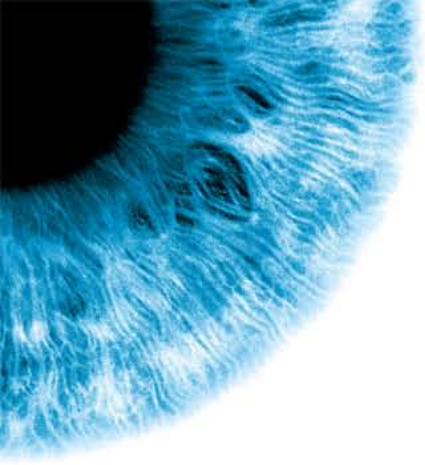

Strategies to prevent unintentional injuries among children and young people aged under 15: Evidence Update February 2013

A summary of selected new evidence relevant to NICE public health guidance 29 'Strategies to prevent unintentional injuries among children and young people aged under 15' (2010)

Evidence Update 29

Evidence Updates provide a summary of selected new evidence published since the literature search was last conducted for the accredited guidance they relate to. They reduce the need for individuals, managers and commissioners to search for new evidence. Evidence Updates highlight key points from the new evidence and provide a commentary describing its strengths and weaknesses. They also indicate whether the new evidence may have a potential impact on current guidance. For contextual information, this Evidence Update should be read in conjunction with the relevant public health guidance, available from the NHS Evidence topic page for accident and injury prevention.

Evidence Updates do not replace current accredited guidance and do not provide formal practice recommendations.

NHS Evidence is a service provided by NICE to improve use of, and access to, evidence-based information about health and social care.

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Contents

Introduction

This Evidence Update identifies new evidence that is relevant to, and may have a potential impact on, the following reference guidance:

[1] **Strategies to prevent unintentional injuries among children and young people aged under 15. NICE public health guidance 29 (2010).**

A search was conducted for new evidence from 1 January 2009 to 29 August 2012. A total of 46,222 pieces of evidence were initially identified. Following removal of duplicates and a series of automated and manual sifts, 22 items were selected for the Evidence Update (see Appendix A for details of the evidence search and selection process). An Evidence Update Advisory Group, comprised of topic experts, reviewed the prioritised evidence and provided a commentary.

Although the process of updating NICE guidance is distinct from the process of an Evidence Update, the relevant NICE guidance development centres have been made aware of the new evidence, which will be considered when guidance is reviewed.

Feedback

If you have any comments you would like to make on this Evidence Update, please email contactus@evidence.nhs.uk

[1] NICE-accredited guidance is denoted by the Accreditation Mark

Key points

The following table summarises what the Evidence Update Advisory Group (EUAG) decided were the key points for this Evidence Update. It also indicates the EUAG's opinion on whether the new evidence may have a potential impact on the current guidance listed in the introduction. For further details of the evidence behind these key points, please see the full commentaries.

The section headings used in the table below are taken from the guidance.

Evidence Updates do not replace current accredited guidance and do not provide formal practice recommendations.

	Potential impact on guidance	
Key point	**Yes**	**No**
General		
• Child death review teams (similar to child death overview panels in the UK) can help implement injury prevention initiatives tailored to local needs, but more research is needed to analyse outcomes.		✓
• Child injury prevention programmes involving a local coordinator can help to implement injury prevention initiatives tailored to local needs, but more research is needed to analyse outcomes.		✓
Injury surveillance		
• Injury surveillance using national datasets or large cohorts appears to be able to identify potential injury risk factors that could help to inform targeting of injury prevention interventions.		✓
Home safety		
• Interventions to improve uptake of smoke alarms comprising a combination of education, equipment, fitting and home inspection appear to be the most effective.		✓
• Thermostatic control of hot water seems able to reduce water temperature to safer levels at which scald risk is minimised, and thermostatic mixer valves appear to be a cost-effective means of preventing bath water scalds.		✓
• Multi-component home safety equipment interventions provided through home assessment and accompanied by information and education appear to be effective.		✓
• Some inequalities in home safety practices appear to be reduced by a health-visitor led home safety intervention, although more research is needed to investigate the impact of particular socioeconomic and other types of barriers to safety equipment uptake.		✓
• Socioeconomic factors can lead to higher risk of an unintentional injury, and housing quality may not be a mediator of this risk. More research is needed to investigate inequalities in home injury risk.		✓
• Several facilitators and barriers seem to be involved in home injury prevention, and interventions may need to take these into account.		✓

Key point	Potential impact on guidance	
	Yes	No
• National home safety equipment schemes may be useful in targeting vulnerable groups and improving workforce training and capacity, but schemes should be longer term and also ensure that provision is made to analyse outcomes, particularly injuries.		✓
Outdoor play and leisure		
• Upgrading playground equipment may help to reduce socioeconomic inequalities in injury risk between schools.		✓
• Formal swimming lessons may reduce drowning risk among younger children, and among older children do not appear to increase drowning risk.		✓
• Evidence suggests that the level of correctly fitted cycle helmets could be improved, but more research is needed including more consistent definitions of correct fit.		✓
Road safety		
• Measures such as local partnership working and speed reduction may help to mitigate risk factors for road injury among disadvantaged groups.		✓
• Evidence suggests that when consulting with at-risk communities about road safety, interventions tailored specifically to the community may positively affect behaviours. Further research examining injury outcomes following interventions, and improved injury monitoring to identify at risk groups, is needed.		✓
• Reduced speed zones around schools and playgrounds appear to have an impact on average speeds. For all roads, 20 mph zones appear to reduce casualties, particularly among children.		✓

1 Commentary on new evidence

These commentaries analyse the key references identified specifically for the Evidence Update. The commentaries focus on the 'key references' (those identified through the search process and prioritised by the EUAG for inclusion in the Evidence Update), which are identified in bold text. Supporting references provide context or additional information to the commentary. Section headings are taken from the guidance.

Context

NICE public health guidance 29 (NICE PH29) recommends that local and national plans and strategies for children and young people's health and wellbeing include a commitment to preventing unintentional injuries, particularly among the most vulnerable groups to reduce inequalities in health.

Vulnerable children are defined specifically by the guidance, which states children are more vulnerable if they: are under the age of 5 years (more vulnerable to unintentional injuries in the home); are over the age of 11 (more vulnerable to unintentional injuries on the road); have a disability or impairment (physical or learning); are from some minority ethnic groups; live with a family on a low income; or live in accommodation which potentially puts them more at risk (this could include multiple-occupied housing and social and privately rented housing).

Much of the new evidence in this Evidence Update should be viewed in the context of reducing health inequalities among vulnerable groups.

General

Child death review teams

NICE PH29 recommends that local authority children's services and their partnerships, in consultation with local safeguarding children boards, and government departments with a responsibility for preparing policy and plans relating to children and young people's health and wellbeing, should ensure that local and national plans and strategies for children and young people's health include: information about how partners will collaborate on injury prevention; support for data collection on the incidence, severity, type, cause and place of injury; and support for monitoring the outcomes of injury prevention initiatives.

A report by **Keleher and Arledge (2011)** discussed the child death review and prevention process in Humboldt County, California (a process similar to child death overview panels in the UK). In 1991, the county set up a foetal infant mortality review programme, which was then combined with the child death review team to form a multi-agency group monitoring trends in child deaths. By 1995, data gathered by the team indicated that unintentional injury was the leading cause of death among children aged 1 to 17 years, and the continuation of this trend led to the development of the childhood injury prevention programme (CIPP) in 2002. The programme's immediate goal was to develop a strategic plan comprising surveillance, identification of risk factors, interventions and evaluations, and implementation.

Four main priorities were identified: child passenger safety, driving under the influence, youth driving, and drowning. The CIPP then researched and implemented interventions for these 4 areas. Although the authors discussed the types of intervention initiated for each area, and their various merits, quantitative outcome data specific to the interventions were not presented. The authors did note that the death rate improved among those aged 0 to 24 years in the period after the CIPP was set up, however these improvements could not be directly attributed to the child death review process.

Although limited by its US setting and lack of outcome data, the report provides an indication of what can be achieved by child death review teams, and the processes described are consistent with those recommended by NICE PH29. Since the searches were performed for the current guidance, child death overview panels have been implemented in the UK, which form the beginnings of a similar local surveillance system. Analysis of nationally collated data arising from this system is awaited.

Key reference

Keleher N, Arledge DN (2011) Role of a child death review team in a small rural county in California. Injury Prevention 17: i19–22

Coordinating local unintentional injury prevention activities

NICE PH29 recommends that local authority children's services and their partnerships, in consultation with local safeguarding children boards, and other local authority services that may have a remit for preventing unintentional injuries such as education, environmental health and trading standards, should ensure there is a child and young person injury prevention coordinator to help achieve the commitments set out in local plans and strategies for children and young people's health and wellbeing.

A study by **Korn et al. (2009)** examined community-based intervention programmes for preventing unintentional injuries among children in Israel. A 5-year multi-component programme comprising promotion of child safety and prevention of injuries was set up to raise public awareness of, and reduce rates of, injury among children aged 0 to 14 years in families from low-income communities. More than 18 interventions were devised, including well-baby clinic education programmes, programmes for child safety in schools and kindergartens, and tools for tracking, mapping and controlling public hazards. A national steering committee was appointed, which was also responsible for selecting 10 communities to participate in the programme. Each community appointed a local steering committee (that then chose interventions to suit local needs), and a city coordinator. The study evaluated the impact and outcomes of the programme at periods before, during and after the intervention.

To measure impact, key components of the process were quantified. Before the programme, across all 10 communities, there were 2 active key individuals and 21 specific interventions in place. During the programme this rose to 12 individuals and 42 interventions, and after the programme there were 35 individuals and 58 interventions. Public awareness was also likely to have increased, as indicated by a rise in the number of related media reports broadcast (116 before, 224 during, and 447 after the programme). In terms of outcomes, as there were no controls, neither mortality nor emergency room visits could be linked to effects of the intervention. The authors summarised that overall, the process and impact were satisfactory, but outcomes were unclear.

The primary limitation of the study noted by the authors was that it lacked control communities, so no firm conclusions about the effect of the interventions on outcomes could be made. There was also little information provided on the exact nature of the programme and interventions. Additionally, child mortality data were not available, and the outcome data that were available were not complete and could not be sorted by community. Finally, the programme was conducted in Israel and its relevance to the UK may be limited.

Within its limitations, the evidence indicated what can be achieved by a child injury prevention programme coordinated at a local level, and is consistent with the recommendation in NICE PH29 to ensure that an injury prevention coordinator is in place. Further research is needed to assess the effect of these programmes on injury outcomes.

Key reference

Korn L, Hemmo-Lotem M, Endy-Findling L (2009) Safe communities for children: insight from a pilot program for preventing unintentional injuries. International Journal of Adolescent Medicine and Health 21: 187–95

Workforce training and capacity building

No new key evidence was found for this section.

Injury surveillance

Risk-factors for injury

NICE PH29 recommends that the Association of Public Health Observatories, the College of Emergency Medicine, government departments including Department of Health and its Public Health Service, Department for Education, Department for Transport, Department for Communities and Local Government and the Home Office, the Office for National Statistics, and the Information Centre for Health and Social Care should establish a national injuries surveillance resource covering all populations and injuries to help monitor injury risks and the effects of preventive measures. It is recommended that the resource should include local, regional and national injury datasets and data sources. Additionally, a number of recommendations throughout the guidance state that unintentional injury prevention should be directed at the most vulnerable and at-risk groups.

A case-control study by **Orton et al. (2012)** investigated risk factors for thermal injury, fracture and poisoning in pre-school children. The study used prospectively gathered data from The Health Improvement Network (THIN), a UK database of all healthcare provision (including secondary and tertiary care) in 3.9 million patients from 255 general practices. The study focused on a cohort of all children (1 per household) in THIN born between 1998 and 2004, from which all first occurrences of thermal injury (n=3649), fracture (n=4050) and poisoning (n=2193), up to the age of 5 years, were identified. For each injury type, a case-control dataset (n=94,620) was created, comprising up to 10 controls (from the same general practice) per case. A fully adjusted multivariable model was used to analyse the data, incorporating all risk factors under assessment by the study (gender, age of child at the time of injury, birth order, age of mother at birth, perinatal depression, household composition, hazardous or harmful alcohol consumption in the household, and deprivation).

For poisonings and thermal injury, modifiable risk factors (namely those that could be subject to risk-reduction measures) associated with injury were perinatal depression (odds ratio [OR]=1.45, 95% CI 1.24 to 1.70 and OR=1.16, 95% CI 1.02 to 1.32 respectively), hazardous or harmful alcohol consumption (OR=1.73, 95% CI 1.26 to 2.38 and OR=1.39, 95% CI 1.07 to 1.81 respectively), and deprivation (tests for trend p≤0.001). For fracture, not living in a single-adult household was associated with reduced risk (OR=0.88, 95% CI 0.82 to 0.95).

Limitations of the study noted by the authors included the possibility of missing data from the THIN database, and the lack of information in THIN about other potentially confounding variables such as parental education and housing type. It should also be noted that thermal injury included burns and scalds, such as scalds from hot drinks (which are not covered by NICE PH29).

A systematic review by **Mytton et al. (2009)** examined injury patterns and risk factors in school-aged children. Prospective cohort, longitudinal and follow-up studies of unintentional physical injuries sustained in healthy children between the ages of 5 and 18 years were included. Studies were excluded if they involved population or record-based cohorts, they covered psychological or psychiatric injury outcomes only, or they recruited selectively (for example, because of a specific disability or increased risk of injury through particular activities). A total of 44 papers were included, of which 27 discussed risk factors (23 looked at the individual, 19 examined the family, and 6 explored the wider environment). The papers were all derived from 18 cohorts (of approximately 200,000 children) the oldest of which was recruited in 1947, and the most recent in 2002. The modal follow up was 1–2 years (ranging

from 9 months to 15 years). The authors stated that because of heterogeneity and the risk of confounding from the included observational studies, meta-analysis was not appropriate.

Across the studies, factors identified in more than 1 cohort and setting that were associated with increased risk of injury comprised male sex, behavioural problems (including risk-taking behaviour), a large number of siblings, and a young mother. Factors not often explored or not consistently associated with risk included history of injury, sensory deficit, poor learning ability, attention, parental health or parenting ability, family dysfunction, socioeconomic status and the wider environment of the child.

Several limitations of the review were noted by the authors. The focus on prospective cohort studies meant that few child deaths (being potential indicators of the most serious injuries) were included. Publication bias was also a potential issue, with studies often noting that only selected results from their full data set were published. There was heterogeneity among the studies (for example, how injury was defined) and older studies tended to record only more severe injuries. Many of the included studies reported loss to follow up but rarely compared characteristics of those who left the study with those who were retained. Some cohorts were reported in multiple papers and their findings may have been over-represented. Most cohorts were geographically clustered rather than nationally sampled (participants living in proximity may be more similar, leading to potential bias), and were from high-income countries (although this may increase relevance to the UK). Finally, the cohorts date back to the 1940s and therefore relevance of some of the data to modern practice is potentially limited.

The evidence from the 2 studies suggests that injury surveillance can highlight potential injury risk factors, in agreement with recommendations in NICE PH29 to monitor injury risk. Any risk factors can then feed into the targeting of interventions to vulnerable or at-risk groups.

Key references

Mytton J, Towner E, Brussoni M et al. (2009) Unintentional injuries in school-aged children and adolescents: lessons from a systematic review of cohort studies. Injury Prevention 15: 111–24

Orton E, Kendrick D, West J et al. (2012) Independent risk factors for injury in pre-school children: three population-based nested case-control studies using routine primary care data. PLoS One 7: e35193

Home safety

NICE PH29 notes that groups facing a higher than average risk of an unintentional injury need to be prioritised, which include children aged under 5 and those living in temporary, rented and social housing with families on a low income. It recommends that local authorities should consider developing local agreements with housing associations and landlords to ensure permanent safety equipment, including hard-wired or 10-year, battery-operated smoke alarms, thermostatic mixer valves for baths, window restrictors, and carbon monoxide alarms, are installed and maintained in all social and rented dwellings.

NICE PH29 also recommends that local authority children's services and their partnerships, in consultation with local safeguarding children boards, commission local agencies to offer home safety assessments and, where appropriate, supply and install suitable, high quality home safety equipment accompanied by education, advice and information. Commissions should specify that the assessment and the supply and installation of equipment needs to be tailored to meet the household's specific needs and circumstances. These include the developmental age of the children, whether or not a child or family member has a disability, cultural and religious beliefs, whether or not English is the first language, levels of literacy within the household, the level of control people have over their home environment, and the household's perception of, and degree of trust in, authority.

Smoke alarms

A meta-analysis by **Cooper et al. (2012)** examined the effectiveness of interventions to increase prevalence of functioning smoke alarms in households with children. Studies involving children aged 0 to 19 years and their families, that assessed interventions to prevent fire injury including those promoting smoke alarm use and maintenance, and which reported possession of functional smoke alarms, were included. Interventions involving smoke alarm legislation were excluded. A total of 23 studies were included: 20 studies compared types of intervention (14 randomised controlled trials [RCT] and 6 non-randomised comparative studies, n=11,479 households), and 3 studies assessed type of battery-powered alarm (all RCTs, n=1771 households). Follow-up ranged from 2 weeks to 25 months. Network meta-analysis was used to enable comparison of multi-component interventions not compared directly within individual studies.

Across the included studies, 4 types of intervention were extracted for the analysis: education, equipment, fitting, and home inspection. For the main outcome of possessing a functional smoke alarm, an intervention comprising all 4 of these components was most likely to be the most effective (probability=66%), and was more effective than those receiving usual care (OR=7.15, 95% credible interval 2.40 to 22.73). For type of battery-powered alarm, ionisation alarms with lithium batteries were most likely to be the best type for increasing functioning possession (probability=69%).

The authors noted some limitations of the study, including that there was some inconsistency between direct and indirect evidence (but a sensitivity analysis did not alter conclusions), and that among the included studies some details such as intensity of safety education or the type of usual care received by controls were not always clear. The quality of the included studies also varied but a sensitivity analysis restricted to RCTs did not greatly alter key findings.

The evidence appears to be consistent with recommendations in NICE PH29 to install and maintain smoke alarms in social and rented housing, and that interventions should comprise home assessments and accompanying education.

Key reference

Cooper NJ, Kendrick D, Achana F et al. (2012) Network meta-analysis to evaluate the effectiveness of interventions to increase the uptake of smoke alarms. Epidemiologic Reviews 34: 32-–5

Thermostatic hot water control

Three studies recently examined the use of thermostatic hot water control, including thermostatic mixing valves (TMV), in social housing.

An RCT by **Kendrick et al. (2010)** investigated the effect of TMVs on reducing bath hot tap water temperature among 124 families (with at least 1 child under 5 years) living in Glasgow Housing Association accommodation. Exclusion criteria were moving from the original property, participating in other similar projects, or having unsuitable pipework. Families were randomised equally to the intervention (comprising a TMV fitted by a qualified plumber, an accompanying waterproof guide attached to the tap, and educational leaflets) or to a control arm. At baseline, median hot water temperature was similar between the intervention arm (55°C, interquartile range [IQR]=54–58°C) and control arm (58°C, IQR=55–62°C), as was the proportion of families happy or very happy with their water temperature (intervention arm=63%, control arm=60%).

For the primary outcome of bath hot tap water temperature, families with TMVs had a significantly lower median hot water temperature than those in the control arm at both 3 months after TMV installation (45°C vs 56°C, p<0.001) and at 12 months (46°C vs 55°C, p<0.001). At 12-months, families with TMVs were also significantly more likely to be happy or very happy with their hot water temperature (relative risk [RR]=1.43, 95% CI 1.05 to 1.93).

Limitations of the study included that only 15 or 16 families per arm had their hot water temperature measured at each follow-up (although this was a deliberate strategy and still provided adequate power for the data analysis). The authors also noted that blinding of participants and researchers was not possible, however all analysis was blinded to allocation (although the analyst was able to guess most allocations correctly). Finally the authors noted that the trial was not powered to detect a reduction in scalds, but stated that at the temperatures observed after TMV installation, a partial thickness burn would take more than 9 minutes and therefore temperature was a suitable proxy measurement for scalding.

Phillips et al. (2011) performed a cost-effectiveness analysis of TMV installation based on the results of the RCT by Kendrick et al. (2010). Data from the RCT indicated that installing a TMV led to a 68% reduction in scald risk (based on a proxy measure of number of families with a hot water temperature >46°C). Using data from the Royal Society for the Prevention of Accidents' Home and Leisure Accident Surveillance System (2002) and the Department of Trade and Industry (1999), the number of scalds per year of all severities among children from the most disadvantaged areas (and hence likely to live in social housing) was estimated as 653. The average cost to the NHS of treating a scald of any severity was calculated to be £25,226 (based on NHS data from 2005 to 2009).

Combining these data, a 68% reduction in scald risk was calculated to save the NHS £11,200,344. In terms of spend on TMVs, the authors estimated the cost of installing a TMV in every household in social housing to be £7,971,336. This equated to a net benefit to the public purse of £1.41 per £1 spent, a figure the authors also believed would lie within NICE's value-for-money threshold for cost per quality-adjusted life year.

Limitations of the study noted by the authors were the lack of generalisability to families not in social housing (who may have a different risk profile and who would also have to purchase their own TMV). The age of the data used to calculate annual scald incidence should also be noted, although this is likely the best available evidence.

An alternative hot water control system was examined by **Edwards et al. (2011)** in a pair-matched, double-blind, cluster RCT of the effect of thermostatic boiler control, on both hot water temperature and fuel consumption, among 150 households from 22 social housing estates in a deprived inner-London borough. Estate boiler houses were pair-matched (for type of residence supplied, and presence of immersion heaters in individual households), and a 10% sample of households from each estate was taken. Eighty households were randomised to the intervention (a thermostatic control sterilisation programme heating water to 65°C from midnight to 6:00am and then to 50°C from 6:00am to midnight daily), and 70 households to control (a constant temperature of 65°C). The temperatures were chosen due to local concerns about *Legionella* (the bacterium that causes Legionnaires' disease; 90% of *Legionella* are killed in 2 minutes at 60°C). At baseline, mean hot water temperature was similar between the intervention arm (56°C, standard deviation [SD]=10.2°C) and control arm (55°C, SD=11.0°C; p value not stated). Households were followed up approximately 2 months after the intervention began.

For the primary outcome, prevalence of 'dangerous' hot water temperatures (>60°C) was lower in the intervention group (1%) than control group (34%; absolute difference=33%, 95% confidence interval [CI] 12 to 54%, p=0.006). A similarly reduced prevalence of 'high' hot water temperatures (>55°C) was also seen in the intervention versus control group (31% vs 59% respectively; absolute difference=28%, 95% CI 9 to 47%, p=0.009). There was however no significant difference in mean hot water temperature at follow-up (intervention arm 3.8°C lower than control arm, p=0.14). Daily fuel consumption was reduced in both groups (which the authors suggested may have resulted from an unexpected seasonal change) but was not significantly different between groups (p=0.125). *Legionella* were not specifically tested for as

part of the RCT but routine testing by the local authority during the study period did not find any active growth.

Limitations of the study noted by the authors were that the mean temperature after the intervention (53°C) was higher than recommended safety levels and adjustments may be needed to the thermostatic control programme. Also, although boilers were matched for certain variables, this did not include age or type of boiler which may have affected results.

Taken together, the evidence from all 3 studies suggests that thermostatic control of hot water can reduce water temperature to safer levels at which scald risk is reduced. Specifically, TMVs appear to be a cost-effective means of preventing bath water scalds which is consistent with the recommendation in NICE PH29 to install and maintain them in social and rented housing.

A critical abstract of the study by Phillips et al. (2011) was produced for the Centre for Reviews and Dissemination's NHS Economic Evaluation Database.

Key references

Edwards P, Durand MA, Hollister M et al. (2011) Scald risk in social housing can be reduced through thermostatic control system without increasing *Legionella* risk: a cluster randomised trial. Archives of Disease in Childhood 96: 1097–1102

Kendrick D, Stewart J, Smith S et al. (2010) Randomised controlled trial of thermostatic mixer valves in reducing bath hot tap water temperature in families with young children in social housing. Archives of Disease in Childhood 96: 232–39

Phillips CJ, Humphreys I, Kendrick D (2011) Preventing bath water scalds: a cost-effectiveness analysis of introducing bath thermostatic mixer valves in social housing. Injury Prevention 17: 238–43

Supporting reference

Centre for Reviews and Dissemination (2012) Preventing bath water scalds: a cost-effectiveness analysis of introducing bath thermostatic mixer valves in social housing. NHS Economic Evaluation Database

Provision of multiple home safety equipment

An RCT by **Phelan et al. (2011)** investigated the effect on injuries of installing safety devices in the homes of young children. Participants were English-speaking, expectant mothers (aged at least 18 years and no more than 19 weeks' gestation), living in a home built before 1978 with no plans to relocate in the following 12 months, and not living in public housing or a shelter. Participants were randomised to control (n=181), or to the intervention (n=174) which comprised a home visit by research staff who identified hazards, and then discussed interventions and safety products with the families (who could reject any of the recommended interventions). Specific hazards were defined by the study, and those relevant to NICE PH29 included water temperature exceeding 49°C, absent or non-functioning smoke and carbon monoxide detectors, and accessible windows (examples of other hazards included accessible poisons and ungated stairways). Interventions were aimed primarily at hazardous areas less than 99 cm above floor level (the 75th percentile in height for a 3-year-old boy). No data were given for the numbers or types of equipment provided, but examples were given of stair gates, cabinet locks, and smoke detectors. The mean age of mothers at baseline was 30 years, and the mean age of children during the intervention was 6.3 months. There was no difference in hazards at baseline between homes of those in the intervention or control arms.

During 24 months of follow-up, for the primary outcome of modifiable, medically attended injuries (namely injuries preventable by the study interventions involving a call or visit to a doctor or emergency department), the injury rate per 100 child years was 70% less in the intervention versus control group (2.3 injuries [95% CI 1.0 to 5.5] versus 7.7 injuries [95% CI 4.2 to 14.2] respectively, p=0.03). However for all medically attended injuries there was no

significant difference between the intervention and control groups (14.3 injuries [95% CI 9.7 to 21.1] versus 20.8 injuries [95% CI 14.4 to 29.9] respectively, p=0.17).

Limitations noted by the authors were that it was not possible to perform a double-blind study for this type of intervention, and the gathering of injury data relied on maternal reporting (although this was verified through a regional surveillance system for emergency visits). Additionally, not all interventions provided were directly relevant to NICE PH29.

A Cochrane review by **Kendrick et al. (2012)** examined home safety education and provision of safety equipment for injury prevention. Included studies were those where home-safety education with or without the provision of safety equipment was provided to people aged 19 years and under, and which reported injury, safety practices or possession of safety equipment. A total of 98 studies (n=2,605,044) were identified (56 RCTs, 30 controlled before and after studies, 11 non-RCTs, 1 study type not stated) of which 49 studies were from the USA and 14 were from the UK.

For the primary outcome of medically attended or self-reported injuries, there did not appear to be a significant effect of home safety interventions after adjustment for baseline injury rates (incidence rate ratio=0.89, 95% CI 0.78 to 1.01; 15 studies, n=24,406). However it should be noted that the studies pooled for this analysis included some interventions outside the scope of NICE PH29 (such as non-permanent home safety equipment), and the authors also indicated that due to low incidence of injuries these findings were potentially underpowered. Further analysis of specific home safety interventions (results are only listed here for interventions relevant to NICE PH29, namely permanent equipment) showed increases in the proportion of families with safe hot tap water temperatures (OR=1.41, 95% CI 1.07 to 1.86; 16 studies, n=3727) and functional smoke alarms (OR=1.81, 95% CI 1.30 to 2.52; 17 studies, n=5107), however interventions did not appear to increase possession of window locks (OR=1.17, 95% CI 0.87 to 1.57; 3 studies, n=3724). The authors also noted that there was no consistent evidence that home safety interventions were less effective among children at greater risk of injury (differential effectiveness was seen in only 7 of 96 analyses in the review), which suggested that home safety interventions should not widen existing inequalities.

Limitations of the review noted by the authors included that almost half the studies identified were not included in any meta-analyses (mainly due to heterogeneity with other studies), few studies reported specific injury outcomes, most studies reported short-term outcomes (less than 1 year), some studies defined safe hot water temperature as up to 60°C (which still has the potential to scald), and there was potential publication bias for the outcome of smoke alarm possession (although after adjustment the effect was still significant).

The evidence from both studies appears to be broadly consistent with recommendations in NICE PH29 that permanent safety equipment should be installed and maintained in social and rented housing, and that this should be accompanied by home assessments, information and education.

Key references

Kendrick D, Young B, Mason-Jones AJ et al. (2012) Home safety education and provision of safety equipment for injury prevention. Cochrane Database of Systematic Reviews issue 9: CD005014

Phelan KJ, Khoury J, Xu Y et al. (2011) A randomized controlled trial of home injury hazard reduction: The HOME injury study. Archives of Pediatrics and Adolescent Medicine 165: 339–345

Reducing inequalities in home safety

A study by **Kendrick et al. (2009)** performed a secondary analysis of an RCT by Watson et al. (2005) to examine the effect of a home safety intervention on reducing inequalities in safety practices among families with children under 5 years from deprived areas of Nottingham, UK. The aim of the original RCT was to examine child injury outcomes in families assigned to control (n=1717) or to an intervention (n=1711) comprising a safety consultation by a health visitor followed by an offer of free (for families receiving means tested benefits) or low-cost safety equipment. The RCT assessed several different types of equipment, however the secondary analysis looked only at stair gates and smoke alarms because these showed the most marked inequalities at baseline. The effect of the intervention was assessed for 5 socioeconomic characteristics: family origin, maternal age, family type, housing tenure and receipt of means-tested benefits. Safety practices (as indicated by fitted, used and working equipment) were assessed by questionnaires sent to 1000 randomly chosen families in each arm 1 year after the intervention began.

In the intervention arm, 30% of families received a safety consultation, 36% a safety consultation plus free equipment, and 2% a safety consultation plus low-cost equipment. The intervention appeared to reduce inequalities in stair gate use for the socioeconomic markers of housing tenure (p=0.006) and receipt of benefits (p=0.04). However no significant reductions were seen with any markers for working smoke alarms (although the authors noted that this may have been due to high prevalence of smoke alarms at baseline creating a 'ceiling effect' limiting the potential effect of the intervention on inequality).

Limitations of the study noted by the authors were that the numbers of families in some of the socioeconomic subgroups were small, and analyses may have been underpowered to detect significant differences in inequality. Also, the uptake of free equipment by only one third of families may have affected results, and greater penetration of the intervention may have increased its effect. Finally stair gates are not within the scope of NICE PH29 (that covered only permanently fitted rather than temporary equipment), which may limit its relevance.

Some aspects of the evidence are consistent with NICE PH29 in that inequalities among vulnerable families for some types of home safety equipment were reduced by a health visitor-led intervention to assess home safety and install equipment. However this intervention did not overcome inequalities for all socioeconomic markers, and did not show an effect with smoke alarms. This evidence may therefore also indicate the importance of the nature of the intervention (in this case, health-visitor led) which is consistent with the recommendations in NICE PH29 to tailor interventions to the household. The authors suggested that further research is needed into uptake of interventions among minority groups, young mothers and single parents. For smoke alarms, other potential barriers to uptake such as the nuisance of alarms sounding when cooking may also need to be addressed.

Key reference

Kendrick D, Mulvaney C, Watson M (2009) Does targeting injury prevention towards families in disadvantaged areas reduce inequalities in safety practices? Health Education Research 24: 32–41

Supporting reference

Watson M, Kendrick D, Coupland C (2005) Providing child safety equipment to prevent injuries: randomised controlled trial. BMJ 330: 178–81

Reasons for inequalities in home safety

An analysis by **Pearce et al. (2012)** investigated the influence of the home environment on the association between socioeconomic circumstances and unintentional injury. The study used data from the Millennium Cohort Study, a longitudinal survey of 18,296 singleton children born in the UK between September 2000 and January 2002. The data from the cohort were used to calculate the risk of injury in the home (when children were aged between 9 months and 3 years) according to 4 socioeconomic circumstances: social class, maternal education, lone parenthood and housing tenure. Mediators of injury were then assessed in terms of housing quality (indicated by build type, storey of living space, garden access, rooms per capita, central heating and presence of damp) and safety equipment use (fireguards, safety gates, electric socket covers and smoke alarms).

Several socioeconomic factors were associated with increased injury risk including routine and manual background versus managerial and professional background (RR=1.33, 95% CI 1.21 to 1.47), lone parents versus couples (RR=1.23, 95% CI 1.12 to 1.36), mothers with no educational qualifications versus those with a degree (RR=1.42, 95% CI 1.24 to 1.63) and socially rented accommodation versus owned or mortgaged homes (RR=1.35, 95% CI 1.24 to 1.46). However, the greater injury risks observed among less advantaged children were unchanged when indicators of housing quality and safety equipment were controlled for, suggesting that these factors do not appear to explain the observed inequalities.

Limitations of the study noted by the authors were that injury data was based on maternal reports, only those injuries where professional advice was sought were included, only the most severe injury was recorded for any children injured more than once (some of which were injuries outside of the home), and data about the time spent in childcare was not included. It should also be noted that the correct use or functionality of safety equipment was not assessed in this study, and the safety equipment was either non-permanent or not fully described, therefore the equipment aspect is of limited relevance to NICE PH29.

The evidence appears to be consistent with NICE PH29 in recognising specific groups facing a higher than average risk of an unintentional injury. However, the study also found that housing quality did not seem to explain socioeconomic inequalities in injury risk, implying that improvement in housing may not reduce risk. But it should be noted that the study did not examine permanent safety equipment, nor any educational component of home safety. The authors suggested that further research to investigate alternative causes of inequality in home injury was needed.

Key reference

Pearce A, Li L, Abbas J et al. (2012) Does the home environment influence inequalities in unintentional injury in early childhood? Findings from the UK Millennium Cohort Study. Journal of Epidemiology and Community Health 181–8

Facilitators and barriers for home injury prevention measures

A systematic review by **Ingram et al. (2011)** examined the facilitators and barriers for home injury prevention interventions. The review was based on the studies identified for a Cochrane review on home safety education and equipment for injury prevention by Kendrick et al. (2012) (see **'Provision of multiple home safety equipment'** in this section above for further details). From the studies in the Cochrane analysis, 57 were selected for this review using the criteria that the intervention had to be described in detail, the focus was children under 5 years, and the article had to identify process measures, or report barriers and facilitators to success, or both. Themes for barriers and facilitators were then extracted from the papers.

Seven facilitators and 6 barriers were identified. Facilitators were (numbers in brackets refer to the number of studies where the category was identified): form of approach e.g. home visits (46); role of the deliverer e.g. child health professionals (45); focused message e.g. simple

message about a single injury type (32); behaviour change model e.g. reinforcement through reminders (31); accessibility to equipment e.g. free provision and fitting (29); minimal changes required e.g. tailored handouts (21); and incentives e.g. financial rewards (7). Barriers were: behavioural e.g. existing beliefs (25); physical e.g. accommodation type (21); complex interventions e.g. covering multiple injury types (21); cultural e.g. language barriers (20); deliverer constraints e.g. having to train staff (20); and socioeconomic e.g. low literacy levels (15).

Limitations of the review noted by the authors were that many of the included studies did not explicitly examine barriers and facilitators, they were not always able to test durability of effects due to short follow-ups, they often relied on unvalidated self-reported behaviours or questionnaires, and in some studies the effect of the intervention was diluted by behaviour change in the control group after they had gained access to alternative interventions outside the study.

The authors concluded that home safety interventions should consider facilitators and barriers when implementing injury prevention interventions. This evidence is broadly consistent with the need to tailor interventions to the household as recommended by NICE PH29, which takes into account many of the facilitators and barriers noted by the study.

Key reference

Ingram JC, Deave T, Towner E et al. (2011) Identifying facilitators and barriers for home injury prevention interventions for pre-school children: a systematic review of the quantitative literature. Health Education Research 27: 258–68

National home safety schemes

In addition to the recommendations specific to home safety noted at the start of this section, a more general recommendation in NICE PH29 states that local and national plans and strategies to prevent unintentional injuries among children and young people should include support for: data collection and surveillance for injuries; monitoring the outcomes of injury prevention initiatives; and the development of workforce capacity in this area, including the provision of suitably trained staff and opportunities for initial and ongoing multi-agency training and development.

A report by **Errington et al. (2011)** presented an evaluation by the University of Nottingham of Safe At Home, a national home safety equipment scheme funded by the Department for Education (formerly Department for Children, Schools and Families). The scheme was hosted by the Royal Society for the Prevention of Accidents and ran from February 2009 to March 2011. Its main focus was: 'To provide home safety equipment to the most disadvantaged families in areas with the highest accident rates.' The intervention comprised: training for professionals delivering the scheme; a home safety check; free temporary loan and installation of home safety equipment (equipment chosen for the scheme was based on best available evidence of effectiveness); and home safety education for families. Although NICE PH29 is concerned only with permanent home safety equipment, the report provided relevant information about the delivery of home safety interventions generally.

The intervention was targeted to the most at-risk local authorities, namely the 141 authorities with an above-average rate of admission to hospital for accidental injury in children under 5 years. Within these authorities, the intervention was provided to the most disadvantaged families, assessed by eligibility criteria including receipt of means-tested benefits. A governance, monitoring and evaluation process for the scheme was also set up. The present report evaluated the scheme through 7 objectives covering processes, equipment, staff training, injury risk factors, raising awareness, reducing injury outcomes, and costs. The evaluation methods included postal surveys, interviews, discussion groups, direct observation, case studies, documentary analysis and postcode mapping of family data.

Some of the main observations made by the authors were that more than 66,000 families in 129 of the 141 local authorities targeted received equipment (99% of families were in receipt of social benefits and 70% lived in England's most deprived areas, indicating that equipment had reached disadvantaged groups). There were some local examples of adaptations to increase access to homes such as the use of translators and female equipment fitters, and it was felt that the non-threatening nature of the intervention may have encouraged uptake. A survey indicated that 96% of families were satisfied with the scheme and 91% felt their home was safer. Over 4000 staff completed professional training with 98% rating it very highly. Experts within the evaluation team thought that if continued, the scheme had the potential to reduce injuries (assessment of injury outcomes was part of the initial proposals but this element was removed due to government funding restrictions), and agreed that 2-years was very short for an intervention of this nature. The benefits of a large national scheme in terms of its high profile and economies of scale were recognised.

Limitations of the evaluation were that it ended at the same time as the intervention (therefore considered only short-term outcomes), it was not published in a peer reviewed journal, and the provision of temporary equipment was not directly relevant to NICE PH29. Further, the analysis was largely qualitative, it did not collect baseline data about equipment use, did not attempt to isolate effects from other similar schemes families may have been involved with, did not obtain data from those choosing not to take part, and did not assess injury outcomes.

Recommendations made by the report, all of which are consistent with NICE PH29, included that: measuring longer term outcomes should be worked into future interventions; support for these types of schemes is needed from national and local public health policies; periodic training should be made available to practitioners; the effect of this and future schemes on injury rates should be investigated further; and injury surveillance is needed at national and local levels to assist planning and targeting. Overall, the evidence provides a useful analysis of intervention targeting, workforce training, accessing vulnerable groups, and surveillance involved in a large national scheme to prevent injuries in the home.

An analysis of the implementation of the Safe At Home scheme at a local level in Merseyside was also performed by Liverpool John Moores University's Centre for Public Health (2012).

Key reference

Errington G, Watson M, Hamilton T et al. (2011) Evaluation of the National Safe at Home Scheme. Royal Society for the Prevention of Accidents

Supporting reference

Centre for Public Health, Liverpool John Moores University (2012) An evaluation of the Fire Support Network Safe and Sound project in Liverpool

Outdoor play and leisure

Upgrading playground equipment

NICE PH29 recommends that head teachers and school governors, local strategic partnerships, play and leisure providers in the public, private, voluntary and community sector, along with public, private, voluntary and community sector managers and decision makers responsible for play and leisure policies, should ensure a policy for public outdoor leisure is in place that takes into account the needs of all children including those from lower socioeconomic groups. It also states that injury prevention initiatives should focus on groups most at risk of an unintentional injury, which could include modification of equipment and the environment, and the provision of information, education and safety equipment.

A retrospective cohort study in Toronto, Canada by **Macpherson et al. (2010)** examined the association between playground injuries and school socioeconomic status before and after upgrading playground equipment in line with Canadian Standards Association guidelines.

Injury data were obtained from the Ontario School Board Insurance Exchange's database of incident reports (recorded whenever medical or dental attention was required) for 374 elementary schools ranging in size from 62 to 1600 students (mean=388 students). Data were collected during 2 periods: prior to upgrading equipment (January 1998 to December 1999) and after the upgrades (January 2004 to June 2007). The rate of playground injuries was calculated using 'student months' (arrived at by multiplying student population by number of school months) prior to and subsequent to upgrading equipment. Injury rates were then compared with schools' scores on the Learning Opportunity Index, used to define school socioeconomic status on a scale from 0 (wealthiest) to 0.97 (poorest) based on several factors including family income, housing and parental education.

Prior to equipment upgrades there was a significant effect of socioeconomic status on equipment-related injuries, with an increased risk among children at poorer schools (RR=1.52, 95% CI 1.24 to 1.86). After upgrading unsafe equipment, the relationship between injury and socioeconomic status was no longer significant (RR=1.13, 95% CI 0.95 to 1.32).

Limitations of the study noted by the authors included not being able to exclude the potential effect of factors that may differ between lower and higher socioeconomic status schools, such as quality of equipment prior to the upgrade, differences in teacher supervision, level of exposure to equipment, and changes in play once the equipment was upgraded (the authors noted that future studies should include measures of exposure to play). They also stated that the threshold for reporting injuries was low, and reporting may have differed between schools (for example, it may have been that schools with lower socioeconomic status tended to report more superficial injuries; however this was felt to be unlikely as all schools have the same reporting guidelines). The authors additionally noted that the Learning Opportunity Index has not been tested extensively. Finally, the study was from Canada which may limit transferability to a UK setting.

The study provides some evidence that upgrading playground equipment reduces inequalities in injury risk between schools of a lower and higher socioeconomic status. This is consistent with NICE PH29 that injury prevention policy should address the needs of lower socioeconomic groups, and should focus initiatives (including modification of equipment) on groups most at risk of an unintentional injury.

Key reference

Macpherson AK, Jones J, Rothman L et al. (2010) Safety standards and socioeconomic disparities in school playground injuries: a retrospective cohort study BMC Public Health 10: 542

Swimming lessons and drowning risk

NICE PH29 recommends that injury prevention coordinators, lifeguards, outdoor activity and holiday centre managers, schools, swimming instructors and swimming pool managers, should encourage children, young people, their parents and carers to become competent swimmers and to learn other water safety skills (for example, so that they know how to effect a rescue). It also recommends that swimming lessons include general and specific water safety information, and should raise children and young people's awareness of how difficult it is to assess and manage the hazards posed by water in a range of different outdoor environments.

A case-control study by **Brenner et al. (2009)** investigated the association between swimming lessons and drowning risk among 301 children aged 1 to 19 years. The study included cases where death was caused by submersion in liquid and where history of swimming lessons was known, but excluded intentional drownings, those where the intent was uncertain, or where swimming ability was unlikely to affect risk (such as in ice water, or bathtubs). A minimum of 2 matched controls were sought for all cases, matched for age, sex and country of residence (for children up to 4 years, having a swimming pool at home was

also matched for). A total of 88 cases and 213 controls were identified, whose families were then interviewed to obtain information about water exposure, swimming ability and participation in swimming lessons (either formal or informal). For the analysis, children were split into 2 groups: 1 to 4 years (61 cases, 134 controls), and 5 to 19 years (27 cases, 79 controls). Analyses were adjusted on an individual basis for confounders, the largest of which were education and household income of the interviewees.

For children aged 1 to 4 years, participation in formal swimming lessons was significantly lower among cases of drowning versus controls (3% vs 26%, adjusted OR=0.12, 95% CI 0.01 to 0.97), however in children aged 5 to 19 years there was no significant difference in formal swimming instruction between cases and controls (27% vs 53%, adjusted OR=0.36, 95% CI 0.09 to 1.51). For informal swimming lessons, no significant differences were found between cases and controls for either age group.

Limitations of the study noted by the authors included the small sample size (particularly of older children) resulting in wide confidence intervals. Also, interviews were conducted only with a proportion of the families of drowning cases (38% in the 1 to 4 years group and 26% in the 5 to 19 years group) and therefore some data had to be gathered from medical examiners' reports, which may have introduced bias. Finally the authors noted that the mechanism by which swimming lessons may exert a protective effect was not examined, stating that approximately half of those who had drowned in the older age group were relatively strong swimmers. The authors therefore advised that swimming lessons alone were unlikely to prevent drowning.

The evidence suggests that among younger children, formal swimming lessons may reduce drowning risk. Among older children, although not associated with risk reduction, formal lessons do not appear to increase risk (there have been concerns that swimming lessons may have the potential to increase exposure to water or reduce parental vigilance). These results appear to be broadly consistent with recommendations in NICE PH29 to encourage children and young people to become competent swimmers.

Key reference

Brenner RA, Taneja GS, Haynie DL et al. (2009) Association between swimming lessons and drowning in childhood: a case-control study. Archives of Pediatrics and Adolescent Medicine 163: 203-10

Correct use of bicycle helmets

NICE PH29 recommends that the NHS, other health organisations, and local authorities should use local information campaigns and ongoing education to promote the use of correctly fitted and fastened cycle helmets while cycling off the road. It also recommends that retailers should provide point-of-sale advice on the correct fitting of cycle helmets, and that cycle hire centres should advise about the advantages of children and young people wearing correctly fitted and fastened cycle helmets.

A systematic review by **Lee et al. (2009)** examined the correct use of bicycle helmets. Studies presenting original data that reported on the prevalence of and correct or incorrect use of helmets among cyclists were included. A total of 11 studies (7 observational surveys, 2 case-control studies, 1 RCT and 1 questionnaire) involving more than 15,000 cyclists from the USA, Canada and Australia were identified. Only 4 of the studies looked exclusively at children. The authors stated that the heterogeneity of the included studies prevented meta-analysis.

The observed level of correct helmet use ranged from 46% to 100% across the studies. There was also some evidence that correct helmet use may be lower among children than adults, that educational interventions in schools may increase correct helmet use, and that poor helmet fit may increase risk of head injury, but the absence of statistical pooling of data limited any firm conclusions.

Limitations of the study noted by the authors included that correct helmet use was only a secondary outcome in most studies, with helmet prevalence frequently the primary outcome. The criteria used to assess correct fitting also varied considerably between studies (from a single definition of 'chin strap fastened', through to more complex multi-component criteria), and the studies using more strict criteria tended to observe reduced levels of correct fit. Most studies did not report confidence intervals or p values for correct helmet use, and did not attempt to compare characteristics in those people with and without correctly fitted helmets. Finally, external validity was limited by the lack of reporting of participant characteristics in several studies, and by most studies being conducted in urban or suburban areas.

Within the limitations of the study, the evidence appears to be broadly consistent with the need to promote correct fitting of cycle helmets as recommended by NICE PH29. The authors noted that further research is needed to more directly examine correct helmet use, which should employ more consistent definitions for correct fitting.

Key reference

Lee RS, Hagel BE, Karkhaneh M et al. (2009) A systematic review of correct bicycle helmet use: how varying definitions and study quality influence the results. Injury Prevention 15: 125–31

Road safety

Road user safety in disadvantaged areas

NICE PH29 recommends that local highway authorities should maintain the existing road safety partnership (or establish one where none exists) to help plan, coordinate and manage road safety activities, and ensure that the partnership develops policies, strategies and programmes in consultation with parents and carers about their children's road use and safety, and using local information from other professional partnerships, children's councils and neighbourhood forums. It also recommends that the partnership draws on all available information to plan road injury reduction programmes, which should reflect the increased risks facing children and young people from disadvantaged areas and communities. Further recommendations state that local highway authorities and their road safety partnerships should use measures to reduce vehicle speeds.

A study by **Lowe et al. (2011)** examined the reasons for increased risk of road injury among disadvantaged groups. The research comprised 3 parts: a development phase (including analysis of injury and spatial deprivation data, a review of existing evidence, and interviews with road safety experts and government representatives from other policy areas); a core phase (5 detailed case studies in Wigan, Bradford, Newham, Sunderland and Wolverhampton); and a follow-up phase (to fill information gaps arising from the previous stages of the study).

The study indicated that the factors related to increased risk of road injury in people from disadvantaged areas were: more hazardous environments (such as dense housing, proximity to fast-moving traffic, and high levels of on-street parking); lifestyle (such as being more likely to walk and less likely to have a car); and limited facilities for children and young people (meaning roads were more likely to be used as places to socialise and play). Residents were also concerned about driving behaviours, including dangerous parking, speeding and aggressive driving. Specific observations made by the authors included that more joined-up working at an operational level was needed, that there was little evidence of involving local people in road safety interventions in the case study areas, and that more effective enforcement was needed to deter motorists from driving and parking dangerously and flouting regulations especially in the pre-and post-school period. Limitations of the study included a lack of detail about the literature review phase, and that evidence was observational comprising mainly qualitative analysis.

The evidence is consistent with NICE PH29 in terms of the need for road safety partnerships that should consider increased injury risk in disadvantaged areas and involve communities when planning road safety interventions. The evidence is also consistent with recommendations for speed reduction.

Key reference

Lowe C, Whitfield G, Sutton L et al. (2011) Road user safety and disadvantage. Road Safety Research Report no. 123. Department for Transport

Engaging at-risk local communities in road safety

NICE PH29 recommends that local highway authorities and their road safety partnerships should ensure local children and young people, particularly those from disadvantaged communities, are consulted about their road use and their opinions about the risks involved. In addition, parents and carers should also be consulted about their children's road use and safety.

A case study by **Christie et al. (2012)** described engagement of road safety practitioners with the Somali community in a social marketing project to improve child road safety and explore how the community responded to the intervention. The intervention was prompted by an analysis done by the London Borough of Hounslow identifying that children of black ethnic origin were over-represented among child pedestrian casualties, many of which occurred in a specific postcode that census data revealed housed a large Somali community. In order to address potential inequalities, a project was set up to engage with the Somali community in Hounslow (focusing on those aged 0 to 20 years) to explore road safety awareness and offer road safety training and advice to parents of young children in the form of classroom and practical sessions. The present study was a qualitative evaluation of the project via interviews with senior road safety practitioners who managed the project, and focus group sessions with some of the participants.

From the interviews with the road safety practitioners, a number of themes emerged including awareness of an at-risk group that was not previously known, the process of engaging with the Somali community including gaining their trust, engaging with local stakeholders who knew the community, increasing knowledge of the community, and understanding feelings of marginalisation in the community. Lessons for the future were also discussed and included getting to know the community, seeking out existing community groups, focusing on smaller groups, and how best to perform evaluations. From the community focus groups, issues arising included a lack of understanding of the road system in the UK and fears about road safety which may have had a negative impact on freedom of mobility. The participants revealed that following the intervention, their knowledge of how to cross the road safely increased, they felt positively about the road safety team working with them, and they made considerable effort to tell their children and families about what they learned.

Limitations of the study noted by the authors were that the high cost of translation meant only some of the groups and sessions were evaluated, and some of the more subtle information from the discussions may have been lost during translation. They also noted that no outcome data for injuries was presented and the analysis was qualitative, but stated that this was appropriate given the small numbers involved.

Although the study did not present firm evidence about the efficacy of engaging with communities in terms of injury outcomes, it highlighted the importance of identifying and consulting with disadvantaged communities, consistent with the recommendations in NICE PH29. It also demonstrates a potentially useful methodology for consulting on road safety in small communities in a local setting, and suggests that routine collection and monitoring of injury data should incorporate ethnicity.

Key reference

Christie N, Sleney J, Ahmed F et al. (2012) Engaging the Somali community in the road safety agenda: a process evaluation from the London Borough of Hounslow. Journal of Community Health 37: 814–21

Speed reduction zones

NICE PH29 recommends that local highway authorities and their road safety partnerships should use signage, road design and engineering measures to reduce vehicle speeds on roads where children and young people are likely to be, such as those passing playgrounds or schools. Signage is also recommended to warn drivers of the likely presence of children and young people in areas that they frequent (such as schools and playgrounds) and the need to comply with safety measures. Recommendations are also made that national and local education and media campaigns should promote the benefits of safety initiatives – including 20 miles per hour (mph) speed limits and zones – in areas frequented by children and young people.

A study by **Kattan et al. (2011)** investigated traffic speed at school and playground zones in Calgary, Canada. Calgary has introduced zones with speed limits of 30 kilometres per hour (km/h; equivalent to 18.6 mph) around schools and playgrounds, marked by signs at the beginning and end of the zones. School zones operate from 8:00 am to 4:30 pm on school days, and playground zones from 8:30 am until 1 hour after sunset. Vehicle speed data were collected in 30 minute blocks at off-peak times in dry conditions (to reduce the impact of traffic and weather conditions on speed) at a sample of 11 schools and 16 playgrounds randomly located in the 4 quadrants of the city.

The mean speed of the 4580 vehicles measured was 32.0 km/h (SD=6.6 km/h, 85th percentile=38.8 km/h). This was lower than the default speed of 50 km/h in urban areas, but higher than the 30 km/h reduced speed limit (although the measurements were taken at off-peak times which may have inflated true average speed in these zones). The proportion of vehicles travelling faster than 30 km/h was 54.4%, and 10% of vehicles were travelling at more than 10 km/h over the speed limit. The study also found that mean and 85th percentile speeds were significantly lower in school zones (versus playground zones, $p=0.0003$), on roads with 2 lanes (versus 4 lanes; $p<0.0001$), and on roads with fencing, speed displays, controlled intersections, or with reduced speed zones over 200m in length (versus roads without these features; all $p<0.0001$).

The primary limitation of the study was that it was performed in a single Canadian city, which is likely to have a different road layout to equivalent urban areas in the UK, and therefore external validity to a UK setting may be reduced. The authors also noted that they had to assume that a previous 50 km/h or greater speed limit was in place before the introduction of the reduced speed zones, in order to conclude that speed had been reduced.

Grundy et al. (2009) performed an observational study of the effect of introducing 20 mph traffic speed zones on road collisions, injuries, and fatalities in London from 1986 to 2006. The analysis was based on police STATS19 data (used to report vehicle-related road casualties) that was then linked to a database of road characteristics to determine whether incidents occurred in a 20 mph zone, and when this speed limit was introduced. Data from before and after introduction of the 20 mph zones were then compared relative to other roads to allow for the general underlying trend of decreasing road casualties. A total of 119,029 road segments with at least 1 casualty were included in the analysis.

After introducing 20 mph zones, among all children aged 0 to 15 years, all casualties were reduced by 48.5% (95% CI 41.9 to 55.0%), and the number killed or seriously injured was reduced by 50.2% (95% CI 37.2 to 63.2%). For pedestrians aged 0 to 15 years, all casualties were reduced by 46.2% (95% CI 36.8 to 55.5%), and the number killed or seriously injured was reduced by 43.9% (95% CI 26.6 to 61.3%). Reductions among pedestrian casualties

were largest for subgroups of the youngest children (0 to 5 and 6 to 11 years). There was also a reduction among cyclists aged 0 to 15 years in all casualties of 27.7% (95% CI 6.3 to 49.1%). In areas adjacent to 20 mph zones, all casualties among those aged 0 to 15 years fell by 9.7% (95% CI 4.5 to 14.9%) suggesting that casualties had not migrated to nearby roads. A sensitivity analysis comparing inner and outer London did not alter results. The authors also interpreted their data against the general trend for decreasing casualties and collisions for all roads in London over time (an annual decline of 1.7%, equivalent to a reduction of 29% over 20 years), and suggested that the additional effect of 20 mph zones was a substantial achievement.

Limitations of the study discussed by the authors included the known under-reporting of injuries in STATS19 data (although they suggested reporting in London was better than other areas of the UK). They also could not examine the effect of other safety measures such as speed cameras, which may potentially have been more common in 20 mph zones. Finally the authors noted that most collisions occur on roads where 20 mph limits would not be appropriate and so examining risk on major roads may offer greater gains in road safety. They also suggested examining traffic calming specifically among low and middle income settings, where most road traffic injuries occur.

The evidence from the 2 studies suggests that measures to reduce speed around schools and playgrounds appear to have an impact on average speed in these areas, and that 20 mph zones appear to reduce casualties, particularly among children. It is therefore consistent with current recommendations in NICE PH29.

A report by the **House of Commons Transport Committee (2012),** which noted that 2011 was the first year since 2003 that road accident fatalities increased, provided further support for 20 mph zones by recommending that the Government should encourage the development of inter-agency partnerships to help introduce these zones at a local level.

Key references

Grundy C, Steinbach R, Edwards P et al. (2009) Effect of 20mph traffic speed zones on road injuries in London, 1986-2006: controlled interrupted time series analysis. BMJ 339: b4469

House of Commons Transport Committee (2012) Road safety: second report of session 2012–13.

Kattan L, Tay R, Acharjee S (2011) Managing speed at school and playground zones. Accident Analysis and Prevention 43: 1887–91

2 New evidence uncertainties

During the development of the Evidence Update, the following evidence uncertainties were identified for the NHS Evidence UK Database of Uncertainties about the Effects of Treatments (UK DUETs).

Home safety

- Home safety education and provision of safety equipment for injury prevention

Further evidence uncertainties for preventing unintentional injuries among children and young people aged under 15 can be found in the UK DUETs database and in the NICE research recommendations database.

UK DUETs was established to publish uncertainties about the effects of treatments that cannot currently be answered by referring to reliable up-to-date systematic reviews of existing research evidence.

Appendix A: Methodology

Scope

The scope of this Evidence Update is taken from the scope of the reference guidance:

- Strategies to prevent unintentional injuries among children and young people aged under 15. NICE public health guidance 29 (2010).

Searches

The literature was searched to identify studies and reviews relevant to the scope. Searches were conducted of the following databases and websites, covering the dates 1 January 2009 (the end of the search period of NICE public health guidance 29) to 29 August 2012:

Databases

- ASSIA (Applied Social Sciences Index and Abstracts)
- Campbell Collaboration
- CDSR (Cochrane Database of Systematic Reviews)
- CENTRAL (Cochrane Central Register of Controlled Trials)
- CINAHL (Cumulative Index to Nursing and Allied Health Literature)
- DARE (Database of Abstracts of Reviews of Effects)
- EconLit (American Economic Association electronic bibliography)
- EMBASE (Excerpta Medica database)
- EPPI-Centre (Evidence for Policy and Practice Information and Co-ordinating Centre)
- ERIC (Education Resources Information Centre)
- HMIC (Health Management Information Consortium) database
- MEDLINE (Medical Literature Analysis and Retrieval System Online)
- NHS EED (Economic Evaluation Database)
- PreMEDLINE
- PsycINFO
- SafetyLit
- TRIS (Transport Research Information Service) – for the road safety search only

Websites

- Collaboration for Accident Prevention and Injury Control
- Department for Education
- Department for Transport
- European Association for Injury Prevention and Safety Promotion
- Injury Observatory for Britain and Ireland
- Institute of Home Safety
- International Society for Child and Adolescent Injury Prevention
- Royal Society for the Prevention of Accidents

- Scottish Executive
- South East Public Health Observatory (lead on transport)
- South West Public Health Observatory (lead on injuries)
- Transport Research Laboratory
- Welsh Assembly Government

NICE public health guidance 29 was underpinned by 6 evidence reviews, and several searches were run within each evidence review. This was unfeasible to replicate for an Evidence Update, therefore search strategies were developed in 4 areas: risk factors for and correlates of childhood injury; road safety; home safety; outdoor play and leisure.

Population terms for children and young people were combined with:

- MeSH terms for accidents (including: Accidents, Wounds and Injuries, Traffic Accidents, Home Accidents, Accident Prevention, Burns, Accidental Falls, Poisoning, Asphyxia, Drowning) or
- Terms for media and publicity (MeSH terms including Mass Media; free text terms including: public campaigns, social marketing)

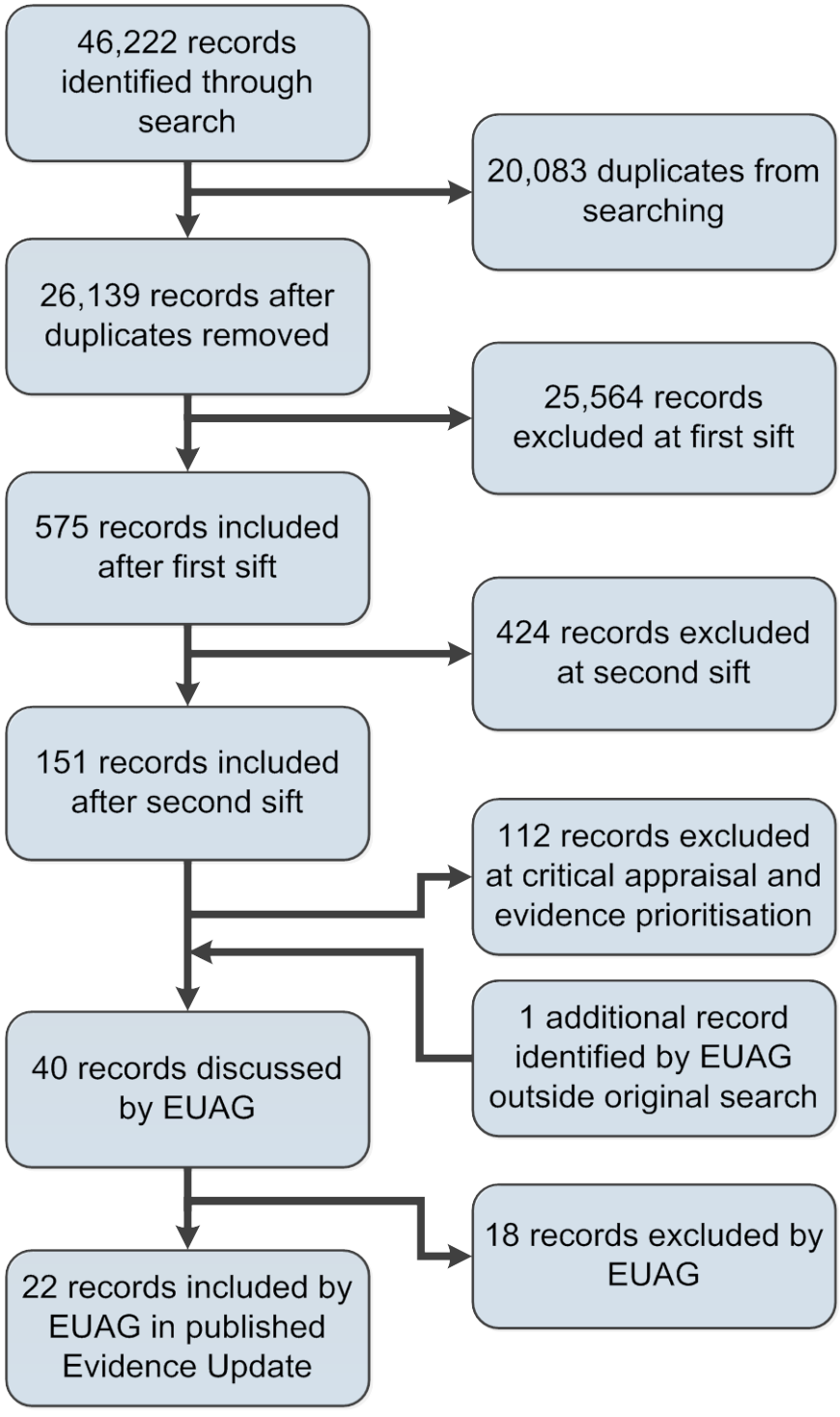
These were then run in conjunction with searches for each of the 4 areas:

- Risk factors for and correlates of childhood injury (MeSH terms including: Socioeconomic Factors; free text terms including: inequalities)
- Road safety (free text terms including: fatalities, crash, collision, casualties, death, unintentional injuries)
- Home safety (free text terms including: home, house, garden, home safety assessment, home safety equipment)
- Outdoor play and leisure (free text terms including: leisure activities, play, recreation, holidays, outdoor environment)

Figure 1 provides details of the evidence selection process. The long list of evidence excluded after review by the Chair of the EUAG, and the full search strategies, are available on request from contactus@evidence.nhs.uk

There is more information about how NICE Evidence Updates are developed on the NHS Evidence website.

Figure 1 Flow chart of the evidence selection process



EUAG – Evidence Update Advisory Group

Appendix B: The Evidence Update Advisory Group and Evidence Update project team

Evidence Update Advisory Group

The Evidence Update Advisory Group is a group of topic experts who review the prioritised evidence obtained from the literature search and provide the commentary for the Evidence Update.

Ms Heather Ward – Chair

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