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Randomized controlled trial of three burns dressings for partial thickness burns in children

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ABSTRACT

Background: This study compared the effects of three silver dressing combinations on small to medium size acute partial thickness burns in children, focusing on re-epithelialization time, pain and distress during dressing changes.

Method: Children (0–15 years) with clean, ≤10% total body surface area (TBSA) partial thickness burns who met the inclusion criteria were included in the study. Children received either (1) Acticoat™; (2) Acticoat™ with Mepitel™; or (3) Mepilex Ag™ dressings. Measures of burn re-epithelialization, pain, and distress were recorded at dressing changes every 3–5 days until full re-epithelialization occurred.

Results: One hundred and three children were recruited with 96 children included for analysis. No infections were detected for the course of the study. When adjusted for burn depth, Acticoat™ significantly increased the expected days to full re-epithelialization by 40% (IRR = 1.40; 95% CI: 1.14–1.73, $p < 0.01$) and Acticoat™ with Mepitel™ significantly increased the expected days to full re-epithelialization by 33% (IRR = 1.33; 95% CI: 1.08–1.63, $p \leq 0.01$) when compared to Mepilex Ag™. Expected FLACC scores in the Mepilex Ag™ group were 32% lower at dressing removal ($p = 0.01$) and 37% lower at new dressing application ($p = 0.04$); and scores in the Acticoat™ with Mepitel™ group were 23% lower at dressing removal ($p = 0.04$) and 40% lower at new dressing application ($p < 0.01$), in comparison to the Acticoat™ group. Expected Visual Analog Scale-Pain (VAS-P) scores were 25% lower in the Mepilex Ag™ group at dressing removal ($p = 0.04$) and 34% lower in the Acticoat™ with Mepitel™ group ($p = 0.02$) at new dressing application in comparison to the Acticoat™ group. There was no significant difference between the Mepilex Ag™ and the Acticoat™ with Mepitel™ groups at all timepoints and with any pain measure.

Conclusion: Mepilex Ag™ is an effective silver dressing, in terms of accelerated wound re-epithelialization time (compared to Acticoat™ and Acticoat™ with Mepitel™) and decreased pain during dressing changes (compared to Acticoat™), for clean, <10% TBSA partial thickness burns in children.

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1. Introduction

Small to medium sized partial thickness burns are a common occurrence for children in high income countries [1]. Scarring remains the biggest problem for pediatric burn centers, contributing to negative physical and psychosocial outcomes for children [2]. Therefore the initial care of the burn wound and choice of burn dressing is vital in creating the ideal healing environment to ensure rapid re-epithelialization of the wound and to reduce the possibility of hypertrophic scarring. Currently, ≤10% TBSA partial thickness burns in children are predominantly managed in the outpatient setting using specialized dressings which promote moist wound healing and prevent wound infection [3]. The standard of care for burns of this size in children has changed in the last 10–15 years. Currently silver-depositing fabric and foam dressings are the most commonly used treatment to manage the bioburden of a wound, with or without a silicone skin interface [4].

Many trials have been conducted regarding the efficacy of silver dressings for treating burns, using topical silver sulfadiazine applications as the control or comparator dressing. However, the use of silver sulfadiazine as the comparator treatment needs to be reconsidered, as silver fabric dressings have been shown to promote faster wound re-epithelialization rates, are associated with lower levels of pain during burn care procedures and do not require daily changes [4–6]. Despite the large number of silver-impregnated burns dressings now on the market, very few high level trials have been conducted which compare these dressings in pediatric or adult patients [5]. To date, only one randomized controlled trial has been conducted comparing the use of silver dressings, in a combined adult and pediatric population [7]; however, none have been conducted specifically in a pediatric population. Therefore there is a need to identify the silver dressing(s) which best meet the current challenges of burn wound management in the pediatric burns population.

The aim of this study was to determine whether one of three silver dressings – Acticoat™, Acticoat™ combined with Mepitel™ or Mepilex Ag™ – would be more effective in terms of reduced pain during change of dressings and the re-epithelialization rate of acute, partial thickness burns in children. Acticoat™, Mepitel™ and Mepilex Ag™ were selected for the trial as all are commonly used within pediatric burn centers in Australia and New Zealand. It was hypothesized that silver dressings with a silicone interface, compared to no silicone interface, would hasten the re-epithelialization of a burn and decrease the amount of pain and distress experienced during dressing changes within a pediatric population.

2. Methods/design

This study was a prospective, randomized controlled trial. This study is registered with the Australian New Zealand Clinical Trials Registry (ACTRN12613000105741) and was approved by the Queensland Children's Health Services (Royal Children's Hospital) Human Research Ethics Committee and the University of Queensland Ethics Committee. A protocol paper has been published for this trial; please refer to the article for a more detailed summary of the methods [8]. This trial was completed as per the published protocol.

2.1. *Intervention*

The intervention was randomized to be one of either: Acticoat™; Acticoat™ combined with Mepitel™; or Mepilex Ag™ dressings (see Fig. 1). Each dressing was replaced every 3–5 days until re-epithelialization occurred or grafting was undertaken.

Acticoat™ was moistened with sterile water and applied over the entire wound, with a nasogastric tube placed on top of the dressing, (with the capped end of the tube left unsecured outside the border of the dressing) before the entire dressing was secured with self-adhesive tape. A dry absorbent pad dressing was then applied over the Acticoat dressing and secured with tape. For the Acticoat™ with Mepitel™ intervention, Mepitel™ was cut to the identical size of the Acticoat™ and was placed onto the wound first, after which Acticoat™ was applied as per the previous protocol. Nasogastric tubes were used to assist in the moistening of the dressing between changes. Depending on the size of the wound, tubes were placed approximately 10 cm apart over the Acticoat™, and 1–2 ml of sterile water was then inserted via plastic syringe through the tubes three times a day. Mepilex Ag™ was applied to the wound and secured with self adhesive tape as per manufacturer instructions.

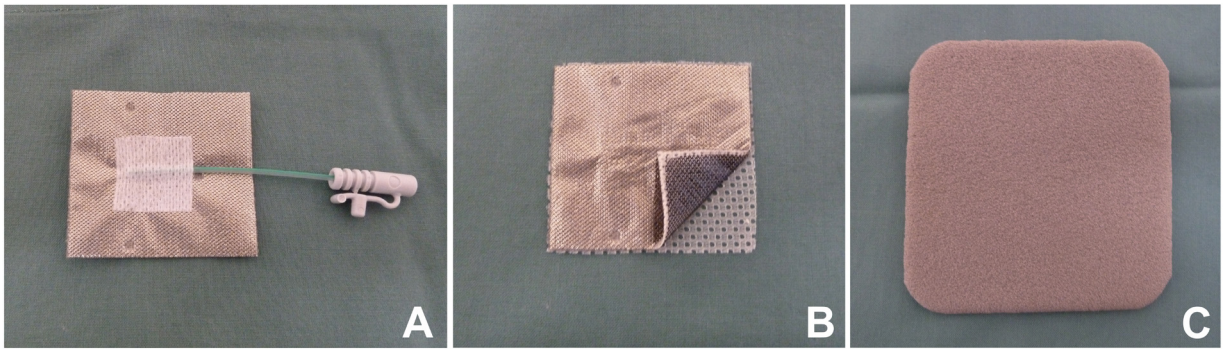

Fig. 1 – Acticoat™ dressing with nasogastric tube attached (A); Mepitel™ dressing in situ beneath Acticoat™ (B); Mepilex Ag™ dressing (C).