
Gary Robinson, Bonnie Moss & Bernard Leckning
Centre for Child Development and Education, Menzies School of Health Research
Contents

Introduction ........................................................................................................................................4

Methods ............................................................................................................................................6

Definitions .......................................................................................................................................6

Overview of childhood injury in Australia and the NT .................................................................6

Evidence for Prevention ..................................................................................................................10

Prevention in the primary care setting .........................................................................................12

Social and Individual Risk Factors for Unintentional Injury .......................................................14

Contexts and settings ....................................................................................................................14

Socio-economic status ....................................................................................................................14

Family type and household characteristics ..................................................................................15

Caregiver supervision ....................................................................................................................15

Caregiver characteristics ................................................................................................................16

Family and individual relationships ..............................................................................................17

Understanding supervision ............................................................................................................17

Unintentional injury, supervision and responsibility for child safety .........................................19

Questions for the NT ......................................................................................................................21

Prevention of Indigenous child injury ..........................................................................................21

Injury prevention in NT communities .............................................................................................23

Child Mortality Review ...................................................................................................................24

Prevention Research .....................................................................................................................25

Prevention in the primary care setting .........................................................................................25

Summary .........................................................................................................................................26

References .......................................................................................................................................27

Appendix 1: What interventions work? .........................................................................................34

Appendix 2: Aboriginal Prevention programs ..................................................................................35
Figures

Figure 1: Age-specific rates of hospitalised injury in children and young people, 2011-2012. (Source: AIHW, 2014.) ........................................................................................................................................7

Figure 2: Injury deaths in Australia and the NT, 2004-2006 to 2011-2013 (Source: AIHW, Children’s Headline Indicators, 2015.) ........................................................................................................................................8

Figure 3: Age-specific rates for hospitalised injury cases for children and young people by age, sex, Aboriginal and Torres Strait Islander and other Australians, 2011-2012. (Source: AIHW, Pointer, S., 2014, 20.) ........................................................................................................................................9

Figure 4: Age-specific rates of hospital admissions due to injury by sex and Indigenous status, NT and Australia, 1991-2001. (Source: You & Guthridge, 2005.) ........................................................................................................................................9

Figure 5: Age-specific rates of death due to injury by sex and Indigenous status, NT and Australia, 1991-2001. (Source: You & Guthridge, 2005.) ........................................................................................................................................10

Figure 6: A conceptual model of interactions between child, caregiver and contextual influences on risk of unintentional injury. (Source: Morrongiello, et al, 2005.) .....................................................................................18

Tables

Table 1: Major external cause groups for hospitalised injury cases in children and young people, 2011-2012. (Source: AIHW, Pointer, S, 2014, p. 11.) ..............................................................................................................................................7


**Introduction**

This report aims to identify sources and directions for further study of the role of caregivers in ensuring the safety and wellbeing of children in situations involving risk. It focuses on childhood injury and safety and factors influencing caregiver supervision and considers evidence for the effectiveness of interventions for the prevention of injury.

The report provides a brief overview of data on childhood injury and review literature on its prevention, with reference to parental supervision. There is only limited evidence around specific sources of risk that pertains directly to communities comparable to those of remote NT. An examination of unique geographical risks, the impact of poverty that takes into account both the cultural diversity and the realities of social change in Northern Territory (NT) communities is needed.

A brief overview of the epidemiology of childhood injury is followed by an overview of prevention programs specifically for Australian Indigenous people. The broader literature on prevention of childhood unintentional injury is then reviewed, and systematic reviews of evidence for the effectiveness of different strategies for prevention of unintentional injuries in childhood are identified. The benefits of whole-community, public health approaches to injury prevention are compared with cause-specific preventive strategies. Rankings of scope and quality of evidence for the effectiveness of preventive interventions are provided where these are useful.

In north Australia, there is a need to understand multiple influences on child safety and wellbeing in disadvantaged communities. The over-representation of Indigenous children in hospitalisations and deaths in part reflects high rates of injuries through assaults, and increasingly, intentional self-harm. Consequently, there is a need for a public health response to childhood injury that is complemented by strategies to reduce the impacts of violence and alcohol use on children. These factors undermine the capacity of parents, families and communities to ensure child safety through adequate, responsive supervision. A justified focus on child protection-related concerns and efforts to reduce domestic violence and alcohol consumption should not overshadow the role that can be played by a multi-faceted universal preventive response to unintentional childhood injury.

Three areas for research are identified for consideration.

1. **We recommend a review of NT child deaths by external causes using coronial and administrative data to rigorously identify the specific contribution of parent supervision to child deaths by external causes, relative to other contributing factors such as mental illness, alcohol and drug abuse, and family violence.**

2. **We recommend that there be an investment in the capacity of primary health care and hospital services to monitor childhood unintentional injury, to engage parents and communities through preventive activities and to evaluate prevention outcomes.**

3. **We recommend both prospective and retrospective investigation of childhood injury in order to evaluate impacts of legislative and regulatory change and the effectiveness of community education strategies in improving access to, and correct use of, seat restraints for children for various NT community groups.**
Methods

For the purpose of this review the following strategies were employed: A database search using EBSCOhost for international peer reviewed journals focused on injury control, prevention and safety promotion. Key search terms included: childhood; unintentional injury; child deaths; safety; caregiver; parent or parenting; supervision; child injury prevention. Particular focus was placed on identifying systematic reviews of evidence and other sources within the research literature, and identifying levels of evidence associated with different strategies for prevention.

In addition, publications from university, government and non-government organisations with mandates to enhance safety and wellbeing were accessed. These include: Australian Institute for Health and Welfare; Injury Research Centre, Monash University; Child Accident Prevention Foundation of Australia – Kidsafe; and Harvard Injury Control Centre. In addition, a review of global child injury status reports was undertaken, and included the World Health Organisation’s World Report on Child Injury Prevention (WHO, 2008).

Literature on adolescence and parental supervision extends into areas such as juvenile delinquency, problem behaviours, sexuality, internet use and school dropout rates as well as substance misuse, mental illness, deliberate self-harm and other important social issues. There is only a limited focus on unintentional injury. For the purpose of this report, the focus was to be on parent supervision and unintentional injury in childhood rather than in adolescence, a period of development when complex issues relating to independence and autonomy in adolescent relationships to parents, families and peers need to be taken into account.

Definitions

A definition of injury is “physical harm or damage to the body. Injury may be intentionally or unintentionally caused. An injury may be minor and require little or no care, or may be more serious, requiring treatment or hospitalisation and may result in permanent scarring, disability or death.” (see Kidsafe-The Child Accident Prevention Foundation of Australia: www.kidsafe.com.au/).

Definitions of supervision usually include the following elements: “to see, to oversee (a process, work, workers, etc.), to superintend. The term supervision is most used to mean direct watching and oversight of young children and includes anticipatory guidance and active engagement of younger children (Morrongiello, 2005). The term monitoring is often used for older children who are not necessarily under the direct supervision of a caregiver. Supervision is seen as a protective factor mitigating risks of child injury and consequently, the absence of supervision as a risk factor. The category of supervisory neglect is a subset of concepts of neglect as understood in the child protection literature. Supervisory neglect may also be an indicator of risk of other forms of child neglect.

Overview of childhood injury in Australia and the NT

Injuries are a leading cause of hospitalisation and mortality for Australian children. In 2010-2011, injuries accounted for approximately 10% of all hospitalisations for children up to 14 years of age. Between 2010 and 2012, at least a quarter of all deaths up to 14 years of age involved injury. A brief summary of the available hospital and mortality data is presented to illustrate the distribution of injury risk to children across Australia and the NT according to age, gender and Indigenous status.
Between 1999 and 2007, there were 471,416 estimated episodes of hospitalised care for children aged 0 to 14 due to an injury. Over this period, boys outnumbered girls and there were some differences by age group (see Table 1).

**Table 1: Major external cause groups for hospitalised injury cases in children and young people, 2011-2012. (Source: AIHW, Pointer, S, 2014, p. 11.)**

<table>
<thead>
<tr>
<th>External cause</th>
<th>Males</th>
<th></th>
<th>Females</th>
<th></th>
<th>Persons</th>
<th></th>
<th>M:F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unintentional injuries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>13,303</td>
<td>15.2</td>
<td>5,836</td>
<td>13.0</td>
<td>19,139</td>
<td>14.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Drowning and submersion</td>
<td>193</td>
<td>0.2</td>
<td>100</td>
<td>0.2</td>
<td>293</td>
<td>0.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Poisoning, pharmaceuticals</td>
<td>1,143</td>
<td>1.3</td>
<td>1,142</td>
<td>2.6</td>
<td>2,285</td>
<td>1.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Poisoning, other substances</td>
<td>489</td>
<td>0.6</td>
<td>321</td>
<td>0.7</td>
<td>810</td>
<td>0.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Falls</td>
<td>24,684</td>
<td>28.2</td>
<td>13,463</td>
<td>30.1</td>
<td>38,147</td>
<td>28.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Thermal causes</td>
<td>1,806</td>
<td>2.1</td>
<td>1,037</td>
<td>2.3</td>
<td>2,843</td>
<td>2.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Other unintentional causes</td>
<td>36,863</td>
<td>42.2</td>
<td>13,693</td>
<td>30.6</td>
<td>50,556</td>
<td>38.2</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Intentional injuries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intentional self-harm</td>
<td>2,450</td>
<td>2.8</td>
<td>6,426</td>
<td>14.4</td>
<td>8,878</td>
<td>6.7</td>
<td>0.4</td>
</tr>
<tr>
<td>Assault</td>
<td>5,485</td>
<td>6.3</td>
<td>1,825</td>
<td>4.1</td>
<td>7,310</td>
<td>5.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Undetermined intent</td>
<td>906</td>
<td>1.0</td>
<td>864</td>
<td>1.9</td>
<td>1,770</td>
<td>1.3</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>87,426</td>
<td>100</td>
<td>44,770</td>
<td>100</td>
<td>132,198</td>
<td>100</td>
<td>2.0</td>
</tr>
</tbody>
</table>

(a) Includes other external causes of injury and not reported (167 cases).

Indigenous children are at a much higher risk than other Australian children of injury resulting in hospitalisation or death. In 2012, the rate of death by injury for Indigenous children was three times that of non-Indigenous children, with a rate of hospital separations for injury just under 50% higher than that of non-Indigenous children (AIHW, 2012, 91-92). The leading causes of death were similar to those for other Australian children, with the greatest disparity in rates for hospitalisations related to assault. Indigenous boys were five times more likely - and Indigenous girls 11 times more likely -
to be hospitalised for assault, than other Australian children (AIHW, 2012, 92). The rates are highest in remote and very remote areas. The NT has the highest rate of hospitalisation for assault of any Australian jurisdiction, at 616 cases per 100,000 for children aged 0-14 years (AIHW, 2012, 96).

Recent data show that the rate of injury deaths amongst children in the NT between 2001 and 2013 was 24.4 per 100,000 persons – about five times the rate for the rest of Australia over that period. Moreover, child injury deaths have been increasing in the NT in contrast to the declining rates across the rest of the country (see Figure 2). Whilst the distribution of child injury deaths in the NT is similar across age groups and Indigenous status to the rest of Australia, the NT is the only jurisdiction in Australia where the rate of child injury deaths is greater amongst girls than boys (see Figure 5). Unfortunately, small numbers prevent any further breakdown of trends in child injury deaths in the NT.

Figure 2: Injury deaths in Australia and the NT, 2004-2006 to 2011-2013 (Source: AIHW, Children’s Headline Indicators, 2015.)

According to a recent study (Moeller et al, 2014), Indigenous:non-indigenous ratios for morbidity and mortality for unintentional injury range from 1.2:2.3 and 1.8:8.2, respectively. Burns, poisoning and transport injuries are the major contributors to the increased injury burden in Indigenous children. For Indigenous persons, not only are rates of fatal and serious injury higher with remoteness, but a far greater proportion of injuries, including land transport injuries, occur in remote settings.(Henley & Harrison, 2010; cf Falster et al, 2013).
For both hospital admissions for injury and ‘death due to injury’ among NT Indigenous people, by far the greatest burden falls on young to middle adulthood. A study of ‘death due to injury’ in the NT from 1991-2001, found that there is a wide disparity between Indigenous and non-Indigenous rates of hospitalisation and of death due to injury that is most pronounced in adult years (see Figures 3 & 4).

Figure 3: Age-specific rates for hospitalised injury cases for children and young people by age, sex, Aboriginal and Torres Strait Islander and other Australians, 2011-2012. (Source: AIHW, Pointer, S., 2014, 20.)

Figure 4: Age-specific rates of hospital admissions due to injury by sex and Indigenous status, NT and Australia, 1991-2001. (Source: You & Guthridge, 2005.)
Interpersonal violence beginning in mid-adolescence is a major cause of the disparity between male and female Indigenous and non-Indigenous rates of mortality and hospital admissions due to injury, and is associated with mental health problems and remoteness (Meuleners, et al, 2010; Irie, 2012). However, as further discussed below, these levels of interpersonal violence also have implications for the over-representation of Indigenous children as victims of assault.

In summary, while trends in child hospitalisation and deaths caused by injury appear to be moderating across Australia, there is evidence to suggest that this is not the case in the NT. There are distinct determinants of hospitalisation and death caused by injury to NT children, associated with remoteness and with Indigenous status.

**Evidence for Prevention**

The principles of injury prevention have been summarised as the “three E’s”: education, enforcement and engineering (WHO, 2008). However, the application of these principles differs by type of injury and context. Towner and colleagues (2001a & 2001b) conducted a systematic review of evidence in preventing unintentional childhood injuries including primary prevention measures designed to prevent accidents, and secondary measures designed to reduce the impact of accidents and rated the effectiveness of the interventions and the quality of evidence. In Part 1, focusing on the road environment, the authors reviewed over 42 studies and found evidence to be good/reasonable in 12 studies, reasonable in 13 studies, and reasonable/weak in 17 studies (2001a: 162). One study found traffic calming measures intended to reduce speeds across multiple suburban traffic areas to be effective in reducing total injuries, including child pedestrian and child cyclist injuries and in reducing traffic speeds; evidence was rated as good/reasonable (2001a: 161). Five studies were found on pedestrian and road behaviour training schemes; these provided limited evidence that such schemes can improve safe riding, pedestrian safety and safe bus boarding behaviour. Some interventions were ineffective or inconclusive. Promotion of bicycle helmets through education and legislation was addressed in 10 studies which found that there was some evidence of positive effects on behaviour, but only limited evidence on the effect of these interventions on rates of injury (2001a: 163).
The second part of the study reviewed evidence for the effectiveness of a total of 24 interventions focusing on home, leisure and community environments. Of these, 16 projects aimed to reduce general accidents, burns and scalds, and to prevent poisoning in the home environment, and to prevent leisure injuries in the leisure environment. The review also considered evidence for five community-based studies and three mass media general interventions. The results are summarised in Appendix 1.

Group interventions for children, including modelling, training and demonstrations have been shown to have positive outcomes; however, a systematic review found that there was insufficient evidence to identify the key characteristics – such as intensity, duration and method – of the most effective practices (Bruce & McGrath, 2005).

There is evidence that ‘whole of community’ programs may be effective in reducing child injuries: a Swedish study found that a reduction in child injuries in the intervention area (a region with a population of 41,000) between 1983 and 1989 were likely to be attributable to the safety promotion program. The authors concluded that the WHO Safe Community program was successful in reducing child injuries (Lindqvist & Dalal, 2012). Similarly, state-wide safety programs have been found to increase participation in safety prevention activities and to significantly increase safety awareness and behaviours. A significant reduction in motor vehicle occupant injuries for children 0-5 years was associated with 50% participation in safety programs by families with children of that age (Guyer et al., 1989).

Damasheck and Kuhn (2014) provided a relevant summary of outcomes relating to child and infant car seat use; safe sleeping, home hazards and caregiver supervision. For car-seat use, a combination of broad community messaging, targeted education and provision of seats may increase use. However, training and practicing proper installation is necessary to reduce injury. Barriers include recruitment of families for training; the level of resources needed for skills based training; and costs and needs for technical training in installation.

Some forms of parent education can change behaviours. In a trial of a parenting intervention, 228 mothers were randomly assigned to treatment and control groups. Parents who had seen a video and participated in post-video structured discussion of injury risk showed improvements in injury risk appraisals and in supervisory behaviours, including perceived need to actively supervise, compared with the control group sample. These differences were sustained at one year after the intervention (Morrongiello, et al, 2013; 2012).

Concerning interventions to improve caregiver supervision, a limitation of some promising home-based interventions is that these have mainly been conducted among economically advantaged families (Morrongiello et al, 2013). For interventions to reduce home hazards, a few rigorously evaluated studies have demonstrated favourable results. Limitations have included use of relatively low-risk samples. Didactic programs may increase parent knowledge of hazards, but this does not necessarily translate into changed behaviours if there is no behavioural training. Intensive, behaviourally-based programs have shown promise amongst families where children are maltreated, but these are resource intensive, and not yet adapted for wider implementation.

The reduction in child injury resulting from transportation accidents over recent decades has largely been attributed to legislation enforcing the use of car-seat restraints. However, the capacity to
achieve further change may require strategies to reach disadvantaged minority parents. A series of studies evaluated a multi-faceted centre-based intervention consisting of subsidised access to restraints, safe fitting and training in use of age-appropriate car seat restraints for families with 3-5 year olds in NSW (Brown et al, 2013; Hunter et al, 2013). A cluster randomised controlled trial in 28 urban childcare centres and preschools found that at centres delivering the intervention there was a significant increase in age-appropriate car-seat restraint use, and a reduction in the misuse of restraints. Significantly, effect sizes were greater for subjects speaking a language other than English at home (Leay et al, 2012).

To be effective for disadvantaged communities, interventions need to be able to assist with factors such as cost while also addressing parents’ low sense of self efficacy relating to adverse influences in their neighbourhoods and families. The type of messages produced and the strategies adopted need to actively engage and respond to the specific needs of low income families and minority social groups.

**Prevention in the primary care setting**

In 1983, the American Academy of Pediatrics (AAP) drew attention to the importance of preventing childhood injury, as the leading cause of child death in the USA. It recommended injury prevention counselling to parents for the main causes of child injury (Bass, et al, 1993). Specific measures were advocated for American Indian and Alaskan Native (AI/AN) families in response to their elevated rates of childhood death by unintentional injury (AAP, 1999).

A number of systematic reviews have supported the case for injury prevention counselling in the primary care setting. A review of 20 studies found evidence that counselling by physicians lead to increased knowledge, improvements in safety behaviours and in some cases reductions in child injury for motor vehicle related and home injuries (Bass et al 1993). These kinds of educational preventive measures are potentially important adjuncts to legislative measures and “passive” protections which are indispensable foundations of a comprehensive public health approach. A systematic review of individual-level interventions to prevent child unintentional injury in the clinical setting, including 22 randomised controlled trials, found clear evidence for the effectiveness of counselling interventions for practices targeting the prevention of some injuries. Use of motor vehicle restraints, smoke alarms and temperature-regulating taps were effective, while bicycle helmet use and measures to “childproof” the home were of less value (DiGiuseppi and Roberts, 2000).

The impact of clinical interventions is also determined by baseline community behaviours, and may vary with changes in community responses to legislative and other changes. For example, as seatbelts and use of child restraints become more widespread, the potential impact of individual-level counselling may be reduced. The population not using restraints is smaller, but may include the economically disadvantaged, or groups less responsive to mainstream messages, and those more subject to influences that lead to failure to use restraints. To be effective, counselling strategies may therefore need to target those most at risk, and may be most effective in the presence of complementary measures – for example financial incentives and product innovations to improve access to, and ease of use of, restraints (DiGiuseppi and Roberts, 2000). DiGiuseppi and Roberts (2000) found that clinical interventions are most effective when they combine health education and behaviour-change strategies that include demonstrations with feedback and reinforcement.
A more recent review (Theurer & Bhavsar, 2013) found the evidence for physician counselling to be mixed, in that there was only limited evidence of actual injury reduction, but substantially more evidence of behaviour change in parents. Importantly, interventions targeting at-risk parents were more effective. Cost-benefit analyses of clinician counselling in The Injury Prevention Program (TIPP) of the AAP show a positive cost-benefit ratio, in that total benefits were over eight times the cost of delivery of the program (PIRE, 2014; see Appendix 2). However, the resource costs of counselling by paediatricians were greater than the cost of medical and other resources saved as a result of the intervention. Although the benefits of prevention strategies in health services may not be realised in savings in health resources, the social validity and feasibility of delivery of the program may outweigh any concerns about the additional health service resource requirements.

The development of clinical counselling strategies to prevent child injury and their incorporation into guidelines for preventive clinical care need to be accompanied by an understanding of risk and vulnerability, and other characteristics of the target populations. They should be aligned with public health, information and regulatory initiatives that can influence behaviour change. In some circumstances, clinical interventions may be more effective when purposively combined with interventions at the family, community or even national levels (DiGiuseppe and Roberts, 2000; Theurer & Bhavsar, 2013).

For children below the age of five, parents are most often the targets of prevention strategies. These include clinically-oriented interventions outside the primary care setting, such as home visiting programs. The most well-known of these, the Nurse-Family Partnerships Program, targets first time mothers from socio-economically disadvantaged backgrounds. It has reported significant reductions in hospital presentations for injury (Olds, et al, 1984; Kitzman, et al, 1997). A systematic review of 11 randomised controlled trials (RCTs) of home visiting programs (Roberts, et al, 1996) found that there was the potential for home visiting interventions to significantly reduce child injuries. However, it is possible that while interventions may change medical help-seeking behaviours, this may not be associated with changes in serious injury. An RCT of the implementation of a state-wide nurse home-visiting program found no effect on hospital presentations for serious injury, but elevated levels of presentation to emergency departments for minor injuries in the treatment group compared to the control group (Matone, et al, 2012). The authors argued that this is consistent with studies showing that younger disadvantaged mothers tend to be more frequent service users for minor injury.

Repeat injury is in itself an indicator of risk. An American study found that children with recurrent injury were more likely to have used a medical service despite similar levels of well-child checks, than children with one injury or none (Braun et al, 2005). Children with repeat injuries were significantly more likely to have social risk factors, such as a single parent (mother), a parent aged under 18 years, a parent with substance abuse issues, mental illness, or history of domestic violence. The level of social risk rose with the number of injuries. Targeted injury prevention counselling can be delivered to families during multiple visits to the health service. Thus children with risk factors for recurrent injury should be effectively identified, and multiple injuries monitored.

A Cochrane collaboration systematic review and meta-analysis of parenting interventions to prevent child injury included a small number of clinically-focused home visiting programs. It found that parenting interventions for “at risk” families delivered as an element of multi-faceted interventions
appeared to be effective in reducing self-reported or medically-attended injury in children. The evidence reviewed related to families at risk of adverse child health outcomes, including abuse and neglect. The authors concluded that, although further research is needed to explore the effectiveness of different intervention models, health and social care providers should consider providing home visiting programmes to families ’at risk’ of adverse child health outcomes including injury as part of routine child and maternal health strategies (Kendrick, et al, 2008; Kendrick et al, 2013).

**Social and Individual Risk Factors for Unintentional Injury**

As outlined, leaving aside hazardous materials, objects and environments, the most well-defined determinants of risk of childhood unintentional injury are child age and gender. Children are at risk of different kinds of injury by age and at different rates, with boys generally more likely to be hospitalised for injury than girls from early childhood onwards. Child temperament, behavioral development and the presence of clinical conduct problems such as oppositional defiant disorder or ADHD are associated with injury risk (Morrongiello, et al, 2008). In general, boys undertake more risk-taking behaviour than girls (Little, 2006).

**Contexts and settings**

As noted, rates of child unintentional injury are higher in rural and regional areas, with children living on farms at high risk. In response, specific strategies to reduce children’s injury risk have been proposed for Australian farms such as reduction of environmental risks, creation of safe play spaces for young children, and other measures (Stiller, et al, 2008). In highly regulated environments, such as early childhood centres, strategies for training and supervising staff to adequately respond to children’s different characteristics including risk-taking, sensation-seeking - and differences in temperament at different ages, have been advocated (Little, 2006).

A study of child play-related deaths in NSW (Lam et al, 1999) found that around half of child play injuries occurred in the home, specifically in living and sleeping areas (29.4%), the yard and garage (21.5%), and the kitchen (4.6%), and the school playground (10.1%). The home was the most common place of injury across the different age groups, although the proportion of injuries that occurred in the home decreased with age from 73.0% (0–4 years) to 33.3% (10–14 years). There was a significant association between age groups and the place of injury.

Lam et al (1999) advocated strategies to improve environmental safety and parental supervision of children’s play, particularly in the home environment. Comparatively little literature has been identified dealing with the role of parent supervision of adolescent play activities.

**Socio-economic status**

Analyses focusing on low income communities have shown a strong association between fatal and serious paediatric injury and socio-economic disadvantage (Durkin, et al, 1994). However, socio-economic status is variable in its relationship to the distribution of childhood injury, with a NSW epidemiological study showing that relative socio-economic disadvantage was associated with higher risk of injury only for transport-related injuries, burns, and poisoning, accounting for 25% of all injuries (Poulos et al, 2007). The authors conclude that interventions targeting specific injury mechanisms may help to reduce rates of injury for some causes in lower socioeconomic groups.
Family type and household characteristics
A significant body of research has examined links between family or household type and risk of unintentional injury. A large scale national register study in Sweden found significant association between single parent families and a range of adverse psychiatric and psycho-social outcomes, as well as unintentional injuries, specifically falls, poisonings and traffic injuries (Weitoft et al, 2003). The research found that socio-economic circumstances including household resources accounted for a large proportion, but not all of this association. A large prospective study of 10,000 families examined the links between family composition and psychosocial risk in the UK (O’Connor, et al, 2000). It found that, two year-old children in single-parent and stepfamilies were disproportionately likely to experience accidents and receive medical treatment for physical illnesses and to be hospitalized or receive attention from a hospital doctor for an injury or illness. Exposure to psycho-social risks were elevated in single-parent families and stepfamilies, and these factors - rather than socio-economic differences or social class - primarily accounted for the association with injury.

A population-based case-control study using data from the Missouri Child Fatality Review Program for 1992–1999 examined circumstances of children under five years who had died during the study period (Schnitzer et al, 2008). The three hundred and eighty children identified were compared with a random sample of children who had died of natural causes during the study period. Households were classified into five types: (a) two biological parents and no other adults, (b) one biological parent and no other adults, (c) one or two biologic parents and another adult relative, (d) step-parents or foster parents, and (e) one or two biologic parents and another unrelated adult. Logistic regression analyses were conducted and estimates of the risk of maltreatment-related unintentional death associated with each household category were compared to the reference households: those with two biological parents and no other adults. Using logistic regression analysis and odds ratio estimates the study found that young children residing in households with unrelated adults, step-parents, or foster parents are at increased risk of fatal injury.

An Australian study tested the hypothesis that children in single parent and stepfamilies would be at greater risk of unintentional injury compared with families consisting of children and two biological parents (Richardson et al, 2005). It found that the elevated risk of injury for children in non-intact families was accounted for by socio-economic differences between sole-parent and intact families, and concluded that these families have a range of child, parent, family and neighborhood characteristics that are risk factors for injury. A UK study (Towner, 2005) examined the basis for strategies reduce the disparity in injury outcomes across social classes, focusing on motor vehicle accidents. It cited the Harlem Healthy Neighborhoods model (cf Davidson, et al, 1994) as an example of a promising community-wide approach to prevention targeting low socio-economic areas. It involved a multi-faceted approach with a mix of policies and educational programs to address key mechanisms, neighborhood environments, affordability, parent resources and social supports, with community leadership and partnerships between schools, councils and other stakeholders to implement programs.

Caregiver supervision
A study of child deaths in Alaska and Louisiana at ages 0-6 years was able to identify whether child safety standards had been met for 157 child deaths by injury over a period of two years (Landen, et al, 2003). The most commonly violated standard identified was, “children should be supervised by a responsible care provider”, identified in 43% of cases. Of these, supervision was present but
inadequate in 45% of episodes; caregivers were absent in 38% of cases and the caregiver present actually contributed to danger to the child in 18% of cases. In Alaska, deaths among Alaskan natives were almost twice as likely to have involved a supervision standard violation as for all cases, while in Louisiana, supervision standard violations were almost twice as likely among white children as among black children. Overall, inadequate supervision was more likely for boys than girls. The most common causes of death due to inadequate supervision were drowning, pedestrian and fire deaths.

In the study of children at play cited above, the critical context for supervision of young children is the home. However, supervision at home is of diminishing significance as children reach their teens when the challenge for supervision relates to contexts of peer play outside of the home (Lam et al, 1999).

Caregiver characteristics
The links between caregiver characteristics, beliefs and practices have been studied by a variety of means: most often by self-report, using survey, diary reports, responses to scenarios and some observational strategies. A number of limitations of self-report measures for supervision characteristics have been reviewed (Saluja et al., 2004). The generalisability of these studies is limited in that they have tended to be used in mainly low-risk populations with standard levels of education and literacy. While some key findings are relevant in general terms, the applicability of the research methodologies themselves may be limited in many of the social and community contexts encountered in the NT.

An Australian study of childhood injury prospectively followed a random sample of over 800 primary school children aged 5-12 years in a major city (Spinks, et al, 2006). It used parent responses to hypothetical scenarios to measure attitudes to supervision of children to generate scores, together with parent reports of child injury, gathered by structured questionnaire on a two-monthly cycle. Using logistic regression analysis the study found a significant association between caregiver views on the need for closer supervision, and subsequent reported injury among primary school children. The effect persisted after controlling for gender and SES of the child.

A qualitative study of parental attitudes in a socio-economically disadvantaged area of Great Britain (Whitehead and Owens, 2012) found that parents were able to identify risks of injury for their children and some prevention strategies and resources, but that they tended to perceive injuries as an inevitable part of growing up. Caregiver attributes include parental attitudes to injury risk. For example, mothers and fathers may differ in their tolerance of risk-taking and value its significance for child development and learning differently.

In a study of 107 mother-father pairs, maternal supervision beliefs and practices were found to predict a child’s history of minor and medically attended injuries, while those of fathers did not (Morrongiello et al, 2009). A study of parenting style and teaching strategies of parents has found that risk of child injury was associated with permissive parenting styles and associated teaching strategies (Morrongiello, et al, 2006).

Individual caregiver characteristics may refer directly to characteristics of the parent/caregiver. A study of 125 caregivers found an interaction between mothers’ developmental knowledge and self-efficacy and perceived supervision. However, the effect was not present for fathers (Guilfoyle et al,
A mothers’ sense of self-efficacy and sense of her ability to control the health outcomes of her children is a strong predictor of active supervision and reduced risk of unintentional injury. There is evidence of higher unintentional injury rates amongst children whose mothers have a psychiatric disorder, are suffering from depression or anxiety and have experienced a greater number of adverse life events, such as separation from their partner, recent bereavement, or household move (Kendrick et al 2013). A US cohort study found that depressed mothers were significantly less likely to engage in safety practices in the home (McLennan 2000).

Family and individual relationships
An analysis of data from a longitudinal prospective study of preschool children’s development, (Koulouglioti et al, 2009) indicates that factors related to household disorganisation are associated with risk of unintentional injury. The study analysed self-reported ratings by 278 mothers of household organisation, routines, child sleep, maternal fatigue and supervision. The analysis showed that injury risk to pre-schoolers was influenced by interactions between household organisation, the presence or absence of everyday routines, maternal fatigue and supervision. Absence of routines combined with maternal fatigue, low supervision and inadequate child sleep predicted injury risk. Additional factors influencing supervision include the presence of siblings. The supervision of younger siblings by older siblings increases the risk of unintentional injury of young children (Morrongiello & Schell, 2013).

Some research suggests that caregiver self-efficacy and supervision behaviours are mediated by family structure and functioning. In interpreting findings of the Nurse-Family Partnerships Program, Cole and associates (1998) strongly emphasised the effects of household structure and the nature of relationships between adults in the household, including grandparents, spouses, parents’ siblings, older children etc.; these often quite powerfully affect the mother’s capacity to respond to her children and to manage care and supervision for them. Financial dependence on others, competing demands for attention, and the capacity of others to undertake caregiving responsibilities all influence the degree to which the mother can actively supervise her children, and even the extent to which she can maintain passive environmental protections that reduce risk for a child.

Children in many families are substantially at risk for a range of reasons both directly and indirectly related to parental supervision. Between 2008 and 2012, the Queensland Child Deaths Case Review Committee (QLD CDCRC, 2014) reviewed the deaths of 89 Aboriginal and Torres Strait Islander children and young people. Of these, 60 were from families in which domestic violence co-existed with parental substance misuse. Domestic violence was present in 72 families and parental substance misuse in 70 families; parental criminal history was present for 64 families and parental mental health issues in 30 families. Parents in families with complex needs were often struggling to overcome adversity – housing instability, low education, poverty, social isolation, and disability – and may themselves have experienced repeated child protection intervention as children. The impacts of parental substance abuse include domestic violence, abusive behaviour and lack of supervision of children, resulting in increased risk of injury, neglect or harm by others. Individual-focused interventions to improve supervision may not be successful if these issues are not addressed.

Understanding supervision
A significant and growing body of work has sought to model processes of caregiver supervision. This has predominantly focused on parental supervision of young children rather than adolescents. Key
measurable dimensions of supervision of a child are: attention (which may be visual and auditory); proximity (ranging from touching to being within reach and being beyond reach, depending on response required) and continuity (which may be constant, intermittent or suspended for periods) (Saluja et al, 2004). How parents or others maintain supervision in terms of these dimensions varies according to the supervisor’s estimate of risk and danger in the environment; of the supervisor’s estimation of the child’s competences and abilities for their age; and of the child’s capacity to be occupied alone. Proximity may be the most important dimension of supervision for a small child or toddler, whereas continuity of attention may be needed for a toddler who is growing more mobile and able to access the environment in different ways. For very young children, lapses in caregiver supervision have been implicated in many types of common injuries such as drowning, poisoning, and falls (Morrongiello, 2005). For older children playing alone in their room, for example, supervision may be considered necessary in the form of periodically ‘checking in’. How parents, adults and others actually supervise children depends on many factors, including assumptions about the child, about the role, capacities and attentiveness of other persons, elements of knowledge, about the predictability of the environment, and the social circumstances that may affect the level of risk to a child. These are not fixed, but are socially and culturally variable and interact in complex ways.

Figure 6: A conceptual model of interactions between child, caregiver and contextual influences on risk of unintentional injury. (Source: Morrongiello, et al, 2005.)

Defining adequate supervision requires consideration of factors other than just caregiver behaviours. Supervision – and what may count as adequate supervision – must be understood in
terms of the direct context of interaction with a child (Morrongiello et al, 2008). From the point of view of parents, the presence of competing demands and influences on the parent, and his or her attention to supervision are important contextual considerations. These are determined by, amongst other things, the parents’ or caregivers’ expectations, developmental knowledge and understanding of the child, and awareness of the need for supervision in different social contexts and physical environments. As outlined, parental supervision can be affected by supportive or unsupportive relations with others in a caregiving context, as well as substance misuse and other lifestyle factors that affect attentiveness, continuity and conscientiousness of supervision.

Community and parental norms and expectations about supervision may allow for variation of broad assumptions about what can be expected of children at various stages of development: for infants under one year; toddlers and young children (1 – 4 years); and older children (5 – 14 years) - as well as variation in roles of those expected to attend to a child’s needs other than, or in addition to, the parents.

In terms of the characteristics of the child, the context varies according to different temperaments, age, and other factors that together pose different kinds of challenges for supervision (Morrongiello, et al, 2008). Children’s risk of injury is shaped by the interactions between these areas of influence, modelled in Figure 6. However, it must be noted that this model does not fully represent interactions between social relationships and individual characteristics.

Unintentional injury, supervision and responsibility for child safety

The responsibility of the state is not merely to provide safe environments, regulation and enforcement. It should also ensure that the state’s agencies and personnel have the capacity, the competence and the training to act in the public good in many different ways, including acting in loco parentis where specifically required. This also extends to a responsibility to educate parents and the community about risks and vulnerabilities and about their responsibilities. The state must seek to improve community knowledge and to change the behaviours of all parties with any responsibility for children through a combination of regulation, education and instruction across various systems of health, education, children’s and community services, and administrative enforcement.

Public discussion of responsibility for the prevention of child injury and death is often caught between the two opposed principles of public liability and parental responsibility, with the two often directly at odds over blame, litigation, statutory intervention and, in extreme cases, prosecution. Too neat a division between these principles can be misleading. A sometimes adversarial opposition between the principles of public liability and parental responsibility is heightened in politically-charged policy environments and is often a response to cases that become prominent in the public domain. For example, the abduction and murder of a child in Queensland was followed by a series of prosecutions of parents for failure to supervise children under 12 that were highlighted in the media (Bita, 2012). Queensland legislation is somewhat more prescriptive about parental liability for supervision of children than other jurisdictions, prescribing a maximum jail term of three years for the misdemeanour of leaving a child under the age of 12 years unattended. However, in each state or territory, there is a wide exercise of discretion in actual prosecution of cases or statutory action taken against parents under family, administrative or criminal law. Debate about these matters is often not well informed by evidence about the effectiveness of using police powers to change
parental behaviour, compared to - or in conjunction with - other measures such as education or community engagement.

Public discourse advocating state and/or parental responsibility tends to obscure the often complex relationships and circumstances that are involved in effective supervision and care. Both research and common sense suggest that the relationship between supervision and child injury outcomes is complex and multi-factorial. It should entail state or community responsibility for maintenance of safe environments and protections, and also have regard for characteristics of parents and children, as well as family, community and cultural norms about safety, care, independence, learning and self-responsibility.

The concern about the role of parental supervision in relation to childhood injuries overlaps with concerns about identification of neglect in child protection policy and research. There is a need to delineate commonalities and differences between identification and prevention of child abuse and neglect and prevention of unintentional injury. The concept of supervisory neglect refers to cases in which there is evidence of chronic or frequent gaps or other inadequacies in supervision of a child leading to risk of harm. Research indicates that "exposure to one type of harm (such as neglect) increases the risk of exposure to other forms of harm (such as physical or sexual abuse). In a child protection context, if children suffer a number of injuries this may serve as a warning that there are other issues of a potentially neglectful nature" (Scott, et al, 2012). A study of presentations for child injury in the US found that children with two or more injury presentations in one year were significantly more likely to have a child protection notification and to have had a substantiated report (Spivey et al, 2009).

A recent report by the NSW Child Deaths Review Team (NSW CDRT, 2014) reviewed causes of death of children with a child protection history. Although some causes of death declined, the report detailed the extent to which children with a child protection history had an elevated risk of death by multiple causes (NSW CDRT, 2014):

- Sudden Unexpected Death in Infancy (SUDI) (9.8 times the mortality rate of children without a child protection history)
- External (unnatural) causes of death (2.8 times the mortality rate of children without a child protection history), including deaths due to:
  - fire (23.8 times the mortality rate)
  - assault (6.3 times the mortality rate)
  - accidental poisoning (5.5 times the mortality rate)
  - suicide (4.1 times the mortality rate), and
- Drowning (2.7 times the mortality rate)

Investigation of links between hospitalisation for injury and cases of substantiated neglect may help to inform prevention of child deaths. It is important that the relationship between caregiver supervision and risk of injury to children is considered on the basis of evidence drawn from careful review of a number of cases. Public concern in response to high profile single cases often leads to a focus on toughening the thresholds of statutory intervention rather than fully examining opportunities for more thorough and effective prevention.
Questions for the NT

Prevention of Indigenous child injury

A lack of focus on childhood injury has been evident in Indigenous health policies at the national level. The National Aboriginal and Torres Strait Islander Safety Promotion Strategy (NPHP, 2004) provided a set of broad guidelines for action, but did not review evidence on child deaths by external causes, or child unintentional injury. Two extensive reports on injury prevention programs, projects and actions for Aboriginal people were presented to the Commonwealth in 2004. One of these (Moller et al., 2004) described epidemiology and distribution of injury, social influences and policies on injury for Aboriginal people. The second by Clapham (2004) contained information on programs, projects and activities. The focus of the reports was on injury in general, and the words “parent”, “child”, “childhood” or “supervision” did not appear in either volume. In a review of key national health strategy documents, Anderson (2008) welcomed the inclusion of injury in the Aboriginal and Torres Strait Islander Health Strategy, but noted the continuing fragmentation of policy relating to injury prevention, and questioned “whether the priorities such as children’s and young people’s safety ... are reflected in the broader strategy” (2008, 560).

Despite some recent progress, there remains a lack of research evidence on risk factors for unintentional injury to, and effective prevention strategies for, Indigenous children. A systematic search of the literature sought to identify risk factors for Indigenous unintentional injury; it identified 39 studies (Moeller, et al., 2014). These were mainly descriptive studies of which only five adjusted for potential confounding factors. Indigenous to non-indigenous rate ratios for morbidity and mortality for unintentional injury ranged widely, and varied greatly by cause of injury. While the studies showed that Indigenous children experienced a significantly higher burden of morbidity and mortality from unintentional injuries, they provided only limited evidence concerning underlying risk, and no evidence of prevention outcomes.

A “rapid review” of Indigenous injury prevention projects was commissioned by the NSW Health Department to identify the most effective strategies to prevent injury among Indigenous people (Senserrick, et al., 2010). It found that although some initiatives reported promising outcomes, most lacked any formal research design, none included controls, and many were conducted in non-representative settings such as small rural and remote communities, such that their generalisability was doubtful. The review identified 11 promising or effective initiatives including: state wide legislative interventions in relation to road safety (use of mandatory roll cages in remote WA); alcohol restrictions; alcohol management plans (NT); and community street patrols (Qld, NT) (see Appendix 2). Of these, few interventions reported injury outcomes and none specifically focused on child injuries; those that did refer to child injuries did so in the context of concern with domestic violence, child abuse, and alcohol related violence. Apart from road traffic related programs and one multi-faceted community safety initiative that included a focus on playgrounds and other elements of the child’s environment, there were few interventions focusing on safety and prevention in relation to unintentional injury among children.

A study of responses to legislative change relating to child seat restraints found that post-legislation there were significant increases in the use of appropriate child restraints, and significant increases in correct use of seat restraints in low socio-economic areas (Brown et al., 2013). In this study it was also found that knowledge about restraints was limited and that there were significant barriers to
the purchase of effective child restraints among members of lower socio-economic, non-English speaking families (Keay et al, 2013). In WA, legislation prohibiting riding unrestrained in open vehicles (comparable to regulatory changes in the NT concerning passengers in open vehicles) produced a reduction in fatalities (Hawke, 2005). However, for Indigenous remote contexts, it is important to identify the extent to which complementary educational strategies and measures to improve access to affordable restraints can help to ensure that a reduction in child injury can be achieved.

Hunter et al (2014) reported findings of an evaluation of a multi-faceted pilot program to encourage use of age-appropriate child restraints in a regional setting with a high proportion of Aboriginal families. The program was delivered in three early learning centers where 31 percent of the children were of Aboriginal and Torres Strait Islander descent. Each component of the program was assessed for message consistency and uptake. Participating children were matched by age, language spoken at home, and annual household income with children from the control arm of a contemporaneous cluster-randomised trial (Ivers et al, 2011). The evaluation found that children from the centers receiving the program were significantly more likely to be appropriately restrained than children from a matched sample of controls. The authors of this NSW study concluded that an integrated educational program with access to subsidised restraints among communities that include a high proportion of Aboriginal and Torres Strait Islander families showed promising outcomes. They further concluded that - with adjustments to implementation and support - such a program could reduce death and injuries in child passengers in this vulnerable group.

With recent changes in regulation and policing, including the prohibition of passengers riding unrestrained on trucks or utilities, the use of seatbelts and child seat restraints may be on the increase in NT remote communities. This has coincided with a general rise in private vehicle ownership in remote communities. However, there are no published data on child injury and mortality rates over this period, or on the degree to which behavioural change relating to child safety may have occurred. Investigation of the degree of change in relation to injury outcomes could help to identify the need for additional education and incentives to improve compliance in remote communities.

In the NT it is important to understand community contexts of injury. A study of five remote communities in Cape York, Queensland provides valuable insight into community-level determinants of injury not leading to hospitalisation (Gladman, et al, 1997; Shannon, et al, 2001). In one community of over 900 persons, 93% of the adult population were drinkers and alcohol was associated with the majority of presentations for injury among both males and females from 16-44 years. Over 75% of injuries for these groups were caused by assault (40%) and assault related to domestic violence (35%). Three quarters of injuries caused by assaults unrelated to domestic violence were incurred by males. Over three quarters (78%) of those injured as a result of assault related to domestic violence were female. In one year there were 683 injuries, of which 244 were to children 0-15 years. Other reviews of child deaths have suggested that the burden of substance abuse contributes to elevated risk of child injury, not only through assault, but through impaired parental supervision, (Child Deaths Case Review Committee, 2014).

A population-based retrospective study using linked data retrieved from the Western Australian Mortality Database and the Hospital Morbidity Data System, investigated child hospitalisations and
deaths due to interpersonal violence from 1990-2004 period (Meuleners, et al, 2009). The study identified 747 patients aged 10 years or younger in 834 hospitalisations for injury as the consequence of violence. A total of 43 deaths from violence were recorded, and 74 (9%) patients were admitted for more than one episode of violence. Victims aged 0–4 years from rural and remote parts of the state and Indigenous children aged 5–9 years were significantly more likely to experience a second hospitalisation for violence than their urban and non-Indigenous counterparts, respectively. The authors conclude that the identification of young victims at high risk of repeat hospitalisations should be a priority in efforts to reduce the impacts of interpersonal violence and recommend a focus on remote and Indigenous children. These conclusions are of particular significance for the NT: in 2012, the NT had twice WA’s rate of hospitalisation of children aged from 0-14 years for assault (616 and 303 per 100,000 children, respectively) (AIHW, 2012, 96)

The concern with the burden of injury among Indigenous adults and its association with factors such as alcohol abuse, domestic violence and related concerns with incarceration may have partly overshadowed the significance of injury in childhood. However, the evidence suggests that multifaceted interventions dealing explicitly with risks of injury to children are needed, and should accompany strategies to reduce community violence and alcohol use.

In the Northern Territory, the Child Deaths Review and Prevention Committee (CDRPC, 2013) reported that deaths by external causes accounted for 28% of all child deaths for the period 2008-2012. The peak age groups for these deaths were 1-4 years and 10-17 years. For children 1-4 years of age, deaths by external causes accounted for 59% of all child deaths for that age; 39% for 5-9 year olds and 61% for both 10-14 and 15-17 year olds (CDRPC, 2013: 56-58). The report notes the prominence of transport-related deaths at all ages, as well as assaults, and the increase of drowning, crocodile attack, and other deaths from age of 10 and above. There was also a growing number of deaths by intentional self-harm (hanging) among older teens. For the purposes of targeting prevention to address specific sources of risk it would be of value to further investigate deaths by age, gender and ethnicity and by cause, location, or setting, and other characteristics. With small numbers of deaths, this investigation would need to use additional sources of information about contexts of child death, including home and family information, community contexts and public environments, contexts of social involvement, and various specific risk factors. Without such information, it is not possible to clearly identify the potential role of supervision and monitoring by parents or other adults that could be made the subject of legislation, enforcement, education or other preventive action.

**Injury prevention in NT communities**

Systems of response to childhood unintentional injury have lagged behind other responses to child endangerment and neglect. While it is likely that there is overlap in cases involving child injury risk and cases of supervisory neglect as identified by child protection investigations, the thresholds of reporting of neglect and substantiation of cases mean that child protection responses are an insufficient response to child injury risk. Community-based child safety programs that are focused on child protection concerns and issues will fail to engage with the broader context of everyday risk to children. There is a need to develop surveillance and preventive responses to childhood injury on more than one front. There should be improvements in universal services responsible for monitoring and routine care and treatment of children. There should also be improvements in targeted programs that deliver preventive counselling, advice and education to individual parents and groups,
tailored to age of child and source of risk. These should occur in the context of multi-faceted community interventions with high levels of community engagement around key issues in child safety and wellbeing.

Although the literature on parent supervision has been developed mainly through research in general populations, it nevertheless provides some guidance for response to challenges in the NT, particularly in rural, remote and Indigenous community contexts. As outlined above, such research has shown that children in households with adults and older youth - other than immediate family members - are at elevated risk of fatal injury (Schnitzer et al, 2008). In other words, family composition and cohesion matter for the wellbeing of children. This is broadly relevant for many Aboriginal families where variable household composition in terms of numbers of adults and youths - other than parents and their children - may add to risk of unintentional injury to younger children.

In overcrowded living situations and in situations where traditionally oriented kin relationships still shape parenting practices, there are significant challenges in promoting the understanding of child safety and the importance of parental supervision. Delegation of care and supervision to siblings of small children, and to parents’ own siblings is common. Moreover, parents’ authority in households may be secondary to that of a spouse or grandparents or parents’ elder siblings. Some parents may be in a very weak position of autonomy of action and have a low sense of self-efficacy and responsibility. This includes many parents who suffer from mental health problems and are dealing with their own personal experiences of adversity. Attempts to address issues of supervision need to be targeted at the forms of support that may benefit mothers and other primary caregivers, while providing support and information to enable all parents to act to ensure the wellbeing of their children.

The literature on unsupervised peer play among children and adolescents is not well linked to epidemiology of injury. Children in many Aboriginal communities are allowed a great deal of autonomy to engage in unsupervised or peer-led play around communities. This exposes them to risks including stinger bites, crocodile attack, and drowning in waterways and in drains. The surveillance literature does not yet provide detail on these causes of injury and death. Gladman and colleagues (Gladman et al, 1997) describe the need for community-based surveillance strategies to capture the very high proportion of unintentional and intentional injuries treated in communities without leading to hospitalisation. It is likely that strategies for injury prevention for children and adolescents may need to involve whole of community partnerships including councils, health services, schools and parents to prioritise responses. This will assist in identifying risky environments and engaging those responsible for children in different age groups about the need to reduce environmental risks and respond to risk behaviours, and to improve prevention awareness generally. Local monitoring and reporting of injury by health services would help to target such campaigns.

**Child Mortality Review**

A priority for the NT should be the development of a better understanding of data on child injury in order to improve surveillance and preventive responses based on better identification of risk. A number of Australian and international studies cited here refer to reviews of child deaths that have made important contributions to clarifying contextual risks associated with fatal unintentional injury (Landen, 2003; Qld CDCRC, 2014; Lam et al, 1999; NSW CDRT, 2014; Schnitzer et al, 2008).
hospital data on injury with mortality data (Meuleners et al, 2009), can help to identify important indicators of risk of death related to assault.

These examples suggest that a detailed review of risks of child death and childhood injury in the NT would be of value. A review of child deaths by external causes in the Northern Territory could help to identify specific and emerging risks for both intentional and unintentional injury in children, and could be a powerful resource for policy development in community public health. The study could investigate various sources of contributing risk for all external causes of death.

Such a review could involve linkage of NT administrative data - including mortality data - with hospital records of past injury, child protection records of cases of neglect and abuse, and police contacts for violence and alcohol. An audit of coronial records would add significant depth to such a study. It would aim to identify different risk profiles for causes of death associated with the presence or absence of parental involvement and supervision (and supervision by other adults and children). It would also examine related contributing circumstances: environmental risks and dangers, including presence and use of home and public safety equipment, vehicles, animals, etc.; presence of alcohol and other drugs; elements of child protection history, including neglect and abuse; evidence of child, parent and family characteristics and of family functioning; and characteristics of community contexts across urban, rural and remote regions. The criteria for inclusion of cases and the audit protocol could be developed in consultations with the CDRPC and the Coroner’s Office. Trends in hospital admission by socio-demographic status and injury mechanism could be examined retrospectively over two decades drawing on earlier research.

**Prevention Research**

While critically important to investigating parental and family factors relating to child deaths, it should be acknowledged that investigation of deaths may not provide a balanced picture of risks of unintentional injury among children by all causes and in many contexts. A retrospective study of mortality is not likely to capture all patterns of emerging risk associated with new technologies, new forms of consumption and other behavioural or social changes. A strategy of monitoring and surveillance through hospital and community health services would be needed to capture the wider context of unintentional injury requiring medical treatment. This could be done through audit of primary health services at the community level, linked to records of hospitalisation.

Evaluation of prevention strategies can be undertaken to ascertain the degree to which compliance with legislation and risk reduction standards can be improved through appropriate educational strategies delivered through both universal services and targeted community programs. Prospective evaluation research is an important element of response to legislative and other changes and to new emerging risks, for example those associated with vehicle use. In relation to motor vehicle accidents generally, there is clear scope for evaluation of access to, and use of, car seat restraints relating to motor vehicle safety and children’s injury risk. This evaluation should focus on remote Indigenous communities and other community groups thought to be low users of restraints.

**Prevention in the primary care setting**

Following international examples, there is potential to benefit from improved investment in prevention within the primary healthcare setting using screening combined with a variety of interventions. This could include home visiting of mothers by nurses on the model of the Nurse-
Family Partnerships, through to increases in proactive counselling on injury prevention during routine delivery of child health checks in health centres. In the NT, current clinical guidelines for child health known as Healthy Under 5s Kids (HU5K) provide only brief mention of specific counselling to reduce child injury. ABCD National Research Partnership audit reports have consistently indicated that there are very low levels of recording of inquiries and of counselling about risks of injury to children (Bailie, et al, 2014). There does not appear to be provision for injury-related surveillance and risk assessment (apart from domestic violence screening) in current practice guidelines. Unintentional injury appears to be an under-developed area within child health protocols and associated training.

A review of guidelines and active training around monitoring, assessment and counselling of parents on child injury risk would therefore be a valuable initiative. ABCD audits could assess practitioner (GPs, RNs AHWs) adherence to revised clinical preventive care guidelines and could extract clinical data on presentations for injury. In conjunction with this approach, it should be possible to monitor trauma and trauma-related medical evacuations at the community level. The strategy should be extended to include older children and adolescents, and include development of guidelines for monitoring and counselling relating to injury, including both intentional and non-intentional self-harm. This would be a first step towards enhancing capacity for monitoring and response to adolescent injury. Community level screening of this kind would inform local child safety education delivered through schools, childcare services and integrated child and family centres.

**Summary**

The high rates of death and hospitalisation due to injury among children in the NT underscore the need for research into parental, family and community factors relating to child deaths and injury. This research will clarify the most important risk factors that can be targeted by preventive responses. It is important that current efforts to reduce the level of alcohol and drug-related harm and prevention of child neglect and abuse, should be complemented by a much stronger focus on the wider spectrum of risks and concerns related to childhood injury and its prevention. In summary, we have identified three areas of possible research that can help to frame preventive strategies. These include:

1) a review of child deaths by external causes using coronial records and linked administrative data to identify risk factors associated with family vulnerability and other relevant circumstances;

2) prospective research to support improved monitoring and surveillance through community primary health care services and hospitals in order to identify the incidence of injuries not leading to hospitalisation, and to encourage counselling on injury prevention by practitioners

3) evaluation of the impacts of legislative and other responses on parent behaviour and childhood injury outcomes in order to inform community education and prevention strategies.
References


Child Deaths Case Review Committee, (QLD CDCRC), (2014). What contribution does the misuse of alcohol have on child safety? Presentation to the 9th Indigenous Family Violence Prevention Forum, Brisbane, QLD.


Morrongiello, B., & Schell, S., (2013). "You have to listen to me because I am in charge". Explicit instruction improves the supervision practices of older siblings. Journal of Pediatric Psychology 38: 3, 342-350.


### Appendix 1: What interventions work?

Source: Towner et al, 2001b.

<table>
<thead>
<tr>
<th>Good evidence***, reasonable evidence**, some evidence*</th>
<th>INTERVENTIONS IN THE ROAD ENVIRONMENT</th>
<th>INTERVENTIONS IN THE HOME ENVIRONMENT</th>
<th>INTERVENTIONS IN THE LEISURE ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
</tr>
<tr>
<td>Area wide urban safety measure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 mph zones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pedestrian injuries</strong></td>
<td><strong>Behaviour change</strong></td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
</tr>
<tr>
<td>Education/enforcement aimed at driver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education aimed at child/parent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bicycle injuries</strong></td>
<td><strong>Behaviour change</strong></td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
</tr>
<tr>
<td>Bicycle training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycle helmet educational campaigns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycle helmet legislation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Car passengers</strong></td>
<td><strong>Behaviour change</strong></td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
</tr>
<tr>
<td>Child restraint educational campaigns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seat belt educational campaigns.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child restraint loan schemes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child restraint legislation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bus passengers</strong></td>
<td><strong>Behaviour change</strong></td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
</tr>
<tr>
<td>Education aimed at child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Product design.</strong></td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
</tr>
<tr>
<td>Safety devices.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burns and scalds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoke detector promotion programmes.</td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
</tr>
<tr>
<td>Tap water temperature reduction</td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
<td><strong>Behavioural change</strong></td>
</tr>
<tr>
<td><strong>Parent and child education</strong></td>
<td><strong>Behavioural change</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Poisoning</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child resistant packaging</td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
</tr>
<tr>
<td>Parent education</td>
<td><strong>Behavioural change</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falls prevention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window bars (education and environmental modification and legislation)</td>
<td><strong>Behavioural change</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent education</td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
</tr>
<tr>
<td><strong>General campaigns</strong></td>
<td><strong>Behavioural change</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent education on hazard reduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drowning</strong></td>
<td><strong>Behavioural change</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent and child education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult supervision of public swimming pools, beaches</td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
<td><strong>Injury reduction</strong></td>
</tr>
<tr>
<td>Pool design and protection</td>
<td><strong>Behavioural change</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Play and leisure injuries</strong></td>
<td><strong>Hazard reduction</strong></td>
<td><strong>Little evidence</strong></td>
<td><strong>Injury reduction</strong></td>
</tr>
<tr>
<td>Environment improvement—playground layout, equipment and surfacing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training schemes for adult supervision</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2: Aboriginal Prevention programs

A rapid review of Indigenous injury prevention projects was commissioned by the NSW Health Department to identify the most effective strategies to prevent injury among Indigenous people identified 11 promising or effective initiatives (Senserrick et al, 2010).

<table>
<thead>
<tr>
<th>Authors</th>
<th>Title</th>
<th>Publication</th>
<th>Intervention</th>
<th>Design</th>
<th>N</th>
<th>Setting</th>
<th>Findings</th>
<th>Level of Evidence (Grades)</th>
<th>Quality of Evidence (Promising Matrix)</th>
<th>Summary of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawkes (2005)</td>
<td>Open Load Space Project</td>
<td>Australasian Road Safety Research Policing and Education Conference proceedings</td>
<td>State-wide legislation introducing in 2001 making it illegal to ride in the open load space of utility vehicles without rollover cages</td>
<td>Descriptive pre-post</td>
<td>State-wide (Western Australia)</td>
<td>Western Australia (2001-2005)</td>
<td>Compared to estimate of 4-8 fatalities per year prior to legislation, there were 2 fatalities per year post-legislation</td>
<td>D</td>
<td>Promising</td>
<td>Results show reduced fatalities of passengers traveling in open load spaces of utilities since policy introduced, however, no statistical analysis on control was included, to establish a causal relationship. As Indigenous people are over-represented in such crashes and the potential to reach the population could be high, this policy shows some promise in reducing road traffic injuries.</td>
</tr>
</tbody>
</table>

| Burns et al (1996) | An evaluation of unleaded petrol as a harm reduction strategy for petrol sniffers in an Aboriginal community | Journal of Toxicology: Clinical Toxicology | Exclusive use of unleaded petrol, as opposed to leaded petrol, to reduce neurotoxic effects of sniffing tetraethyl lead, introduced mid 1999 | i) Control pre-post evaluation of hospital records | i) Two communities intervention, comparison (leaded petrol only) | i) 85 males (56 in intervention community, approx. 31% male population) | i) Mainingrida (intervention) plus other community. Apex Hom Land NT, 1987-1992 | i) Prior to intervention averaged 8 emergency evacuations to hospital per year, 1991-1992 none vs. 13 in comparison community (prior probability no evacuations: 0.000004). | C | Very promising | Elimination of lead petrol was concluded to significantly decrease emergency evacuations to hospital and to reduce blood lead levels in petrol sniffers similar to that of ex-sniffers. Given the high potential to reach the population, this initiative is most promising. |
### Community Night Patrols

<table>
<thead>
<tr>
<th>Belt (2007)</th>
<th>Community Patrols in Alice Springs: Keeping People Safe</th>
<th>Indigenous Law Bulletin</th>
<th>3 Indigenous community night patrols, 5 nights per week, aiming to diffuse and prevent violence in community, introduced 1990</th>
<th>Descriptive pre/post</th>
<th>Community wide (approx 25,000)</th>
<th>Community wide (approx 25,000)</th>
<th>Reported 20% reduction in assaults compared to pre-1990 levels</th>
<th>D</th>
<th>Promising</th>
</tr>
</thead>
</table>

A reduction in assaults was reported in relation to a national award in 1993, with such awards also received in 1999 and 2002 suggesting some level of sustainability. However, no statistical analysis of control was reported and a 2006 review found the program was under-resourced. The initiative has promise although substantial resources would be needed to reach a high proportion of the population and to sustain the program.

### Community Justice Group

| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

A reduction in violence-related crime including assaults and domestic violence was found, however, no statistical analysis or control was reported. The initiative has promise although substantial resources would be needed to reach a high proportion of the population and to sustain the program.

### Alcohol and Substance Misuse Initiatives

| Chiltzie et al. (2005) | Living with Alcohol Program | Addiction | Combination of education, alcohol supply reduction, treatment and rehabilitation services implemented from 1992 | Control pre/post evaluation mortality data | State-wide, two States, Northern Territory, intervention, Western Australia, control, 1985-2002 | NT death rates for acute alcohol-attributable conditions (e.g. road traffic injury, assault, suicide, drowning and suicide) were 32.8% lower on average than they had been before the program was implemented | C | Very promising |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Strong statistical analyses, accounting for several potential confounders, demonstrated a significant reduction in injuries. Potential reach in the population is also high such that the likelihood of the initiative being effective is most promising.
<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Location</th>
<th>Outcome Measures</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray et al. (2000)</td>
<td>Alcohol supply restrictions</td>
<td>Tennant Creek, Northern Territory</td>
<td>Alcohol supply restrictions: opening hours by outlet type, size of container, large glass containers, third party sales, alcohol content by time of day, and alcohol content by container size, plus requirements for food availability.</td>
<td>Promising</td>
</tr>
<tr>
<td>Kinnane et al. (2009)</td>
<td>Alcohol restrictions in Fitzroy Crossing</td>
<td>Report to The Drug and Alcohol Office, Western Australia</td>
<td>Supply restrictions: sale of packaged liquor with alcohol &gt;2.7% at 20°C to any person other than a lodger (as defined in Section 3 of the Liquor Licensing Act) introduced October 2007.</td>
<td>D</td>
</tr>
<tr>
<td>Margolis et al. (2005)</td>
<td>Alcohol &amp; Alcoholism</td>
<td>Restrictions on the selling of takeaway alcohol, all wine, and the selling of beer and spirits over 5.5% alcohol content in licensed premises introduced Dec 2002 or Oct. Dec 2003 in various communities. Pre-post emergency retrievals by the Royal Flying Doctor Service.</td>
<td>On average, over the four communities, there was a significant reduction in injury retrieval rates at 3 years (quantified as 51.9%) and also 10 years.</td>
<td>C</td>
</tr>
<tr>
<td>Senior et al. (2009)</td>
<td>Alice Springs Alcohol Management Plan</td>
<td>Mandale School of Health Research Report</td>
<td>Alcohol supply restrictions, education and harm reduction programs; including restrictions on opening hours, alcohol content by time of day, alcohol content by container size, total takeaway sale by time of day, drinking locations. Pre-post and process evaluation.</td>
<td>C</td>
</tr>
<tr>
<td>Study (Year)</td>
<td>Intervention / Program Name</td>
<td>Description</td>
<td>Outcome Measures</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>-------------</td>
<td>------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Stockwell et al (2001)</td>
<td>Living with Alcohol Program</td>
<td>Combination of education, alcohol supply reduction, treatment and rehabilitation services implemented from 1992</td>
<td>Control pre-post evaluation hospital, mortality and road crash data</td>
<td>Strong statistical analyses with a control group demonstrated significant reductions in injury-related deaths and hospitalisation crashes. Potential reach in the population is also high such that the likelihood of the initiative being effective is very promising.</td>
</tr>
</tbody>
</table>

**Multiple Community Injury Control Strategies**

<table>
<thead>
<tr>
<th>Study (Year)</th>
<th>Intervention / Program Name</th>
<th>Description</th>
<th>Outcome Measures</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shannon et al (2001)</td>
<td>Injury Prevention in Indigenous Communities: Results of a Two-Year Community Development Project</td>
<td>Multiple strategies to reduce injury (inc. domestic violence, public intoxication and broken glass); including revised public bar opening hours, football team anti-violence agreement, clean-up glass on streets, resurfacing child playground, less alcohol in glass implemented during Apr 1997-Apr 1999</td>
<td>Pre-post analysis of community medical clinic injury records</td>
<td>Strong statistical analyses demonstrated significant immediate reductions in injuries and continued reductions over two years. Potential reach in the population is also high such that the likelihood of the initiative being effective is very promising.</td>
</tr>
</tbody>
</table>