Pedestrian Deaths in Children - Potential for Prevention

Abstract

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The National Paediatric Mortality Database was reviewed for the six year period 1st January 2006 to 31st December 2011 and all pedestrian deaths extracted, after review of available data the deaths were categorized as either traffic or non-traffic related. There were 45 child pedestrian fatalities in the period examined. Traffic related deaths accounted for 2 (5%) vs. 19 (42%) non-traffic related. Analysis of the deaths showed there was a male preponderance 28 (62%), weekend trend 22 (44%) with an evening 16 (35%) and summer peak 20 (44%). The highest proportion of deaths occurred in the 1-4 year age group 24 (53%), with 13 (26%) due to low speed vehicle rollovers, mainly occurring in residential driveways and 8 (16%). Child pedestrian fatalities are highly preventable through the modification of risk factors including behavioural, social and environmental. Preventative action needs to be addressed, particularly in relation to non-traffic related deaths i.e. low speed vehicle rollovers.

Introduction

Injury from road traffic incidents is a leading cause of child deaths worldwide. In Ireland, progress has been made in decreasing child road-related deaths and injuries in recent years; the number of paediatric pedestrian fatalities reduced from 2 (5%) vs. 19 (42%) non-traffic related. Our study showed a second peak in incidence in the 10-14 age group 24 (53%), with 13 (28%) due to low speed vehicle rollovers, mainly occurring in residential driveways and 8 (16%). Child pedestrian fatalities are highly preventable through the modification of risk factors including behavioural, social and environmental. Preventative action needs to be addressed, particularly in relation to non-traffic related deaths i.e. low speed vehicle rollovers.

Methods

The National Paediatric Mortality Register (NPMR) collects data on all paediatric deaths in the Republic of Ireland aged 0-14 years. The NPMR is based on: 1) The Central Statistics office (CSO) for death registration data; 2) Autopsy reports from Coroners; and 3) Notifications received from Emergency departments. All fatalities recorded on the National Paediatric Mortality Database from 1st January 2006 to 31st December 2011 were retrospectively reviewed and all road traffic related deaths examined to identify pedestrian deaths. Autopsy reports were then reviewed to determine the circumstances of the injury. Where autopsy reports were not available media reports were used to gather information. In cases where the child was a passenger in a vehicle or cyclist were included. The selected cases were then categorised as being traffic related or non-traffic related. Non-Traffic related deaths were considered to be deaths involving a vehicle that had occurred in an off-road setting (e.g. driveways, farmyards). To examine socioeconomic status each death was assigned a deprivation score based on where the child resided. Deprivation was assessed using the Nominalisation of the Scottish Deprivation Index (NSI), which is based on a deprivation score to each of the 3,000+ electoral divisions (ED) based on Census 2011 data. The Index table of deprivation scores was used to assign the ED where the child resided to a category from extremely affluent to extremely dis-advantaged.

Results

For the six year period examined a total of 82 deaths were reviewed with 45 being identified as pedestrian deaths. On examination it was found in some cases insufficient information was provided. In many cases the child was a passenger in a vehicle, a pedestrian or a cyclist. Autopsy reports were available for 64% of cases, media sources were used to supplement information in 28% of cases. Examination of the NPMR database for 2006-2011 showed that the highest proportion of traffic related deaths (42%). Over half (53%) of the fatalities being classified as RTAs. The 1-4 year age group accounted for 48% of the traffic related deaths compared with 35% of the population and 25% being classed as Marginally above average, compared with 35% of the population.

Socioeconomic status

Social deprivation scores were assigned based on the electoral district in which the child resided. Figure 1 shows the distribution of deprivation index scores. The scores for the pedestrian fatalities were compared with the National population figures. The majority of cases (78%) were in the middle of the scale with just over half (53%) of the pedestrian fatalities being classed as Marginally above average. Low average, road safety campaigns, increased enforcement by the police and changed cultural attitudes to road safety in this period may account for this striking improvement. Young children lack the cognitive skills, attention and perception skills to interact safely. With road vehicles children may fail to appreciate the danger associated with fast moving traffic and be unable to integrate speed and distance of vehicles. Play activity places children in unsafe locations such as driveways, and children are highly influenced by the behaviour of peers and heavily rely on adult supervision.

Discussion

Our study identified 45 fatalities with a striking male preponderance. This finding is supported by a number of studies in the literature that show an increased incidence among males; however, some studies suggest an equal sex distribution. In older children this sex discrepancy may be due to a higher incidence in males of unsafe road crossing behaviour and playing on roads. In terms of age, the majority of deaths occurred in the 1-4 year-olds and this finding was most marked in the non-traffic related pedestrian deaths. This is in keeping with a recent review of the literature, which suggested a peak incidence of driveway injuries in children under five years and is perhaps unsurprising given their stage of cognitive and perceptual development. Our study showed a second peak in incidence in the 10-14 year-olds and reflects risk-taking behaviour in this age group. This study identified some temporal risk factors (weekends and summer months) and this is perhaps unsurprising considering the increased amount of time spent outdoors.
In preventing pedestrian injuries and deaths, one important measure is school road-safety programmes. Although such interventions may improve children’s knowledge, this does not necessarily translate into better road crossing behaviours. Furthermore, education programmes may be unreliable as they can be overly dependent on the individual teacher delivering them. Thus the development of better education programmes that effectively alter crossing behaviour remains essential. Simple knowledge, such as appropriate crossing location, has a big impact on injury severity and is amenable to classroom learning. Safety training for children using virtual models represents an exciting new prospect in tackling this problem and avoids exposing children to physical traffic hazards. One well-established risk factor for paediatric pedestrian injury is the built environment in which the injury occurs. A meta-analysis of previous studies established a direct link between the built environment and risk of pedestrian injury. A number of environmental features (e.g., multiple family dwellings, lack of playgrounds, the presence of major roadways, increased traffic levels and roadside parking) are significant risk factors. In a resource-poor setting, built environment features such as lack of road markings are of relevance. The environmental features that best improve pedestrian safety are the provision of playground/ recreation features and traffic calming. These relatively simple interventions have a significant and lasting impact on improving child pedestrian safety at a local level.

Injury is more likely in non-traffic incidents in environments that lack a physical barrier between the driveway and the play area, with shared driveways, and multiple parking spaces. Adequate child supervision is also of paramount importance in combating the issue. A case-control study conducted in Peru identified the number of streets crossed en route to school combined with lack of supervision as the single best predictors of pedestrian injury. Although parents are aware of the importance of educating their children in road crossing, observational research suggests that these practices are inadequately taught, sometimes due to the extraneous factors such as distracting stimuli in the environment, which is thought to decrease awareness of warning sounds, may represent a safety risk to pedestrians, and in particular adolescents. In addition, resources in the environment could also have a detrimental effect on crossing abilities, as early research suggests they distract children to a significant degree and may increase their risk of collision. A number of studies have concluded that a child’s road crossing behaviours remain essential. Simple knowledge, such as appropriate crossing location, has a big impact on injury severity and is amenable to classroom learning. In preventing pedestrian injuries and deaths, one important measure is school road-safety programmes. Although such interventions may improve children’s knowledge, this does not necessarily translate into better road crossing behaviours. Furthermore, education programmes may be unreliable as they can be overly dependent on the individual teacher delivering them. Thus the development of better education programmes that effectively alter crossing behaviour remains essential. Simple knowledge, such as appropriate crossing location, has a big impact on injury severity and is amenable to classroom learning. Safety training for children using virtual models represents an exciting new prospect in tackling this problem and avoids exposing children to physical traffic hazards. One well-established risk factor for paediatric pedestrian injury is the built environment in which the injury occurs. A meta-analysis of previous studies established a direct link between the built environment and risk of pedestrian injury. A number of environmental features (e.g., multiple family dwellings, lack of playgrounds, the presence of major roadways, increased traffic levels and roadside parking) are significant risk factors. In a resource-poor setting, built environment features such as lack of road markings are of relevance. The environmental features that best improve pedestrian safety are the provision of playground/ recreation features and traffic calming. These relatively simple interventions have a significant and lasting impact on improving child pedestrian safety at a local level.

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