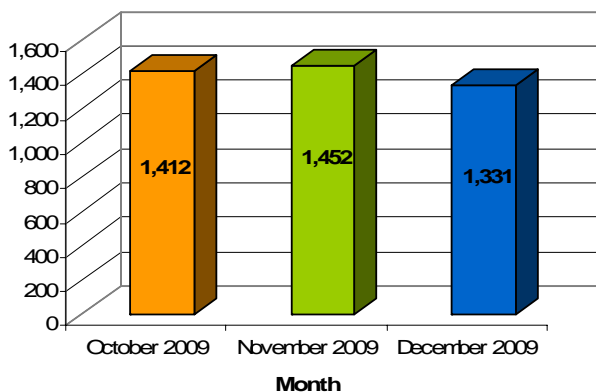


## Pedestrian Related Injuries

### Childhood Injury Presentations: October to December 2009

- There were 15,112 presentations to the Princess Margaret Hospital Emergency Department (PMH ED) from October to December 2009
- This was a 16% decrease in presentations on the previous quarter (n=18,119) and a 9% increase from the corresponding quarter in 2008 (n=13,778)
- Injury presentations accounted for 28.1% (n=4,195) of the total presentations to PMH ED between October and December 2009
- This was considerably higher than the long term average of 25% and the previous quarter (23%), however, it is comparable to the proportion of injuries in the corresponding quarter in 2008 (27.66%)
- There were 119 presentations due to poisoning, 106 due to burns and 8 due to drowning/near drowning
- 213 injuries involved playground equipment
- The majority of injuries were sustained in the home (n=1,455). Outside areas and sheds accounted for 32.22% of home injuries
- Toddlers aged 1-2 years accounted for the highest number of injury presentations (n=981)
- The majority (79.4%) of children who presented to ED with an injury were treated in the ED and discharged home

### Number of Injury Presentations by month, October to December 2009



### Introduction – Pedestrian Related Injuries

- Between July 2005 and June 2009, there were a total 211,422 presentations to PMH ED. Of these 50,498 were due to injury
- During the four year period, there were 1,615 pedestrian related injury presentations (3.99% of total injury presentations)
- This equates to approximately 404 pedestrian related injuries per year



- Pedestrian related injuries are comprised of the following injury categories: “pedestrian” (n=230, 14.24%), “other pedestrian conveyance” (n=111, 6.87%) and “wheeled pedestrian” (n=1,274, 78.89%)
- Children aged 0 to 1 year of age accounted for the highest number of “other pedestrian conveyance” injuries (0: n=49; 1: n=24)
- Those aged 2 to 5 years of age accounted for the highest number of “pedestrian” injuries (2 years n=22; 3 years n=20; 4 years n=21; 5 years n=22)
- Those aged 12 to 13 years of age accounted for the highest number of “wheeled pedestrian” injuries (12 years n=168; 13 years n=152)
- More Aboriginal children sustained a “pedestrian” injury (46.67%) compared with non-aboriginal children (12.59%).
- “Public Roadway, Footpath, Cycleway” (n=712) was the most common location for pedestrian injuries to occur

## Results

This edition of the WA Childhood Injury Surveillance Bulletin features pedestrian-related injuries. The data examined was collected by the Princess Margaret Hospital Injury Surveillance System between July 2005 and June 2009 and includes all children who presented to the hospital's Emergency Department due to injury.

During the four year study period there were a total of 50,498 injury presentations to PMH ED. The total number of pedestrian-related injuries over the four year period was 1,615; an average 404 per year and 3.99% of all injury presentations.

Pedestrian-related injuries are comprised of three separate categories:

- "pedestrian" injuries (230 presentations)
- "other pedestrian conveyance" (111 presentations)
- "wheeled pedestrians" (1,274 presentations)



The category "other pedestrian conveyance" was in use until June 2008. It was intended to capture all pedestrian injuries where the child was travelling neither by foot, nor by using a small-wheeled device such as a scooter or skateboard. This left two main instances that could be placed in this category: children in prams/strollers and children in wheelchairs. However, the analysed data shows 13 cases where children using skateboards, bicycles, scooters, rollerblades or travelling by foot were included under "other pedestrian conveyance". The reason for this is unclear but is likely to be a coding error.

The "other pedestrian conveyance" category was removed from the 2008-09 coding set, and the presentations were coded as either "pedestrian" or "wheeled pedestrian". This eliminated some of the confusion and discrepancies seen in the previous years' data.

From July 2008, "pedestrian" refers to any situation where the child is on foot, while "wheeled pedestrian" refers to any situation where the child is a pedestrian using some form of wheeled transport. This includes scooters, skateboards, rip-sticks, rollerblades, roller-skates, trikes, wheelchairs and prams.

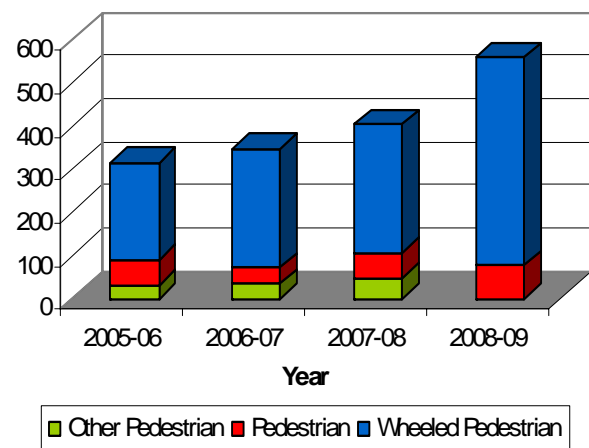
As a result of these coding changes, the distribution of pedestrian related injuries altered in 2008-09.

Overall, there was an increase in pedestrian related injuries over the four year study period. This is consistent with overall injury presentations to PMH ED during the study period.

The category "wheeled pedestrian" showed a marked increase in 2008-09, which it is difficult to explain based solely on changes in the coding.

One possible explanation for the increase in "wheeled pedestrian" injuries during the four year study period over and above the coding changes, may be an increase in popularity of small-wheeled devices such as "rip-sticks" during 2008-09. These products were first identified by name in injury description fields in 2008-09.

**Figure 1: Pedestrian Injury Presentations to PMH ED by Year and Cause: June 2005 to July 2009**



Pedestrian related injuries were most common during April, accounting for 200 presentations. The number of pedestrian related injury presentations fell below 100 per month for the three months; July (n=86), August (n=89) and September (n=86).

Pedestrian related injuries were more likely to present at PMH ED on the weekend, with Saturdays recording a total of 315 injuries and Sundays 322 over the four years.

Pedestrian related injury presentations to PMH ED in the study period increased with child age up to 12 years of age (n=190), then decreased, with only 74 children aged over 14 years presenting to PMH ED. This is most likely to be due to both an actual decrease in pedestrian-related injuries in the older age group combined with the tendency for adolescents to present to and be treated in non-paediatric specific hospitals.



The male: female gender ratio for pedestrian related injury presentations to PMH ED was 2:1, indicating that boys are twice as likely to sustain a pedestrian related injury as girls. This is comparable with the 3:2 gender ratio observed for total causes of injury presentations.

Pedestrian related injuries most frequently occurred on "public roadways, footpaths or cycleways". The next most common location for injury was the "home" (n=433), followed by "Public Buildings, Cultural or Recreation areas" (n=198).

The majority of pedestrian injuries were deemed unintentional. Just 8 of the 1615 pedestrian related injury presentations were classed as intentional. These included 2 "alleged assault", 2 recorded as "intentional self harm" and 4 "undetermined intent".

More than one quarter of all pedestrian related injury presentations were subsequently admitted (n=436; 27.0%). This is notably greater than the 18% admitted for all causes of childhood injury. Two of the 436 cases died in ED. Of those not admitted, 1152 were treated and departed, 2 were discharged to a clinic, 2 referred to a PMH Department and 3 transferred to another hospital. A further 16 did not wait for treatment and 1 left at their own risk.



## OTHER PEDESTRIAN CONVEYANCE

Injuries categorized as "other pedestrian conveyance" accounted for 6.87% (n=111) of pedestrian related injury presentations to PMH ED during the study period, although the category was not in use in the final 12 months of the study period. In the three years July 2005 to June 2008 the category accounted for 10.48% of pedestrian related injury presentations.

In the final year of the study period, July 2008 to June 2009, the cases that previously would have fallen into this category were recorded as either "pedestrian" or "wheeled pedestrian" injuries. The coding change during the study period is a limitation of this report.

"Other pedestrian conveyance" injuries consisted predominantly of children in prams or strollers (n=90, 81.08%). A further 8 were children in wheelchairs. The remaining 13 cases included children on bicycles and tricycles (n=4), scooters (n=2), toy cars (n=1), rollerblades (n=1), skateboards (n=1) and walkers (n=1), as well as children as pedestrians who were hit by a vehicle (n=3). The reason for these cases being included in this category is unclear.

### Age and Gender

The majority of presentations (44.14%) were by children aged less than 1 year. This is consistent with the majority of injuries in this category being to children in prams.

- Children aged 1 to less than 5 years accounted for 95 (85.59%) "other pedestrian conveyance" presentations
- Children aged 5-9 years accounted for 8 "other pedestrian conveyance" presentations and
- children aged 10-14 years accounted for 6

The 2 presentations by children older than 14 years consisted of one child in a wheelchair and one child who was hit by a vehicle.

There was no gender difference in this category (gender ratio 1:1) unlike the 2:1 ratio for combined pedestrian related injuries and the 3:2 for total causes of injury.



### Ethnicity

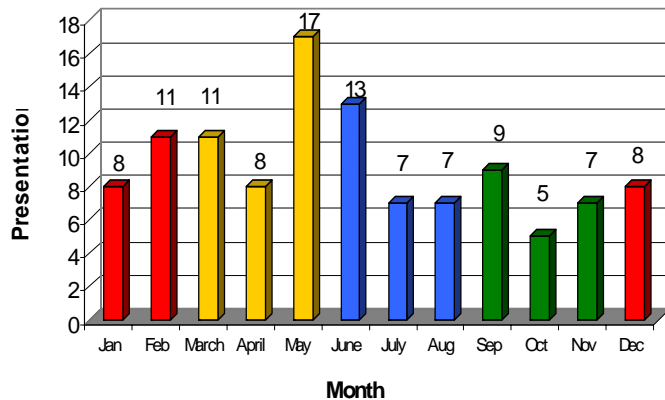
Children identified as of Aboriginal or Torres Strait Islander descent were over-represented in the data. These children accounted for approximately 9.0% (n=10) of the "other pedestrian conveyance" presentations. All of these were children who either fell from a pram, or were in a pram when it tipped over.

Month and Day of Injury

There was a peak in presentations for this category during the month of May (n=17) and the least number of presentations were recorded in October (n=5). This was reflected in the seasonal distribution, with 32.43% of injuries occurring during autumn compared to 18.92% in spring.

The weekly distribution of injuries ranged from 10 on Mondays to 20 recorded on Fridays and Saturdays.

**Figure 2: "Other Pedestrian Conveyance" Injury Presentations to PMH ED by Month: June 2005 to July 2009**



Location of Injury

There were 44 injuries that occurred in each the locations of "home" and "public roadway, footpath or cycleway". A further 7 occurred in a "public building, cultural or recreation area".

Intent of Injury

As with total causes of childhood injury, the majority (97.30%) of "other pedestrian conveyance" injuries were unintentionally caused.

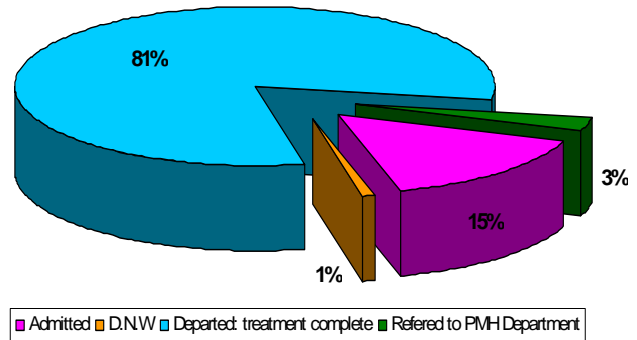
One presentation was recorded as being "alleged assault" and a further 2 as "undetermined intent".

Disposition

Of the 111 presentations to PMH ED in this category, 17 were subsequently admitted and another 3 were referred to a PMH Department. The majority (81.08%) of children were treated in the Emergency Department and then departed. Only one case chose not to wait for examination.



**Figure 3: "Other Pedestrian Conveyance" Injury Presentations to PMH ED by Disposition: June 2005 to July 2009**



**PEDESTRIAN INJURIES**

Between July 2005 and June 2009 there were 230 injury presentations to Princess Margaret Hospital Emergency Department that were coded as "pedestrian" injuries; an average of 57 presentations per year.

Injuries are coded as "pedestrian" when the injury occurs in a transport related event, during which the child is on foot.

The two recurring scenarios in the injury surveillance data for "pedestrian" injuries commonly involve either;

- children being hit by a car reversing out a driveway, or
- children hit by a car or other vehicle while trying to cross the road

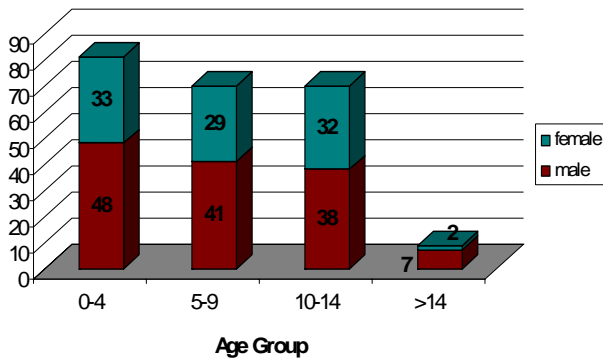
Age and Gender

The highest proportion of "pedestrian" injury presentations was in the 1-4 year old age group (n=95). Unlike "other pedestrian conveyance" injuries, there were no presentations by children less than 1 year old. This is a largely expected finding as children less than 1 year of age are far less likely to be "on foot" in places such as roadways.

There were 70 presentations for each of the age groups 5-9 years and 10-14 years and 9 presentations by children aged over 14 years.

Approximately 58% of presentations were male children (n=134). This is comparable to the male: female gender ratio of 3:2 that exists for total causes of child injury.

**Figure 4: "Pedestrian" Injury Presentations to PMH ED by Age Group and Gender: June 2005 to July 2009**



Ethnicity

Aboriginal children comprised 15% of "pedestrian" injury presentations during the four year study period. This is approximately three times greater than the proportion usually observed for all childhood injury.

Month and Day of Injury

The seasonal distribution of "pedestrian" injuries showed little variation. The fewest injuries occurred during autumn (n=52) and the most during summer (n=60). The monthly distribution ranged from 11 presentations in March to 23 presentations in October.

The weekly distribution did not show an increase in presentations over the weekend, which is the common trend for child injury presentations to Princess Margaret Hospital Emergency Department. Instead, "pedestrian" injury presentations were most common on Mondays and Fridays. This is partially explained in the injury descriptions, which reveal that many of the injuries occurred to children walking to and from school.

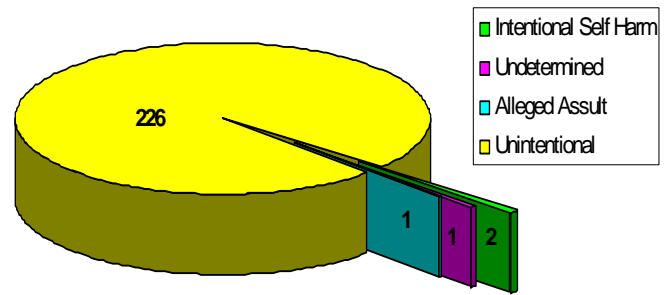
Location of Injury

Over two thirds of injuries (68.70%) occurred on "public roadways, footpaths or cycleways". "Home" was the next most common location with all cases occurring in the driveway.

Intent of Injury

The majority of "pedestrian" injuries were deemed to be "unintentional" (n=226). One was considered to be an "alleged assault", one was recorded as "undetermined intent" and 2 were recorded as "intentional self-harm".

**Figure 5: "Pedestrian" Injury Presentations to PMH ED by Intent of Injury: June 2005 to July 2009**



Disposition

The proportion of hospital admissions for "pedestrian" injuries was notably higher than generally observed for total causes of childhood injury.

Of the 230 "pedestrian" injury presentations, 122 (53.04%) were subsequently admitted to Princess Margaret Hospital. A further 1 case was transferred to another hospital.

The high proportion of admissions from ED presentations is indicative of the severity of injuries that result from pedestrian vs vehicle collisions.



**WHEELED PEDESTRIAN INJURIES**

"Wheeled pedestrian" refers to injuries that are sustained when the child is a pedestrian using some form of wheeled transport. This includes scooters, skateboards, rip-sticks, rollerblades, roller-skates and trikes. After the coding changes in July 2008, it also included wheelchairs and prams. This category is not limited to injuries sustained on roadways, but also includes locations such as footpaths, cycleways, home driveways and skate parks.

"Wheeled pedestrian" comprised the highest proportion of pedestrian-related injury presentations in this report (78.89%, n=1274).

There was an increasing trend during the four year study period, which spiked in the 2008-09 year. This is most likely due to the combined effect of previously mentioned coding changes and the increased popularity in small-wheeled devices.

### Age and Gender

The age distribution for “wheeled pedestrian” injury presentations was significantly different from what is usually observed in PMH ED presentations, where children under 5 years of age account for the majority of injuries.

Instead, children aged 10-14 years were most likely to present to PMH ED with “wheeled pedestrian” injuries (n=728, 70.41%). This is most likely due to an increased use of small-wheeled devices by this age group. Males accounted for 70.41% of the presentations.

### Ethnicity

There were 29 presentations recorded as being of Aboriginal ethnicity (2.28%) and a further 11 (0.86%) of unknown ethnicity.

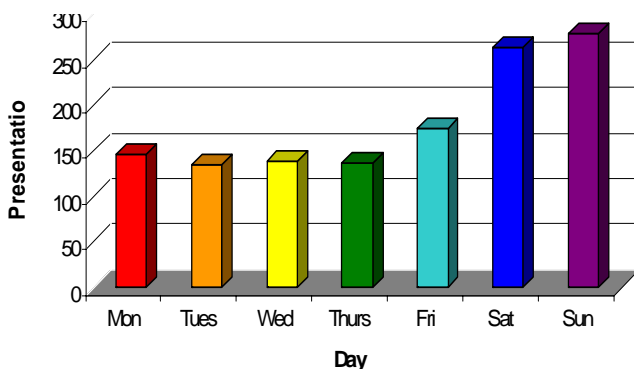
### Month and Day of Injury

“Wheeled pedestrian” injuries most frequently occurred during summer (n=391) and autumn (n=408). Only 15.54% of injuries occurred during the winter months.

During the weekdays “wheeled pedestrian” injuries remained fairly constant, averaging 146 per day. The number of injuries rose considerably over the weekend, with 263 on Saturdays and 279 on Sundays.



**Figure 6: “Wheeled Pedestrian” Injury Presentations to PMH ED by Day of Injury: June 2005 to July 2009**

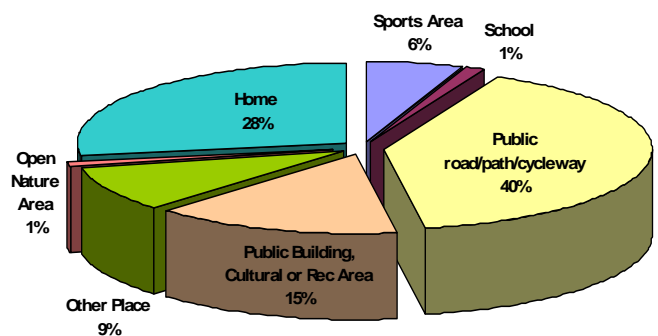


### Location of Injury

“Public roadways, footpaths and cycleways” were the locations in which 40% of “wheeled pedestrian” injuries occurred. A further 28% of injuries were sustained in the home, the majority of which were outside.

There were 190 injuries (16%) recorded as occurring in a “public building, cultural or recreation” area. This included some Skate Parks, as did some of the 72 (6%) that were recorded as “Sports Areas”.

**Figure 7: “Wheeled Pedestrian” Injury Presentations to PMH ED by Location of Injury: June 2005 to July 2009**



### Intent of Injury

Almost all (n=1,273) “wheeled pedestrian” injury presentations were categorized as unintentional and just one was classed as “undetermined intent”.

### Disposition

Over three quarters of presentations were treated in the PMH Emergency Department and departed home (n=957, 75.11%).

- 297 cases (23.31%) were admitted and
- 6 were referred to PMH clinics or transferred to other hospitals
- 1.2% of presenting cases did not wait for treatment.



## Discussion

The analysed data shows that Western Australian children are frequently at risk of sustaining pedestrian-related injuries when on foot, in prams and wheelchairs and while using small-wheeled devices.

The type of pedestrian-related injuries sustained by children is related to their age and stage of development. Children less than one year old are most likely to sustain injury while in a pram or stroller, while toddlers are at risk of driveway run-over injury and fatality.

Preschoolers and children in early childhood are most at risk as pedestrians crossing the road and walking to and from school. Children ten years of age and older are most frequently injured using small-wheeled devices for play and transportation. These differences relate to the child's stage of development and consequently influence the key prevention strategies for each group.

Being a pedestrian is a normal and almost unavoidable part of childhood in Australia. Walking and other pedestrian-related activities are important both for transportation and for physical activity<sup>1</sup>. However, there are many dangers involved. Child pedestrians are reportedly up to thirty times more likely to die, per kilometre travelled, compared to child passengers in vehicles<sup>1</sup>.

Environmental risk factors for child pedestrian-related injury include the volume and speed of traffic, kerbside parking, the density of housing, lack of safe crossing sites and lack of safe play areas<sup>1</sup>. Child factors include small stature and weight, lack of knowledge and understanding, inattention and their perceptual skills not being fully developed<sup>2</sup>.

While many pedestrian-related injuries result in bruises, abrasions and fractures, some are far more severe. In 1995, pedestrian injury was the leading cause of injury specific death in Australian children 5-9years old<sup>2</sup>. These are usually the result of child vs vehicle collision. There is a huge disparity between the momentum, size and power of a vehicle weighing several tons and a child of only a few kilograms<sup>2</sup>.

There are a number of intervention and prevention strategies that will improve the safety of child pedestrians.

Road design plays a large role in pedestrian safety<sup>2</sup>. Risks are reduced when roads have designated crosswalks, adult assisted crosswalks, warning signs/signals and separated footpaths and cycleways<sup>1</sup>.

Children are commonly injured when crossing the street from between parked vehicles, so limiting kerbside parking means these visual obstructions are removed.

The implementation of speed restrictions such as the 50km per hour restrictions in residential areas and 40km per hour in school zones also helps to reduce the risk of pedestrian injury<sup>1</sup>.

The creation of safe play areas that are separated from roadways and driveways is crucial to child safety. Children should play in the backyard of homes instead of front yards and should not play in driveways. When this is not possible, constant parental supervision is essential. This is not intended to deprive children from fun, challenge and learning experiences – merely to minimise the risk of the devastating consequences of child vs vehicle collisions.

Parental supervision of young children is necessary for prevention of all causes of child injury. This includes pedestrian situations such as walking and using small-wheeled devices on roads, footpaths, cycleways and any other situation. Young children do not have the cognitive, motor or perceptual abilities to recognise, understand and avoid dangers.

While protective equipment may not prevent serious injuries that occur during child vs vehicle collisions<sup>2</sup>, they can minimise and prevent injury in many other circumstances. Protective equipment is recommended for all "wheeled pedestrians" using equipment such as scooters, skate boards, roller blades and rip sticks. This includes helmets, knee and elbow pads and wrist guards that can be purchased from most sporting, bicycle and department stores.



Educating children about pedestrian safety helps them to understand risks and provides them with skills as they become increasingly independent. This will enable older children to safely negotiate pedestrian situations – such as walking to school – without an adult. It is never too early to start talking to children about safe pedestrian behaviours.

Parental role-modelling is also important. Children learn behaviours from what they observe as well as from what they are told.

Education programs for parents and children can increase awareness of safe pedestrian behaviours and provide strategies for parents to teach these to children.

There are a number of programs of this nature currently available in Western Australia. One of these is the School Drug Education and Road Aware (SDERA) *Smart Steps* program, targeted at parents and carers of children 0-5years and delivered by community organisations.



There are also programs aimed at educating and facilitating safe travel to school for school aged children. Walking to and from school is a common situation in which children sustain pedestrian related injuries. Two such programs include the national *Walk Safely to School* program run by the Pedestrian Council of Australia and the *Walking School Bus* program run by the Western Australian Department of Transport. Both of these programs encourage supervised walking to and from school using safe routes.

Key features of pedestrian safety:

- "Stop, look, listen, think" before crossing the road
- Use designated crosswalks, manned crossings and signal crossings whenever available
- Don't attempt to cross roads from between parked cars – you may not be able to see oncoming traffic
- Take care when alighting from buses. Do not step out behind or in front of the bus

- Use footpaths and cycle paths whenever available
- Wear helmets and other protective equipment when using small-wheeled devices such as scooters and skateboards
- Create safe play areas that separate children from driveways and roadways.
- Know where children are when moving vehicles in driveways to avoid driveway run-over injuries.



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2. Centre for Disease Control (2010). *National Strategies for Advancing Child Pedestrian Safety*. Available from [http://www.cdc.gov/MotorVehicleSafety/Pedestrian\\_Safety/pedstrian.html](http://www.cdc.gov/MotorVehicleSafety/Pedestrian_Safety/pedstrian.html) Accessed 2010 Aug 30.

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