Queensland Injury Surveillance Unit

INJURY BULLETIN

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Low speed run-overs of young children in QLD

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QISU collects and analyses data from emergency department injury presentations on behalf of Queensland Health. Participating hospitals represent three distinct areas of Queensland.

QISU publications and data are available on request for research, prevention and education activities.

Summary

- 28 children younger than five years died as a result of a low-speed, non-traffic pedestrian impact in Queensland in the seven year period, 1994-2000
- Low-speed run-over is the third most frequent cause of injury death for toddlers (1-4 years) in Queensland
- 60% of the vehicles involved in the deaths were reversing at the time
- 41% of the vehicles involved in the deaths were 4WDs
- 2/3 of the deaths occurred at the victim's home and the driver was most frequently a relative or family friend (54%)
- In the four years to 2001 QISU recorded 68 emergency department (ED) presentations by children younger than five years for low speed runover.
- 80% of the injury presentations to ED occurred at home and 60% required hospital admission

Introduction

In Australia pedestrian crashes are responsible for half of all transport related deaths of children aged under five years. Of these fatalities half are the result of a low speed driveway run-over[1]. For the years 1994 to 2000 there were 53 pedestrian fatalities of children aged less than five years in Queensland of these 28 (53%) were the result of a low speed impact[2]. A recent study examining driveway run-over deaths of young children in Australia found that most fatalities involved toddlers being reversed over by a large 4WD vehicle in the driveway of their own home by a member of their immediate family[3]. After drowning and motor vehicle passenger deaths low speed run-overs are the most frequent cause of death due to injury amongst toddlers (aged 1 to 4 years).

This bulletin examines the circumstances of low speed (non-traffic) pedestrian injury deaths and Emergency Department presentations of children younger than five years to participating QISU hospitals*.

*Listed far right column

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Results

Deaths

During the period 1994 to 2000 there were 28 deaths of children aged less than five years as the result of a low speed pedestrian impact. These deaths represent 10% of all injury deaths of children aged 1 to 4 years and is the third leading cause of death due to injury at this age. Almost a third of the fatalities were aged one year (12 to 23 months) and the male female ratio was 1.5:1 (Figure 1). The median age was 22 months.

An examination of the circumstances of the fatalities show that in 15 (54%) of the cases either a direct relative or friend of the family was driving the vehicle, most frequently a parent. Where the direction of travel was known 60% of vehicles were reversing at the time of the incident. Where the type of vehicle involved was known the majority were large (19 out of 22) with the biggest single group being 4WD vehicles (41%) (Figure 3).

The largest number of fatalities occurred on a Sunday (6). Twice as many fatalities occurred in the afternoon (mostly late afternoon) compared to before noon. Almost 60% of the incidents occurred in the driveway or garage of the deceased's own home.

ED presentations

For the period 1998 to 2001 there were 68 presentations of children aged under 5 years to participating EDs in Queensland as result of a low speed pedestrian related injury. These cases represent two thirds of all pedestrian related injuries at this age.

Almost 50% of the ED presentations for a low speed pedestrian injury were aged one year with males outnumbering females 1.7:1 (Figure 2) with a median age of 23 months, a similar pattern to that observed in the fatalities.

Nearly 80% of the cases were described as occurring at home with 60% taking place in the driveway or garage/carport. Forty per cent of runovers occurred on a Saturday or Sunday while 40% took place between 3pm and 6pm in the afternoon and 32% between 8am and 12pm in the morning.

The most frequent injury was superficial injuries (24%) followed by fracture (22%), intracranial (16%), crushing injury (9%) and internal injury (7%). Four cases (6%) suffered no physical injury. The head, face or neck was the most frequently injured body part (26%) followed by the lower limbs (25%), multiple sites (13%) and thorax and upper back (12%). Almost half of the fractures involved the major bones of the lower body (pelvis, thigh or lower leg) (Table 1).

Almost 60% of low speed pedestrian injury presentations resulted in admission to hospital while one case died in ED. Fifty five (81%) presentations were assigned a triage category of *Urgent* or higher while 1 in 10 had the highest category, *Resuscitation*.

Discussion

The findings of this bulletin are similar to other studies of low speed run over fatalities amongst young children. These deaths most often involve children aged between 12 and 23 months, an age when independent mobility becomes established but when the concept of personal safety is absent. Not unex-

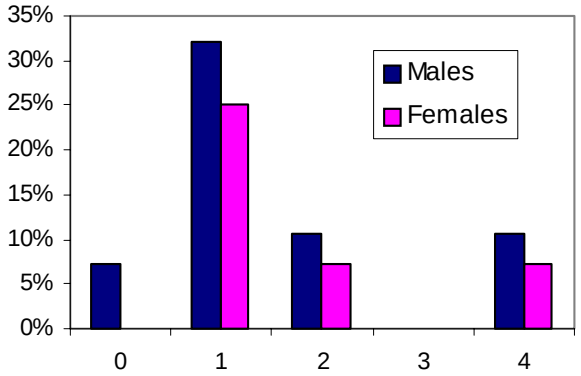

Figure 1 Queensland non-traffic slow speed run-over deaths, children aged 0 - 4, by age and gender, 1994 -2000

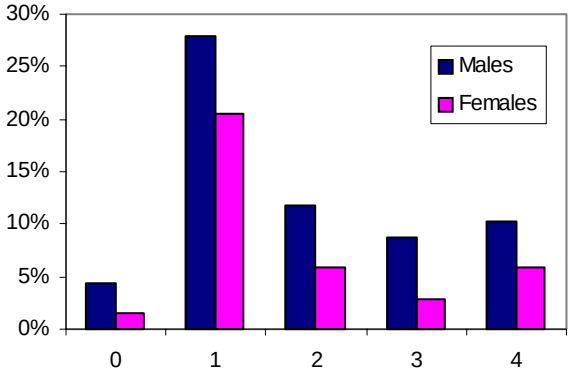

Figure 2 QISU Emergency Department presentations, non-traffic, slow speed pedestrian injuries, aged 0 - 4, by age and gender, 1998 - 2001

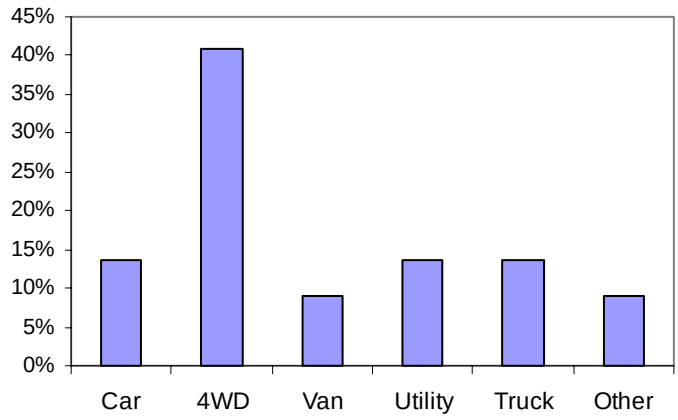

Figure 3 Queensland non-traffic slow speed run-over deaths, children aged 0 - 4, by type of vehicle, 1994 -2000

pectedly almost two thirds of fatalities occurred in the driveway of the child's own home. Toddlers are more likely than older children to be at home at times when parents or visitors are driving in or out. This coupled with enhanced mobility in a familiar environment make the driveway a high risk area for toddlers.

Most frequently the child has been reversed over by a vehicle driven by a member of the child's immediate family. These deaths most often occurred in late afternoon on a Sunday. Studies elsewhere have found children from larger families, those living in rental or public housing and in dwellings with shared driveways were associated with increased risk[4,5].

The type of vehicle involved in the fatalities examined here were predominantly large with 41% being 4WD vehicles, a similar pattern as observed elsewhere in Australia and internationally[3]. 4WDs make up only 6% of passenger vehicles in Queensland indicating an increased risk associated with this type of vehicle[6]. The over representation of 4WD vehicles is somewhat paradoxical in that studies of rearward visibility have found their high driving position means that they have rearward visibility no worse than some smaller vehicles[3]. However this visibility is compromised on many 4WDs by the fitting of spare wheels and other accessories on the rear door.

Prevention

Low-speed run-overs are often the predictable consequence of a child following a parent into the driveway area without their knowledge. These circumstances are similar to those surrounding the most common cause of death due to injury at this age, drowning in domestic swimming pools. Strategies for the prevention of driveway run-overs may require a similar approach. In the case of domestic pools passive changes to the environment have been found to be the most effective measure to reduce toddler drownings[7] while behaviour modification and education campaigns are only effective if used in combination with passive measures.

There are several environmental and technological interventions which should be investigated further for their potential to reduce driveway run-overs. The first is to design residential driveways in such a way that children are separated from driveways and garages. Although this may be difficult to achieve in existing dwellings it should be incorporated into the building code for new homes. *Smart*

NATURE	Abdo, lower back, pelvis	Upper limbs	Thorax, upper back	Multiple sites	Lower limbs	Head, face, neck	Unspecified, other	TOTAL
Open Wound	-	1	-	-	1	-	-	2
Multiple injuries	-	-	-	3	-	-	-	3
Sprain/Strain	-	1	-	-	3	-	-	4
Internal injury	1	-	3	1	-	-	-	5
Crush injury	1	-	-	2	3	-	-	6
Intracranial	-	-	-	-	-	11	-	11
Fracture	1	1	1	-	7	5	-	15
Superficial	1	1	4	3	3	2	2	16
No injury	-	-	-	-	-	-	4	4
Unspec/Other	-	-	-	-	-	-	2	2
TOTAL	4	4	8	9	17	18	8	68

Table 1 QISU Emergency Department presentations, non-traffic, slow speed pedestrian injuries, aged 0 - 4, nature of injury by body part, 1998 -2001

Housing an initiative of the Queensland Department of Housing which provides guidelines on safe and secure house design recommends that driveways be separated from children's play areas and that doorways do not lead directly onto the driveway[8].

Vehicle design is another area where improvements could be made which may reduce the incidence of driveway run-overs. Currently there are no requirements under Australian Design Rules for vehicles to be designed to minimise the risk of reversing over small children. Recently the NRMA graded all passenger vehicles available in Australia for rearward visibility. The index measures how well a driver can see out of the back of a car. There is a need for car designers and regulators to put more emphasis on this important safety design feature in the future. Parents can use the Reversing Visibility Index to assist them in choosing a vehicle with an acceptable rating[9].

Technology is another possible avenue by which these fatalities could be avoided. Recently the NSW Motor Accident Authority conducted tests on devices intended to reduce the risk to young children from reversing vehicles[10]. The report concluded that a technical solution was feasible and that a combination of a proximity sensor and video camera was a viable countermeasure with a cost of around $1000. However they emphasised that drivers still need to reverse with care. Both Ford and Holden provide as standard or as an option proximity sensors on their most popular models, but they stress that these devices are only to be used for assistance in parking and cannot be relied upon to detect small children behind a vehicle.

Supervision and education remain important components of a preventive strategy to reduce driveway run-over deaths however longer term structural changes are more likely to provide more effective outcomes. As in the case of toddler pool drownings it took many years of campaigning and research to convince regulators that proven passive interventions were the most likely strategies to succeed in reducing deaths. However given the success of pool fencing legislation in reducing toddler drownings[7] we would expect similar measures to reduce driveway run-over deaths. In the mean time the issue of low speed runovers needs to be highlighted amongst the injury prevention community as well as government and non-government agencies involved in housing and motor vehicle design. Those agencies providing services to young children should ensure that all parents and caregivers are provided with suitable educational material highlighting the dangers to young children around motor vehicles in all settings.

Further information

- Smart Housing website: http://www.smarthousing.qld.gov.au
- NRMA website: The Reversing Visibility Index ratings are available at: http://www.nrma.com.au/pub/nrma/car-research/reversing-visibility/

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4 Roberts I, Norton R, Jackson R. Driveway-related child pedestrian injuries: a case-control study. Pediatrics 1995; 3:405-408.

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6 Australian Bureau of Statistics. Motor Vehicle Census, Australia. Cat No. 9309.0. ABS Canberra 2002

7 Pitt, W R and Balanda, K P. Childhood drowning and near-drowning in Brisbane: the contribution of domestic pools. Med J Aust 1991 May 20;154(10):661-5.

8 Queensland Department of Housing. Smart Housing – Safety and Security. Department of Housing:Brisbane, 2002.

9 NRMA Insurance Reversing Visibility Index 2003 URL: http://www.nrma.com.au/pub/nrma/car-research/reversing-visibility/index.shtml

10 Paine M, Henderson M. Devices to reduce the risk to young pedestrians from reversing motor vehicles. Report prepared for the Motor Accidents Authority of NSW, March 2001.