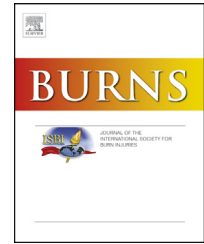


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## Review

# Optimal treatment of partial thickness burns in children: A systematic review

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## ABSTRACT

A large part of the patient population of a burn centre consists of children, most of whom are younger than four years. The majority of these young children suffer from superficial and deep partial thickness scald burns that may easily deepen to full thickness burns. A proper wound therapy, that prevents infection and ensures a moist wound condition, might prevent the deterioration of the wound.

Therefore, we performed a systematic review of wound management and dressing materials to select the best treatment option for children with burns.

A search in Medline and Embase revealed 51 articles for a critical appraisal. The articles were divided into randomized controlled trials, cohort studies and a group of case-reports. Total appraisal did not differ much amongst the groups; the level of evidence was highest in the randomized controlled trials and lowest in the case-reports.

In 16 out of 34 comparative studies, silver sulfadiazine or a silver sulfadiazine/chlorhexidine-gluconate combination was the standard of wound care treatment. The competitor dressing was Biobrane<sup>®</sup> in six studies and amnion membrane in three. Tulle gauze, or tulle gauze impregnated with an antibacterial addition were the standard of care treatment in seven studies.

In general, membranous dressings like Biobrane<sup>®</sup> and amnion membrane performed better than the standard of care on epithelialization rate, length of hospital stay and pain for treatment of partial thickness burns in children. However, hardly any of the studies investigated long-term results like scar formation.

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**1. Introduction**

In most burn centres in the world, a large part of the patient population consists of children. In the Netherlands, about 45% of the patients admitted to a Burn Centre is below 17 years of age. Between 1995 and 2007, 2682 children have been admitted to a Dutch burn centre. Almost 70% of these children are younger than four years. They suffer from scald burns in more than 84% of the cases. For children between 5 and 17 years of age the aetiology of the burns is about the same as for adults: roughly 60% are flame burns and 20% are scalds. The majority of scald burns is partial thickness similar to the group of children younger than four years of age [1]. Recent studies that have been conducted in Western Australia and the Czech Republic showed similarly high frequencies of scald burns in the group of young children [2,3].

Compared to adults, children, especially those between 0 and 4 years old, have a thin skin. Because of their thin skin even a small quantity of hot fluid, such as a cup of tea or a mug of soup, may inflict a serious burn. Moreover, burns in children often affect anatomically important areas such as the face, neck, shoulder and hands. Dewar et al. found that in scalds caused by hot beverages in children, the anterior torso was affected in 65%, the upper limbs in 51%, the head and neck in 39% and the legs in 26% [4].

Infection prevention and the promotion of a moist wound environment to prevent deepening of the wound nowadays form the basis of the wound treatment in children [5]. The choice of a wound dressing for a child with burns should meet these requirements. However, most wound dressings that are currently available on the market are originally developed for the treatment of chronic wounds. These wounds differ from burn wounds in level of exudate, inflammatory status and healing potential [6]. Therefore, dressings designed for chronic wounds may not possess optimal characteristics for burn treatment and vice versa.

Since there is abundant choice of different dressing materials and topical treatment modalities, it is not easy to determine which materials should be preferred for a specific wound type. Because of the thin skin in children and the different physiology and specific aetiology of the injury, some dressing materials may be better suited for the treatment of burns in the younger age group. We performed a literature

search to investigate paediatric burns, their treatment and the dressing used in these treatments.

**2. Methods**

**2.1. Search strategy**

In April 2011, we conducted a structured literature search in Medline (1996 to present) and Embase. Our search domain was defined as patients less than 18 years of age with burns accompanied by the determinant, which was defined as a topical wound dressing. The outcome was defined as (re)epithelialization (short term) and scar formation (long term). Synonyms and syntax structure including the domain and determinant are shown in Fig. 1. In total, 3455 articles were found. After excluding duplicates (n = 1500), an independent title/abstract screening was performed by two reviewers based on the following inclusion criteria, the presence of our previously described domain and determinant. If no abstract was available the full text was included, based on the title. Seventeen articles were irretrievable and 70 articles were excluded for not containing our third and last criterion for relevance: outcome. Finally, 51 articles remained for a critical appraisal.

**2.2. Critical appraisal**

We performed a critical appraisal based on the Centre for Evidence-Based Medicine (Toronto) guidelines (CEBM) by determining items to score for relevance and validity [7]. Relevance was scored on articles only concerning children, and only children under the age of 4 years old, only partial thickness burns, time post burn of the first application of treatment material and at least one item describing the outcome.

As partial thickness scald burn in children under the age of four are most common, and as these children have a thin skin that makes them vulnerable for thermal lesions, we added children under the age of four to the domain.

Partial thickness burns are prone to deepening, also known as conversion, but a wound dressing might be able to influence and prevent this process [5,8]. We therefore defined the

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