Systematic review of controlled trials of interventions to promote smoke alarms

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Abstract
Aims—To evaluate the effects of promotion of residential smoke alarms.
Methods—Electronic databases, conference proceedings, and bibliographies were systematically searched, and investigators and organisations were contacted, in order to identify controlled trials evaluating interventions designed to promote residential smoke alarms. The following were assessed: smoke alarm acquisition, ownership, and function; fires; burns; and fire related injuries. Odds ratios (OR) were estimated by meta analysis of randomised trials.
Results—A total of 26 trials were identified, of which 13 were randomised. Overall, counselling and educational interventions had only a modest effect on the likelihood of owning an alarm (OR = 1.26; 95% confidence interval (CI): 0.87 to 1.81) or having a functional alarm (OR = 1.19; 95% CI: 0.85 to 1.66). Counselling as part of primary care child health surveillance had greater effects on ownership (OR = 1.93; 95% CI: 1.04 to 3.58) and function (OR = 1.72; 95% CI: 0.78 to 3.78). Results were sensitive to trial quality, however, and effects on fire related injuries were not reported. In two non-randomised trials, direct provision of free alarms significantly increased functioning alarms and reduced fire related injuries. Media and community education showed little benefit in non-randomised trials.
Conclusion—Counselling as part of child health surveillance may increase smoke alarm ownership and function, but its effects on injuries are unevaluated. Community smoke alarm give away programmes apparently reduce fire related injuries, but these trials were not randomised and results must be interpreted cautiously. Further efforts to promote smoke alarms in primary care or through give away programmes should be evaluated by adequately designed randomised controlled trials measuring injury outcomes.
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Keywords: accident prevention; burns prevention; smoke alarms; systematic review

Residential fires caused at least 67 deaths and 2500 non-fatal injuries to children aged 0–16 in the United Kingdom in 1998.1 Among children aged 0–14, fire and flames are the second leading cause of unintentional injury death.2 Fires detected by smoke alarms are associated with more rapid discovery, lower casualty rates, and less property damage.1 Smoke alarm ownership is associated with a reduced risk of fire death,3,4 and appears particularly effective in households with young children.3 Because controlled trials provide the best evidence about effectiveness, we systematically reviewed trials evaluating interventions to promote residential smoke alarms, to assess their effect on smoke alarm ownership and on fire related injuries.

Methods
INCLUSION CRITERIA
We included original studies if: (1) subjects were prospectively assigned to study groups (controlled trials); (2) subjects were not institutionalised; (3) the experimental intervention was designed, either wholly or in part, to promote residential smoke alarms; (4) outcome data were collected concurrently from intervention and control subjects; (5) outcomes included smoke alarm ownership, installation, function, or acquisition; fires; burns; or fire related injuries; and (6) the study was completed or published after 1969 (residential smoke alarms became widely available and affordable in the mid 1970s).

DATA SOURCES
We searched Medline by combining a published methodological filter for controlled trials (phases 1 and 2) or (volunteer* in ti or in ab) or the mesh headings “EVALUATION-STUDIES” or “PROGRAM-EVALUATION/ all subheadings” or “INTERVENTION-STUDIES”, with relevant content terms. These content terms included “ACCIDENTS”/all subheadings, ACCIDENT-PREVENTION, “BURNS”/prevention-and-control, “FIRES”/ prevention-and-control, (fire or smoke) near (detector* or alarm or alarms), (accident* or safety) near home, (fire or fires or burn or burns or smoke) near (prevent* or control), (explode “BURNS”/all subheadings or explode “FIRES”/all subheadings or “SMOKE-INHALATION-INJURY”/all subheadings) and (“PROTECTIVE-DEVICES”/all subheadings or “SAFETY”/all subheadings), and other terms (available from author). Similar search strategies were developed for each database. We searched the Cochrane registers, ISTP, FIRE- DOC, and LRC without methodological filters. We examined reference lists of reviews,15–16 conference proceedings15–16 and case study collections.17–20 To find internal or unpublished documents, we contacted national and international organisations involved in fire and injury prevention, such as the Home Office (United Kingdom), National Fire Protection Association (United States), Centers for Disease Control and Prevention (United States), Centre d’Information et de Rencontre pour la Prévention des Accidents d’Enfants (France), and International Society for Child and Adolescent Injury Prevention.

STUDY SELECTION

Title, abstract, and keywords of all citations were reviewed and, using the first four inclusion criteria, ineligible studies were excluded. The full texts of remaining citations were reviewed and those that failed to meet these four inclusion criteria were excluded. We contacted corresponding authors of all remaining studies to determine eligibility, request outcome data, or other details, and identify additional trials. When the corresponding author was deceased or untraceable, we contacted additional authors.

DATA EXTRACTION

Two investigators independently extracted data on participants, interventions, outcomes, loss to follow up, and methods of allocation concealment and outcomes assessment (as quality indicators7). Allocation concealment was rated as adequate if methods convincing of concealment were used (for example, sealed, opaque, numbered envelopes) and otherwise as inadequate (for example, alternation).22 Outcomes assessment was rated as blinded if data were collected either by researchers blinded to intervention status or by postal survey. Subjects were not blinded in any trial. Differences were resolved by discussion.

ANALYSIS

Primary outcome measures included post-intervention proportions with owned, functional, newly acquired, and newly functional smoke alarms, and incidences of fires, burns, and fire related injuries. When data on acquisition of alarms or of functional alarms were unavailable, we estimated these data by subtracting pre- from post-intervention prevalence for each group. We planned subgroup analyses of the effects of (1) safety advice as part of routine child health surveillance; (2) discounted/ free smoke alarms; (3) adequate allocation concealment; and (4) blinded outcomes assessment.

We performed meta analysis to combine odds ratios (OR) between intervention and control groups, using a random effects model.22 A test for heterogeneity,22 that is, whether observed differences among the results of included trials were greater than could be expected by chance, used a significance level of 10%. Except where specifically noted, there was no statistically significant heterogeneity. Results from non-randomised trials were not quantitatively combined.

No authors of cluster randomised trials provided cluster specific outcome data. We therefore reduced their subject numbers to “effective sample sizes”25 using published estimates for the intraclass correlation coefficient: 0.017 for medical practices24 and 0.02 for school classes.25 As sensitivity analyses we alternatively: (1) ignored clusters; and (2) used intraclass correlation coefficients five times larger than the above. Neither alternative materially affected the results (data not shown).

As further sensitivity analyses, we accounted for all randomised subjects whose outcomes were not assessed (when numbers randomised to each group were known) assuming: (1) all those lost to follow up had “positive” outcomes (for example, owned alarms post-intervention); and (2) all had “negative” outcomes (for example, did not).

Results

We found 4486 unduplicated citations in electronic databases. From these, we identified 118 potentially relevant citations. We found an additional 28 potentially relevant citations from other sources. We could not retrieve the full text of two studies,28 29 and nine were available only in abstract. Of 135 studies reviewed in full, 15 trials met all inclusion criteria,24 26–45 the eligibility of 16 could not be determined, and the remainder were excluded. To determine the eligibility of the nine abstracts and remaining 16 trials, we contacted all 24 authors. From 22 responses, we identified six eligible trials.30 31 We also found five trials in progress through organisational contacts (written communication, P Harvey, Centers for Disease Control and Prevention, 2 July 1998). Hence, we identified 26 relevant trials (tables 1 and 2).
### Table 1  Summary of randomised controlled trials of interventions to promote smoke alarms

<table>
<thead>
<tr>
<th>Trial, year (country)</th>
<th>Study population</th>
<th>Randomisation method</th>
<th>Allocation concealment</th>
<th>Outcomes assessment blinded</th>
<th>Loss to follow up</th>
<th>Intervention*</th>
<th>Outcomes assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas et al, 1984† (USA)</td>
<td>16 well baby classes (55 parents)</td>
<td>Coin toss</td>
<td>Not stated</td>
<td>Not stated</td>
<td>Total: 0%</td>
<td>I: Burn prevention lecture, pamphlets, handouts, coupon for alarm; usual safety education&lt;br&gt;C: Usual safety education</td>
<td>Home inspection 4–6 wk after class</td>
</tr>
<tr>
<td>Kelly et al, 1987† (USA)</td>
<td>171 parents of 6 mth old children seen for well child care</td>
<td>Not stated</td>
<td>Not stated</td>
<td>Yes</td>
<td>I: 35%</td>
<td>I: Developmentally oriented child safety education, hazard assessment, and handout, at 6, 9, 12 mth visits; usual well child care&lt;br&gt;C: Usual well child care</td>
<td>Home inspection, medical chart review 1 mth after 12 month visit</td>
</tr>
<tr>
<td>Davis, 1987† (USA)</td>
<td>41 grade 4–6 classes (861 children)</td>
<td>Not stated</td>
<td>Not stated</td>
<td>No</td>
<td>C: 37%&lt;br&gt;I: 1%</td>
<td>I: 6 one hour fire safety lessons with workbook, demonstrations; teacher training, materials; take home materials for parents&lt;br&gt;C: Usual lessons</td>
<td>In school survey immediately after last class</td>
</tr>
<tr>
<td>Williams, 1988† (USA)</td>
<td>12 prenatal classes (165 pregnant women)</td>
<td>Random numbers table</td>
<td>Adequate</td>
<td>No</td>
<td>C: 0%&lt;br&gt;55% of women attending randomly allocated classes did not enrol in trial</td>
<td>I: One hour lecture, handouts on burn prevention; motor vehicle safety education and video; usual safety education&lt;br&gt;C: Usual safety education</td>
<td>Home inspection 2–4 wk after live birth</td>
</tr>
<tr>
<td>Barone, 1988 (USA)</td>
<td>5 parenting classes (108 parents of toddlers)</td>
<td>Coin toss, within paired classes</td>
<td>Inadequate</td>
<td>No</td>
<td>27% of parents attending randomly allocated classes did not enrol in trial</td>
<td>I: Slides, handouts on burn prevention; motor vehicle safety education and video; bath water thermometer; hot water gauge; usual safety education&lt;br&gt;C: Usual safety education</td>
<td>Home inspection 6 mth after class</td>
</tr>
<tr>
<td>Mathews, 1988† (USA)</td>
<td>26 mothers of toddlers recruited from clinics, daycare centres</td>
<td>18 by random numbers table; 8 by alternation</td>
<td>Inadequate</td>
<td>Not stated</td>
<td>Total: 8%</td>
<td>I: Home safety inspection, video, handouts, modelling re: safety and managing dangerous child behaviour; hot water thermometers; choke tube&lt;br&gt;C: Routine discharge teaching</td>
<td>Home inspection 2 wk after home visit</td>
</tr>
</tbody>
</table>
| Ploeg et al, 1994† (Canada)† | 359 public health clients aged 65+ y | Random numbers table | Adequate | Yes | I: 1%<br>C: 7%<br>Total: 13% | I: Home safety inspection, safety promotion<br>C: Home visit for influenza vaccine promotion<br>I: Discharge teaching book about burn care and prevention; routine discharge teaching<br>C: Routine discharge teaching | Telephone survey 2–3 mth after home visit
Interview in clinic at first follow up visit |
| Jenkins et al, 1996† (Canada)† | 141 families of <17 y in burn unit | Random numbers table | Adequate | Yes | I: 20% | I: Home safety inspection, education, safety device coupons; reinforcement at 4 and 8 mth<br>C: Usual care | Home inspection at 1 y follow up |
| Clamp and Kendrick, 1998 (UK)† | 165 families of children <5 y on GP list | Random numbers table | Adequate | No | Total: 0% | I: Safety advice by health visitors and practice nurses, leaflets, discount safety devices for low income families<br>C: Usual care | Telephone/mail survey 6 wk after visit |
| Klassen et al, 1998 (Canada)† | 1172 families of children <3 y hospitalised for injuries | Sealed, opaque envelopes drawn from opaque bag | Adequate | Yes | C: 18% | I: Home safety inspection only<br>C: Home safety inspection only | Telephone survey of injuries; telephone survey of safety practices at 25 mth follow up |
| Kendrick et al, 1999 (UK)† | 36 general practices (2052 registered children 3–13 mth) | Random numbers table | Adequate | No | Survey: I: 67%<br>C: 64%<br>(Prelim. results from 1 pair): I: 30% (excluded families not complying intervention)<br>C: 11%<br>Total: 31% of families | I: Safety advice by health visitors and practice nurses, literature, discount safety devices for low income families, home safety checks and first aid training by health visitors<br>C: Usual care<br>I: Home visit every 2 mth for 2 y by trained lay worker, teaching child development, safety, first aid; low cost safety devices; home safety inspection<br>C: Home safety inspection<br>I: 5 hours of special training in injury prevention counselling<br>C: Usual training | Record review for injuries; telephone survey of safety practices at 25 mth follow up
Home inspection, survey at 2 years; alarms (preliminary—1 pair): 287/312 (92%) v 271/302 (90%) |
| Smithson and Mullan, 1998 (UK) (in progress) | 8 paired areas in 4 deprived communities (384 families of children <2 y/area) | Coin toss, within pairs | Not stated | No | C: 64%<br>(Prelim. results from 1 pair): I: 30% (excluded families not complying intervention)<br>C: 11%<br>Total: 31% of families | I: Home visits every 2 mth for 2 y by trained lay worker, teaching child development, safety, first aid; low cost safety devices; home safety inspection<br>C: Home safety inspection<br>I: 5 hours of special training in injury prevention counselling<br>C: Usual training | Home inspection, survey at 25 mth follow up |

*I, intervention; C, control. †Unpublished data provided by investigators.
Table 2  Summary of non-randomised controlled evaluations of interventions to promote smoke alarms

<table>
<thead>
<tr>
<th>Study, year (country)</th>
<th>Intervention (I) and control (C) populations</th>
<th>Intervention</th>
<th>Assessment</th>
<th>Smoke alarms intervention</th>
<th>Smoke alarms control</th>
<th>Other outcomes: intervention</th>
<th>Other outcomes: control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protect Burn Prevention, 1979,* 1982** (USA)</td>
<td>C: Usual well child care</td>
<td>C: 105/120 (88%)</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Adjusted burn incidence rate ratio, during v before: I: 1.4 (1.1, 1.6); C: 0.8 (0.5, 1.1); C: 1.2 (0.8, 1.7)</td>
<td>Adjusted burn incidence rate ratio, during v before: 1.0 (0.6, 1.5)</td>
<td></td>
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<tr>
<td>Miller et al, 1982** (USA)</td>
<td>C: Preceding 120 consecutive parents</td>
<td>T able 2 Summary of non-randomised controlled evaluations of interventions to promote smoke alarms</td>
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<tr>
<td>LeBailly et al, 1990** (USA)</td>
<td>C: No intervention</td>
<td>407 families with children &lt;5 y seen for well child care in suburban practice or urban clinic, allocated sequentially in groups of 100 (differed on home ownership, socioeconomic status)</td>
<td>Not collected</td>
<td>Not collected</td>
<td>Data unavailable</td>
<td>Data unavailable</td>
<td></td>
</tr>
<tr>
<td>SCIPP, 1989**; Bass et al, 1991* (USA)**</td>
<td>C: Demographically similar municipalities (total pop. 130 807)</td>
<td>3 y community injury prevention programme: mass media, education, training, promotion, and action for hazard reduction and environmental change</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Data unavailable</td>
<td>Data unavailable</td>
<td></td>
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<tr>
<td>Oztanne-Smith et al, 1994** (Australia)</td>
<td>C: Demographically similar municipality (with higher baseline injury hospitalisation rate)</td>
<td>C: 140 866</td>
<td>Population injury surveillance 1 y before to 2 mth after. Phone survey response: pre, 59%, post, 85% (similar in 2 groups)</td>
<td>Owned: 418/508 (82.3%), Change: +9.4%</td>
<td>Adjusted odds ratio for burns (during v intervention v control communities): OR = 0.8 (0.5, 1.2)</td>
<td></td>
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<tr>
<td>Schwarz et al, 1993** (USA)*</td>
<td>C: 5 contiguous census tracts (3004 households (51%) participated)</td>
<td>I: Free alarms and installation; home inspection, education, modification; community education</td>
<td>Injury surveillance 2 y before to 1 y after. 1 y post-intervention inspection. Response rate: I: 902/1250 (72%); C: 1060/1472 (72%)</td>
<td>Functioning: 866/902 (96%); Adjusted odds ratio: 0.14 (0.1, 0.2)</td>
<td>Functioning: 816/1060 (77%)</td>
<td>Fire related injuries/1000: before: 1.83; during: 1.14; after: 0.86</td>
<td>Fire related injuries/1000: before: 1.34; during: 2.68; after: 1.11</td>
</tr>
<tr>
<td>Mallonie et al, 1996** (USA)</td>
<td>C: City area with highest risk of fire related hospitalisations and deaths</td>
<td>I: Fire related injury surveillance 2.5 y before to 4 y after programme</td>
<td>Functioning at 4 y: 45%</td>
<td>Not collected</td>
<td>Incidence change (after v before): 0.2 (0.4, 0.6)</td>
<td>Incidence change (after v before): 0.8 (0.6, 1.1)</td>
<td></td>
</tr>
<tr>
<td>McConnell et al, 1996** (USA)</td>
<td>C: Rest of city</td>
<td>C: No intervention</td>
<td>Population fire and fire related injury surveillance 2.5 y before to 4 y after programme</td>
<td>Not collected</td>
<td>278 fires/100k person years. Relative risk (intervention v control): 0.18 (0.16, 0.21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centers for Disease Control (USA) (in progress) (n = 5)</td>
<td>C: Comparison block groups, town, or city</td>
<td>C: Comparison block groups, town, or city</td>
<td>Installation of free smoke alarms in high risk households</td>
<td>Injury and fire surveillance: smoke alarm ownership and function In progress</td>
<td>In progress</td>
<td>In progress</td>
<td>In progress</td>
</tr>
</tbody>
</table>

*Unpublished data provided by investigators.
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Main analyses
Among 13 randomised controlled trials, eight interventions were delivered in the clinical setting (including prenatal, well child, and parenting classes held in clinics and hospitals),24 28 30 35 44–47 four were delivered at home,36 46 50 51 and one in school11 (table 1). Eleven have been completed.

Ten completed trials collected data on smoke alarm ownership. We were unable to obtain these data from one trial,16 which reported “no significant difference” in alarm ownership between study groups. Combining the other nine trials, smoke alarm ownership at follow up appeared somewhat more likely in the intervention group (OR = 1.26; 95% confidence interval (CI): 0.87 to 1.81; fig 1). Similarly modest positive, statistically non-significant effects on functioning smoke alarms, and on new acquisitions of smoke alarms and functioning smoke alarms, were found (fig 1). Assumptions of all positive or all negative outcomes resulted in similar or even smaller effect estimates (data not shown).

Two trials collected injury outcomes,24 33 but fire related injury data were unavailable. None of the trials reported fire incidence.

Subgroup analyses
All five completed trials of safety advice as part of routine child health surveillance showed positive effects on smoke alarm ownership, function, and acquisition.24 28 30 35 44 Among these, intervention families were more likely than control families to own an alarm (OR = 1.93; 95% CI: 1.04 to 3.59) and to have a functioning alarm (OR = 1.72; 95% CI: 0.78 to 3.78). There were strong, statistically non-significant effects on acquiring an alarm (with significant heterogeneity, p = 0.09) and acquiring a functioning alarm (data not shown), but these analyses were based on few trials and were heavily influenced by one trial.14

Four trial interventions combined discounted or free smoke alarms with education.24 30 44 45 Offering discounted alarms had a stronger effect on smoke alarm ownership (OR = 1.81; 95% CI: 0.63 to 5.19) than did education alone, but the trial results were significantly heterogeneous (p = 0.015). Effects on function and acquisition were similar to those in the main analyses (data not shown).

Among five trials with inadequate (or unstated) allocation concealment,8 32 33 35 44 the combined effect of intervention on smoke alarm ownership (OR = 1.33; 95% CI: 0.97 to 1.82) was only slightly higher than that in trials with adequate concealment (OR = 1.22; 95% CI: 0.56 to 2.65, with significant heterogeneity, p = 0.025).24 30 47 48 There was even less difference between trials with and without adequate allocation concealment in the effect of intervention on functioning alarms (data not shown).

Among trials with unblinded (or unstated) outcomes assessment, smoke alarm ownership and function were substantially more likely with intervention (OR = 2.1; 95% CI: 0.94 to 4.69, and OR = 2.21; 95% CI: 0.91 to 5.39, respectively). However, among trials with blinded outcomes assessment,44 33 47 48 50 intervention had little effect on ownership (OR = 1.01; 95% CI: 0.64 to 1.59) or function (OR = 1.07; 95% CI: 0.77 to 1.49).

NON-RANDOMISED CONTROLLED TRIALS
Of 13 non-randomised controlled trials, eight are completed (table 2). Two evaluated safety advice during routine child health surveillance...
visits and one evaluated education during mandatory tenants’ meetings.7 The other five evaluated community programmes involving mass media, school or community education, clinical counselling, free smoke alarms, and/or alarm installation.29 32 34 35 38 39 41-43 Allocation concealment was rated inadequate for all non-randomised trials.

**Smoke alarms**

Five completed trials reported smoke alarm outcomes (table 2).32 40-41 49 Two involved safety advice during routine child health surveillance.40 49 Results of one of these were similar to those from randomised trials reported above.52 The other trial reported modest effects from free smoke alarms but none from counselling alone.52 However, post-intervention ownership in all groups was greater than 95%, and the study did not control for significant differences among groups in home ownership, education, and income, all of which are associated with alarm ownership.52

Two trials of community wide injury prevention education reported no effects on alarm ownership32 or installation41 42 (table 2). In contrast, installation of free smoke alarms increased the prevalence of functioning smoke alarms by 19% (table 2).42 In the latter trial, efforts were made to match intervention and control areas on injury rates, sociodemographic characteristics, and geographical location, to reduce the likelihood of selection bias.

**Fires**

After a mandatory lecture and video targeting fire safety and prevention, fire incidence in intervention (new tenant) households was one fifth that in control (existing tenant) homes (table 2), even though, before intervention, fire incidence was higher in new tenancies than in existing ones.7 Community wide distribution of fire prevention brochures with free smoke alarms had little effect on fire incidence (table 2), although the intervention and control areas differed significantly in their fire injury risks prior to intervention.35

**Fire related injuries**

Four community trials measured burns or fire related injuries (table 2).29 32 34 35 38 39 41-43 After direct provision (with or without installation) of free alarms, fire related injury rates fell significantly in intervention communities but not in control communities (written communication, D Schwarz, Children’s Hospital of Philadelphia, 17 July 1998).35 41 In one trial, however, the intervention area was selected because it had the highest baseline injury rate, hence regression to the mean may explain some of the decline.35

Community injury prevention education produced a modest, non-significant effect on burn injuries,7 32 and there was no apparent benefit from community burn prevention education.34 38 39 Because these trials assessed all types of burns but excluded smoke inhalation, results are not directly comparable to those from the trials of alarm give away programmes, which assessed fire related injuries.

**Discussion**

Evidence from randomised controlled trials indicates that, in general, counselling or education to promote smoke alarms is likely to have only a modest effect, if any, on smoke alarm ownership, function, or acquisition. The results were sensitive to decisions on imputation of missing data and to study quality. In particular, trials with blinded outcome assessment showed no apparent effect from educational interventions.

Stronger (and statistically significant) effects were seen among trials evaluating counselling in the context of routine child health surveillance. Based on our results, the estimated number of families clinicians would have to counsel to influence one additional family to own a smoke alarm varies with the baseline practice prevalence: seven families if 50% own alarms, 13 families if only 10% own alarms, and 22 families if 90% already have alarms. Effects on the prevalence of functioning smoke alarms from clinical counselling were less clear. Moreover, several of the trials of child health surveillance used unblinded outcomes assessment, which may have biased their results upward.

Although observational studies support a substantial beneficial effect of smoke alarm ownership on fire related injuries,14 there were no data from randomised controlled trials on the effects of counselling or education on fire related injuries. Because fire related injuries are the second leading cause of injury death in childhood, the net benefit of educational or counselling interventions may be important. However, its effectiveness and cost effectiveness in relation to fire injuries prevented has not been adequately evaluated.

Community trials suggest that providing free smoke alarms reduces fire related injuries. Because these trials were not randomised, however, selection bias or regression to the mean may have exaggerated their effects. Hence, the benefit of such programmes is not established. Non-randomised trials do not support a beneficial effect of mass media and community based injury prevention education on either smoke alarm ownership or burn incidence. One author attributed this to attenuation in the numbers who hear, then understand, then act on such information.39

**EXPLORING HETEROGENEITY**

Although there was no statistically significant heterogeneity in the main analysis, subgroup analyses suggested important differences in results according to both setting (primary care versus other settings) and outcomes assessment methods. Post hoc examination of results suggests that variations in other factors may also influence results. In the only two trials involving families of injured children,67 68 ownership and acquisition were equally high in control and intervention families, so there was no apparent effect of intervention. Having an
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our meta analyses. The intervention, was probably non-randomised. However, several studies on which these conclusions are based suffered from methodological weaknesses. In addition, effects on fire related injuries and cost effectiveness have not been studied.

While community programmes that provide and install smoke alarms appear to reduce fire related injuries, the quality of that evidence is limited. Further trials to evaluate the impact of smoke alarm promotion as part of child health surveillance in primary care, or of community smoke alarm distribution, should assess their impact on fire related injuries, using adequate allocation concealment and blinded outcomes assessment.

We thank the investigators who responded to our queries and Dr Ian Roberts for advice and data extraction. Dr DiGuiseppi was funded by the Camden and Islington Health Authority, and Dr Higgins by the National Health Service Research and Development Directorate.

15 Third International Conference on Injury Prevention and Control, Melbourne, Australia, 18–22 February 1996.


53 Dickerson R, Min YI. NIH clinical trials and publication bias. Online J Curr Clin Trials 1993;28 April, doc. no. 50.