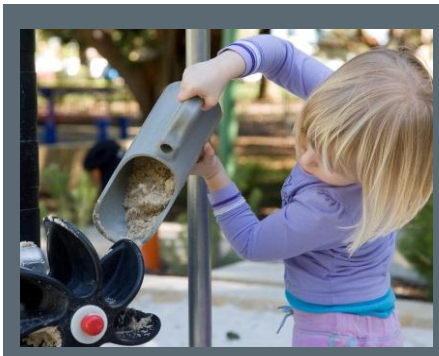

# WA CHILDHOOD INJURY SURVEILLANCE RESEARCH REPORT:
## PLAYGROUND INJURIES

Prepared with the support of Princess Margaret Hospital Emergency Department

Government of Western Australia
Department of Health

Kidsafe
Child Accident Prevention Foundation of Australia
Western Australia

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# PLAYGROUND INJURIES AT A GLANCE

## 6,852

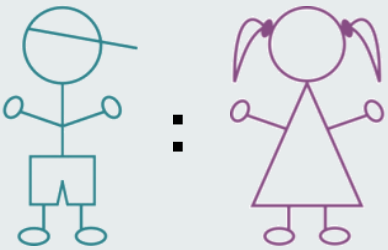
Children were seen in the Princess Margaret Hospital Emergency Department (PMH ED) due to playground injury between July 2006 and June 2014

## 856

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

## 5.2%

Of injury presentations to the PMH ED are due to playground equipment



There is a male to female ratio of 1:1 for playground injury presentation

## 47.2%

Of children who sustained a playground injury were between 5 and 9 years of age

## Location

Home
**35.7%**

Public Area
**15.4%**

School
**11.6%**

## Falls

Most common cause of playground injury seen in the PMH ED, accounting for **77.1%** of presentations

## Equipment Type

Most common playground injury related equipment seen in the PMH ED

Trampoline
**47.3%**

Monkey Bars
**17.9%**

Slide
**15.1%**

Swings
**12.6%**

# INTRODUCTION

Injury is a leading cause of death and hospitalisation in Australian children aged 0 - 14[1]. Each year in Western Australia more than 19,000 children present to the Princess Margaret Hospital Emergency Department (PMH ED) as a result of an injury, with the majority of presentations due to unintentional circumstances[2].

PMH is the only tertiary paediatric centre for Western Australia and is the reference for paediatric illness and injury for the state. Although the catchment zone may potentially be the entire state, it does not see all children requiring hospital treatment in any given year. Many will be treated at other metropolitan or regional facilities. This report examines data collected by the PMH Injury Surveillance System during the eight year period from July 2006 to June 2014. The PMH Injury Surveillance System involves the systematic collection of data related to all children presenting to the Emergency Department with an injury.

The 2006/07 financial year was the first full calendar year to include playground injuries within the coding set. Playground injury presentations to the PMH ED have continued to rise from 551 presentations between July 2006 and June 2007 to 1,120 presentations between July 2013 and June 2014, accounting for an average of 5.2 percent of total injury presentations over the eight year time period. Although playground injury numbers appear to be small, 18.2 percent of children presenting to PMH have injuries severe enough that they require admission to hospital. There is no significant gender variance between females and males, however children aged between five and nine years of age were at greater risk of sustaining a playground injury, accounting for almost half of all presentations to the PMH ED.

Play is a vital part of childhood. It is a way for children to explore and learn, allowing them to develop essential physical, cognitive and emotional skills [3]. Playgrounds are common areas for children to play and when compared to other settings, are considered to be a safe environment[4] as they are generally away from traffic and other hazards which can be found outdoors[5]. Unfortunately, playground equipment is a common cause of childhood injury[4], with a large number of playground injuries resulting in hospital admission[5].

It is important to find a balance between risks within playgrounds and the benefit they have towards a child's development. To do this playgrounds should be designed and installed to minimise hazards that could cause potential serious injuries. All playgrounds also require regular maintenance to ensure their continued safety. In Western Australia there is no regulatory requirements to comply with the Australian Standards relating to playgrounds, however these are widely regarded as the minimum standard:

- Australian Standard AS 4685: 2014 - Playground Equipment (Parts 1-6, 11)
- Australian Standard AS 4486.1 - Playgrounds and Playground Equipment
- Australian and New Zealand Standard AS/NZS 4422 - Playground Surfacing

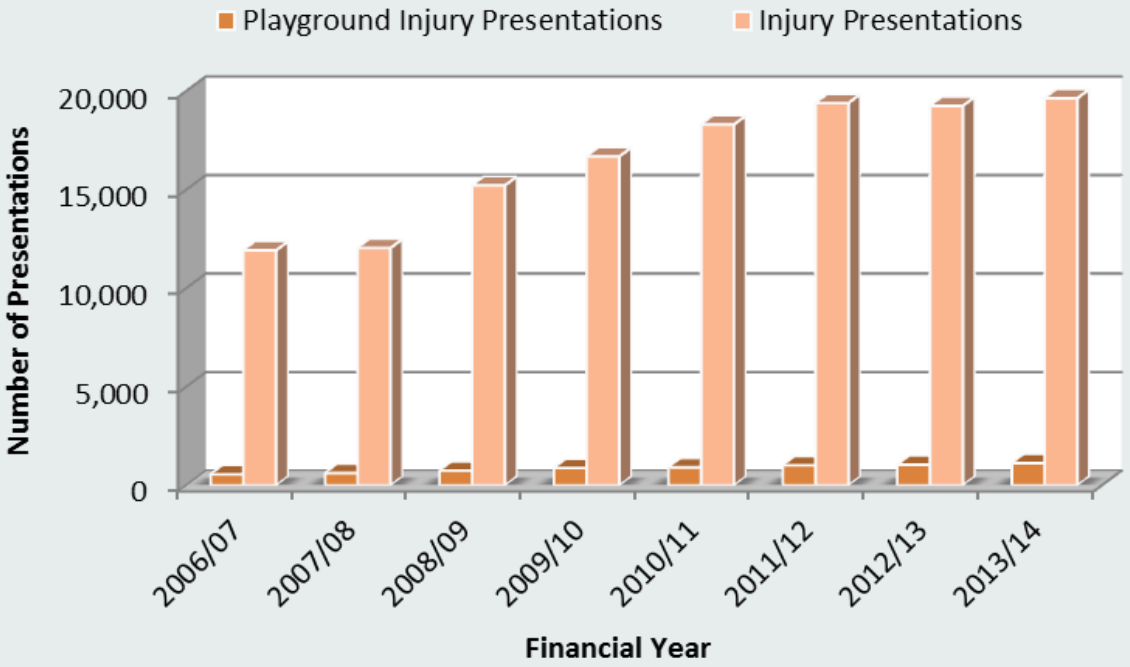
In 2014 the Australian Standard AS 4685: 2014 - Playground Equipment (Parts 1-6, 11) was introduced, superseding the Australian Standard AS 4685: 2004. Many of the changes in the new standard seek to align with the European Standard EN 1176: 2008 (parts 1-6). Significant changes to the standard include an increase in the free height of fall to 1,800mm for supervised early childhood settings and 3,000mm for all other settings. In addition there has been an increase to the height of playground equipment requiring safety surfacing, specifically to 600mm or more above ground level.

# 1.0 DEMOGRAPHIC DATA

## 1.1 EMERGENCY DEPARTMENT INJURY PRESENTATIONS

Over the eight year period from July 2006 to June 2014 there was a total of 132,424 presentations to the PMH ED for injury. During that same time period there were 6,852 injury presentations specifically relating to playgrounds, accounting for 5.2 percent of injury presentations. Both total injury presentations and playground injury presentations have risen since the 2006/07 financial year, when playground injuries were first included within the coding set (Figure 1).

**Figure 1** **Injury Presentation and Playground Injury Presentation by Financial Year; July 2006 to June 2014**




The number of playground injury presentations to the PMH ED has doubled in the past eight years rising from 551 presentations between July 2006 and June 2007 to 1,120 presentations between July 2013 and June 2014 (Table 1). The proportion of playground injuries has also increased from 4.6 percent to 5.7 percent during the same time period (Table 1).

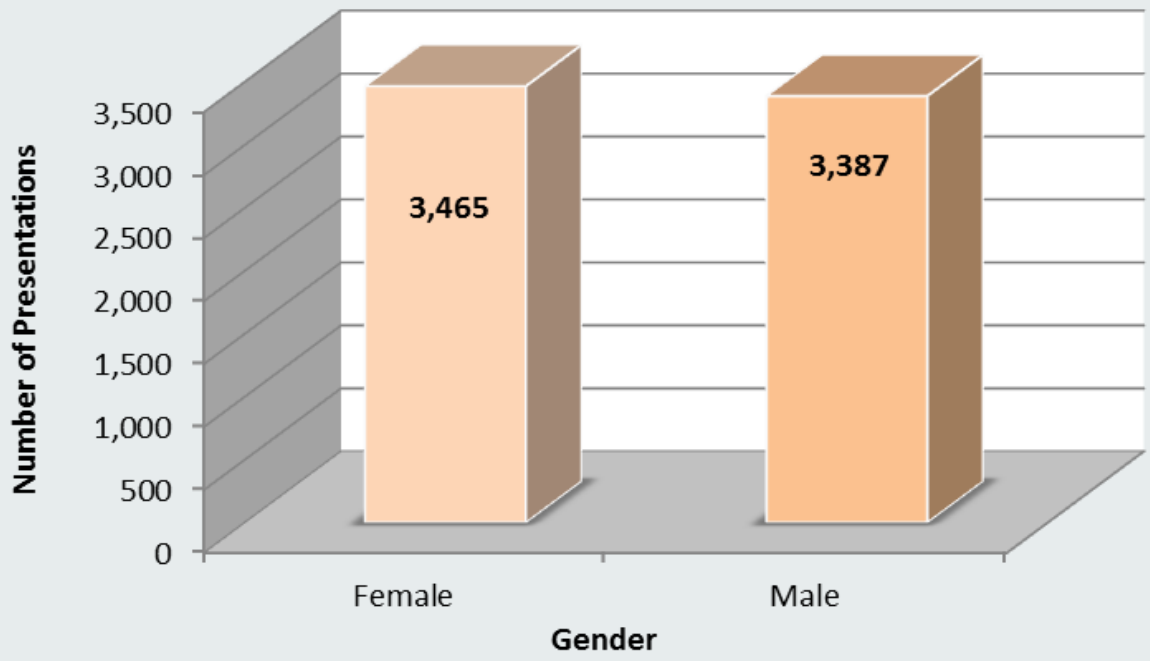
**Table 1** **Playground Injury Presentation and Total Injury Presentation by Financial Year; July 2006 to June 2014**

| | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Playground Injuries | 551 | 614 | 738 | 873 | 908 | 1,013 | 1,035 | 1,120 | **6,852** |
| Total Injuries | 11,913 | 12,040 | 15,212 | 16,686 | 18,302 | 19,389 | 19,247 | 19,635 | **132,424** |
| Proportion of Playground Injuries | 4.6% | 5.1% | 4.8% | 5.2% | 5.0% | 5.2% | 5.4% | 5.7% | **5.2%** |

## 1.2 AGE AND GENDER DISTRIBUTION

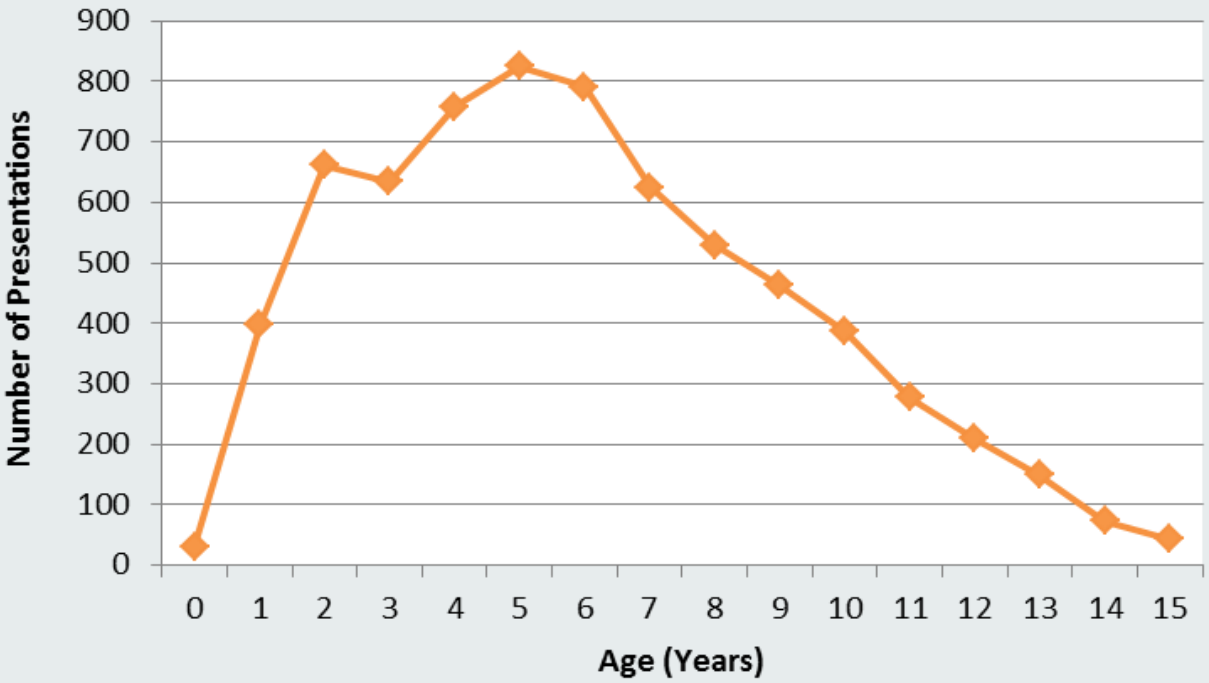
The gender distribution for playground injuries was fairly even, with males accounting for 49.4 percent (n=3,387) of presentations and females the remaining 50.6 percent (n=3,465) (Figure 2). This deviates from the standard male to female ratio of 3:2 seen across childhood injury statistics.

**Figure 2 Injury Presentation by Gender; July 2006 to June 2014**




Children aged between five and nine years are at greater risk of injuring themselves on a playground, accounting for 47.2 percent (n=3,232) of playground injury presentations. A peak in playground injuries is seen in children at five years of age (12.0%, n=825) (Figure 3). Children under five are also at risk, accounting for 36.2 percent (n=2,481) of presentations. Children aged 10 to 14 years present to the emergency department for playground injuries somewhat less than the younger age groups, accounting for 16.0 percent (n=1,096) of presentations. Children aged over 15 generally present at even lower rates due to a tendency for adolescents to present to non-paediatric facilities.

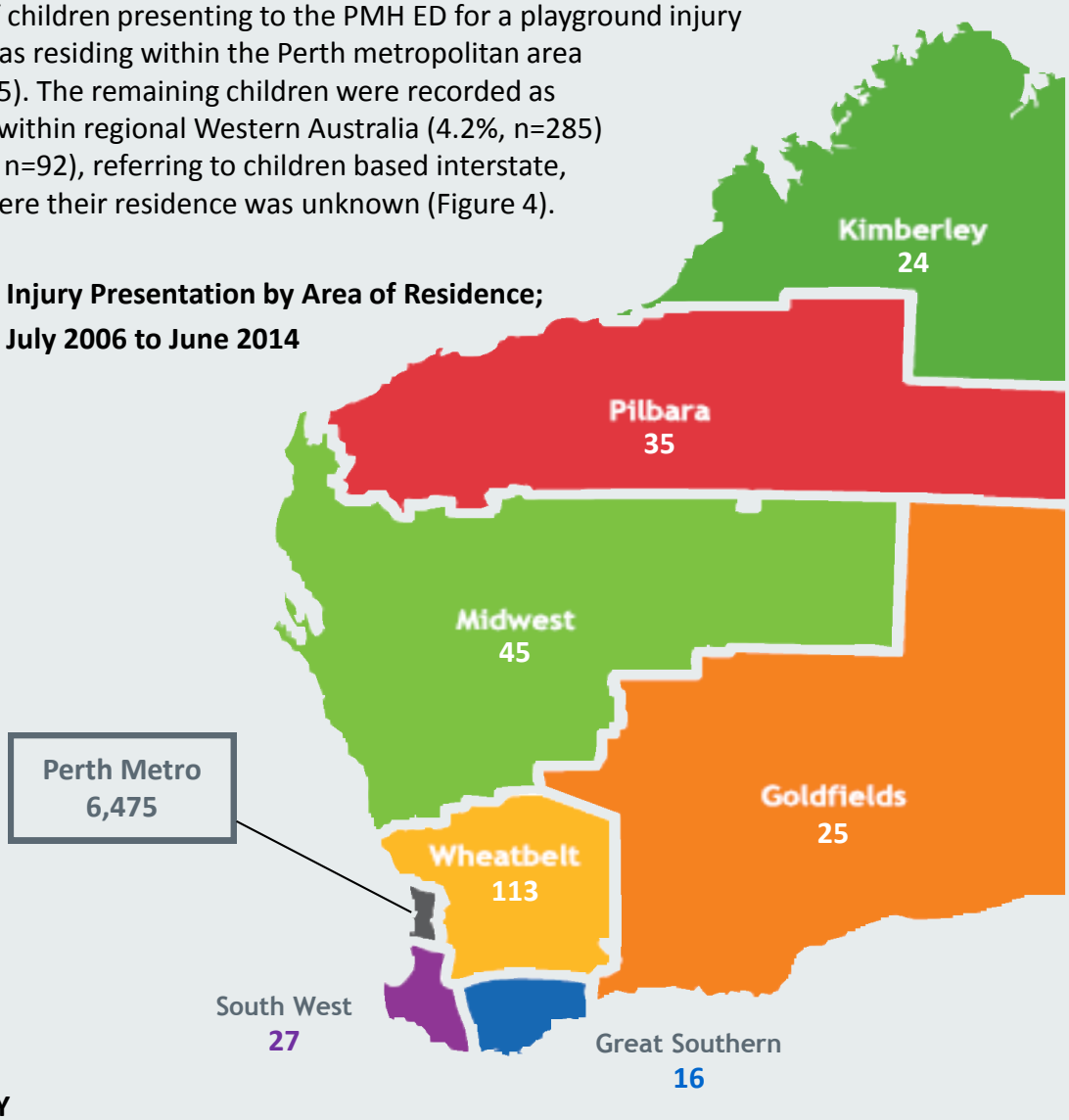
**Figure 3 Injury Presentation by Age; July 2006 to June 2014**



## 1.3 AREA OF RESIDENCE

The majority of children presenting to the PMH ED for a playground injury were recorded as residing within the Perth metropolitan area (94.5%, n=6,475). The remaining children were recorded as either residing within regional Western Australia (4.2%, n=285) or other (1.3%, n=92), referring to children based interstate, overseas or where their residence was unknown (Figure 4).

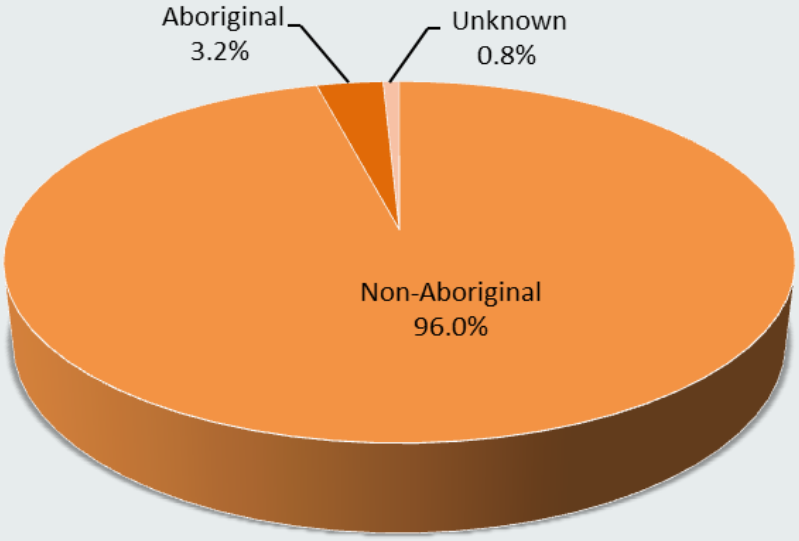
**Figure 4** **Injury Presentation by Area of Residence; July 2006 to June 2014**




## 1.4 ABORIGINALITY

Children of Aboriginal and/or Torres Strait Islander descent represent 3.2 percent (n=221) of children presenting to the Emergency Department for playground injuries (Figure 5). There was no significant gender or age group differences between Aboriginal and non-Aboriginal children, however 24.4 percent of presentations from children of Aboriginal or Torres Strait Islander descent resided in a regional location.

**Figure 5** **Injury Presentations by Aboriginality; July 2006 to June 2014**

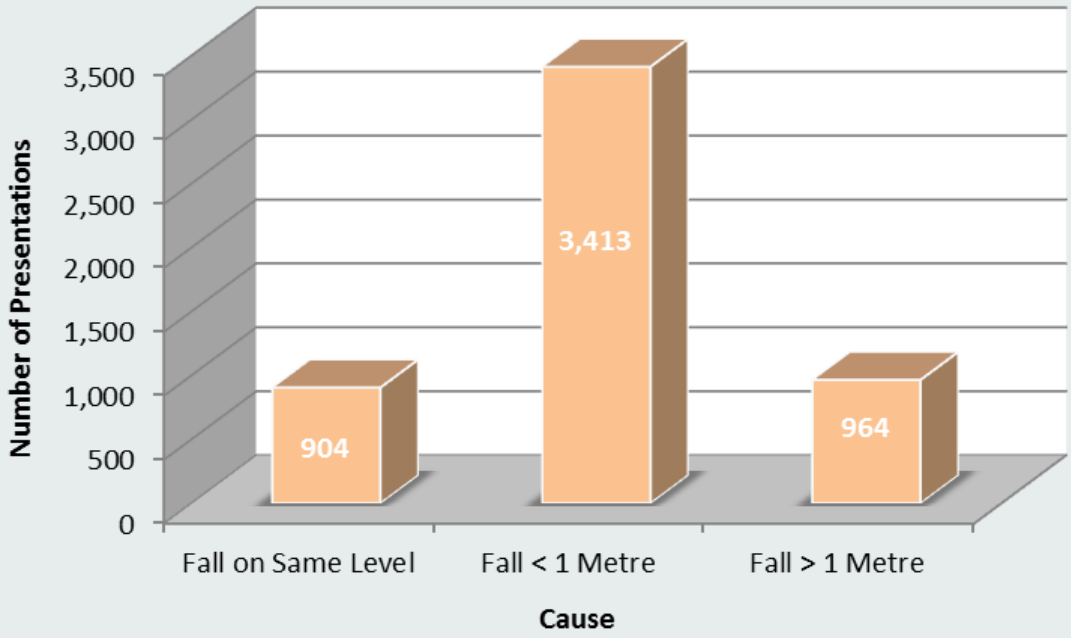


# 2.0 INJURY DATA

## 2.1 CAUSE OF INJURY

Falls are the leading cause of playground injury presentation to the PMH ED, accounting for 77.1 percent (n=5,281) of injuries. Falls are further categorised into falls on the same level, falls from less than one metre and falls from greater than one metre. The majority of children who suffer a fall from playground equipment fall from a height of less than one metre (64.6%, n=3,413) (Figure 6). Secondary to this are falls from greater than one metre (18.3%, n=964), followed by falls from the same level (17.1%, n=904). Aside from falls, playground injuries are also commonly caused by blunt force (14.7%, n=1,007), other causes (7.5%, n=515) and cutting/piercing (0.5%, n=33).

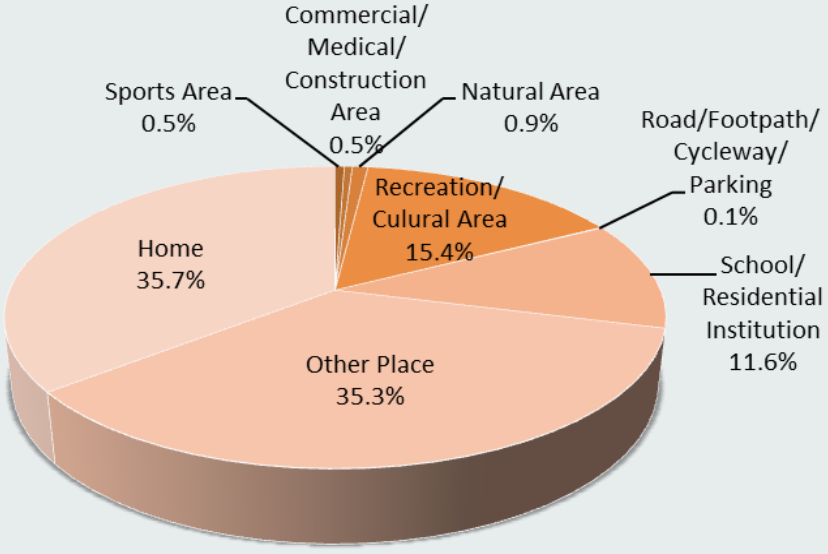
**Figure 6 Injury Presentation by Falls; July 2006 to June 2014**




## 2.2 LOCATION OF INJURY

A large proportion of playground injury presentations to the PMH ED were recorded as other place (35.3%, n=2,421), referring to a location that has not been specified or one that does not fit into an existing category. Aside from other place, playground injuries were frequently recorded as occurring within a home (35.6%, n=2,438), a recreation or cultural area (15.4%, n=1,055) or a school or residential institution (11.6%, n=796) (Figure 7).

**Figure 7 Injury Presentation by Location; July 2006 to June 2014**



## 2.3 INJURY INTENT

Almost all playground injury presentations to the PMH ED were recorded as due to unintentional circumstances (99.8%, n=6,840).

## 2.4 EQUIPMENT TYPE

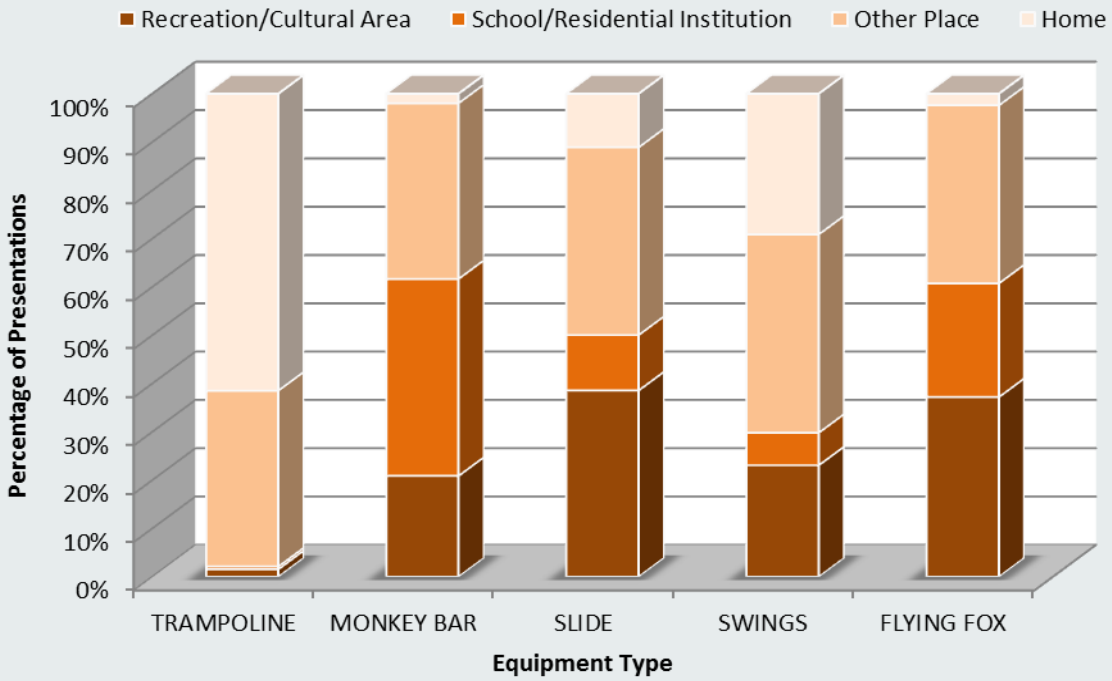
Trampolines were the most commonly associated piece of equipment relating to playground injuries, accounting for 47.3 percent (n=3238) of presentations, followed by monkey bars (17.9%, n=1,226), slides (15.1%, n=1,037) and swings (12.6%, n=862) (Table 2).

**Table 2 Injury Presentation by Equipment Type; July 2006 to June 2014**

| Equipment Type | Percentage of Injuries | Number of Injuries |
|---|---|---|
| Trampoline | 47.3% | 3,238 |
| Monkey Bars | 17.9% | 1,226 |
| Slide | 15.1% | 1,037 |
| Swing | 12.6% | 862 |
| Flying Fox | 4.3% | 293 |
| Cubby House | 1.3% | 97 |
| See-Saw | 1.0% | 68 |
| Fireman Pole | 0.5% | 31 |

Certain types of equipment were more commonly recorded as occurring in specific locations. For example, a large number of trampoline and swing related injuries were recorded as occurring within the home , accounting for 61.4 percent (n=1,989) and 29.1 percent (n=251) of presentations respectively (Figure 8). Monkey bar related injuries were most commonly recorded within the school (40.8%, n=500), whereas injuries resulting from slides and flying foxes commonly occurred in recreation or cultural areas.

**Figure 8 Injury Presentation by Equipment Type and Location; July 2006 to June 2014**

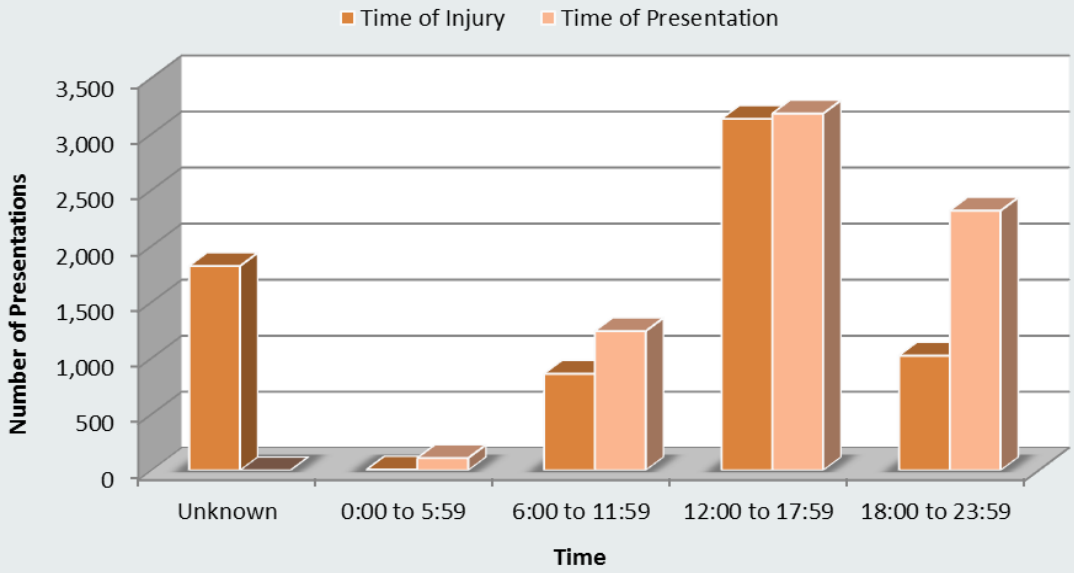


# 3.0 ASSESSMENT & TREATMENT DATA

## 3.1 TIME OF INJURY

When a child presents to the PMH ED the time they were injured and the time they presented to the Emergency Department are both recorded. Time of injury and time of presentation are broken down into 5 time categories; 0:00 to 5:59, 6:00 to 11:59, 12:00 to 17:59, 18:00 to 23:59 and unknown. Almost a quarter of playground injury presentations were recorded with an unknown injury time (26.6%, n=1,823) (Figure 9). Where the injury time was known, almost half occurred between 12:00 and 17:59 (45.8%, n=3,136). This correlates with after school and evening meal preparation times. Similarly the majority of children presenting to the PMH ED with an injury did so between 12:00 and 17:59 (46.4%, n=3,183) or 18:00 and 23:59 (33.8%, n=2,317).

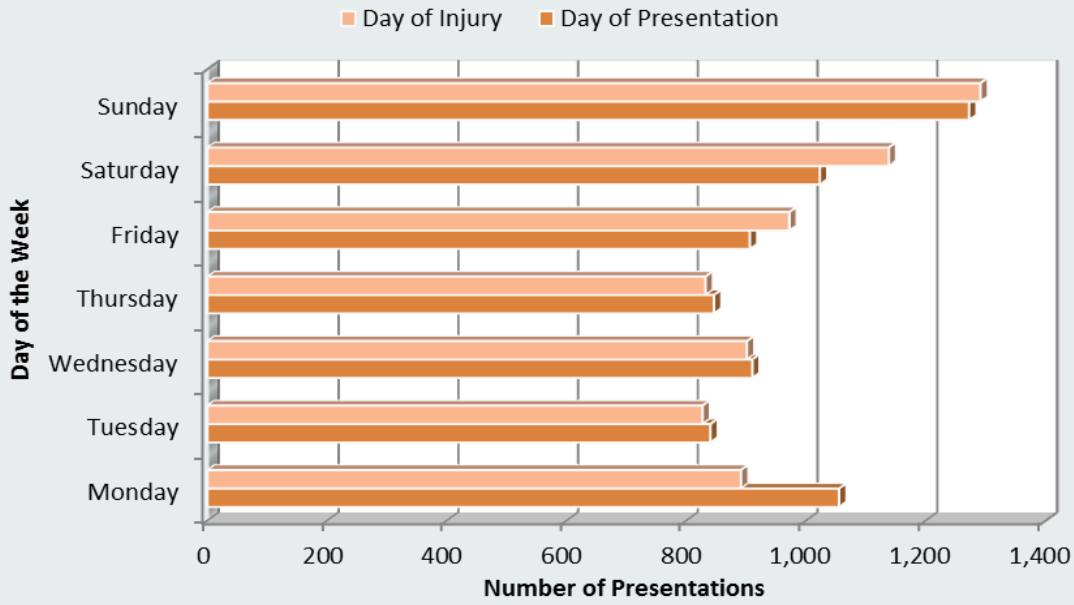
**Figure 9 Injury Presentation by Time of Injury and Presentation; July 2006 to June 2014**




## 3.2 DAY OF INJURY

The highest number of playground injuries occurred on Sunday, accounting for 18.8 percent (n=1,291) of presentations (Figure 10). Similarly Sunday had the highest number of playground injury presentations to the PMH ED (18.6%, n=1,272). A trough was seen on Tuesday and Thursday with both injury occurrence and presentation recording low numbers.

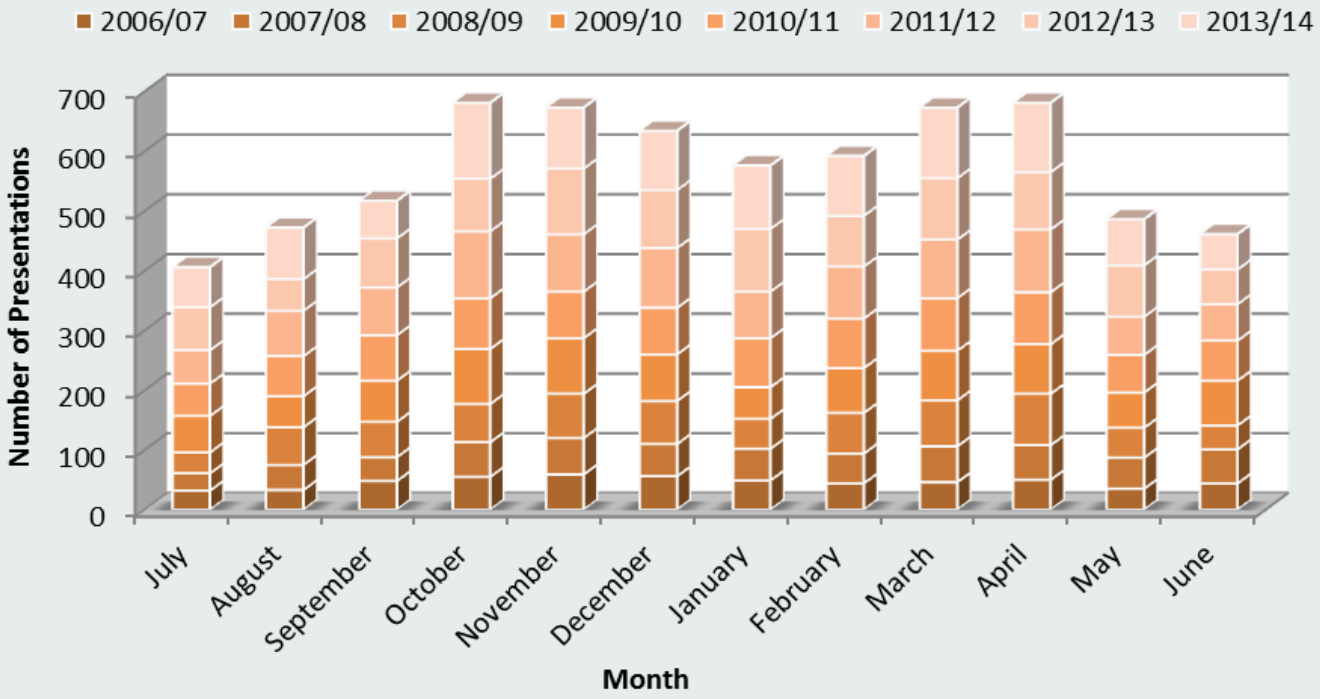
**Figure 10 Injury Presentation by Day of Injury and Presentation; July 2006 to June 2014**



### 3.3 MONTH OF INJURY

Playground injuries showed an increase during the shoulder months leading into and out of the hot summer months of December, January and February. Peaks were seen in October and April, each accounting for 9.9 percent (n=681) of playground injuries. This was closely followed by November and March, each accounting for 9.8 percent (n=673) of playground injuries (Figure 11). Troughs were seen in the cooler, wetter months of June, July and August accounting for 6.7 percent (n=461), 5.9 percent (n=406) and 6.9 percent (n=472) of playground injuries respectively.

**Figure 11** **Injury Presentation by Month of Injury; July 2006 to June 2014**




### 3.4 TRIAGE CATERGORY

Every child that presents to the PMH ED is allocated a triage category based on their urgency for medical attention (Table 3). The majority of playground related presentations were given a triage category of semi-urgent (74.8%, n=5,125) or urgent (22.7%, n=1,555). Few children were assigned a triage category of emergency (2.2%, n=154) and even fewer as resus or non-urgent.

**Table 3** **Triage Category**

| Category | Seen within (minutes) |
|---|---|
| (1) Resus | 0 |
| (2) Emergency | 10 |
| (3) Urgent | 30 |
| (4) Semi-Urgent | 60 |
| (5) Non-Urgent | 120 |

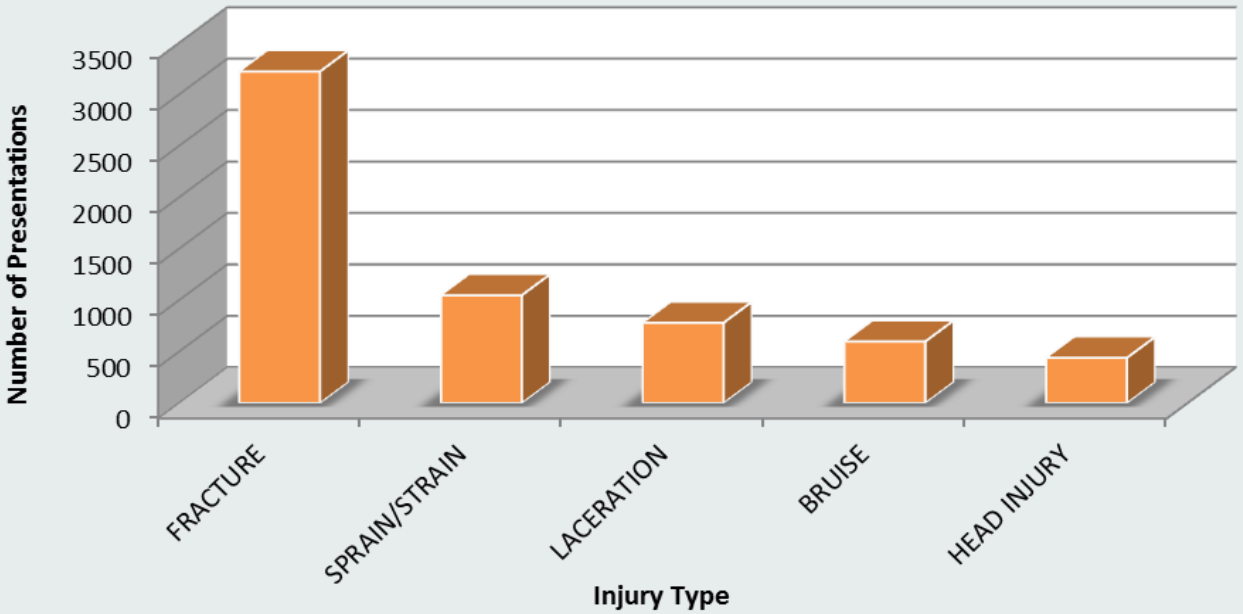
### 3.5 BODY REGION

The upper limbs were the most common region of the body to be injured accounting for 42.8 percent (n=2,935) of presentations. The head/neck (25.7%, n=1,760) and lower limb (19.4%, n=1,331) regions also account for large proportions of presentations.

### 3.6 DIAGNOSIS

Almost half of all playground injury presentations resulted in a fracture (47.1%, n=3224) (Figure 12). Other common diagnoses include sprains and strains (15.3% n=1048), lacerations (11.4%, n=780), bruising (8.7%, n=598) and head injuries (6.4%, n=440).

**Figure 12 Injury Presentation by Top Five Injury Types; July 2006 to June 2014**



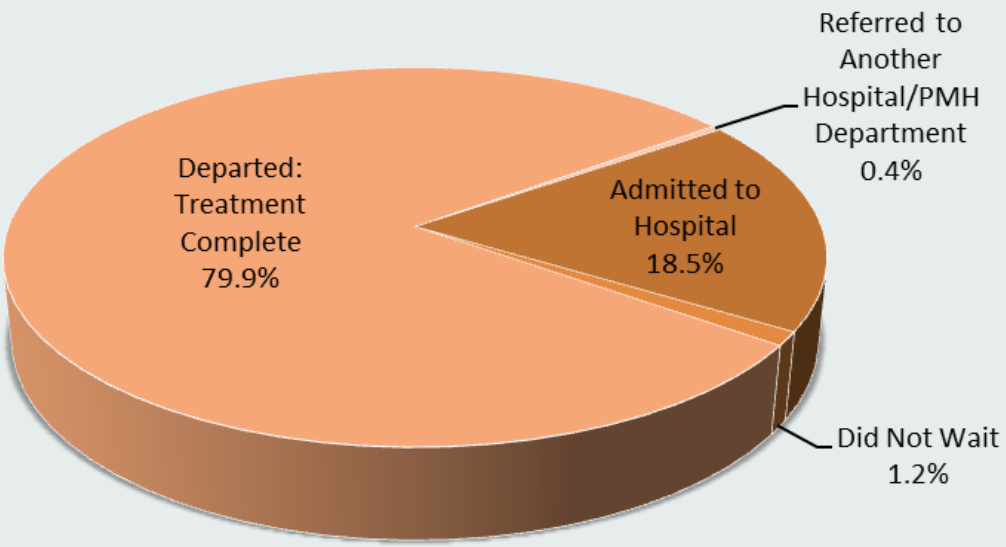

### 3.7 REFERRAL SOURCE

Most children present to the PMH ED with a playground injury based on the concerns of themselves or a relative (85.6%, n=5,862). A further 12.2 percent (n=839) were referred by either a general practitioner or by another hospital.

### 3.8 OUTCOME OF ATTENDANCE

Following a playground injury, many children were able to depart from the PMH ED with treatment complete (79.9%, n=5,478) (Figure 13), however a significant number of children (18.2%, 1,250) had injuries severe enough that they required admission to hospital for further treatment. A small percentage of children either did not wait for treatment or were referred to another hospital or department of PMH.

**Figure 13 Injury Presentation by Outcome of Attendance; July 2006 to June 2014**



# DISCUSSION

Play is an essential part of childhood. It assists children in developing physical skills such as strength, coordination and balance as well as cognitive and emotional skills. Play environments can encourage children to be problem solvers, social, imaginative, creative and collaborative. Although the number of injuries occurring on playgrounds is relatively small in comparison to other injury concerns, playground injuries have continued to rise over the last eight years. During the most recent financial year playground injuries accounted for over 1,000 presentations to the PMH ED. Over 18 percent were severe enough to require admission to hospital. Many of these injuries are preventable.

Falls are the most common cause of playground related injury, accounting for 77 percent of presentations. Falls injuries from greater than one metre are often associated with more severe injuries with nearly a quarter (24.3%, n=234) requiring hospitalisation. Similarly 22.2 percent (n=756) of falls from less than a metre required hospitalisation, in comparison to only 11.7 percent of falls from the same level.

In order to reduce the severity of falls from playground equipment, the following Australian Standard recommendations should be followed:

- Impact attenuating surface such as synthetic rubber or loose fill at a depth of 300mm, should be placed beneath all playground equipment over 600mm in height and beneath any piece of equipment that moves, such as a rocking equipment or swings
- Equipment over 600mm in height or equipment that moves requires adequate impact area around it that is free of hard objects
- The maximum height of equipment should not exceed 1,800mm in supervised early childhood settings and 3,000mm in all other settings

Injuries within the playground can be attributed to both behavioural and environmental factors. Common factors of playground related injury include;

- Lack of appropriate adult supervision
- Use of equipment not suitable to the age or stage of development of the child
- Inappropriate use of equipment
- Over-crowding
- Poor design or layout of equipment
- Lack of maintenance

**For further information:**
Kidsafe WA's Playground Advisory Service provides a range of services to help create and maintain playspaces that support children's development, learning, health and wellbeing while reducing the risk of serious injury. Kidsafe WA provides advice, consultation, comprehensive audit services and professional development workshops and is not affiliated with any playground equipment manufacturer, retailer or ancillary business.

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