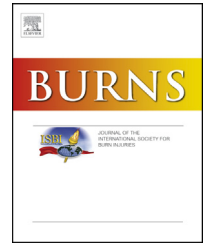


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# Preventing childhood scalds within the home: Overview of systematic reviews and a systematic review of primary studies

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## ABSTRACT

**Objective:** To synthesise and evaluate the evidence of the effectiveness of interventions to prevent scalds in children.

**Methods:** An overview of systematic reviews (SR) and a SR of primary studies were performed evaluating interventions to prevent scalds in children. A comprehensive literature search was conducted covering various resources up to October 2012. Experimental and controlled observational studies reporting scald injuries, safety practices and safety equipment use were included.

**Results:** Fourteen systematic reviews and 39 primary studies were included. There is little evidence that interventions are effective in reducing the incidence of scalds in children. More evidence was found that interventions are effective in promoting safe hot tap water temperature, especially when home safety education, home safety checks and discounted or free safety equipment including thermometers and thermostatic mixing valves were provided. No consistent evidence was found for the effectiveness of interventions on the safe handling of hot food or drinks nor improving kitchen safety practices.

**Conclusion:** Education, home safety checks along with thermometers or thermostatic mixing valves should be promoted to reduce tap water scalds. Further research is needed to evaluate the effectiveness of interventions on scald injuries and to disentangle the effects of multifaceted interventions on scald injuries and safety practices.

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## 1. Introduction

Children are at particular risk of thermal injuries. Globally, thermal injuries are the 11th leading cause of death between the ages of 1 and 9 years and the fifth most common cause of non-fatal childhood injuries [1]. The majority of thermal injuries in the under-fives are scalds [2]. They are important as they can result in long term disability, have lasting psychological consequences and place a large burden on health care resources, with an estimated 19 million disability-adjusted life years lost each year [3]. The treatment of scalds is resource intensive. In the USA between 2003 and 2012, the average cost per hospital stay for scald injuries in the under-fives was between \$40,000 and \$50,000 [4]. The total cost of treating hot water tap scald injuries to children and adults in England and Wales in 2009 was estimated at £61 million [5].

Most scalds in the under-fives occur at home [2,6]. They are most commonly caused by hot liquids from cups or mugs, baths and kettles [8,9]. Bath water scalds are more likely to involve a greater body surface area especially in infants and toddlers and are more likely to undergo admission to hospital, transfer to specialist hospital or burns unit [8].

There are a number of systematic reviews that have synthesised the evidence on scald prevention interventions. However, most of them reviewed interventions to prevent a range of childhood injuries including scalds, some do not report conclusions specific to scald prevention and the remainder report conflicting conclusions [10–15]. One review [16] focussing on interventions specific to reducing thermal injuries in children concluded that there was a paucity of research studies to form an evidence base on the effectiveness of community-based thermal injury prevention programmes. A meta-analysis for which the searches were undertaken in 2009 found home safety education, including the provision of safety equipment, was effective in increasing the proportion of families with a safe hot tap water temperature, but there was a lack of evidence that home safety interventions reduced thermal injury rates or helped families keep hot drinks out of the reach of children [14].

There is therefore a need to consolidate evidence across existing reviews and update the evidence with more recently published studies to inform policy, practice, and the design and implementation of scald prevention. Overviews that synthesise all available evidence on a topic are more accessible to decision makers than multiple systematic reviews and can avoid uncertainty created by conflicting conclusions from different reviews, which may vary in scope and quality [17]. Overviews are useful where, as is the case for programmes to prevent scalds, there are multiple interventions for the same condition or problem reported in separate systematic reviews [18]. This paper presents the findings from an overview of reviews of childhood scald prevention interventions and a systematic review of primary studies to enable the most up-to-date information on scalds prevention interventions to be evaluated.

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## 2. Methods

### 2.1. Literature search

We searched Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane database of systematic reviews, MEDLINE,

Embase, CINAHL, ASSIA, PsycINFO and Web of Science from inception to October 2012. We also hand-searched the journal *Injury Prevention* (March 1995–August 2012), abstracts of World Conferences on Injury Prevention and Control (1989–2012), reference lists of included reviews and primary studies, and a range of websites and trial registers for potentially relevant studies. No language limitation was applied.

### 2.2. Study selection

We included systematic reviews, meta-analyses, randomised controlled trials (RCT), non-randomised controlled trials (NRCT), controlled before-after studies (CBA) and controlled observational studies (cohort and case-control studies) targeting children aged 0–19 and their families to prevent unintentional scalds. The outcomes of interest were unintentional scalds, hot tap water temperature, use of thermometers to test water temperature, lowering boiler thermostat settings, use of devices to limit hot tap water temperature, keeping hot drinks and food out of reach, and kitchen and cooking practices. Potential eligible primary studies were identified from included systematic reviews by scanning references and further eligible primary studies were identified from additional literature searches of electronic databases and other sources. Titles and abstracts of studies were screened for inclusion by two reviewers. Where there was uncertainty about inclusion from the title or abstract the full text paper was obtained. Disagreements between reviewers were resolved by consensus-forming discussions and referral to a third reviewer if necessary.

### 2.3. Assessment of risk of bias and data extraction

We assessed the risk of bias in included systematic reviews and meta-analyses using the Overview Quality Assessment Questionnaire (QQAQ) [19]. The risk of bias of randomised controlled trials, non-randomised controlled trials and controlled before-after studies was assessed with respect to random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting and other bias. The risk of bias in cohort and case-control studies was assessed using the Newcastle–Ottawa scale [20].

Data on study design, characteristics of participants (e.g. age, ethnicity, socio-economic group), intervention (content, setting, duration, intensity), and outcomes (injuries, possession or use of safety devices and safety practices) were extracted using separate standardised data extraction forms for reviews and primary studies.

Quality assessment and data extraction were conducted by two independent reviewers, with disagreements being resolved by consensus forming discussions and referring to a third reviewer if necessary.

### 2.4. Data synthesis

In view of the clinical heterogeneity between studies in terms of design, population, intervention and outcomes, data were synthesised narratively by types of outcomes including outcomes related to safe hot water temperature, safe handling

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