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Review

A systematic review of the features that indicate intentional scalds in children

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ABSTRACT

Background: Most intentional burns are scalds, and distinguishing these from unintentional causes is challenging.
Aim: To conduct a systematic review to identify distinguishing features of intentional and unintentional scalds.
Methods: We performed an all language literature search of 12 databases1950–2006. Studies were reviewed by two paediatric/burns specialists, using standardised methodology. Included: Primary studies of validated intentional or accidental scalds in children 0–18 years and ranked by confirmation of intentional or unintentional origin. Excluded: neglectful scalds; management or complications; studies of mixed burn type or mixed adult and child data.
Results: 258 studies were reviewed, and 26 included. Five comparative studies ranked highly for confirmation of intentional/unintentional cause of injury. The distinguishing characteristics were defined based on best evidence. Intentional scalds were commonly immersion injuries, caused by hot tap water, affecting the extremities, buttocks or perineum or both. The scalds were symmetrical with clear upper margins, and associated with old fractures and unrelated injuries. Unintentional scalds were more commonly due to spill injuries of other hot liquids, affecting the upper body with irregular margins and depth.
Conclusions: We propose an evidence based triage tool to aid in distinguishing intentional from unintentional scalds, requiring prospective validation.

Contents

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1. Introduction

Severe burns are reported in an estimated 10–12% of children who have suffered from physical abuse [1,2]. Studies give widely varying estimates that 1–35% of children admitted to burns units have suffered from intentional burns. The highest incidence figures are reported in the USA [1,3–7], where the majority of studies have been conducted, and the lowest figures are from the UK [8–10].

Burns and scalds are amongst the commonest causes of fatal child abuse [11,12] and are one of the most painful injuries a child can sustain. They can cause long-term scarring, as well as physical and psychological disabilities. It is well recognised that physical abuse is an ongoing process, recurrent abuse occurs in up to 70% of children who are physically abused [13–15]. The severity of these injuries often escalates, early diagnosis and recognition of intentional thermal injury is therefore essential to inform effective management.

Scalds are the commonest thermal injury in childhood (66% [16]) however differentiating between an intentional and accidental aetiology is challenging. Children who sustained scalds may present to clinical services in primary care, accident and emergency departments, paediatric dermatology and burns units. Clinicians in each of these disciplines have different levels of experience in the field, therefore a clear understanding of the distinguishing features of accidental and intentional scalds would facilitate appropriate referrals for child protection assessment when necessary.

The features of any scald are defined by their causal and physical characteristics. Causal factors include the thermal agent, mechanism and intent of the injury. The physical appearance of the scald can be described in terms of: the *pattern* with regards to the *depth* of the burn (superficial, deep dermal, full thickness or mixed), which may be uniform across the scald or variegate, and the *outline* [3,18,22], the *distribution*, referring to the affected body part [17,18], and the *extent* of the scald according to the total body surface area (TBSA) affected. A child can sustain a scald from any hot liquid [3,19–21], and can come into contact with it from three different mechanisms, i.e. a spill, flow or immersion incident [3,12,20,21].

Abusive scalds due to neglect outnumber those due to intentional injury by a factor of 9:1 [9]. These were excluded from this review however as their clinical features mimic accidental scalds [9,23,24], and the diagnosis relies upon an assessment of the circumstances of the injury and a judgement as to whether thresholds of neglect have been met in terms of levels of exposure to the hazard, appropriate levels of supervision or treatment. The identification of an intentional scald relies upon the hypothesis that it will have a different appearance and different characteristics to a scald that has been sustained accidentally. We have performed a systematic review of the international scientific literature to test this hypothesis.

2. Materials and methods

This systematic review addressed the question "What are the clinical and associated features of intentional and unintentional scalds in children?"

2.1. Search criteria

We performed an all language literature search of 12 databases for original articles and conference abstracts published from 1950 through to October 2006 (Fig. 1). In addition we hand searched bibliographies, study references and checked relevant internet sites. We used keywords listed in Fig. 2.

2.2. Inclusion criteria

We included primary studies of children aged 0–18 years with confirmed intentional scalds (Table 1) and/or validated unintentional scalds where child abuse had been actively excluded (Table 2) and where the causal, physical and social features of the scald were detailed.

We excluded review articles, personal practice, studies on scald management or outcome, scalds that were due to neglect, studies that combined scald and contact burn data or mixed child and adult data, where child specific scald data could not be extracted.

2.3. Validity assessment

Our specialist review team (Welsh Child Protection Systematic Review Group) consisted of child health professionals with expertise in child protection and critical appraisal, and plastic surgeons with expertise in burns. Each reviewer completed standardised training in critical appraisal methodology. Two members of the team independently reviewed each article; a third review was undertaken if there was disagreement between the initial reviewers. A consensus was then reached based on agreement between two of the three reviewers.

2.4. Grading of evidence

All included studies were critically appraised using data extraction sheets, critical appraisal forms and evidence sheets