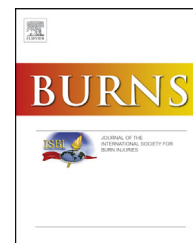


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Cost-effectiveness of silver dressings for paediatric partial thickness burns: An economic evaluation from a randomized controlled trial

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ABSTRACT

Background: Partial thickness burns of up to 10% total body surface area (TBSA) in children are common injuries primarily treated in the outpatient setting using expensive silver-containing dressings. However, economic evaluations in the paediatric burns population are lacking to assist healthcare providers when choosing which dressing to use. The aim of this study was to conduct a cost-effectiveness analysis of three silver dressings for partial thickness burns $\leq 10\%$ TBSA in children aged 0–15 years using days to full wound re-epithelialization as the health outcome.

Method: This study was a trial based economic evaluation (incremental cost effectiveness) conducted from a healthcare provider perspective. Ninety-six children participated in the trial investigating Acticoat™, Acticoat™ with Mepitel™ or Mepilex Ag™. Costs directly related to the management of partial thickness burns $\leq 10\%$ TBSA were collected during the trial from March 2013 to July 2014 and for a one year after re-epithelialization time horizon. Incremental cost effectiveness ratios were estimated and dominance probabilities calculated from bootstrap resampling trial data. Sensitivity analyses were conducted to examine the potential effect of accounting for infrequent, but high cost, skin grafting surgical procedures.

Results: Costs (dressing, labour, analgesics, scar management) were considerably lower in the Mepilex Ag™ group (median AUD\$94.45) compared to the Acticoat™ (median \$244.90) and Acticoat™ with Mepitel™ (median \$196.66) interventions. There was a 99% and 97% probability that Mepilex Ag™ dominated (cheaper and more effective than) Acticoat™ and Acticoat™ with Mepitel™, respectively. This pattern of dominance was consistent across raw cost and effects, after a priori adjustments, and sensitivity analyses. There was an 82%

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probability that Acticoat™ with Mepitel dominated Acticoat™ in the primary analysis, although this probability was sensitive to the effect of skin graft procedures.

Conclusion: This economic evaluation has demonstrated that Mepilex Ag™ was the dominant dressing choice over both Acticoat™ and Acticoat™ with Mepitel™ in this trial-based economic evaluation and is recommended for treatment of paediatric partial thickness burns $\leq 10\%$ TBSA.

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1. Introduction

In children aged 0–15 years, burns of less than 20% total body surface area (TBSA) are the fifth most common cause of non-fatal childhood injuries worldwide, occurring in 153 per 100,000 population of children [1]. As the mortality rates from burns have decreased over time with better treatment options, burns of up to 10% TBSA in children can now be managed in the outpatient setting and consequently there has been a significant drop in inpatient admissions [2]. Previous to the introduction of silver dressings (prior to 2006/2007), the proportion of inpatients greatly outnumbered burns treated in the outpatient setting. A 26 year study of burns hospital admissions in Western Australia noted a significant decrease of admissions from 64 per 100,000 people to 32 per 100,000 from 1983 to 2008 [3]. Many research papers have also noted a transition to outpatient treatment after 2007 with the use of silver dressings for paediatric burns [4–6]. According to data collected by the Burns Registry of Australia and New Zealand (BRANZ) from seven burns centres over a one year period (2010–2011), the ratio of paediatric outpatient admissions to inpatients was 3.2:1 [7].

In recent years, burns dressing applications for partial thickness burns $\leq 10\%$ TBSA in children have changed from daily silver sulfadiazine cream (SSD) applications to the use of silver impregnated dressings which can be changed up to twice weekly in the outpatient setting [4,5]. The wound re-epithelialization process using dressings can take 2–3 weeks or occasionally more [8]. More than 800 children are typically treated for a burn in the city of Brisbane, where the present study was conducted, each year [9]. Outpatient treatment approaches (the majority of cases) are cheaper than admitted cases, but the costs associated with silver dressings utilized, and the health professional labour time consumed during the management of these burns are substantial.

A systematic review of burn care costs calculated the mean total cost as \$3883 per 1% TBSA burned for burns 0–10% TBSA in high income countries [10]. Thus, choosing a silver dressing which can promote a rapid re-epithelialization time (therefore decreasing the need for scar management and surgical intervention), and which is also less costly than other silver dressings on the market, has the potential to greatly reduce the resource consuming burden on the health system from paediatric burns.

Economic evaluations of silver burns dressings are warranted among clinical populations in order to assist decision making for healthcare providers. However, there is a paucity of cost-effective studies among paediatric clinical

populations with burns. Notably, despite silver dressings being the standard of care in Australasia and one of the main treatment choices for paediatric burns in high-income countries, there has yet to be a rigorous cost-effectiveness study comparing silver burns dressings in a paediatric outpatient population.

A systematic review of the costs of burn care published in 2014 [10] noted that the majority of cost studies available in this area had numerous inconsistencies in study methodology. The majority were combined adult and paediatric populations, there was unreliable measurement and reporting of TBSA in patients, severe burns with inpatient stays were largely the focus of studies and many studies which included direct medical costs often only recorded dressing costs. Cohort studies were most commonly reported ($n = 107$), while a small number were randomized controlled trials ($n = 24$). From the 153 studies included in the review, only three were identified as complete economic evaluations comparing burns dressings using cost effectiveness analyses, the remainder being cost studies only. One study investigated non-standard burns treatments [11] and the remaining two studies included either Aquacel Ag[®] [12] or Mepilex Ag™ [13] silver dressings however both were compared to SSD. Both studies found that each silver dressing respectively was cost-effective compared to SSD.

Since publication of this systematic review, a comprehensive cost-utility analysis of silver dressings (Mepilex Ag™ and Aquacel Ag[®]) compared to SSD in partial thickness burns $\leq 20\%$ TBSA was published [14]. This study among adults with burns incorporated a cost-utility analysis and again concluded that these silver dressings were cost effective over a wide complication (e.g. infection) range in comparison to SSD among that sample. Mepilex Ag™ and Aquacel Ag[®] were not however compared to each other and only adult patients were studied, therefore it remains difficult to ascertain the cost-effectiveness of silver dressings in the paediatric burns population.

The most comprehensive economic evaluation currently in the literature of paediatric burn care is an incremental cost-effective analysis examining the use of a non-pharmacological, procedural preparation and distraction intervention (Ditto™) compared to standard practice in the paediatric burns outpatient setting and the effects on wound re-epithelialization [15]. While this study does not evaluate burn wound treatments, it was conducted from a societal perspective in the same setting as the current study (Royal Children's Hospital, Brisbane) and has provided a detailed overview of cost estimations associated with paediatric burns managed as outpatients.

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