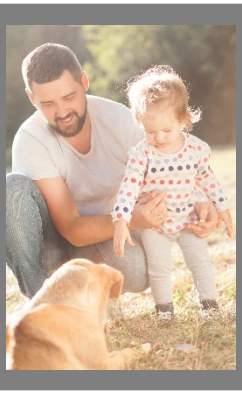




WA CHILDHOOD INJURY SURVEILLANCE RESEARCH REPORT: FARM INJURIES

Government of Western Australia
Department of Health

Kidsafe
Child Accident Prevention Foundation of Australia
Western Australia

Suggested Citation:
Collins J, McKenna J, Skarin D. WA Childhood Injury Surveillance Research Report: Farm Injuries Perth (WA): Kidsafe WA (AUS); 2016 Mar.

CONTENTS

INTRODUCTION **1**

FARM INJURIES AT A GLANCE **3**

DEMOGRAPHIC DATA **4**

- Emergency Department Injury Presentations 4
- Age and Gender Distribution 5
- Area of Residence 5
- Ethnicity 5

INJURY DATA **6**

- Cause of Injury 6
- Injury Intent 6
- Injury Factors 6
- Type of Activity 7
- Sporting Equipment 7

ASSESSMENT AND TREATMENT DATA **8**

- Triage Category 8
- Month of Year 8
- Day of Attendance 9
- Time Factors 9
- Referral Source 10
- Outcome of Attendance 10

DISCUSSION **11**

REFERENCES **12**

INTRODUCTION

FARM INJURIES

Childhood farm injuries are recognised as a significant issue, with Australian farms remaining a high-risk setting for injury and fatalities[1,2]. Within the 2011-2012 financial year alone, over 400 children were hospitalised for injuries that occurred on Australian farms[3].

Independent outdoor play is important for the healthy physical and mental development of children, with farms offering a unique setting for children to explore[4]. Although there are many benefits to living within a farming environment, they can also be home to a number of hazards which may result in child injury or death[1]. A high proportion of farms are family owned and operated, therefore it can be difficult to distinguish between a farm environment as a workplace or a family home[5]. This overlap presents a challenge for maintaining the health and safety of not only farmers but their families, children and visitors[5].

Farmers and their families often live and work within rural and remote settings[6]. In the case of an unexpected accident resulting in the injury of a child, the remoteness of the location may lead to substantial delays in first aid, transport time to hospitals, and necessary treatment, all of which compound injury severity[6]. In the event of a severe injury the Royal Flying Doctor Service, an aeromedical emergency service, is available at all hours to reach rural and remote areas and to reduce critical transport times and improve patient outcomes[7]. Accessing help may also be difficult with restricted telephone network coverage, with delays often contributing to the overall severity of farm injuries in children[6]. Time is a crucial factor in surviving injuries, emphasising the need for injury prevention on farms.

The leading causes of farming injuries and deaths among Australian children are drowning in dams, and quad bike accidents[2]. Other common childhood injury on farms include those from farm machinery and farm animals[6].

Drowning

Drowning incidents on farms commonly involve young children playing outside and walking off undetected into a farm dam[8,9]. Other water bodies such as tanks, creeks, rivers, pools, troughs, dips, and channels are also potential drowning hazards for young children[2,8]. An insufficient barrier between the body of water and the family home, which may be close in proximity, increases the risk of drowning[8]. The construction of a fenced safe play area in conjunction with active supervision is the most effective prevention method of drowning in children living on farms[8].

Quad Bike Injuries

Quad bikes have become a frequent vehicle on Australian farms, being utilised for a number of agricultural tasks such as the movement of stock, transport, spraying weeds, carrying small loads, towing, and recreation[10,11]. Quad bikes are widely characterised as unstable vehicles, possessing small wheel bases and a high centre of gravity that makes them unstable and highly susceptible to tipping over on uneven surfaces[12]. As a result, quad bikes are involved in a large number of serious injuries and fatalities among children[11]. Parents of children on farms need to be aware of the dangers associated with children under 16 years as either drivers or passengers on quad bikes[11]. Quad bike activities pose numerous risks such as the quad bike rolling and crushing or pinning the child underneath, or children falling off or being thrown off the moving quad bike[11]. Such accidents result in serious injury, with head and spine trauma associated with high morbidity and mortality[11].

Machinery Injuries

Farm machinery and equipment are key to the operation of Australian farms, however they are potential contributors to significant injuries and fatalities amongst children[13]. Machinery such as tractors, transportation equipment, harvesting equipment, power take-offs, and drills are commonly used on farms and can cause serious injury in children such as run-overs, entanglement in machines, being pinned, crushed, or hit by machinery, and falls from heights[13 14]. Younger children are more at risk of being injured from falls or being struck by farm machinery, whereas older children are more likely to be injured as an operator[15]. To ensure safety around machinery and equipment child access to the farm worksite must be restricted[14]. As previously discussed, safe play areas create an ideal environment for children to play safely away from farm hazards[8 14]. Additionally, safe storage, fall protection barriers, and removal of keys from machinery and equipment should be utilised to ensure farm safety in children[14].

Animal Injuries

Farms create great opportunities for children to interact with a variety of animals, however the unpredictable nature of animals can be dangerous. Horses are a common risk to children on farms as well as cows, chickens, and pigs[16 17]. Childhood injury from farm animals can include falling off animals such as horses, getting kicked by an animal, and being crushed by an animal. As a result, injuries such as concussions, fractures, dislocations, and cuts can occur[14 16]. When participating in animal related farm activities such as horse riding, injury prevention strategies including instructions for safe activity, and protective equipment should be utilised[14].

PMH INJURY SURVEILLANCE SYSTEM

Princess Margaret Hospital for Children is the sole tertiary paediatric hospital in Western Australia, acting as a key referral source for childhood injury and disease within the state. In 2015 almost 20,000 children presented to the Princess Margaret Hospital Emergency Department (PMH ED) as a result of an injury[18].

The PMH Injury Surveillance System is an electronic database that involves the systematic collection of all ED injury data. This report examines farm injury data over a ten year period from July 2005 to June 2015.

Although PMH has the potential to provide medical assistance to the whole of Western Australia, often children are treated at local medical facilities. In particular, childhood farm injuries are likely to occur within regional areas where farms are more prevalent, resulting in children presenting to closer medical facilities. In addition, regional hospitals tend to provide a range of basic services, managing low acuity presentations[19]. It is also not uncommon for regional hospitals to experience a shortage of doctors and other medical staff[19]. Children presenting from regional locations to the PMH ED are often seriously injured or cannot be adequately treated at regional centres. Therefore the data presented here has a ‘high acuity’ selection bias and should not be taken as a representation of typical childhood farm injuries.

Farm Injuries

at a glance

226

Children attended the Princess Margaret Hospital Emergency Department (PMH ED) as a result of farm injury between July 2005 and June 2015

22

Children on average are seen in the PMH ED each year for a farm injury

40.7%

Of children who experienced a farm related injury were aged between 10 and 14 years

There is a male to female ratio of approximately 5:4 for farm injury presentation in children

Causes of Injury

Falls
33.6%

Transport
33.6%

Blunt Force
14.6%

Burns and Scalds
5.8%

Activities

Most commonly associated with childhood farm injuries seen at the PMH ED

Motorcycling
14.2%

Horse Riding
12.8%

Quad Biking
5.3%

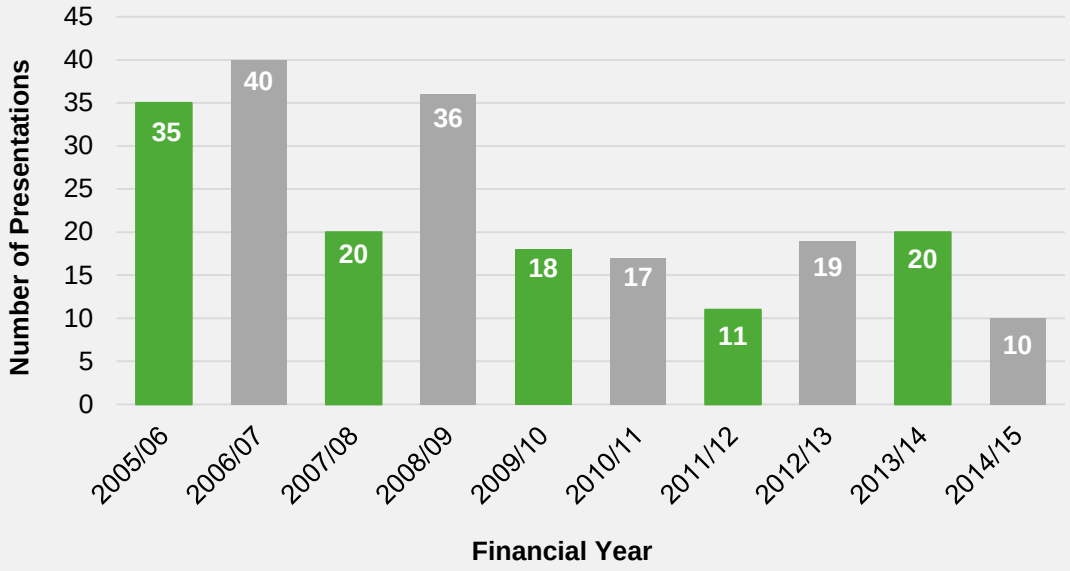
Cycling
3.1%

DEMOGRAPHIC DATA

EMERGENCY DEPARTMENT INJURY PRESENTATIONS

Over the ten year period from July 2005 to June 2015 there was a total of 163,643 injury presentations to the PMH ED, 226 of which occurred on a farm. Childhood farm injury presentations have decreased since the 2005/06 financial year, however they remain a highly preventable cause of morbidity and mortality in children. These figures do not take into account children who present to other medical facilities across WA, those who present to a general practitioner, or that do not present at all.

Figure 1: Farm Injury Presentation by Financial Year



Farm injuries in children contribute to a small percentage of injury presentations to the PMH ED (Table 1). This may be attributed to the regional location of farms and the likelihood of injured children visiting nearby medical facilities.

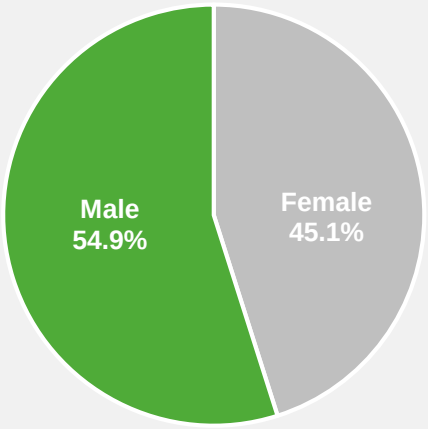
Table 1: Total Injury and Farm Injury Presentations by Financial Year

Financial Year	Total Injury Presentations	Farm Injury Presentations
2005/06	11,345	35
2006/07	11,913	40
2007/08	12,040	20
2008/09	15,212	36
2009/10	16,686	18
2010/11	18,303	17
2011/12	19,393	11
2012/13	19,252	19
2013/14	19,645	20
2014/15	19,854	10
Total	**163,643**	**226**

AGE AND GENDER DISTRIBUTION

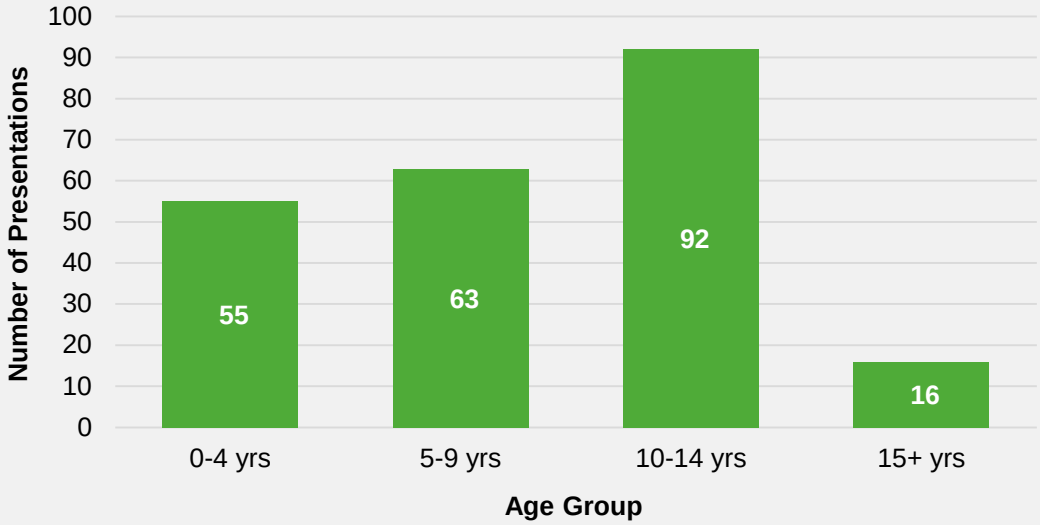
Males account for a higher number of farm injury presentations to the PMH ED accounting for 54.9 percent (n=124) of injuries. Females account for the remaining 45.1 percent (n=102) of farm injuries (Figure 2).

Figure 2: Farm Injury Presentation by Gender



Children aged between 10 and 14 years are at greater risk of experiencing a farm related injury, accounting for 40.7 percent (n=92) of presentations to the PMH ED (Figure 3). This is in contrast to general childhood injury presentations where children under the age of five experienced the highest number of injuries. Often children of these older ages are allocated farm tasks that are not suitable for their developmental ability[7 8]. There is also a tendency for children aged 15 years and above to present to non-paediatric facilities which may account for the low number of presentations in this age group.

Figure 3: Farm Injury Presentation by Age Group



AREA OF RESIDENCE

A high proportion of farm injury presentations were from children residing within the Perth Metropolitan Area (57.1%, n=129), followed by children residing in the Wheatbelt region of WA (23.5%, n=53). A further 17.7 percent resided in other regions of WA (n=40) and the remaining were recorded as either interstate or unknown.

ETHNICITY

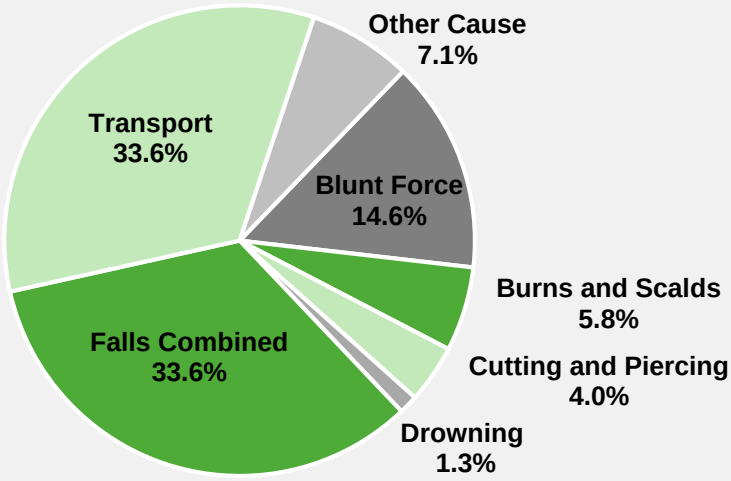
The majority of children presenting to the PMH ED for a farm injury did not identify as being Aboriginal and/or Torres Strait Islander decent.

INJURY DATA

CAUSE OF INJURY

Falls and transport injuries were the leading causes of farm related injury to the PMH ED, both categories accounted for 33.6 percent (n=76) of presentations (Figure 4). The majority of falls (50.0%, n=38) occurred from a height of greater than one metre. Over half of all transport injuries (55.3%, n=42) were related to motorcycling and 21.1 percent (n=16) occurred to children as a motor vehicle occupant.

Figure 4: Farm Injury Presentation by Cause



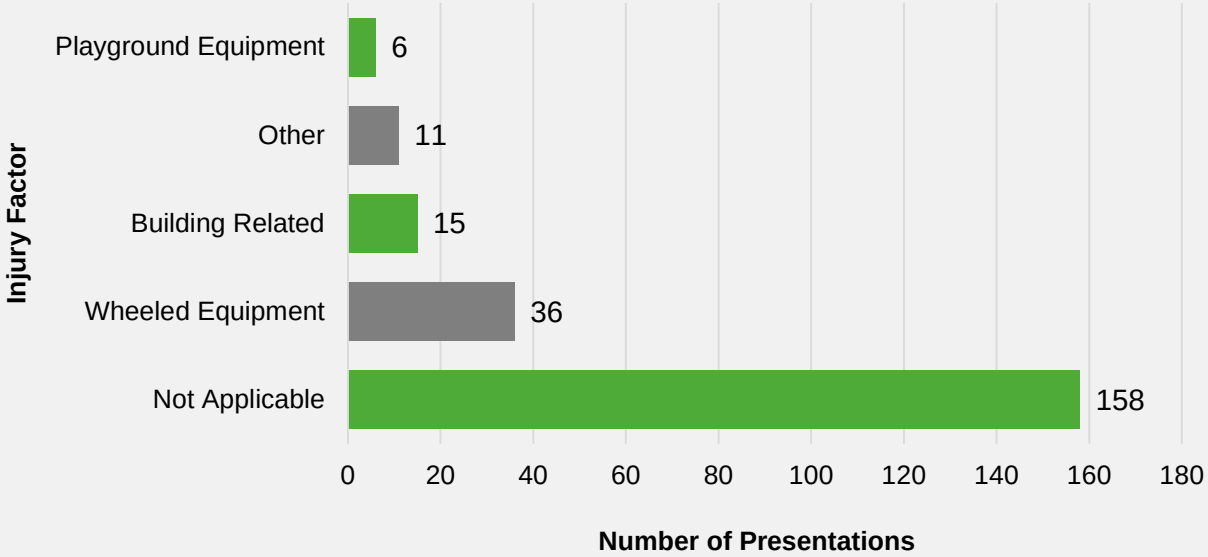
INJURY INTENT

The majority of farm injury presentations to the PMH ED occurred as a result of unintentional circumstances.

INJURY FACTORS

A high percentage of presentations did not have an associated injury factor (Figure 5). Those that did, included wheeled equipment (15.9%, n=36), building related factors such as floors, doors, windows, and walls (6.6%, n=15), and playground equipment (2.7%, n=6).

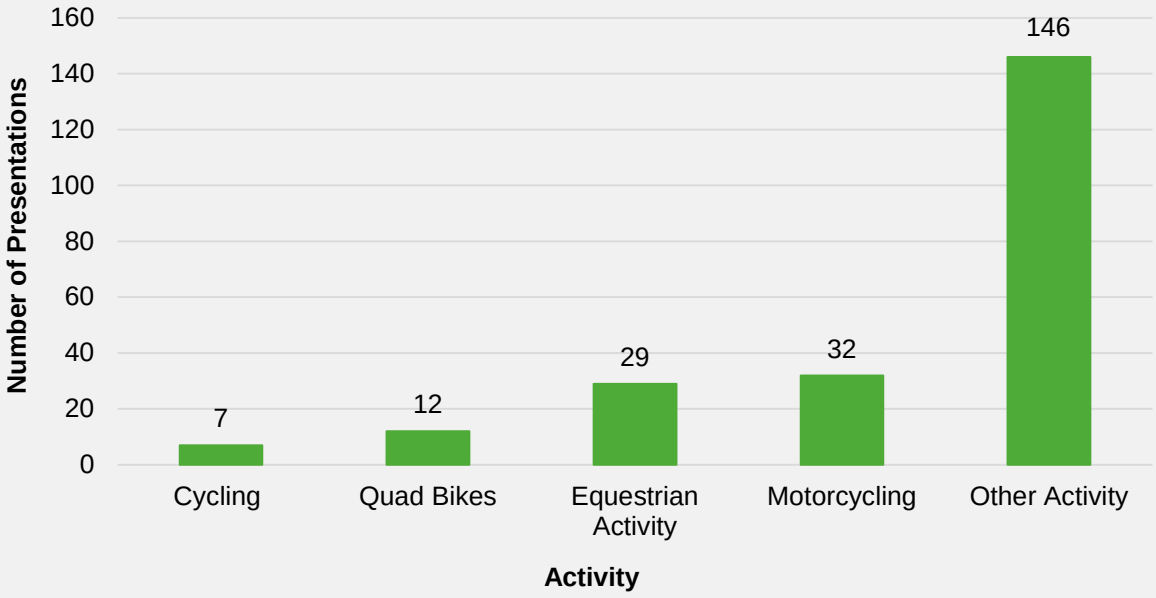
Figure 5: Farm Injury Presentation by Injury Factor



TYPE OF ACTIVITY

Motorcycling was the most common activity associated with farm injuries accounting for 14.2 percent (n=32) of presentations (Figure 6). Secondary to motorcycling, equestrian activities (horse riding) accounted for 12.8 percent (n=29) followed by quad bikes (5.3%, n=12), and cycling (3.1%, n=7).

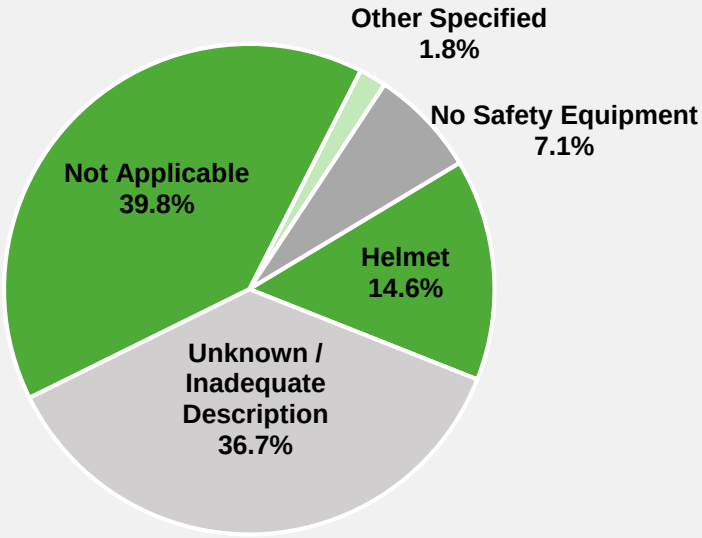
Figure 6: Farm Injury Presentation by Activity



SAFETY EQUIPMENT

Prevention measures such as safety equipment are vital for the reduction of farm injuries in children. Over the 10 year period 7.1 percent (n=16) were recorded as using no safety equipment, 14.6 percent (n=33) were recorded as wearing helmets, and a small proportion of children were recorded as using 'other', representing the use of seatbelts, approved child restraints, or other specified safety equipment.

Figure 7: Farm Injury Presentation by Safety Equipment



ASSESSMENT AND TREATMENT DATA

TRIAGE CATEGORY

Each child presenting to the PMH ED is allocated a triage category to determine the urgency of their medical treatment. Most farm injuries were triaged as either Semi-Urgent (53.5%, n=121), Urgent (34.9%, n=79) or Emergency (8.8%, n=20) (Table 2) with few Resuscitation (2.7%, n=6) and no Non-Urgent triage allocations.

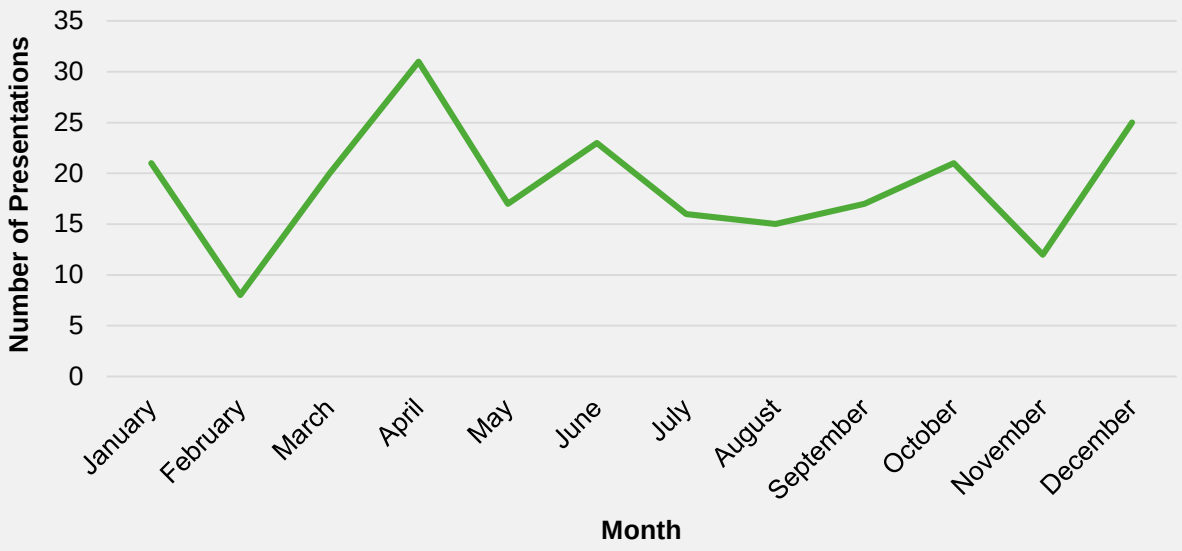
Table 2: Triage Category

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

MONTH OF YEAR

Figure 8 shows the trend of farm injury presentations to the PMH ED by month. Seasonal increase in farming activities can increase the exposure of hazards to children, and when compared to farm injury presentations there is a notable correlation. Sowing and harvesting periods on Western Australian farms generally occur within April to June and October to January respectively, which may account for a higher average of farm injury presentations in children within these months, when compared to other times of the year[9]. Farm injury presentations within seasonal months represents 66.4 percent (n=150) of total presentations to the PMH ED and is almost double the number of injury presentations during off season months (n=76) (Figure 8). Additionally, these farming seasons coincide with Western Australia's school holiday periods, which is also likely to contribute to peaks and troughs in the presentations[10].

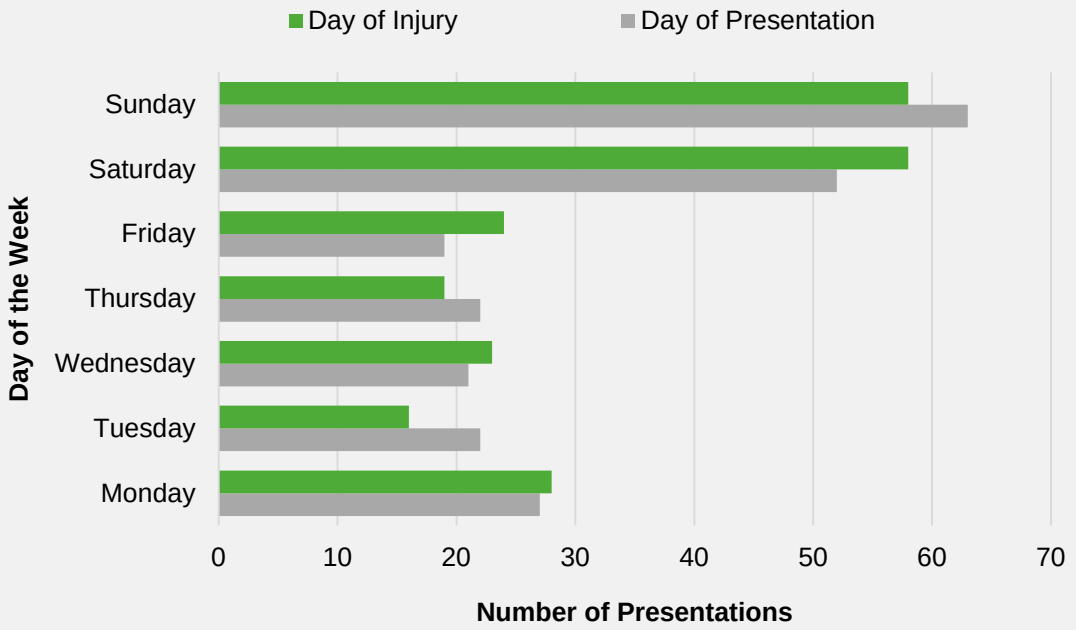
Figure 8: Farm Injury Presentations by Month



DAY OF ATTENDANCE

Saturday and Sunday recorded the highest number of injury occurrences, with each day accounting for 25.7 percent (n=58) of childhood farm injuries. Similarly, Saturdays and Sundays were the most common days for farm injury presentations to the PMH ED, with 23.0 percent (n=52) and 27.9 percent (n=63) of presentations respectively. Figure 9 demonstrates that the day a farm injury occurs is similar to the day of presentations to the PMH ED, suggesting that same day or next day hospital presentation is typical.

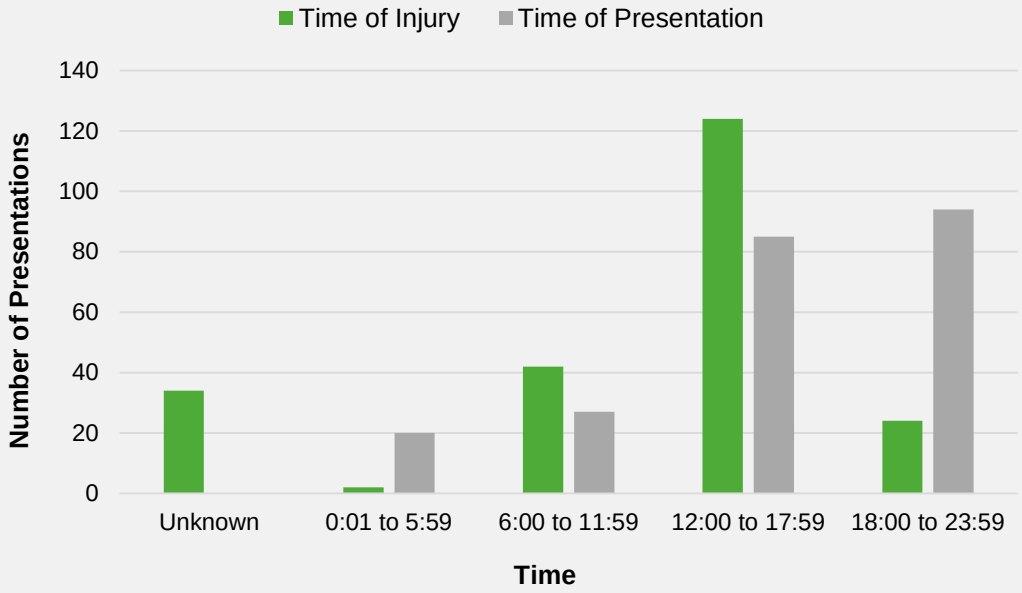
Figure 9: Farm Injury Presentations by Day of Injury and Day of Presentation



TIME FACTORS

Time of injury and time of presentation to the PMH ED are categorised into the five groups as displayed in Figure 10, with 15.0 percent (n=34) of injury times unknown. Between 12:00 and 17:59 was the most common time period to experience a farm injury (54.9%, n=124), while 18:00 to 23:59 was the most common time to present to hospital (41.6%, n=94).

Figure 10: Farm Injury Presentations by Time of Injury and Time of Presentation



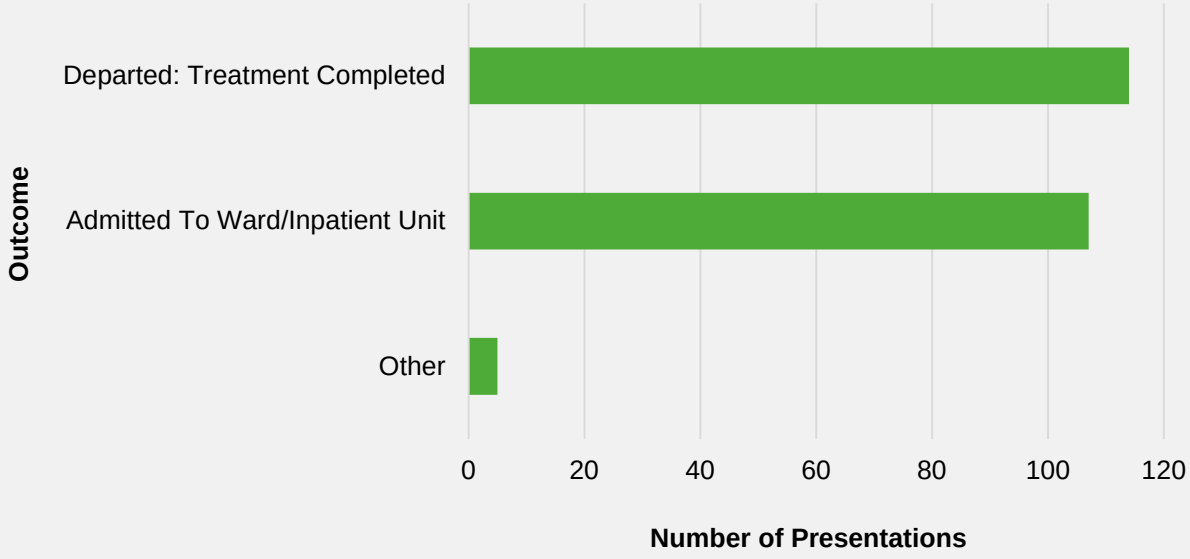
REFERRAL SOURCE

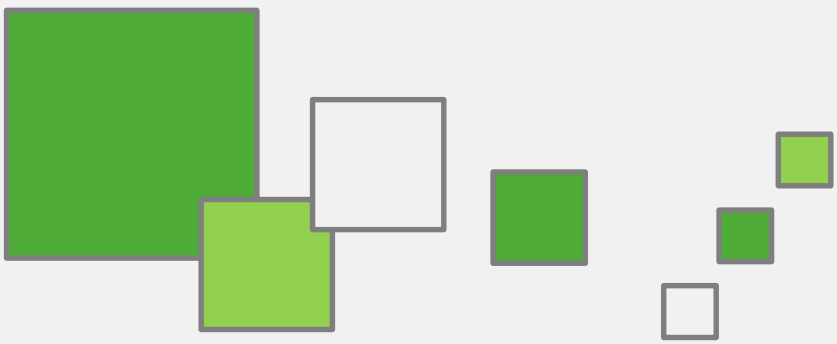
Children that presented to the PMH ED with a farm injury were predominantly referred to the hospital based on the concerns of a family member or themselves (57.1%, n=129). Other hospitals were also a common referral source, accounting for 31.9 percent (n=72) of farm injury presentations. Additionally, 8.4 percent (n=19) of childhood injuries were referred by a General Practitioner.

OUTCOME OF ATTENDANCE

Approximately half (50.4%, n=114) of total farm injury presentations to the PMH ED between July 2005 and June 2015 resulted in the child departing the hospital with treatment completed. Additionally, 47.3 percent (n=107) of the patients were admitted to a ward or inpatient unit. A small percentage (2.2%, n=5) of presentations were recorded as 'other' (Figure 11).

Figure 11: Outcome of Farm Injury Presentations





DISCUSSION

Childhood farm injuries are a significant public health issue in Australia, with the farm remaining a unique and high risk setting for childhood injury. As the family home also becomes a work environment, numerous hazards arise for children such as bodies of water, vehicles, machinery, equipment, and animals.

Data collection and analysis plays an essential role in the development of injury prevention strategies. The ten year period from July 2005 to June 2015 saw 226 farm injury presentations to the PMH ED. While farm injuries form only a minor portion of presentations to the PMH ED, the data contained within this report provides a small representation of the wider picture of childhood farm injuries in WA.

Injury prevention for children on farms is essential and can vary depending on the age of children. Active supervision is a vital component of preventing injuries on farms in all children. Where there are multiple potential supervisors present on the farm, parents and carers must clearly outline a supervisory role to avoid any confusion and ensure there is sufficient attentive supervision[1]. Additionally, supervision on farms may contribute to childhood injuries in cases where the supervising adult is also working in a hazardous environment[20].

Risk reduction among younger children relies on removing the child from the danger source and allowing them to play in a safe area[20]. For young children, active supervision combined with the development of safe play areas and barriers are the ideal methods of injury prevention[20]. Education and familiarisation of potential hazards from a young age is also a recommended injury prevention strategy.[8] As children grow, teach them rules and set clear guidelines to ensure they understand the potential dangers around their home. This is also essential for visitors to the farm.

In contrast to their young counterparts, older children are more vulnerable to hazards arising from the allocation of age inappropriate jobs on the farm[6 20]. Subsequently, farm injury prevention in older children consists of altering the activities and restriction in the involvement in hazardous tasks and chores on the farm[20]. To ensure safety, children must be supervised with parents and carers following recommended safety procedures and guidelines at all times. To ensure no critical time is wasted in the event of an emergency, cardiopulmonary resuscitation and first aid education for farm workers and families should also be kept up to date[6 8].

Prevention measures are essential for the avoidance of childhood injuries and fatalities on WA farms. The development of seasonal injury prevention strategies tailored to the peak activity times within an agricultural region could show benefits in reducing childhood injury on farms. Within WA it is important to consider strategies not only for broad acre farming, but horticulture, viticulture, dairy farms and pastoral stations, each of which have their own peak activity times and therefore unique injury risk profiles. While the main contributing factors for injuries may be similar regardless of the agricultural activities involved, the peak activity times will vary from region to region. Targeting the individual activities occurring on the farm such as planting and harvesting periods; mustering, shearing and stock movement, as well as school holidays may also show benefits for an overall reduction in farm injuries.

REFERENCES

1 Morrongiello, B. A., Zdzieborski, D., & Stewart, J. (2012). Supervision of children in agricultural settings: Implications for injury risk and prevention. *Journal of Agromedicine, 17*(2), 149-162. http://dx.doi.org/10.1080/1059924X.2012.655127

2 Lower, T., & Herde, E. (2012). Non-intentional farm injury fatalities in Australia, 2003–2006. *New South Wales Public Health Bulletin, 23*(2), 21-26. http://dx.doi.org/10.1071/NB11002

3 Australian Institute of Health and Welfare. (2014). *Hospitalised injury in children and young people 2011–12* (Cat. no. INJCAT 167). Retrieved from http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129549323

4 Ergler, C. R., Kearns, R. A., & Witten, K. (2013). Seasonal and locational variations in children's play: Implications for wellbeing. *Social Science & Medicine, 91,* 178-185. http://dx.doi.org/10.1016/j.socscimed.2012.11.034

5 Lower, T., & Herde, E. (2012). Non-intentional farm injury fatalities in Australia, 2003–2006. *New South Wales Public Health Bulletin, 23*(2), 21-26. http://dx.doi.org/10.1071/NB11002

6 Wright, S., Marlenga, B., & Lee, B. C. (2013). Childhood agricultural injuries: An update for clinicians. *Current Problems in Pediatric and Adolescent Health Care, 43*(2), 45-46. http://dx.doi.org/10.1016/j.cppeds.2012.08.002

7 Royal Flying Doctor Service. (n.d.). What we do. Retrieved from https://www.flyingdoctor.org.au/what-we-do/

8 Depczynski, J., Herde, E., Fragar, L., & Lower, T. (2013). Safe play areas on farms in New South Wales. *Australian Journal of Rural Health, 21*(4), 220-224. http://dx.doi.org/10.1111/ajr.12048

9 Depczynski, J., Fragar, L., Hawkins, A., & Stiller, L. (2009). Safe play areas for prevention of young children drowning in farm dams. *Australasian Journal of Early Childhood, 34*(3), 50-57. Retrieved from http://search.informit.com.au.dbgw.lis.curtin.edu.au/fullText;dn=178605;res=AEIPT

10 Lower, T., & Trotter, M. (2014). Adoption of Quad Bike Crush Prevention Devices on Australian Dairy Farms. *Journal of Agromedicine, 19*(1), 15-26. http://dx.doi.org/10.1080/1059924X.2013.857625

11 Fragar, L. & Lower, T. (2010). Motor transport and traffic safety in Australian agriculture: A review. *Journal of the Australasian College of Road Safety, 21*(4), 22-26. Retrieved from http://search.informit.com.au.dbgw.lis.curtin.edu.au/fullText;dn=842602574415421;res=IELENG

12 Milosavljevic, S., McBride, D. I., Bagheri, N., Vasiljev, R. M., Carman, A. B., Rehn, B., & Moore, D. Factors associated with quad bike loss of control events in agriculture. *International Journal of Industrial Ergonomics, 41*(3), 317-321. http://dx.doi.org/10.1016/j.ergon.2011.02.010

13 Jawa, R. S., Young, D. H., Stothert, J. C., Yetter, D., Dumond, R., Shostrom, V. K., Mercer, D. W. (2013). Farm machinery injuries: The 15-year experience at an urban joint trauma center system in a rural state. *Journal of Agromedicine, 18*(2), 98-106. http://dx.doi.org/10.1080/1059924X.2013.766145

14 Pickett, W., Brison, R. J., Berg, R. L., Zentner, J., Linneman, J., & Marlenga, B. (2005). Pediatric farm injuries involving non-working children injured by a farm work hazard: Five priorities for primary prevention. *BMJ Publishing Group Ltd, 11*, 6-11. http://dx.doi.org/10.1136/ip.2004.005769

15 Lubicky, P. J., & Feinberg, R. J. (2009). Fractures and amputations in children and adolescents requiring hospitalization after farm equipment injuries. *Journal of Pediatric Orthopaedics, 29*(5), 435-438. http://dx.doi.org/10.1097/BPO.0b013e3181aa21ab

16 Davies, J., & Franklin, R. (2006). Injuries resulting from horse riding and motorcycle incidents on farms. *Journal of Occupational Health and Safety, Australia and New Zealand, 22*(1), 51-59. Retrieved from http://search.informit.com.au.dbgw.lis.curtin.edu.au/fullText;dn=200603255;res=IELAPA

17 Orihuela, A., Aguirre, V., & Lakestani, N. (2015). Farm Animal Welfare and Children: A Preliminary Study Building an Attitude Scale and Evaluating an Intervention. *Society and Animals, 23*(4), 363-378. http://dx.doi.org/10.1163/15685306-12341370

18 Mohamed-Isa, I., Richards, J., & Skarin, D. (2015). *WA Childhood Injury Surveillance Bulletin: Annual Report 2014-2015*. Perth (WA): Kidsafe WA

19 Kenny, A., & Duckett, S. (2004). A question of place: Medical power in rural Australia. *Social Science & Medicine, 58*(6), 1059-1073. http://dx.doi.org/10.1016/S0277-9536(03)00278-8

20 Morrongiello, B. A., Marlenga, B., Berg, R., Linneman, J., & Pickett, W. (2007). A new approach to understanding pediatric farm injuries. *Social Science & Medicine, 65*(7), 1364-1371, http://dx.doi.org/10.1016/j.socscimed.2007.05.013