

# Prevention of unintentional injury in children

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## Abstract

Unintentional injuries are one of the leading causes of mortality and morbidity in children, many of these injuries can be anticipated and avoided. There is mounting evidence for the effectiveness of injury prevention interventions, but further research and data are needed to help identify the reason for inequalities between population groups and to identify the full scale of the problem. This article outlines the different approaches to injury prevention and discusses primary, secondary and tertiary prevention along with the 6 E's: Education, Enforcement, Engineering, Environment, Economics and Empowering. It outlines some of the current government legislation, national policies, strategies and interventions. Health professionals who work with children have a professional responsibility to keep them safe from harm. They can do so by identifying children at risk, providing safety advice and signposting parents to further educational or practical resources, and by further spreading awareness amongst colleagues.

**Keywords** accidental injury; burn; paediatric; prevention; road traffic incident; scald; unintentional injury

## Introduction

Unintentional injuries are one of the leading causes of mortality and morbidity amongst the paediatric population. The term 'accident' has fallen out of favour, since it implies an unpredictable and unavoidable event whereas in reality many injuries may have been anticipated and are therefore potentially avoidable.

This article aims to outline the scale of the problem posed by unintentional injuries, discuss approaches to injury prevention and give an overview of the national and local schemes currently in place. It will also suggest ways in which both local health services and individual clinicians can aid in injury prevention.

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## The scale of the problem

Unintentional injury is the leading cause of death in childhood in the developed world, accounting for a third of all deaths up to 19 years of age. Whereas England has one of the highest overall child mortality rates in Europe for those aged 0–14 years, in 2010 the UK had Europe's 5th lowest childhood mortality rate for unintentional injuries (3rd for all injuries). Over the last 20 years, there has been a significant reduction in deaths from unintentional injuries in England and Wales (Figure 1), although this does not necessarily reflect the overall incidence of child injuries. For every recorded death, there are around 150 hospital admissions, 1900 Emergency Department attendances and an unknown number of patients attending primary care or self-treated at home. The improvement in mortality rate can be attributed to a combination of improved trauma care systems and injury prevention strategies. Conversely, deaths from *intentional* injuries continue to rise.

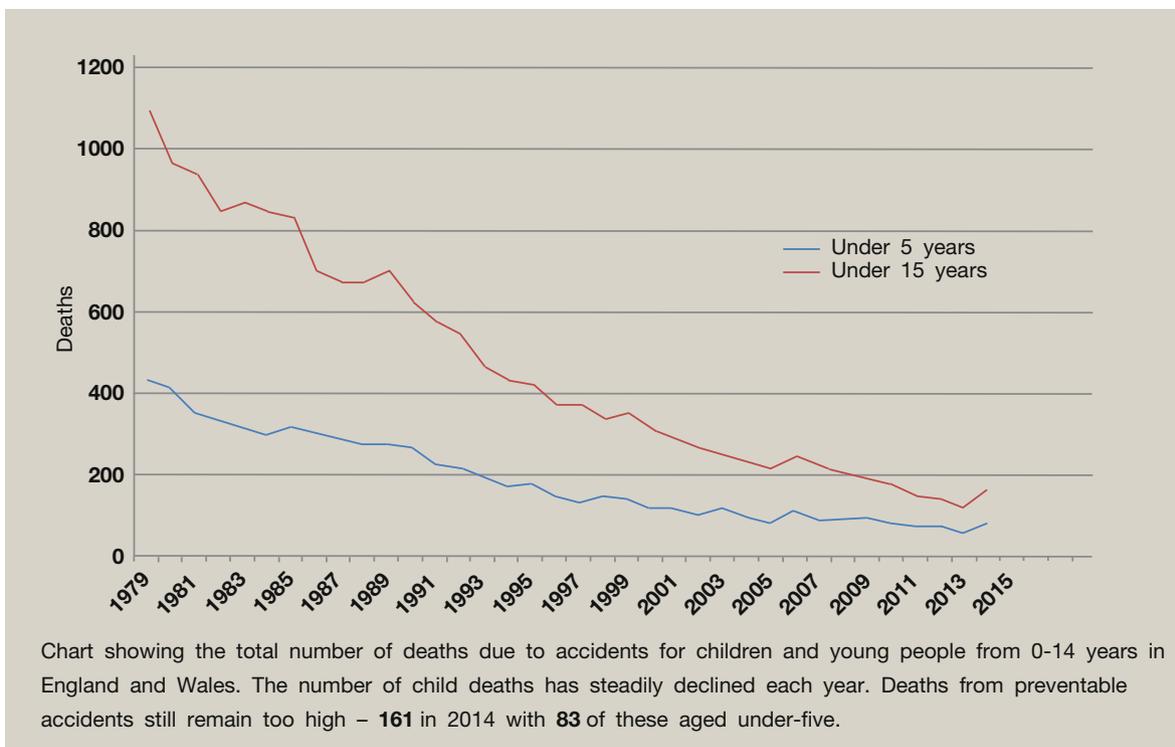
Road traffic incidents account for the majority of injuries (Figure 2). 1,910 children were seriously injured on the roads of Great Britain in 2015 and 54 died; the majority of these were pedestrians. In addition to the human cost of these events, serious road injuries cost society an estimated £189,000 each with the average cost of a fatality being an estimated £1.69m.

The incidence of fatal unintentional injuries varies with age. In the under-1's, there is a high rate in both boys and girls. This then decreases and settles during school years but there is a second peak in deaths in older teenagers (15–19 year olds). Mortality rates are consistently higher in males; the difference is minimal for infants but nearly 3 times greater in the over 15's. About half of the injuries are sustained in the home with the under-5's being at greatest risk. With increasing age there is a greater risk from external injury (Table 1), reflecting children's developmental progression and the subsequent environments they find themselves in. The variation with age is attributed to environmental factors in the younger age groups and increased exposure to risk taking behaviours in teenagers.

2 million children (under 14) attend the UK's Emergency Departments (ED) each year with an unintentional injury. The cost to the NHS is approximately £150 million, and unintentional injuries result in almost 100,000 hospital admissions every year. 2000 attendances are for bathwater scalds, of which around 400 need admission. Treatment for severe scalds cost between £72,000 and £170,000, with an intensive care unit stays costing £2,500 daily. Additionally 300 children present to the UK's emergency departments each week with hot drinks scalds resulting in 1,200 admissions. The NHS spends approximately £2.2m annually on these injuries alone. Recent years have seen a doubling in the number of children presenting with burns from hair straighteners which now account for up to 10% of burn injuries in children.

Some injuries can also carry a significant long-term socio-economic cost. It has been estimated that a severe traumatic brain injury in a 3 year old can generate a lifetime cost of £4.89m when considering the medical care costs in addition to the effect of acquired disability on educational needs, loss of family earnings, social care and benefit costs to the state.

Poverty and deprivation are closely linked to unintentional injury and the socio-economic gap is widening in the UK. Children in social class V are 15 times more likely to die in residential fires and 5 times more likely to die as a pedestrian than children in social class I. Overall children from unskilled families are 5 times more likely to



**Figure 1** Deaths due to unintentional injuries, 0–14 years<sub>(E&W)</sub>. Sources: Office for National Statistics and Making the Link, Child Accident Prevention Trust

die from an unintentional injury than those from professional families. Increased exposure to hazardous environments and limited availability of safety equipment, safety advice and access to health services may account for these observed differences. An increased risk of injury has also been associated with parental alcohol consumption, stress and anxiety. Conversely a decreased risk of injury is seen with improved parental supervision and social support.

Despite their significance, unintentional childhood injuries fail to attract the same amount of attention and investment as the other ‘big killers’ of children e.g. sepsis and cancer.

### Approaches to injury prevention

#### Primary, secondary and tertiary prevention

Injury prevention can be thought of in the same way as with preventive medicine, occurring at three levels.

**Primary prevention:** the avoidance of injury. This can be achieved by modifying the circumstances leading to injury or by removing the relevant risks and hazards. Examples would include safe materials in playgrounds, child resistant packaging or thermostatic mixing valves on hot taps.

**Secondary prevention:** reducing the impact or severity of injury following an incident. This includes the use of seatbelts and child car restraints or cycle helmets.

**Tertiary prevention:** reducing the consequences of injury. This is achieved by providing effective emergency medical care with stabilisation and rapid transfer of an injured child to specialised centres, improved investigation and intervention pathways and better intensive care facilities. It also includes the effective rehabilitation of injured children who have acquired a disability.

#### The 6 Es

Preventive strategies can be categorised using “the 6 Es”: Education, Enforcement (legislation), Engineering, Environment, Economics and Empowerment.

#### Education

Educational approaches to reduce injuries are well established. Examples range from the government’s “THINK!” road safety campaign to the inclusion of teaching about hazards, risk and safety education within the National Curriculum. Strategies can be child-focussed, aimed at parents, carers and health professionals or targeted at high-risk or vulnerable individuals and groups. They can take a number of forms from compulsory teaching at school to national media and advertising campaigns.

#### Enforcement

Enforcement strategies are aimed at identified opportunities for injury prevention that can be legislated. This process is, however, time consuming and often costly requiring the input of a number of services. Examples include seatbelt and child car seat laws, product safety laws, building regulations and 20 mph zones.

#### Engineering

Engineered solutions and technologies can be used effectively to reduce child injuries. In 1976 admissions from salicylate poisonings fell by 85% as a result of the introduction of child resistant containers (N.B. 20% of 5 year olds can open a child-resistant container!) Improved product design, such as car and cycle helmet designs decreasing energy transmission and its effects, can also improve product safety.

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