

## Childhood Pedestrian Injury in Queensland

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### Summary

- ◆ 7 child pedestrians are killed on Queensland roads every year
- ◆ Between 1998 and 2003 539 children presented to QISU participating hospitals with pedestrian related injuries
- ◆ Boys between 5 and 9 years are most likely to be injured
- ◆ Child pedestrians are more likely than adult pedestrians to suffer head and chest injuries
- ◆ The most dangerous time for school age child pedestrians is weekdays between 3 and 6 pm but particularly the hour immediately after school
- ◆ Children under 10 years are ill equipped to cross roads because of poor peripheral vision and their poor judgement of speed and distances



### INTRODUCTION

Every year around 30 pedestrians under 15 years are killed on Australian roads. On Queensland roads alone, on average, 7 children are killed each year. The chance of being fatally injured in a pedestrian crash is approximately double that of other road users. Pedestrian injury is a significant source of childhood morbidity and mortality. For the period 1994-2000 more than 84 children were killed due to pedestrian injury in Queensland (1). Of these, 33 were driveway run-overs. The issue of driveway run overs is very specific and covered in Bulletin 76 March 2003 *Low Speed Run-overs of Young Children in Queensland* and is available on the QISU website for further information.

### METHODS

Data were collected through the QISU surveillance system from the 11 participating hospitals. Injury presentations were coded at the presenting hospital according to the nature and cause of the injury. Pedestrian injury is defined as person struck by a vehicle or bicycle. This includes low speed run-overs in driveways. Data was extracted from the database by searching the external cause field for pedestrian injury. Additional information about the mechanism of the injury was gleaned from the text descriptions. These descriptions are non-standard and although they give additional information it is not possible to formally analyse these data using this information. Triage categories are scaled from 1 to 5, with 1 indicating a need for immediate resuscitation, 2 urgent assessment within 10 minutes and 3 to 5 requiring less urgent assessment. An injury code of *intracranial injury* includes minor to more serious diagnoses (concussion, cerebral swelling, intracranial haemorrhage).

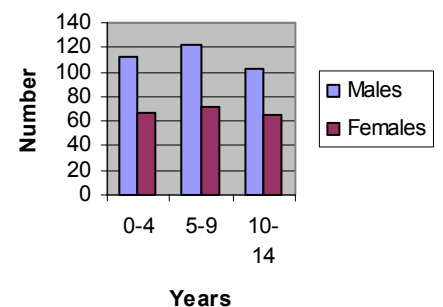
### RESULTS

During the period 1998 to 2003, 539 childhood pedestrian related injuries presented to QISU participating hospital emergency departments (EDs) in Queensland.

#### Age and Gender

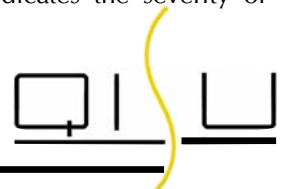
Boys were more likely to be injured than girls even in the 0-4 age group where the male bias is often less obvious for other types of injury. Children under the age of 5 were most likely to be injured in a driveway or car park while children between 5 and 9 years were more likely to be injured on a roadway. The frequency of pedestrian injury was similar across age groups.

Table 1: Pedestrian Injury Age by Gender



#### Nature of Injury

A proportion (n=135 25%) of children presented with superficial injuries but the high percentage of fractures (n=114, 21%) and intracranial injuries (n=85, 16%) indicates the severity of the injuries.



### Body Part Injured

The vulnerability of the child's head is indicated by the high proportion of injuries involving head (n=113, 21%) followed by the leg, ankle and foot (34% of all presenting injuries). Younger pedestrians are more likely to suffer head and chest injuries than adult pedestrians (43% in under 5 year olds and only 20% in adults). Six percent of children presented with multiple injuries and 3 children suffered injuries to their back and spinal cords.

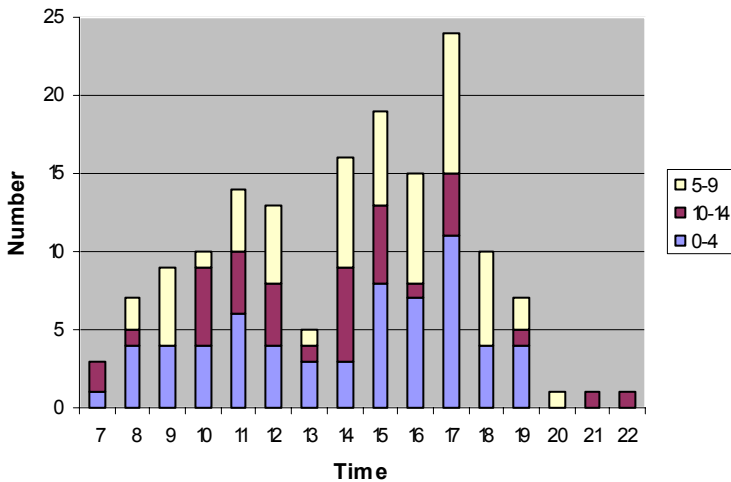
### Injury Severity

Of the 539 pedestrian injuries, three died of their injuries in EDs and 47 were admitted with a triage category of resuscitation (requiring immediate life saving treatment). Most of the remaining children presented to the ED with a triage category of urgent (requiring treatment within 30 minutes) and a very high proportion (39%) of presenting children required admission to hospital.

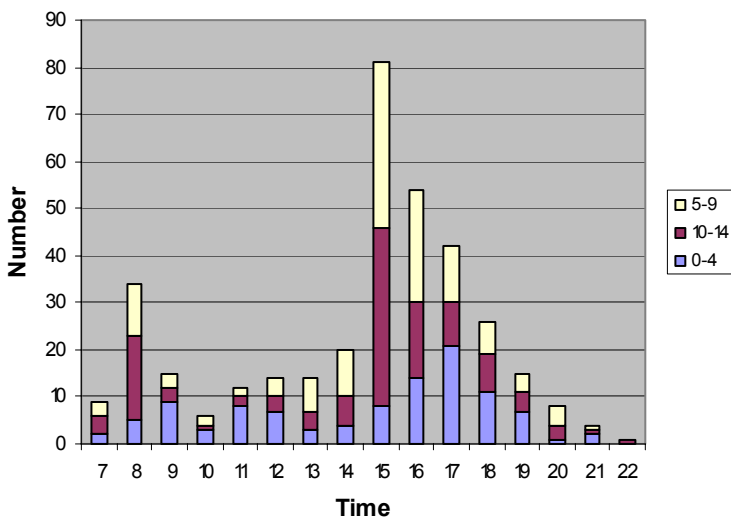
### Day and Time of Injury

For school age children (5 – 14) almost half of injuries occurred between 3pm and 5pm (45%) with a peak between 3pm and 4pm (29%) on school days. On weekends there is a more even distribution but still with almost half in the afternoon between 2 and 6 pm (45%). For preschool children the pattern is consistent on weekday or weekend with injuries peaking later in the afternoon and in the early evening between 5 – 7 pm (28% during the week and 35% on weekends).

**Table 2: Weekend pedestrian injury for children by time of day**



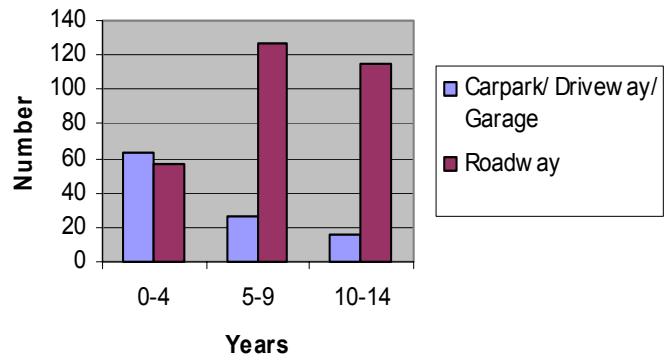
**Table 3: Weekday pedestrian injury for children by time of day**



### Place

Over half (53%) the injuries occurred on sealed urban roads with 35 (6.5%) injuries occurring on a footpath, path or foot track. Seventeen percent (n=93) occurred in a driveway or car park and 2.6% (n=14) in a garage or carport. Of these, 28 (26%) occurred while the vehicle was being reversed. The most common place of injury for children under 5 was the driveway (n=58) followed very closely by sealed roadway (n=55). Children over the age of 4 were most commonly injured on a sealed roadway.

**Table 4: Age of pedestrian injury by place**



### Activity

A large group of children (27%) were identified as being engaged in non-specific activity when injured and a search of the text field described these as walking home, crossing street, walking to park etc. For 23% of children their activity was playing. 8% of children were being nursed or cared for—some of these included injuries while crossing streets with parents (either being carried or escorted) or while sitting in a pram and having the pram struck by a car.

### Mechanism of Injury

Nearly 10% (n=52) of children were injured by being struck by a bicycle. Of interest, 9 children were injured by falls. One (1) child fell out of the car onto a roundabout and was subsequently struck by another vehicle, another fell from a car in the driveway as a sibling released the hand brake and the car rolled over him.

## DISCUSSION

Children are at increased risk for pedestrian injuries for several reasons:

- \* Their smaller size makes them difficult for drivers to see, especially if they are standing between parked cars on the side of the road.
- \* Their heads are proportionately larger and less well supported than adults
- \* Children's height means they are being struck at head and chest level by vehicles, as opposed to adults who are struck lower in the body
- \* Because young children are often unable to judge distances and vehicle speeds accurately, they can easily misjudge when it is safe to cross a street.
- \* Parents can over-estimate their children's ability to cross the street. Many primary school-aged children don't understand traffic signals and don't know how to anticipate drivers' actions.
- \* Drivers and child pedestrians each assume (incorrectly) that the other will yield the right-of-way.

The prevention of childhood pedestrian injury is a complex problem. There has been a great deal of research over many decades and experts in the field have long debated the most effective preventive strategies. Literature searches reveal that almost all prevention methods have variable levels of support and occasionally strong critics. (2) Children are most likely to be involved in a pedestrian injury in a suburban street in the late afternoon or early evening. These injuries usually occur mid-block (3) and the children most likely to be involved are boys between the ages of 5 and 9 years of age. Fatal injuries are generally associated with higher vehicle speeds.

The prevention literature tends to focus on 2 major areas, education of the child and the driver, and engineering or environmental factors.

## Education

### Child

Children are generally considered ill equipped developmentally to cross roads before the age of 10. They have poor peripheral vision and their perception of the rate of approach of a vehicle is also poor.

It is thought that "safe crossing" education only results in a temporary improvement in road crossing behaviour and it has not been demonstrated to translate into a reduction in injury (4). Those who support education suggest that while engineering and environmental modifications are successful strategies, at some time a child will have to negotiate a roadway where these are unavailable. (3) There are many programs teaching children safe ways to use roads (i.e. Safe Walking and Pedalling Program, School Crossing Supervisor Scheme, Stop, Look, Listen, Think) (5).

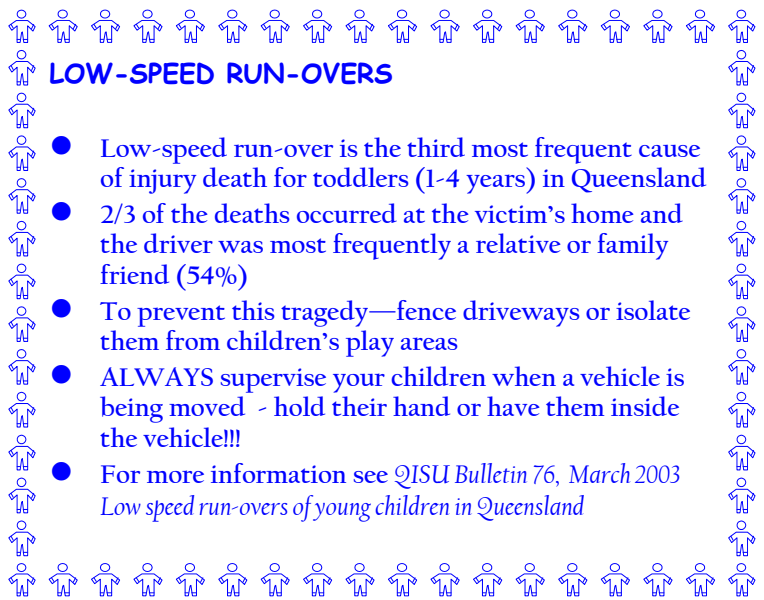
Young children remain at risk for pedestrian injury even after training and as a consequence still require competent supervision up to age 10 years. Parents tend to overestimate their child's ability to safely cross roads (6). Studies have shown that the presence of an effective supervisor is associated with a reduction in pedestrian injuries (7).

### Driver

Drivers who are involved in fatal pedestrian crashes are more likely to have poor driving records, be exceeding the speed limit at the time of the crash and frequently have consumed alcohol prior to getting behind the wheel of the car. (8)

Queensland Transport has invested heavily in campaigns aimed at drivers such as the 'Look out! There are children about' campaign. These involve ads to shock drivers into slowing down and be aware of the vulnerability and unpredictability of children on our roads. Research conducted by Queensland Transport in 1999 /2000 showed an increase of only 5% in awareness of pedestrian safety issues following a public education campaign (9).

For information on current campaigns in Queensland go to [www.roadsafety.qld.gov.au](http://www.roadsafety.qld.gov.au) .



## LOW-SPEED RUN-OVERS

- Low-speed run-over is the third most frequent cause of injury death for toddlers (1-4 years) in Queensland
- 2/3 of the deaths occurred at the victim's home and the driver was most frequently a relative or family friend (54%)
- To prevent this tragedy—fence driveways or isolate them from children's play areas
- ALWAYS supervise your children when a vehicle is being moved - hold their hand or have them inside the vehicle!!!
- For more information see *QISU Bulletin 76, March 2003 Low speed run-overs of young children in Queensland*

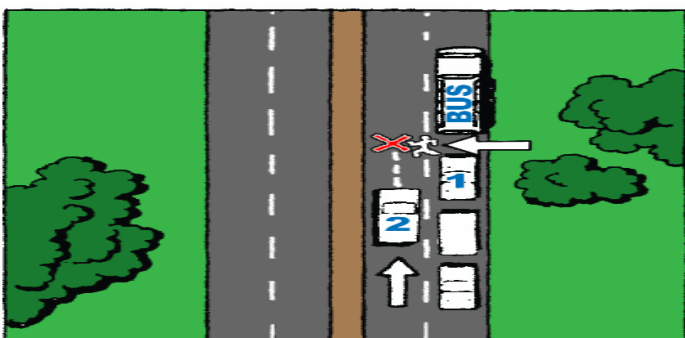
## Engineering and Environmental Factors

Studies in Perth and Auckland found that child pedestrian injuries increase with volume of traffic and exposure to the road environment. (10), (11). The ideal environmental solution to pedestrian injuries is to completely separate pedestrians from road traffic using structures like overpasses. Unfortunately this is not always feasible. However, traffic calming measures have been proven to be effective in reducing traffic injuries. Examples of engineering measures include speed humps, pedestrian refuges, pinch points and chicanes. A systematic review of traffic calming found a 25% reduction in road crashes involving injury on residential streets, and another review looking just at pedestrian injuries found the same rate of reduction (12), (13). Other environmental measures such as improved lighting to increase visibility, separating pedestrian and vehicular traffic by either time (eg. staggering traffic lights so that pedestrians are not in an intersection as vehicles are moving through it) or space (eg. overhead pedestrian bridges) and reducing vehicle speed have all been shown to reduce injury rates.

Reduced speeds have been linked to lower injury rates and less severe injuries. The Queensland Government introduced a 50km/h speed limit in local streets (March 1999). The Victorian Government introduced similar measures in 2001 and a study of the effects of this reduction in Victoria showed a 22% decrease in all pedestrian crashes compared to zones that remained at 60km/h(14). Similar data for Queensland is yet to be released. However, Queensland data from the Australian Transport Safety Bureau (ATSB) shows that there has been a dramatic decline in child pedestrian fatalities from 50 deaths in 1994-1998 to 20 in 1999-2003, a 60% reduction. Almost all of this decline has been in under fives, with the numbers of deaths falling from 24 to 4 for the corresponding periods.

## Pedal Power

The number of children being run down on shared pedestrian/bicycle paths is of concern. Bicycles are vehicles and move at speeds capable of inflicting serious injury if they hit a child. On separated paths, pedestrians should avoid the side reserved for cyclists and cyclists should take into account the unpredictability of child pedestrians and slow down near all pedestrians. On shared paths pedestrians have right of way and cyclists should ride accordingly.



## Danger Hour

This report highlights the particular danger of the hour after school. More children are injured on the journey home from school than the journey to school. Queensland Transport has initiated strategies to address the issue of school travel. One of these is SafeST where a multifaceted approach has been implemented. This program includes strategies to improve the road environment around schools, educate parents and children about ways to make their journey to school safer and raise community awareness about vehicle speed near schools through signage and the use of radar activated variable message speed sign to inform motorists of their speed. For further information about SafeST and other programs such as 'Look out there are children about' go to [www.roadsafety.qld.gov.au](http://www.roadsafety.qld.gov.au).

Parents, teachers and drivers need to be reminded of the danger hour for school children.

## SUMMARY

Reducing child pedestrian injury requires a combination of strategies including environmental modification, enforcement and education. These are as relevant today as they were 20 years ago, although the relative effectiveness of different measures is now better understood. Identifying the chain of events leading to pedestrian injuries as well as the time, place and circumstances are key factors in determining which preventive options work best with specific settings and age groups. Identifying the epidemiological patterns of childhood pedestrian injury contributes to the design of effective preventive packages to target the most common injury scenarios.

Historically, strategies put in place by road safety authorities have tended to concentrate on education and behaviour modification, with little coordinated effort being devoted to changing the road environment. The only *proven* measure to reduce pedestrian injury has been shown to be traffic calming and modifying the road environment. This requires a multifaceted strategy involving the support of the whole community, not just at the governmental level but right down to the individual driver and pedestrian.



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