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[Intervention Review]

# Dressings for superficial and partial thickness burns

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## ABSTRACT

### Background

An acute burn wound is a complex and evolving injury. Extensive burns produce, in addition to local tissue damage, systemic consequences. Treatment of partial thickness burn wounds is directed towards promoting healing, and a wide variety of dressings is currently available. Improvements in technology and advances in understanding of wound healing have driven the development of new dressings. Dressing selection should be based on their effects of healing, but ease of application and removal, dressing change requirements, cost and patient comfort should also be considered.

### Objectives

To assess the effects of burn wound dressings for superficial and partial thickness burns.

### Search methods

We searched the Cochrane Wounds Group Specialised Register (Searched 29/5/08); The Cochrane Central Register of Controlled Trials (CENTRAL) - The Cochrane Library Issue 2 2008; Ovid MEDLINE - 1950 to May Week 3 2008; Ovid EMBASE - 1980 to 2008 Week 21 and Ovid CINAHL - 1982 to May Week 4 2008.

### Selection criteria

All randomised controlled trials (RCTs) that evaluated the effects of burn wound dressings for superficial and partial thickness burns.

### Data collection and analysis

Two authors using standardised forms extracted the data independently. Each trial was assessed for internal validity with differences resolved by discussion.

### Main results

A total of 26 RCTs are included in this review and most were methodologically poor. A number of dressings appear to have some benefit over other products in the management of superficial and partial thickness burns. This benefit relates to time to wound healing, the number of dressing changes and the level of pain experienced. The use of biosynthetic dressings is associated with a decrease in time to healing and reduction in pain during dressing changes. The use of silver sulphadiazine (SSD) as a comparator on burn wounds for the full duration of treatment needs to be reconsidered, as a number of studies showed delays in time to wound healing and increased number of dressing applications in patients treated with SSD dressings.

**Authors' conclusions**

There is a paucity of high quality RCTs on dressings for superficial and partial thickness burn injury. The studies summarised in this review evaluated a variety of interventions, comparators and clinical endpoints. Despite some potentially positive findings, the evidence, which largely derives from trials with methodological shortcomings, is of limited usefulness in aiding clinicians in choosing suitable treatments.

**PLAIN LANGUAGE SUMMARY****Dressings for treating superficial and partial thickness burns**

Superficial burns are those which involve the epidermal skin layer and partial thickness burns involve deeper damage to structures such as blood vessels and nerves. There are many dressing materials available to treat these burns but none have strong evidence to support their use. Evidence from small trials, many with methodological limitations, suggests that superficial and partial thickness burns may be managed with hydrocolloid, silicon nylon, antimicrobial (containing silver), polyurethane film and biosynthetic dressings. There was no evidence to support the use of silver sulphadiazine.

## BACKGROUND

### Description of the condition

Burn injury occurs in all age groups, from many causes, and may range from the very minor, when no or self treatment is sufficient, through to the most severe requiring the highest levels of intensive care and surgery. Thus, patients suffering a burn injury present with a wide spectrum of injury severity depending on the depth of the wound and the surface area of the body affected. This variability of injury makes it difficult to accurately describe the number of people who suffer burn injuries each year, only the most serious are admitted to hospital and these are the least common of burn injuries (Burd 2005).

Full thickness burns involve all layers of the skin and may involve the structures beneath such as muscle and bone. A superficial burn involves just the epidermal layer of the skin, while partial thickness burns involve damage to deeper structures within the skin such as blood vessels, nerves and hair follicles. Whilst causing considerable pain and distress, and because of their relative frequency, these types of burns can heal without the need for surgical intervention and, if only involving relatively small areas, can be managed safely in an outpatient environment. It is these types of burn wounds that are the focus of this review.

Accurate assessment of burn depth is important in making the right decision about treatment. Most extensive burns are a mixture of different depths and burn depth can change and deepen following initial injury (Hettiaratchy 2004). The management of burn wounds can have a considerable influence on the time taken for the wound to heal. Ensuring that the wound is managed in a way that promotes healing will influence the long term quality and appearance of the scar, and also minimize the risk of burn wound infection. Superficial and partial thickness wounds can progress to a deeper burn if the wound dries out or becomes infected.

### Description of the intervention

Numerous dressing materials are available for treating partial thickness burns, the most common being a combination of paraffin impregnated gauze and an absorbent cotton wool layer (Hudspith 2004). Silver sulphadiazine (SSD) cream has also been commonly used in burn wound management since 1968 to minimize the risk of wound infection. These conventional dressings however tend to adhere to the wound surface (Thomas 1995) and their need for frequent changes traumatizes newly epithelialized surfaces and delays healing. Silver sulphadiazine cream itself is also thought to delay wound healing due to a toxic effect on regenerating keratinocytes (Wasiak 2005).

The limitations of conventional dressings, improvements in technology and advances in our understanding of wound healing have led to an enormous expansion in the range of dressing options that can be used on minor burns. Burn wounds may lose large amounts of fluid through evaporation and exudation, so dressings must absorb fluid but also maintain a high humidity at the wound site to encourage granulation and assist epithelialisation. The burn dressing should provide a bacterial barrier to prevent infection entering the wound or being transmitted from the wound. Burn dressings should also possess mechanical characteristics to accommodate movement (Quinn 1985)

The range of dressings now available can be sub-categorised into different types based upon the materials used in their manufacture (Queen 1987). These sub-categories can include; films, foams, composites, sprays and gels. Also available as an alternative to traditional gauze dressings are the biological skin replacements and the bioengineered skin substitutes, including autologous cultured and non-cultured products, and the newer biosynthetic skin dressings that are available to produce physiological wound closure until the epidermal layer has repaired. Further details of these dressing categories are as follows:

#### 1. Hydrocolloid dressings

Hydrocolloid dressings contain a variety of constituents including gelatin, pectin and sodium carboxymethylcellulose in an adhesive polymer matrix. These dressings form a gel when their inner layer comes into contact with exudate which in turn facilitates autolytic debridement of the wound. Examples of a hydrocolloid dressing include Comfeel (Coloplast) and DuoDerm (ConvaTec) (Lawrence 1997).

#### 2. Polyurethane film dressings

Polyurethane films are transparent, adhesive-coated sheets that are applied directly to the wound. They are permeable to water vapour, oxygen and carbon dioxide but not to liquid water or bacteria. Depending on the amount of wound exudate, the dressings can be left in place for several days. Film dressings are suitable for lightly exuding wounds (Lawrence 1997). Two examples of a polyurethane film include OpSite (Smith & Nephew) or Tegaderm (3M Company).

#### 3. Hydrogel dressings

Hydrogel dressings are high water content gels containing insoluble polymers. Their constituents include modified carboxymethylcellulose, hemicellulose, agar, glycerol and pectin. Unlike the film dressings, they have some capacity to absorb fluid, and can therefore cope with some levels of wound exudate. Their fluid donating properties may also aid wound debridement and assist in maintaining a moist wound environment. Hydrogels are available in amorphous form (a loose gel) and in a sheet form where the gel is presented with a fixed three dimensional macro structure. Amorphous hydrogels include products such as IntraSite (Smith & Nephew) and Solugel while sheet hydrogels include Aqua clear and Nu-gel (Johnson & Johnson).

#### 4. Silicon coated nylon dressings

This group of dressings consist of a flexible polyamide net coated with soft silicone containing no biological compounds. They act as a direct wound contact layer and their mesh structure allows drainage of exudate from the burned surface. They function primarily as a non-adherent dressing layer and therefore to reduce potential damage during dressing changes. An example includes Mepitel (Mölnlycke)(Walmsley 2002).

#### 5. Biosynthetic skin substitute dressings

Biosynthetic skin substitute dressings are a family of materials which have been developed to mimic a function of skin by replacing the epidermis or dermis, or both. Generally speaking, manufactured epidermal substitutes will allow for re-epithelization to occur while permitting a gas and fluid exchange which in turn provides both protection from bacterial influx and

mechanical coverage (Demling 2000). Examples include Biobrane (Dow Hickam/Bertek Pharmaceuticals) and Trans Cyte (Advanced Tissue Sciences) (Walmsley 2002).

## 6. Antimicrobial (silver and iodine containing) dressings

Antimicrobial dressings claim to manage the bio burden of the wound: they are thought to reduce the risk of invasive infection by minimizing the bacterial colonization of wounds. Specialist products containing antimicrobials include the Acticoat range (delivering nano-crystalline silver) and the Iodosorb range (cadexomer iodine). Several types of product have now been produced with added silver, including; Contreet (Hydrocolloid with silver), Avance (Foam with silver) and Aquacel Ag (Fibre dressing with silver, ConvaTec).

## 7. Fibre dressings

Fibre dressings such as the calcium alginate dressings are absorbent, biodegradable and derived from seaweed. Alginate dressings may help to maintain a moist microenvironment conducive to healing, whilst limiting wound secretions and minimising bacterial contamination. They are useful for moderate to heavily exudating wounds. Alginates can be rinsed away with saline irrigation, which minimises interference with the healing process and may reduce pain experienced by patients. Some examples of alginate dressings are: Algosteril (Johnson & Johnson), Comfeel Alginate Dressing (Coloplast), Carrasorb H (Carrington Laboratories), Kaltostat (ConvaTec) (Walmsley 2002).

## 8. Wound dressing pads

This group of dressings include simple non adherent dressings, knitted viscose dressings (e.g. N/A Dressing - Johnson and Johnson), tulle and gauze dressings. They are usually in the form of woven cotton pads that are applied directly to the wound surface. They can be either non-medicated (e.g. paraffin gauze dressing) or medicated (e.g. containing povidone iodine or chlorhexidine).

## Why it is important to do this review

Despite the increase in the types of dressings available, traditional dressings of paraffin impregnated gauze and absorbent cotton wool or gauze are still commonly used (Hudspith 2004). Paraffin and gauze dressings are relatively cheap. In many parts of the world where resources for treating burns are limited, even simple medical dressings may be unavailable. In these circumstances, wounds may be managed with various materials, such as banana leaves or potato skins. In addition, open management of burn wounds is also frequently practiced. This review does not address the efficacy of these latter methods. The purpose of this review is to establish whether any type of dressing from the many now commercially available is more effective in promoting healing and minimizing discomfort and infection for patients with superficial and partial thickness burns.

## OBJECTIVES

The objective of this review was to assess the effects of burn wound dressings for treating superficial and partial thickness burns.

## METHODS

### Criteria for considering studies for this review

#### Types of studies

We included all randomised controlled trials (RCTs) that evaluated the effects of burn wound dressings used in the treatment of superficial and partial thickness burns.

#### Types of participants

We focused on people of any age with a superficial or partial thickness burn determined by either clinical evaluation or objective assessment, or both, which required treatment in any health care setting. We did not include trials that recruited people with full thickness burns.

#### Types of interventions

We included any wound dressing used singly and in combination to treat superficial and partial thickness burns. The groups of products considered included:

- Hydrocolloid dressings;
- Polyurethane film dressings;
- Hydrogel dressings;
- Silicon coated nylon dressings;
- Biosynthetic skin substitute dressings;
- Antimicrobial (silver and iodine containing) dressings;
- Fibre dressings
- Wound dressing pads.

We excluded topical skin agents, biological skin replacements and autologous cultured and non-cultured skin engineering products, as these products tend to be used on people with deep dermal and full thickness burns, both of which were not within the remit of this review. Trials which considered the treatment of hand burns were excluded, this decision was taken post hoc as it was felt that the treatment regime for these particular type of burns was different due to the anatomical site.

#### Types of outcome measures

Studies were eligible for inclusion if they reported any of the following outcome measures:

#### Primary outcomes

1. Time to complete wound healing/proportion of burns completely healed in a specified time period
2. Change in wound surface area over time/proportion of wounds partly healed in a specified time period

#### Secondary outcomes

1. Number of dressing changes
2. Cost of the dressings
3. Level of pain associated with the application and removal, or both, of the wound dressing
4. Patient perception, level of satisfaction with the application and removal of dressing
5. Quality of life
6. Hospital length of stay (LOS)

7. Need for surgery
8. Incidence of infection
9. Adverse events

## Search methods for identification of studies

### Electronic searches

We conducted searches of the following databases:

- The Cochrane Wounds Group Specialised Register (Searched 29/5/08)
- The Cochrane Central Register of Controlled Trials (CENTRAL) - The Cochrane Library Issue 2 2008
- Ovid MEDLINE - 1950 to May Week 3 2008
- Ovid EMBASE - 1980 to 2008 Week 21
- Ovid CINAHL - 1982 to May Week 4 2008

The following search strategy was used in CENTRAL and modified as appropriate for other databases:

- #1 MeSH descriptor Bandages, Hydrocolloid explode all trees  
 #2 hydrocolloid\* or askina or biofilm or combiderm or comfeel or cutinova or duoderm or duoderm or (hydroactive NEXT gel\*) or granuflex or hydrocoll or replicare or tegasorb or sureskin or hydrofibre or hydrofiber or aquacel  
 #3 MeSH descriptor Alginates explode all trees  
 #4 alginate NEXT dressing\*  
 #5 alginate\* or calcium or algosteril or kaltostat or melgisorb or seasorb or sorbalgon or sorbsan or tegagen or "algitite M"  
 #6 foam NEXT dressing\*  
 #7 allevyn or avance or biatain or cavi-care or flexipore or lyofoam or spyrosorb or tielle or mepilex  
 #8 MeSH descriptor Hydrogels explode all trees  
 #9 hydrogel\* or aquaform or debrisan or geliperme or granugel or hydrosorb or novogel or nu-gel or "nu gel" or purilon or sterigel  
 #10 film or films or arglaes or omiderm or polyurethane or tegaderm or opsite  
 #11 MeSH descriptor Occlusive Dressings explode all trees  
 #12 paraffin NEAR gauze  
 #13 paranet or paratulle or unitulle or jelonet or bactigras or cuticerin or adaptic or atrauman  
 #14 "retention tape" or hypafix or mexif or fixamul  
 #15 biosynthetic NEAR substitute\*  
 #16 (biosynthetic NEAR dressing\*)  
 #17 transcyte or biobrane  
 #18 (antimicrobial NEXT dressing\*) or acticoat  
 #19 (#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18)

The MEDLINE search ([Appendix 1](#)) was combined with the Cochrane Highly Sensitive Search Strategy for identifying randomised trials in MEDLINE: sensitivity- and precision-maximizing version (2008 revision); Ovid format ([Lefebvre 2008](#)). The EMBASE and CINAHL searches were combined with the trial filters developed by the Scottish Intercollegiate Guidelines Network ([SIGN 2007](#)). No date or language restrictions were applied.

### Searching other resources

We handsearched the references of all identified studies and contacted authors for information about other published and

unpublished studies. All dressing manufacturers were contacted to request information on trials evaluating dressings.

## Data collection and analysis

### Selection of studies

Records retrieved by the initial search were scanned by FC and JW to exclude obviously irrelevant studies, and then three authors (FC, HC and JW) screened titles and abstracts identified by the search against the inclusion criteria. Full-text articles were retrieved and reviewed independently by two authors (FC and JW) for the purpose of applying inclusion criteria. In all instances, differences of opinion were resolved by discussion among the authors.

### Data extraction and management

Data from the studies were extracted independently by two authors (FC and JW) using standardised forms. The standardised forms allowed for the extraction of specific data such as type of care setting, key baseline variables of each group e.g. depth of burn wound, size of burn wound, burn type, age, sex, description of the intervention and the control or co-intervention including: secondary dressings used, frequency of dressings changes, and length of treatment. All differences were resolved by discussion among the review authors.

### Assessment of risk of bias in included studies

Study quality assessment was based on the method outlined in [Schulz 1995](#). Results from the study quality assessment were extracted by two authors (FC and JW) are presented in a descriptive manner. The following characteristics were assessed.

#### Adequacy of the randomisation process:

A: Study reported use of adequate sequence generation, for example, random number tables, computer random number generator, coin tossing, or shuffling.

B: Study did not specify one of the adequate reported methods in (A) but mentioned randomisation method.

C: Other methods of allocation that may not be random.

#### Adequacy of the allocation concealment process:

Trials were awarded the following grades for allocation concealment:

A: Adequate: a randomisation method described that would not allow an investigator/participant to know or influence an intervention group before an eligible participant entered the study, such as central randomisation; serially numbered, opaque, sealed envelopes.

B: Unclear: trial states that it is 'randomised', but no information on the method used is reported or a method is reported that was not clearly adequate.

C: Inadequate: inadequate method of randomisation used, such as alternate medical record numbers or unsealed envelopes; or any information in the study that indicated that investigators or participants could influence the intervention group.

#### Potential for selection bias after allocation:

A: Yes - Specifically reported by authors that ITT was undertaken and this was confirmed on study assessment, or not stated but evident from study assessment that ITT was undertaken

B: Unclear - Reported, but unable to confirm on study assessment, or not reported and unable to confirm by study assessment.

C: No - Lack of ITT confirmed on study assessment (Patients who were randomised were not included in the analysis because they did not receive the study intervention, they withdrew from the study or were not included because of protocol violation) regardless of whether ITT reported or not

Completeness of follow-up:

Percentage of participants for whom data was complete at defined study end-point

Level of masking (treatment provider, patient, outcome assessor): It is unlikely due to the nature of the intervention that trials will be able to blind the patient or treatment provider, therefore the level of masking for trials was rated as follows:

A: Trials which report any blinding of either outcome assessor (most likely) or treatment provider or patient (less likely)

B: Blinding not undertaken

C: Unclear whether any blinding was undertaken

### Data synthesis

For proportions (dichotomous outcomes e.g. percentage of burns healed), relative risk (RR) was used. The mean difference (MD) was to be calculated for continuous data and pooled in a meta-analysis.

All analyses were made on an intention-to-treat basis, where possible, and where not possible this was clearly stated. Time to wound healing was to be analysed as survival (time to event) outcomes if possible, using the appropriate analytical method (as per the Cochrane Reviewers' Handbook version 5.0)(Higgins 2008).

Consideration was given to the appropriateness of pooling and meta-analysis. Data from all eligible studies were extracted and summarised independently by two authors using a standard data extraction tool.

### Subgroup analysis and investigation of heterogeneity

We used a fixed effect model where there was no evidence of significant heterogeneity between studies ( $I^2$  less than 40%), and employed a random effects model when heterogeneity was likely ( $I^2$  more than 40%) (DerSimonian 1986; Higgins 2003).

Consideration was given to the appropriateness of subgroup analyses based on the type of burn injury i.e. superficial or deep partial thickness burn, but many of the studies did not report on the extent of burn depth. If they did, subgroup analysis was to be done by calculation of RR or weighted mean difference (WMD) in each subgroup with examination of the 95% confidence intervals (95% CI). We would take non-overlap in intervals to indicate a statistically significant difference between subgroups.

## RESULTS

### Description of studies

A total of 3000 references were identified by the searches for this review. From independent scrutiny of the titles and abstracts, 370 potentially relevant articles were retrieved and 45 were assessed in full text form. Thirteen trials did not meet the inclusion criteria and were excluded from the review. The reasons for exclusion are detailed in the [Characteristics of excluded studies](#). Six studies are awaiting assessment, 4 studies were not published in English and require translations before deciding whether or not they meet

the inclusion criteria (Frandsen 1978; Hauser 2007; Kuroyanagi 1995; Misterka 1991), one study (Roszbach 1998) requires further clarification about burn depth and the author has been contacted, one study (Schwarze 2008) was retrieved by the most recent search and is currently being assessed against the inclusion criteria. Twenty six studies met the inclusion criteria for this review and further details can be found in the [Characteristics of included studies](#).

### 1. Hydrocolloid dressings

Five studies with 314 participants compared hydrocolloid dressings with other conventional burn wound dressings (Afilalo 1992; Phipps 1988; Thomas 1995; Wright 1993; Wyatt 1990). The studies were published between 1984 and 1995 and carried out in Canada (Afilalo 1992), the United Kingdom (Phipps 1988; Thomas 1995; Wright 1993) and the United States (Wyatt 1990). Studies took place in emergency departments, outpatient clinics or tertiary burn care centres. The type of burn injury was generally limited to partial thickness burns. The definition of superficial or partial thickness burns was described in only one study (Afilalo 1992). The inclusion and exclusion criteria did not differ considerably between the six studies. Within the studies, patients were generally well matched for sex, age, location and size of burn injury.

The traditional treatments which acted as controls included chlorhexidine impregnated tulle-gras in three of the trials (Phipps 1988; Thomas 1995; Wright 1993) and SSD in two trials (Afilalo 1992; Wyatt 1990). The time for changing the comparator dressings differed in the trials ranging from twice daily to every three to five days to when required. The number of dressing changes or ease of dressing change was reported in four studies (Afilalo 1992; Thomas 1995; Wright 1993; Wyatt 1990). The hydrocolloid dressings were changed every 5 days or when required in trials where this was reported.

### 2. Polyurethane film dressings

Two trials with 106 patients compared polyurethane film dressings with conventional burn wound therapy (Neal 1981; Poulsen 1991). The studies were carried out in an outpatient clinic of an accident and emergency department. The type of burn injury examined was limited to partial thickness burns although its definition was described in only one study (Poulsen 1991). The mechanism of burn injury was described in both studies (Neal 1981; Poulsen 1991). The inclusion and exclusion criteria did not differ considerably amongst the three studies. Within the studies, patients were generally well matched for sex, age, location and size of burn injury.

The conventional (control) dressing varied slightly between the studies and included chlorhexidine impregnated gauze (Neal 1981) and paraffin impregnated gauze (Poulsen 1991). The polyurethane film dressing was changed only if leakage, infection or an adverse skin reaction occurred (Poulsen 1991). The control dressings were changed on day 6 post-burn in the Poulsen 1991 study. The control or conventional dressings in the Neal 1981 study were not taken down until the third or fifth day post-burn.

### 3. Hydrogel dressings

Two studies with 115 patients compared hydrogel dressings with SSD or paraffin gauze with or without topical antibiotics for a partial thickness burn injury (Guilbaud 1992; Guilbaud 1993). In both studies, each patient acted as his or her own control. A

total of 310 wound sites with similar depth and surface area, contiguous or anatomically separated were evaluated with the following measures: healing time expressed in days, assessment of pain, quality of healing, sensitivity of the scar and frequency of dressing changes. The endpoint of healing was defined as the complete epithelialisation of the wound. Examinations were performed on days 0, 2, 4, and 8 and on the day of complete healing in both studies. The studies were undertaken in burn centres in Europe (Guilbaud 1992; Guilbaud 1993).

#### 4. Silicon coated nylon dressings

Two studies (Bugmann 1998; Gotschall 1998) compared the effectiveness of silicon coated nylon dressings with SSD on 142 children presenting within 24 hours of injury with a partial thickness burn. A secondary dressing was applied over the silicon coated nylon dressing which consisted of a gauze dressing soaked with chlorhexidine in one study (Bugmann 1998) and wet and dry cotton gauze in the second study (Gotschall 1998).

Outcome measures assessed by Bugmann 1998 included depth of the burn, the number of cumulative dressings, presence or absence of complete epithelial cover, and number of reported cases of infection and bleeding. The criterion used to define the complete epithelial cover time was the time when a full surface shining layer of epithelial cells was observed. Evaluation of the burn was made between day 3 and 6 after injury. In Gotschall 1998, trained burned nurses assessed the following outcome measures: wound healing, eschar formation, pain at dressing with the use of an objective pain scale tool and the time required for dressing changes.

#### 5. Biosynthetic skin substitute dressings

Ten studies compared the effectiveness of biosynthetic dressings with twice daily application of SSD or other comparators in 441 patients. Five studies used Biobrane (Smith & Nephew) (Barret 2000; Cassidy 2005; Gerding 1988; Gerding 1990; Lal 1999), three used Hydron (Abbott Laboratories) (Curreri 1980; Fang 1987; Husain 1983) and one study used Transcyte (Smith & Nephew) (Noordenbos 1999). An additional study by Kumar 2004 had a three arm arms in which patients were randomised to receive either Biobrane or Transcyte or SSD. A total of four studies (Fang 1987; Gerding 1988; Gerding 1990; Husain 1983) had patients serve as their own controls, similar areas of burns were and were randomised to receive either the intervention or control dressing.

The inclusion and exclusion criteria did not differ considerably between the ten studies. Within the studies, patients were generally well matched for sex, age, location although size of burn injury could vary. Outcome measures were similar across the studies with emphasis placed on healing times, infection rates, cost of dressings, levels of pain and length of stay in hospital.

#### 6. Antimicrobial (silver and iodine containing) dressings

Three studies compared the efficacy of silver impregnated dressing (Acticoat, Smith and Nephew) with SSD on pain levels during dressing changes in 162 patients with partial thickness burns (Li 2006; Muangman 2006; Varas 2005). The study by Li 2006 reported on 166 wound sites rather than number of patients. The studies were carried out in tertiary burn centres with patients serving as their own controls (Varas 2005) or randomised to SSD (Muangman 2006) or SSD powder (Li 2006). The outcome of interest - pain scores as assessed and reported using the visual analogue pain scale

score - were collected during the initial application of the dressing (Muangman 2006) and once during the dressing change for Varas 2005. Other outcomes of interest for Li 2006 included healing time expressed in number of days.

#### 7. Fibre dressings

Two studies evaluated the efficacy and safety of fibre type dressings. In the first study by Costagliola 2002, calcium alginate was compared with SSD in the treatment of 59 patients with 73 partial thickness burns. In the second study by Caruso 2006, a hydrofibre dressing, Aquacel, was compared with SSD in 82 patients. With burn characteristics similar in both groups, all patients in the Caruso 2006 study were observed for a maximum of three weeks until the wound had completely healed. Outcomes measures of interest included length of time to onset of healing, pain, amount of care and treatment safety required and evaluated on a weekly basis.

#### Risk of bias in included studies

Details of the quality assessment based on the method outlined in Schulz 1995 are given in the table 'Characteristics of included studies'. Additionally, a brief descriptive analyses of the studies is provided below. In general, study quality was assessed as poor to very poor. The trials included serious methodological and/or reporting shortcomings.

#### Randomisation and adequacy of allocation concealment

The method of randomisation was adequate in only six of the 26 studies (Afilalo 1992; Gerding 1988; Gerding 1990; Lal 1999; Poulsen 1991; Varas 2005). Seven trials used matched controls by randomising paired wounds to treatment by opposite modalities (Fang 1987; Gerding 1988; Gerding 1990; Guilbaud 1992; Guilbaud 1993; Husain 1983; Varas 2005) had patients serve as their own controls. Allocation concealment was poorly documented and described in only five studies (Gerding 1988; Gerding 1990; Lal 1999; Poulsen 1991; Varas 2005).

#### Patient baseline characteristics

Most studies enrolled patients with a superficial or partial thickness burn. The definition of a partial thickness burn injury were absent in most studies with only Afilalo 1992; Gerding 1988; Gerding 1990 and Poulsen 1991 providing the reader with a definition of a burn wound. Li 2006 defined burn depth according to an unusual nomenclature i.e. three levels, four categories method and the size of the burn according to the nine categories method. Kumar 2004 matched burn depth estimates with laser Doppler specific criteria. The reporting of percentage of total burn surface area (%TBSA) and specific inclusion and exclusion criteria was reported in all studies except for Wright 1993. All trials had clear inclusion and exclusion criteria and there was some consistency between studies. Within the studies, patients were generally well matched for sex, age and size of burn injury.

#### Blinding

Only three trials used blinded outcome assessors to measure overall impression of the healing (Wyatt 1990) and wound evaluation (Fang 1987; Neal 1981).

## Subjects lost to follow up and intention to treat

In most studies the number of patients who deviated from the study protocol was not reported. Only 10 studies (Afilalo 1992; Bugmann 1998; Gerding 1988; Gerding 1990; Guilbaud 1992; Guilbaud 1993; Li 2006; Phipps 1988; Varas 2005; Wright 1993) detail patients lost to follow up. None of the studies were analysed for intention to treat.

## Effects of interventions

Results are presented for each dressing comparison and primary and secondary outcomes are presented when reported. Although the trials included a number of similar outcomes, sometimes the heterogeneous nature of the studies (i.e. use of different comparators), the absence of data, poor reporting, or variations in reporting precluded formal statistical analysis. In most instances, the results were synthesized in a narrative review.

### 1. Hydrocolloid dressings

A total of six trials comparing hydrocolloid dressings with other dressing types or with different hydrocolloid dressings were included in this review.

#### *a. Hydrocolloid dressings compared with chlorhexidine impregnated paraffin gauze dressing (3 trials, 236 people)*

##### Time to complete wound healing

We found three RCTs which compared hydrocolloid dressing with chlorhexidine impregnated paraffin gauze dressing (Phipps 1988; Thomas 1995; Wright 1993). None of the trials found a significant difference in healing rates. The trials could not be pooled as no variance data were reported.

Wright 1993 found no significant difference in time to wound healing (median wound healing time: 12 days in each group;  $P = 0.89$ ).

Thomas 1995 had three study arms; hydrocolloid dressing, hydrocolloid dressing plus SSD and chlorhexidine impregnated paraffin gauze dressing. There was no significant difference in mean time to wound healing between hydrocolloid dressing and chlorhexidine impregnated paraffin gauze dressing (10.6 days with hydrocolloid versus 11.1 days with chlorhexidine impregnated paraffin gauze;  $P$  value reported as not significant). No variance data were reported in the study.

Phipps 1988 reported there was no statistically significant difference between the total mean time to wound healing between hydrocolloid dressing and chlorhexidine impregnated paraffin gauze dressing (14.18 days with hydrocolloid versus 11.83 days with chlorhexidine impregnated paraffin gauze;  $P$  value reported as not significant). No variance data were reported in the study.

##### Patient perception/level of satisfaction

In the study by Wright 1993, investigators and participants rated the hydrocolloid dressing more highly than the chlorhexidine impregnated paraffin gauze (10 item visual analogue scale, with 0 = useless and 10 = excellent: participants' rating: 9.04 with hydrocolloid versus 6.86 with chlorhexidine impregnated paraffin gauze;  $P < 0.02$ ; investigators' rating: 9.31 with hydrocolloid versus 6.9 with chlorhexidine impregnated paraffin gauze;  $P = 0.005$ ), the study does not report if these ratings were mean values. The study

does not report that the raters were blinded therefore bias cannot be ruled out.

##### Level of pain

Wright 1993 found no significant difference between treatments in background pain, pain associated with dressing changes (pain rated using a visual analogue scale), or ease of dressing removal (background pain: mean scores not reported;  $P = 0.28$ ; pain on dressing change: mean scores not reported;  $P = 0.96$ ; ease of dressing removal: mean scores not reported;  $P = 0.49$ ).

Similarly Thomas 1995, recorded pain using a visual analogue score of zero to 10 (zero = no pain and 10 = severe pain) by the clinician and, by the patient (where possible). No significant difference between the pain scores of patients was reported (mean scores not reported;  $P = 0.82$ ). During the clinical assessment, however, patients receiving the chlorhexidine impregnated paraffin gauze dressing sometimes complained that the dressing would stick to the wound surface, causing pain. Patients in the hydrocolloid group complained of pain when the adhesive border was removed from surrounding unshaved (numerical or graphical results not presented).

Pain as an outcome measure was not reported by Phipps 1988.

##### Number of dressing changes

Only two of the three trials reported the frequency of dressing changes. In the Wright 1993 study, dressings were changed more often because of leakage in the hydrocolloid group compared with the chlorhexidine impregnated paraffin gauze group (15/94 [15%] with hydrocolloid versus 3/89 [3%] with chlorhexidine impregnated paraffin gauze dressing;  $P < 0.02$ ). This difference was statistically significant.

In contrast Thomas 1995 reported significantly fewer dressing changes per patient during treatment with hydrocolloid dressing compared with chlorhexidine impregnated paraffin gauze dressing (2.3 with hydrocolloid dressing versus 4.1 with chlorhexidine impregnated paraffin gauze dressing;  $P < 0.0001$ ; reasons for dressing changes were not reported and no variance data were reported in the study). Dressing changes were not reported by Phipps 1988.

##### Adverse Events

In the study by Wright 1993, pain was reported in one person and rash in two people with hydrocolloid dressing.

##### Incidence of infection

Wright 1993 reported that one person in the hydrocolloid group withdrew from the study because of infection, but did not report any cases of infection in those who remained in the study (Analysis 1.1). Thomas 1995 reported no significant difference in increase in pathogenic bacterial isolates between the hydrocolloid dressing and the chlorhexidine impregnated paraffin gauze dressing ( $P = 0.12$ ). In Phipps 1988 no significant difference in pathogenic bacterial isolates between hydrocolloid dressing and the chlorhexidine impregnated paraffin gauze dressing was noted ( $P = 0.02$ ), although the organism most commonly acquired in both groups was *Staphylococcus aureus*.

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, length of stay, and need for surgery were not addressed by any of these studies.

**b. Hydrocolloid dressing compared with chlorhexidine impregnated paraffin gauze dressing plus silver sulphadiazine cream (1 trial, 30 people)**

**Time to complete wound healing**

One study by [Afilalo 1992](#) compared hydrocolloid dressing with chlorhexidine impregnated paraffin gauze plus SSD after initial burn in 48 adults with partial thickness burns. They found no statistically significant difference between treatments for the time to wound healing (time to wound healing in the hydrocolloid group: 10.7 days (4.8), paraffin gauze group: 11.2 days (4.2),  $P = 0.76$ ), however 18 out of 48 participants were lost to follow up (9 from each group) and we cannot be confident that this does not introduce bias.

**Number of dressing changes**

Dressings were changed less frequently with hydrocolloid dressing compared with chlorhexidine impregnated paraffin gauze plus SSD (mean number of dressing changes: 3 with hydrocolloid dressing, 8 with chlorhexidine impregnated paraffin gauze plus SSD;  $P < 0.02$ ). Although reasons for dressing changes were not given, this result was to be expected, as chlorhexidine impregnated paraffin gauze plus SSD dressings were changed routinely, whereas hydrocolloid dressings were only changed when there was an indication of leakage or suspected infection.

**Level of pain**

There was no significant difference between treatment groups for pain. [Afilalo 1992](#) reported median pain score baseline: 3/10 in the hydrocolloid group, 2/10 in the chlorhexidine impregnated paraffin gauze plus SSD group; this was reported as non-significant, the variance data and the  $P$  value was not reported. The median pain score at second visit: 0/10 with hydrocolloid compared with 1/10 with chlorhexidine impregnated paraffin gauze plus SSD; reported as non-significant; the variance data and  $P$  value was not reported.

**Patient perception, level of satisfaction with the application and removal of dressing**

[Afilalo 1992](#) reported that application and removal were more frequently rated as "easy" with hydrocolloid dressing compared with chlorhexidine impregnated paraffin gauze plus silver sulphadiazine.

**Adverse Events**

[Afilalo 1992](#) did not report any wound infections. However, three people who developed cellulitis during treatment were excluded from the RCT.

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, length of hospital stay and need for surgery were not addressed by this study.

**c. Hydrocolloid dressing compared with silver sulphadiazine cream (1 trial, 42 people)**

**Time to complete wound healing**

We found one study ([Wyatt 1990](#)) which compared hydrocolloid dressings with sterile gauze plus SSD after initial burn cleaning.

Hydrocolloid dressing significantly reduced mean healing time when compared with SSD. Hydrocolloid dressing (10.23 days +/- 3.19) versus SSD (15.59 days +/- 8.32) ( $P < 0.01$ ). Wyatt also found that after complete wound healing, wound appearance, re-pigmentation, and overall investigator/participant satisfaction were significantly better with the hydrocolloid dressing compared with SSD (wound appearance:  $P < 0.01$ ; re-pigmentation:  $P < 0.01$ ; investigator/participant satisfaction:  $P < 0.001$ ). An assessor, blind to treatment allocation, rated overall wound healing and reported that 64% of wounds in the hydrocolloid group appeared healthy and well hydrated compared with 35% of wounds in the SSD group.

**Number of dressing changes**

There were significantly fewer dressing changes with the hydrocolloid dressing compared with SSD (mean number of dressing changes: 3.55 with hydrocolloid dressing versus 22.2 with SSD; WMD -18.65 95%CI -19.48 to -17.82;  $P < 0.00001$ ) ([Analysis 2.1](#)). The number of minutes taken to change the dressing was 4.82 minutes with hydrocolloid versus 9.05 minutes with SSD;  $P < 0.001$ . However, this result was to be expected, as SSD dressings were changed routinely, whereas there was no indication to change the hydrocolloid dressings without leakage or suspected infection.

**Level of pain**

Patients graded pain on a scale of 0 to 10 (0 = no pain, 10 = maximum pain). Pain was significantly more severe in the those treated with SSD than those treated with a hydrocolloid dressing (mean pain score 2.28 for those in the SSD group versus 1.09 for those treated with a hydrocolloid dressing; WMD -1.19 95%CI -1.82 to -0.56;  $P < 0.00002$ ) ([Analysis 2.2](#)).

**Patient perception, level of satisfaction with the application and removal of dressing**

Dressing application and removal were rated as easier, and dressing comfort as better with hydrocolloid dressing compared with SSD ( $P < 0.01$ ).

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, length of hospital stay, adverse events and need for surgery were not addressed by this study.

**2. Polyurethane film dressing**

**a. Polyurethane film dressing compared with paraffin gauze dressing (1 trial, 55 people)**

We found one study by [Poulsen 1991](#), which compared polyurethane film with paraffin gauze dressing.

**Time to complete wound healing**

The study reported that no significant difference was found between polyurethane film and the paraffin impregnated gauze in time to wound healing (median days to wound healing: 7 days (range 6 to 30 days) with paraffin gauze compared with 10 days (range 5 to 24 days) with polyurethane film;  $P > 0.05$ ).

**Patient perception, level of satisfaction with the application and removal of dressing**

The same study reported no significant difference between groups in participant satisfaction (satisfaction ratings were self assessed, or, in the case of children, assessed by their parents; proportion of people "satisfied": 27/29 (96%) with polyurethane film versus 20/25

(80%) with paraffin gauze; reported as not significant; P value not reported).

#### Level of pain

Patients were assessed for pain on a 4-item scale for degrees of no pain, mild, moderate and severe pain scale. A total of 3/30 (10%) patients with polyurethane film compared with 4/24 (16%) with paraffin gauze reported moderate to severe pain; differences reported as not significant, P value not reported.

#### Incidence of infection

There was no difference in rates of wound infection, 3/30 (10%) people in the polyurethane group and 2/25 (8%) people in the paraffin gauze group (RR 1.25, 95%CI 0.23 to 6.90; P = 0.80) (Analysis 3.1). No infection required antibiotic treatment.

#### Adverse events

Poulsen 1991 reported skin reactions such as follicular exanthema and itching in 2/30 (7%) people with polyurethane film (data for control group not reported).

Other outcome measures such as change in wound surface area, cost of the dressings, number of dressing changes, quality of life, length of hospital stay, adverse events, and need for surgery were not addressed by this study.

### **b. Polyurethane film dressing compared with chlorhexidine impregnated paraffin gauze dressing (1 trial, 51 people)**

#### Time to complete wound healing

We found one study by Neal 1981, which compared polyurethane film with chlorhexidine impregnated paraffin gauze dressing. The author found polyurethane film significantly reduced healing time compared with chlorhexidine impregnated paraffin gauze (mean healing time: 10.0 days (SD 5.00) with polyurethane film, 14.1 days (SD 7.00) with chlorhexidine impregnated paraffin gauze; P = 0.02) The RCT found that at 10 days after injury, polyurethane film significantly increased healing compared with chlorhexidine impregnated paraffin gauze (results presented graphically; P < 0.05). However, more than 10 days after injury, there was no significant difference in wound healing between the two treatment groups (results presented graphically; P value not given but study author reported as not significant).

#### Level of pain

Less pain (by comparative ranking on a "pain" perception diagram assessing intensity and duration) was experienced with polyurethane film compared with chlorhexidine impregnated paraffin gauze (P < 0.01; results presented graphically).

#### Incidence of infection

There was no significant difference in rates of wound infection between the two groups (1/26 [4%] with polyurethane film versus 2/25 [8%] with chlorhexidine impregnated paraffin gauze; RR 0.48, 95% CI 0.05 to 4.98; P = 0.54) (Analysis 4.1).

Other outcome measures such as change in wound surface area, cost of the dressings, number of dressing changes, quality of life, length of hospital stay, and need for surgery were not addressed by this study.

### **3. Hydrogel dressings**

#### **a. Hydrogel dressing compared with usual care (2 trials, 155 people)**

We found two RCTs which compared hydrogel dressings with usual care. In this study usual care was decided by the investigator and was either SSD, paraffin gauze or paraffin gauze with antibiotics (Guilbaud 1992; Guilbaud 1993).

#### Time to complete wound healing

Guilbaud 1992 found healing times to be shorter in the group allocated to the hydrogel dressing (mean wound healing times: 11.92 days (SD 5.91) with hydrogel dressing (n = 51) versus 13.55 days (SD 6.70) with usual care (n = 51); P < 0.02). Guilbaud 1993 showed no statistical difference although a trend in favour of the hydrogel was noted (mean healing time: 13.6 days (SD 9.6) with hydrogel dressing versus 15.1 days (SD 6.45) with usual care; P = 0.07).

#### Level of pain

Both studies report on pain at dressing application and removal. The tool used to describe pain assessment in the study by Guilbaud 1993 was not described and data not reported, although it was reported narratively that pain following dressing application was reduced at days 2, 4 and 8; P < 0.0001. Guilbaud 1992 reported pain assessments at baseline, 30 minutes after treatment, at days 2, 4 and 8 and an overall assessment at the end of the study. There was no significant difference between the groups at baseline but there was significant less pain in the hydrogel group at the end of the study (MD -1.31 95% CI -2.37 to -0.25) Analysis 5.1; Analysis 5.3.

#### Number of dressing changes

Guilbaud 1993 found fewer dressing changes with the hydrogel dressings compared with the control (mean number of dressings reported graphically). Guilbaud 1992 also found the rate of renewal (the ratio between healing time and number of dressings) was 8.2 days for the hydrogel dressing with 3.5 days for control sites. Twenty-seven (51.9%) treated with a hydrogel dressing had one application whereas two treated (3.8%) in the control group had one application.

#### Adverse events

Guilbaud 1992 noted the incidence of local events, especially exudate and suppuration and was similar with both groups, but only noticed 6/52 [11.5%] patients revealing positive bacteriological cultures. In the six patients (12 sites), three specimens were positive in the hydrogel sites versus six in the control sites.

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, length of hospital stay, and need for surgery were not addressed by these studies.

### **4. Silicon coated nylon dressings**

#### **a. Silicon coated nylon dressings compared with silver sulphadiazine (2 trials, 142 people)**

#### Time to complete wound healing

We found two RCTs which compared silicon coated nylon dressings with SSD (Bugmann 1998; Gotschall 1998). Bugmann 1998 found the mean time to full epithelialisation to be significantly shorter

with silicon coated nylon dressings (mean healing time: 7.58 days (+/- 3.12) with silicone coated nylon versus 11.26 days (+/- 6.02) with silver sulfadiazine;  $P < 0.01$ ). [Gotschall 1998](#) reported the median time to full epithelialisation to be shorter with silicon coated nylon dressings (median time to full re-epithelialisation of the wound: 10.5 days with silicone mesh dressing compared with 27.6 days with SSD;  $P = 0.0002$ ). No variance data were reported for this outcome.

#### Level of pain

[Gotschall 1998](#) found that the silicon coated mesh nylon dressing reduced pain (measured on the Objective Pain Scale [OPS], where 0 = no pain and 10 = severe pain) in the first 5 days after injury compared with SSD (mean pain score over first 5 days on pain scale: 4.0 with silicone mesh dressing versus 4.9 with SSD;  $P < 0.025$ ). No variance data were reported for this outcome. They also found that mean pain score at dressing change (measured on the OPS) was significantly lower with silicone mesh dressing compared with SSD in the first 5 days after burn injury. [Bugmann 1998](#) did not report on pain.

#### Number of dressing changes

[Bugmann 1998](#) noted that there were significantly fewer dressing changes with silicone coated nylon net dressing than with SSD (3.64 with silicone coated nylon net dressing versus 5.13 with SSD; WMD -1.49 95% CI -2.64 to -0.34;  $P < 0.01$ ) ([Analysis 6.1](#)). As the dressings were changed every 2 to 3 days until complete healing was obtained, this result was not surprising but simply a result from the longer healing period with SSD. The RCT found no fluid collection, haematoma, or secondary displacement in either group.

#### Cost of the dressing

[Gotschall 1998](#) reported on resource use and noted that children treated with silicone coated nylon net dressing incurred lower total charges for dressing changes from US\$739 per hospitalisation versus US\$413 for those treated with SSD ( $P < 0.05$ ).

#### Adverse events

[Gotschall 1998](#) noted that SSD significantly increased the risk of moderate to severe eschar formation compared with silicone mesh dressing (42% with SSD versus 6% with silicone mesh dressing;  $P < 0.0001$ ). [Gotschall 1998](#) also noted that none of the wounds in either treatment arm exhibited signs of infection during the dressing changes. However, it was reported that wound cultures for children treated with silicone mesh dressing did yield both a wider variety of bacterial flora and larger amounts of bacterial growth. Three children in the silicone mesh dressing group developed fevers of unknown origin followed by a diffuse maculopapular rash. They were excluded from the RCT on a precautionary basis, although their wounds healed without complication. Treatment regimens for these three children were not reported. [Bugmann 1998](#) reported one case of infection and two cases of bleeding in the SSD group, with one case of bleeding reported in the silicon dressing group.

Other outcome measures such as change in wound surface area, quality of life, patient perception and level of satisfaction with application and removal of dressing, length of hospital stay, and need for surgery were not addressed by these studies.

## 5. Biosynthetic skin substitute dressings

### a. Biosynthetic dressing (Biobrane) compared with silver sulphadiazine (4 trials, 209 people)

#### Time to complete wound healing

We found four RCTs that compared biosynthetic dressings (Biobrane) with SSD ([Barret 2000](#); [Gerding 1988](#); [Gerding 1990](#); [Lal 1999](#)). All four studies reported a significantly shorter wound healing time with the use of biosynthetic dressing (Biobrane) compared with SSD. [Barret 2000](#) noted mean healing times to be 9.7 days (+/- 0.7) with biosynthetic dressing compared with 16.1 days (+/- 0.6) with SSD ( $P < 0.001$ ). [Gerding 1988](#) found healing times to be 13.7 days (+/- 6.75) with biosynthetic dressing compared with 21.3 days (+/- 11.03) with SSD ( $P < 0.01$ ). [Gerding 1990](#) noted that in their sample, the greatest difference in healing time was observed in grease/tar burns (mean healing time in biosynthetic dressing group: 8.4 days (+/- 1.0) compared with 18.5 days (+/- 5.0) for those in the SSD group ( $P < 0.02$ )). [Lal 1999](#) reported on days percent TBSA burned (< 3 years: 1.52 days in biosynthetic dressing (Biobrane) compared with 2.35 days with SSD,  $P 0.025$ ; 3 to 17 years: 1.00 days in biosynthetic dressing (Biobrane) compared with 2.40 days with SSD,  $P 0.026$  (information presented graphically)). The results of these studies are presented narratively and not pooled because time to complete wound healing is time-to-event data and the most appropriate way of summarising time-to-event data is to use methods of survival analysis and express the intervention effect as a hazard ratio. It is not appropriate to analyse time-to-event data using methods for continuous outcomes (e.g. using mean times-to-event) as the relevant times are only known for the subset of participants who have had the event. Censored participants must be excluded, which almost certainly will introduce bias ([Higgins 2008](#)).

#### Level of pain

Pain was assessed by [Barret 2000](#); [Gerding 1988](#) and [Gerding 1990](#) using scales of different magnitudes. [Barret 2000](#) using a visual analog scale plus face scale noted a difference in pre-treatment pain baseline scores (3.3 for those randomised to biosynthetic dressing versus 3.8 for those assigned to SSD,  $P$  value not significant). Relief following dressing application was reduced to 2.4 with biosynthetic dressing and 3.7 with those assigned SSD at day 1,  $P < 0.001$ ; and 2.6 with biosynthetic dressing and 3.8 with those assigned SSD at day 2;  $P < 0.001$ . [Gerding 1988](#) and [Gerding 1990](#) noted a difference in pain scores (measured on a visual analog scale using a 5 point scale with 1 = no pain and 5 = severe pain) at first follow up visit. Pooling these two trials using a random effects model ( $I^2 = 75.5\%$ ) demonstrated a statistically significant difference (WMD -1.63 95% CI -2.20 to -1.06) ([Analysis 7.1](#)). Pain was not reported by [Lal 1999](#).

Out of interest, [Gerding 1988](#) also found that patients in the biosynthetic dressing treatment arm used fewer pain relieving tablets than those receiving SSD (1.4 tablets in biosynthetic dressing versus 3.5 tablets in SSD;  $P < 0.01$ , dosage and type of analgesic not reported). In the [Gerding 1990](#) study, on average, fewer doses of narcotics were also given to those receiving biosynthetic dressing (12 doses in the biosynthetic dressing group versus 16.9 doses in the SSD group;  $P$  value not significant, dosage and type of analgesic not reported). [Barret 2000](#) found similar results: (0.5 doses/person/day in biosynthetic dressing versus 1.9

doses/person/day with SSD;  $P < 0.002$ , dosage and type of analgesia not reported).

#### Need for surgery

Gerding 1988 also noted that five participants (22%) in the SSD arm obtained split thickness skin graft to close the granulation defects compared with four patients (15%) who were treated with biosynthetic dressing (RR 0.68; 95%CI 0.21 to 2.24,  $P = 0.53$ ) (Analysis 7.2).

#### Length of hospital stay

Lal 1999 noted that hospital length of stay was shorter in those receiving biosynthetic dressing compared with SSD in both toddlers and infants (age 0 to 3 years;  $P = 0.002$ ), and older children (age > 3 years;  $P = 0.0026$ ).

#### Incidence of infection

Wound infection and other systemic complications were reported in two of four studies (Gerding 1988; Gerding 1990). The remaining studies reported no infection (Barret 2000) or only suspected, but not confirmed (Lal 1999). Infection was poorly defined by many of the studies. Gerding 1988 reported the development of bacterial growth in four wounds in each group with two of the infected in each group requiring surgical excision and grafting. Gerding 1990 noted that there were three infections in those patients assigned to biological dressings and two infections in those assigned to SSD. One patient in each group required skin grafting.

Other outcome measures such as change in wound surface area, cost of the dressing, and quality of life were not addressed by these studies.

### **b. Biosynthetic dressing (Biobrane) compared with hydrocolloid dressing (1 trial, 72 people)**

#### Time to complete wound healing

We found one study by Cassidy 2005 which compared a biosynthetic dressing with a hydrocolloid dressing. No significant difference was found between the biosynthetic dressing and the hydrocolloid dressing in mean time to wound healing: 12.24 days with the biosynthetic dressing compared with 11.21 days for the hydrocolloid dressing (WMD 1.03 95% CI -1.66 to 3.72;  $P = 0.45$ ).

#### Level of pain

Pain assessment was performed using the Oucher Scale in 34 participants, and the VAS utilised for the remaining 37 patients, the study authors do not make it clear if the use of these two scales was balanced across both groups. Cassidy 2005 noted no statistically significant difference in mean aggregate scores (2.36 for those randomised to biosynthetic dressing versus 2.37 with hydrocolloid dressing;  $P = 0.99$ ).

#### Cost of the dressing

Cassidy 2005 reported that cost of each treatment was higher in the biosynthetic dressing group, regardless of the size or thickness of the dressing ( $P < 0.0001$ ). This cost was obvious and not unexpected given the nature of biosynthetic dressing technology compared with older, simpler dressings such as a hydrocolloid.

Other outcome measures such as change in wound surface area, number of dressing changes, adverse events, quality of life, need

for surgery and patient perception and level of satisfaction with application and removal of dressing were not addressed by this study.

### **c. Biosynthetic dressing (Transcyte) compared with silver sulphadiazine (2 trials, 69 wound sites)**

Two trials compared a biosynthetic (Transcyte) dressing with SSD. Noordenbos 1999 undertook this comparison in 14 people and identified paired wound sites, whilst Kumar 2004 undertook a three arm trial of which the comparison of the biosynthetic (Transcyte) dressing and SSD formed two arms of the trial and comprised 20 wound sites (Transcyte) and 21 wound sites SSD respectively.

#### Time to complete wound healing

Noordenbos 1999 included 14 people and identified paired wound sites which were randomised to treatment with a biosynthetic (Transcyte) dressing or SSD. The author reported on days until 90% healed and found that the biosynthetic dressing significantly reduced healing time compared with SSD (days until 90% healed: 11.14 days (SD 4.37) with Transcyte versus 18.14 days (SD 6.05) with SSD, paired t test  $P = 0.002$ ).

Kumar 2004 randomised 33 people with 58 wound sites to three different burn dressings (Transcyte  $n=20$ , SSD  $n=21$ ). Wound healing, measured as mean time to re-epithelialization, was 7.5 days for Transcyte and 11.2 days for SSD. No variance data were reported and Transcyte was reported to be statistically significantly better in time to re-epithelialisation than SSD ( $P < 0.001$ ). Healing progression was estimated visually by two independent observers but it was not reported whether or not they were blind to treatment allocation and this could be a source of bias.

#### Number of dressing changes

Kumar 2004 found fewer dressing changes with Transcyte compared with SSD. The number of dressing changes: 1.5 with Transcyte compared with 9.2 with Silvadene cream ( $P < 0.0001$ ).

#### Level of pain

Although pain scores were not reported using any form of validated pain scale, patients treated with Transcyte required significantly fewer pain medications than those treated with SSD ( $P = 0.0001$ ; type, route, and dose of analgesia not reported).

#### Incidence of infection

Noordenbos 1999 noted that six patients developed mild cellulitis in the SSD arm of the trial, and all incidents responded to intravenous antibiotics. No wounds became infected during treatment with the biosynthetic dressing.

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, patient perception and level of satisfaction with application and removal of dressing, length of hospital stay, and need for surgery were not addressed by this study.

#### Need for surgery

There were five wounds in the SSD group that required auto-grafting and one in the Transcyte group. Patients treated with Transcyte underwent auto-grafting due to infection and loss of product. Patients treated with SSD underwent grafting due to delay re-epithelialization.

#### **d. Mixed biosynthetic dressing regimes (1 trial, 33 people)**

##### **Time to complete wound healing**

We found one study by [Kumar 2004](#), who randomised 33 people with 58 wound sites to three different burn dressings (Transcyte, Biobrane and SSD). Wound healing, measured as mean time to re-epithelialization, was 7.5 days for Transcyte; 9.5 days for Biobrane; and 11.2 days for SSD. No variance data were reported and the times to re-epithelialisation was fastest with Transcyte followed by Biobrane and then SSD ( $P < 0.001$ ). Healing progression was estimated visually by two independent observers but it was not reported whether or not they were blind to treatment allocation and this could be a source of bias.

##### **Number of dressing changes**

[Kumar 2004](#) found fewer dressing changes with either Transcyte or Biobrane compared with SSD. The number of dressing changes: 1.5 with Transcyte and 2.4 with Biobrane compared with 9.2 with Silvasene cream ( $P < 0.0001$ ).

##### **Level of pain**

Although pain scores were not reported using any form of validated pain scale, patients treated with Transcyte or Biobrane required significantly fewer pain medications than those treated with SSD ( $P = 0.0001$ ; type, route, and dose of analgesia not reported).

##### **Need for surgery**

There were five wounds in the SSD group that required auto-grafting, three in the Biobrane and one in the Transcyte group. Patients treated with Transcyte and Biobrane underwent auto-grafting due to infection and loss of product. Patients treated with SSD underwent grafting due to delay re-epithelialization.

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, patient perception and level of satisfaction with application and removal of dressing, length of hospital stay were not addressed by this study.

#### **e. Antimicrobial releasing biosynthetic dressings (Hydron) compared with silver sulphadiazine or other agents (3 trials, 95 people)**

##### **Time to complete wound healing**

We found three RCTs which compared antimicrobial releasing biosynthetic dressings with SSD ([Curreri 1980](#); [Fang 1987](#); [Husain 1983](#)). [Husain 1983](#) reported average healing times to be significantly shorter with antimicrobial releasing biosynthetic dressing (6.8 days) compared with 11.7 days with SSD,  $P$  value and variance data not reported. [Curreri 1980](#) reported time to complete wound healing to be more rapid in wounds covered with antimicrobial releasing biosynthetic dressing rather than SSD (numerical or graphical data not provided,  $P$  value not reported).

##### **Number of dressing changes**

[Fang 1987](#) noted that on average there were 93 dressing applications making it an average of more than three dressings per patient. In most patients (number of patients not reported), the antimicrobial releasing biosynthetic dressing remained in place for almost four days, in the same time period the control site required 4 dressing changes. Although the number of dressing changes was not stated by [Husain 1983](#), the authors reported on their

response to the dressing. Treating nurses and participants rated the antimicrobial releasing biosynthetic dressing more highly than the control using the classification favourable, unfavourable or no difference. Favourable ratings were self-assessed and proportion of treating nurses in favour: 41/50 [82%] treating nurses versus 34/50 [68%] patients; unfavourable: 9/50 [18%] treating nurses versus 11/50 [22%] patients and no difference was recorded in 5/50 [10%] of patients.

##### **Patient perception, level of satisfaction with the application and removal of dressing**

In contrast, [Curreri 1980](#) reported that 81% of the sample population found that the antimicrobial releasing biosynthetic dressing was more difficult and time consuming to apply than SSD (definition and description of difficulty not provided; number of minutes defining time consuming not reported).

##### **Need for surgery**

[Fang 1987](#) noted that eight patients in the antimicrobial releasing biosynthetic dressing required grafting and seven in the SSD group.

##### **Incidence of infection**

[Husain 1983](#) noted that wound infection developed in 15/50 [30%] sites treated with antimicrobial releasing biosynthetic dressing and 8/50 [16%] sites for those treated with SSD, this difference was not statistically significant (RR 1.88 95%CI 0.87 to 4.02;  $P = 0.11$ ) ([Analysis 8.1](#)). [Fang 1987](#) reported on bacterial colonization rather than infection.

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life and length of hospital stay were not addressed by these studies.

#### **6. Antimicrobial (silver containing) dressings**

##### **a. Silver impregnated dressings compared with silver sulphadiazine (3 trials, 162 patients)**

We found three RCTs which compared silver impregnated dressing (Acticoat, Smith and Nephew USA) with SSD ([Li 2006](#); [Muangman 2006](#); [Varas 2005](#))

##### **Time to complete wound healing**

[Li 2006](#) found mean healing times were significantly shorter in those treated with silver dressings compared with SSD (mean time to wound healing: 12.42 days (SD 5.40) with silver dressing compared with 15.79 days (SD 5.60) with SSD). [Muangman 2006](#) and [Varas 2005](#) did not report on time to complete wound healing.

##### **Level of pain**

The studies by [Muangman 2006](#) and [Varas 2005](#) found that silver impregnated dressing reduced pain (measured on a visual analog scale [VAS - scale 1 to 10]) compared with SSD, these trials were pooled using a random effects model due to the high level of heterogeneity ( $I^2 = 89.4%$ ) the difference was not statistically significant (WMD -2.66 95% CI -6.27 to 0.94) ([Analysis 9.1](#)).

##### **Hospital length of stay**

[Muangman 2006](#) reported no difference in hospital length of stay between the two groups.

## Need for surgery

Muangman 2006 noted that six participants (24%) in the SSD arm obtained split thickness skin graft to close the granulation defects compared with four patients (16%) who were treated with silver dressing (RR 0.67; 95%CI 0.21, 2.08,  $P = 0.48$ ) (Analysis 9.2).

## Incidence of infection

No wound complications were observed in either group, including infection for Varas 2005. Muangman 2006 reported there were no differences in wound infection between groups (seven patients developed wound infection; three in the silver dressing group and four in the SSD group,  $P > 0.05$ ). All wound infections were treated with topical or systemic antibiotics. Li 2006 found a total of 56 bacterial strains in 166 wounds which cleared on the 6th and 12th day post antibiotic treatment.

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, patient perception and level of satisfaction with application and removal of dressing were not addressed by these studies.

## 7. Fibre dressings

### a. Calcium alginate compared with silver sulphadiazine (1 trial, 59 people)

#### Time to complete wound healing

We found one RCT by Costagliola 2002 (59 people with 73 partial thickness burns) which compared calcium alginate with SSD. It found no significant difference between calcium alginate and SSD in time to healing (12.1 days with calcium alginate versus 11.7 days with SSD,  $P$  value and variance data not reported).

The author states that he found no significant difference between groups in terms of pain and the amount of care required (however pain scale assessment and scores not provided; definition of amount of care are not described).

Other outcome measures such as change in wound surface area, cost of the dressings, quality of life, patient perception and level of satisfaction with application and removal of dressing, and length of hospital stay were not addressed by this study.

### b. Hydrofibre dressing compared with silver sulphadiazine (1 trial, 47 people)

#### Time to complete wound healing

We found one study by Caruso 2006 which compared a hydrogel fibre dressing with SSD. No significant difference was found between the hydrogel dressing and SSD in time to wound healing; median wound healing time 16 days with hydrogel fibre versus 17 days with SSD;  $P = 0.517$ , no variance data were reported.

#### Level of pain

Caruso 2006 evaluated pain using the John Hopkins visual analogue scale for those aged four years and older and investigator-reported pain scores for the pre-verbal population. Hydrogel fibre dressing reduced pain during dressing changes (mean pain score: 3.63 with hydrogel fibre dressing versus 4.77 with SSD;  $P = 0.003$ ). There was no difference in the investigator reported pain scores between the hydrogel fibre and SSD groups (mean pain scores 3.52 with hydrogel fibre dressing versus 3.32 with SSD;  $P = 0.991$ ). Fewer types of procedural medications (2.4 doses versus 3.4 doses;  $P =$

0.18; and procedural opiates (1.5 doses versus 2.1 doses;  $P = 0.022$ ) were administered in the hydrogel fibre dressing group compared with the SSD group. Drug names, routes and dosages were not reported.

#### Number of dressing changes

Caruso 2006 found fewer dressing changes with hydrogel fibre dressing compared with SSD (mean number of dressing changes: 7.7 with hydrogel fibre dressing versus 19.1 with SSD; (WMD -11.40 95% CI -15.66, -7.14;  $P < 0.0001$ ) (Analysis 10.1). However, this result was to be expected, as SSD dressings were changed routinely, whereas there was no indication to change hydrogel fibre dressings other than every second day. More so, dressing application, comfort of dressing and patient comfort was not significantly different between treatment groups.

#### Cost of dressing

Mean total cost of primary dressings during the study was significantly greater for the hydrogel fibre dressing than for SSD (mean cost of primary dressing: US\$ 684 with hydrogel fibre dressings versus US\$ 398 in SSD group;  $P = 0.007$ ). As expected, the mean cost for the secondary dressing (i.e. gauze dressing application over primary dressing) was lower for the hydrogel fibre group than the SSD group (mean secondary cost US\$ 68.10 with hydrogel fibre dressings versus US\$ 138.00 in SSD group;  $P = 0.004$ ). When total treatment costs were compared, costs were comparable amongst the two groups (mean total dressing cost: US\$ 848.50 with hydrogel fibre dressing versus US\$ 759.60 with SSD group).

#### Incidence of infection

Caruso 2006 noted similar rates of wound infection in the two treatment groups (8/42 with hydrogel fibre dressing compared with 6/40 SSD; RR 1.27 95%CI 0.48 to 3.34) (Analysis 10.2). Patients who developed infections were treated with antibiotics.

#### Need for surgery

The need for skin grafting due to re-classification of a partial thickness burn as a full-thickness burn or because of infection was required in both groups (5.04/42 [12%] with hydrogel fibre dressing versus 7.2/40 [18%] SSD (RR 0.68 95%CI 0.24 to 1.97;  $P = 0.48$ ) (Analysis 10.3).

Other outcome measures such as change in wound surface area, quality of life and length of hospital stay were not addressed by this study.

## DISCUSSION

This systematic review summarizes the best available evidence relating to the effects of dressings used to treat adults with superficial or partial thickness burns. A total of 26 RCTs met the inclusion criteria for the review.

Our results indicate that burn wounds dressed with hydrogels, silicon coated dressings, biosynthetic dressings and anti microbial dressings healed more rapidly than those dressed with SSD or chlorhexidine impregnated gauze dressings. The results for hydrocolloids and polyurethane dressings also suggest an improved rate of healing although 5 studies (Phipps 1988; Thomas 1995; Wright 1993; Afilalo 1992; Poulsen 1991) found no statistically significant difference between the intervention and control groups. There was no evidence that fibre dressings improve rates of healing

compared with SSD. There was no evidence of a difference in healing time between biosynthetic dressings and hydrocolloids.

There was some evidence that the pain experienced by patients appeared to be reduced with the use of the intervention dressing when compared against SSD or chlorhexidine dressings. This finding was not statistically significant in all studies but was consistent for all intervention dressings except antimicrobial dressings where the difference was not significant. There was no significant difference in pain levels between biosynthetic dressings and hydrocolloids when compared directly.

The evidence for the effectiveness of the different dressings for protecting from wound infection is limited by the inconsistent measurement and reporting of this outcome. Where infection rates are reported there does not appear to be a significant difference between intervention dressings and comparison groups.

The number of dressing changes required appeared to favour hydrocolloid dressings, silicon dressings and silver impregnated dressings. When used these wounds required fewer dressing changes. This difference was however also a reflection of different protocol regimens with SSD gauze dressings requiring daily changes and intervention dressings changed as required.

These results, however, must be interpreted with caution. The included studies were generally of poor quality, in many cases the number of people included in the trials was small and the time to wound healing data and subsequent statistical analysis was often not reported in a way that allowed the results to be reproduced by the review authors. The quality of the studies was limited in the following ways:

- a. Poor clinical definition of a superficial or partial thickness burn injury in many studies.
- b. Unreported burn depth estimates or no formal or direct assessment of burn wound depth. This may have erroneously led to the inclusion of a number of studies that were a mixture of various burn depths.
- c. Failure to report on randomisation techniques, allocation concealment, small sample sizes, subjective outcome assessment, lack of blinding at outcome assessment and poor reporting of withdrawals and adverse events data. Time to event data were often inappropriately analysed using methods for continuous outcomes rather than methods of survival analysis and therefore these results were presented in the narrative only.
- d. Poor measurement of outcomes that are important such as levels of pain, patient satisfaction, wound infection, scar appearance.

The limited use of objective outcome measures and insufficient reporting of results makes the analysis and usefulness of these results doubtful.

In conclusion a number of dressings appear to have some benefit over other products in the management of superficial and partial thickness burns. This advantage relates to time to wound healing, the number of dressing changes and ease of use, pain experienced and the ability to absorb and contain exudate. However our confidence in these conclusions is reduced by the low validity and small sample sizes of these trials.

## AUTHORS' CONCLUSIONS

### Implications for practice

A number of dressings appear to have some benefit over other products in the management of superficial and partial thickness burns. There is some research evidence to demonstrate the benefits of hydrocolloids, antimicrobial (silver containing), silicon nylon, polyurethane film and biosynthetic dressings. This advantage relates to time to wound healing, number of dressing changes and its associated pain experience, although the study results are prone to methodological shortcomings. The use of SSD on burn wounds needs to be reconsidered as a number of studies showed delays in time to wound healing and an increased number of dressing applications. In differentiating between the products, there is a strong case for high quality trials with a well defined patient population coupled with clinically relevant end points.

### Implications for research

There is a need for large, well designed trials for dressing interventions. There is a need to clearly estimate burn depth in order to use properly defined dressing interventions. Trials should address key methodological criteria (allocation concealment, blinding of participants and outcome assessors, adequate follow up and appropriate statistical analysis) and should follow CONSORT guidelines on reporting. The review did not conduct an economic analysis and that would usefully inform decisions about the most effective and cost effective treatments for patients with burn wounds.

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\* Indicates the major publication for the study

## CHARACTERISTICS OF STUDIES

### Characteristics of included studies [ordered by study ID]

#### Afilalo 1992

Methods	RCT. Method of randomisation: computer generated random numbers table. Allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported. No ITT analysis. Patients served as their own controls (i.e. one area of the same patient was treated with intervention while another similar area was taken as a control).
Participants	48 adults ( mean age: 38.5 years) with partial thickness burns presenting to an emergency department within 48 hours of injury. Cause of burn - hot liquid, metal, flame or steam. Excluded if previously received treatment other than first aid, had electrical or chemical burns, or burns of the face, hands or perineum, suspected inhalation injury, required hospital admission, had concomitant diseases such as diabetes mellitus. Patients excluded if they could not attend or commit to clinic visits, had poor language, judges to be likely poor compliers with treatment.
Interventions	Gp 1: n=15 Hydrocolloid dressing (DuoDerm, ConvaTec Ltd, Bristol Myer Squibb) Gp 2: n=15 antiseptic tulle gras dressing with chlorhexidine acetate (Bactigras, Smith and Nephew) plus a layer of SSD.
Outcomes	Number of days to complete wound healing, Level of pain, Number of dressing changes, Need for pain medication, Ease of application and removal of dressing.
Notes	18 people dropped from the study and not included in the final analysis. Schulz (1995) rating: randomisation A; allocation concealment B; selection bias B; blinding B.

#### Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

#### Barret 2000

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	20 children with partial thickness burns (mean %TBSA: 8.4) less than 24 hours old. Excluded if participants greater than 17 years of age, causes other than thermal flame or scald injuries, full-thickness burns and admission time greater than 24 hours after injury.
Interventions	Biosynthetic dressing (Biobrane) versus twice daily application of SSD. C: Application of twice daily SSD.
Outcomes	Time to complete wound healing Pain Adverse events
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

#### Risk of bias

**Barret 2000** (Continued)

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Bugmann 1998**

Methods	RCT. Randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.	
Participants	76 patients ( age range 3 months - 15 years, mean age 3.4 years, mean TBSA 2.1%) with partial thickness burns presenting to an emergency department within 24 hours of injury.	
Interventions	Silicon coated nylon dressing (Mepitel, Molnlycke Health Care, USA) covered with a gauze soaked in chlorhexidine versus SSD (Flamazine, Smith and Nephew) covered by tulle gras and gauze	
Outcomes	Time to complete wound healing Number of dressing changes Incidence of wound infection	
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.	

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Caruso 2006**

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported	
Participants	84 participants with superficial, mid-dermal or mixed partial thickness burns at first presentation. Key exclusion criteria included electrical, chemical or frostbite burn, evidence of inhalation injury, treatment of burn with an active agent (i.e.. SSD) before study entry and fractures and/or neurological injury.	
Interventions	Hydrogel (Hydrofiber, ConvaTec, Bristol-Myers Squibb, USA) dressing versus SSD	
Outcomes	Time to complete wound healing Number of dressing changes Cost of dressings Incidence of infection	
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.	

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Dressings for superficial and partial thickness burns (Review)**

### Cassidy 2005

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	37 patients ( age range 3 -18 years) with superficial or mid dermal partial thickness burns less than 10% TBSA. Burns involving face, hands, feet or perineum were excluded.
Interventions	Biosynthetic dressing (Biobrane) versus hydrocolloid dressing
Outcomes	Time to wound healing Level of pain Cost of dressing
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

#### **Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

### Costagliola 2002

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	59 patients with 73 second degree burns of 50-200 cm. Age and gender not provided.
Interventions	Calcium alginate (Algosteril, Smith and Nephew Healthcare Limited) versus SSD
Outcomes	Days to healing Level of pain
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

#### **Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

### Curreri 1980

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	18 patients (mean age 34 years) with second degree burns (mean %TBSA: 26).
Interventions	Biosynthetic dressing (Hydron) versus SSD.
Outcomes	Time to complete wound healing

**Curreri 1980** (Continued)

Patient perception/level of satisfaction with application or removal of dressing

Notes Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
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Allocation concealment?	Unclear risk	B - Unclear
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**Fang 1987**

Methods RCT. Method of randomisation, allocation concealment not reported. Blinding of outcome assessors recorded. Patients served as their own controls (i.e. one area of the same patient was treated with intervention while another similar area was taken as a control).

Participants 27 patients (mean age 18.6 years) with second degree burns (mean %TBSA: 24.1).

Interventions Antimicrobial release biosynthetic dressing (Hydron) versus once or twice daily application of SSD

 Outcomes Wound appearance  
 Number of dressing changes  
 Need for surgery  
 Incidence of infection

Notes Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding A.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
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Allocation concealment?	Unclear risk	B - Unclear
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**Gerding 1988**

Methods RCT with randomisation sequence generated by computer code and allocation concealment achieved by sealed numbered envelopes opened sequentially. Blinding of subjects and investigators (including outcome assessors) not reported.

Participants 50 patients (mean age: 19.6 years) with partial thickness burns (mean %TBSA: 6.3) less than 24 hours old. Chemical and electrical burns, grossly contaminated wounds, wounds more than 24 hours old and wounds treated with topical agents were excluded.

Interventions Biosynthetic dressing (Biobrane) versus twice daily application of SSD.

 Outcomes Time to complete wound healing  
 Level of pain  
 Need for surgery  
 Cost of dressing  
 Incidence of infection  
 Adverse events

Notes Schulz (1995) rating: randomisation A; allocation concealment A; selection bias B; blinding B.

**Dressings for superficial and partial thickness burns (Review)**

**Gerding 1988** (Continued)

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Gerding 1990**

Methods	RCT with randomisation sequence generated by computer code and allocation concealment achieved by sealed numbered envelopes opened sequentially. No blinding employed. Blinding of subjects and investigators (including outcome assessors) not reported.
Participants	64 patients (mean age 20.2 years) with partial thickness burns (mean %TBSA: 2.2%) less than 24 hours old. Chemical and electrical burns, grossly contaminated wounds, wounds more than 24 hours old and wounds treated with topical agents were excluded.
Interventions	Biosynthetic dressing (Biobrane) versus twice daily application of SSD
Outcomes	Time to complete wound healing Level of pain Incidence of infection
Notes	Schulz (1995) rating: randomisation A; allocation concealment A; selection bias B; blinding B.  Withdrawals I: 7/33 (21.2%) C: 5/31 (16.1%) Loss to follow up I: 2/33 (6.1%) C: 4/31 (13.0%)

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate

**Gotschall 1998**

Methods	RCT. Randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	66 patients (age range 0-12 years) with partial thickness scald burns of <15% TBSA .
Interventions	Silicon coated nylon dressing (Mepitel, Molnlycke Health Care, USA) versus SSD. Wet and dry under cotton gauze dressings applied over both treatment arms
Outcomes	Time to wound healing as measured by number of days until wounds were 25%, 50%, 75% and 100% epithelialized Level of pain Cost of the dressing Incidence of infection Adverse events

**Dressings for superficial and partial thickness burns (Review)**

**Gotschall 1998** (Continued)

Notes Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Guilbaud 1992**

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	62 patients (mean age 33 years) with partial thickness burns admitted into a burn centre within 24 hours of injury
Interventions	Hydrogel dressing versus SSD, paraffin gauze or paraffin gauze with antibiotics
Outcomes	Time to complete wound healing Level of pain Number of dressing changes Adverse events
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Guilbaud 1993**

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	93 patients (mean age 35.7 years) with second degree burns admitted within 48 hours of injury. Mean %TBSA not described.
Interventions	Hydrogel dressing versus SSD, paraffin gauze or paraffin gauze with antibiotics or topical antibiotics.
Outcomes	Time to complete wound healing Level of pain Number of dressing changes
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.  Withdrawals I: 9/93 (9.7%) C: 9/93 (9.7%)  Loss to follow up I: 9/93 (9.7%)

**Guilbaud 1993** (Continued)

C: 9/93 (9.7%)

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Husain 1983**

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported. Patients served as their own controls (i.e. one area of the same patient was treated with intervention while another similar area was taken as a control).
Participants	50 patients (mean age 17.34) with a mean %TBSA: 14.7.
Interventions	Antimicrobial release biosynthetic dressing (Hydron) versus SSD and exposed as routine.
Outcomes	Time to complete wound healing Level of pain Incidence of infection
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Kumar 2004**

Methods	RCT. Method of randomisation, allocation concealment and not reported. Described as a non-blind study.
Participants	33 participants with a total of 58 wound sites. patients excluded if the burn injury had occurred >24hours prior to commencement of treatment, the wounds identified as full thickness in depth or the wounds exhibited signs of infection.
Interventions	Comparing the effectiveness of biosynthetic dressings (TransCyte and Biobrane) and SSD.
Outcomes	Time to complete wound healing Need for surgery Number of dressing changes Narcotic analgesia requirements during dressing change
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - not reported

**Dressings for superficial and partial thickness burns (Review)**

### Lal 1999

Methods	RCT. Allocation concealment described. No blinding employed.
Participants	89 children with partial thickness scald burns covering 5-25% TBSA treated within 48 hours of injury and showed no initial signs of cellulitis or need for grafting.
Interventions	Biosynthetic dressing (Biobrane) versus twice daily application of SSD.
Outcomes	Time to complete wound healing Hospital length of stay Incidence of infection
Notes	Schulz (1995) rating: randomisation B; allocation concealment A; selection bias B; blinding B.

#### *Risk of bias*

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate

### Li 2006

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	98 participants (mean age of 36 years) with residual burn wounds (mean %TBSA: 54)
Interventions	Silver impregnated dressing (Acticoat, Smith & Nephew, UK) versus SSD
Outcomes	Time to complete wound healing Incidence of infection
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

#### *Risk of bias*

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

### Muangman 2006

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	50 participants with partial thickness burns admitted to a Burns Unit.
Interventions	Silver impregnated dressing (Acticoat, Smith & Nephew, UK) versus SSD
Outcomes	Level of pain Need for surgery Incidence of infection

#### **Dressings for superficial and partial thickness burns (Review)**

**Muangman 2006** (Continued)

Hospital length of stay

Notes Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Neal 1981**

Methods RCT. Randomisation and allocation concealment not reported. Blinding at outcome assessment recorded.

Participants 51 patients (25 children) with small blistered burns seen within 12 hours of injury. Mean 1.7% TBSA for those in the intervention group; mean 1.83% TBSA to those assigned to conventional therapy.

Interventions Polyurethane film (Op-site, Smith and Nephew Healthcare Limited) versus chlorhexidine impregnated paraffin gauze (Bactigras, Smith and Nephew Healthcare Limited)

 Outcomes Number of days to complete wound healing  
 Level of pain  
 Incidence of infection

Notes Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding A.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Noordenbos 1999**

Methods RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.

Participants 14 patients (mean age 23.4 years) with moderate to deep partial thickness burns (mean %TBSA: 13.3%). Burn wounds to hands, face, buttocks, feet and genitalia were excluded.

Interventions Biosynthetic dressing (TransCyte) versus twice daily application of SSD.

 Outcomes Time to complete wound healing  
 Adverse events

Notes Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Dressings for superficial and partial thickness burns (Review)**

**Phipps 1988**

Methods	RCT. Randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	196 patients with burns (mean %TBSA: 1) presenting to an emergency department.
Interventions	Hydrocolloid dressing (Granuflex, Squibb surgicare) versus chlorhexidine impregnated tulle-gras (Bactigras, Smith and Nephew Healthcare Limited). Dressings changed at weekly intervals.
Outcomes	Number of days to complete healing Incidence of infection
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.  Withdrawals: I:42/92 (45.7%) C:35/104 (33.7%) Loss to follow-up I: 42/92 (45.7%) C: 35/104 (33.7%)

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Poulsen 1991**

Methods	RCT. Randomisation produced by computer generated random number generator. Allocation concealment recorded. Blinding of subjects and investigators (including outcome assessors) not reported.
Participants	55 patients with partial thickness burns seen within 6 hours of injury. Patients with burns of the face, hands, feet, axilla and perineum were excluded.
Interventions	Polyurethane film (Op-site, Smith and Nephew Healthcare Limited) versus paraffin gauze (Jelonet, Smith and Nephew Healthcare Limited).
Outcomes	Number of days to complete wound healing Level of pain Number of dressing changes Incidence of infection Adverse events i.e. skin reactions
Notes	Schulz (1995) rating: randomisation A; allocation concealment A; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - Adequate

**Thomas 1995**

Methods	RCT. Method of randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported
Participants	50 patients (54 burn sites) with less than 5% TBSA (mean %TBSA 0.83). Excluded if patients had burns which were awkward to dress, such as on the face, neck, and axilla, as were those with chemical or electrical burns.
Interventions	Three arm study with participants allocated to hydrocolloid dressing, hydrocolloid dressing plus SSD and chlorhexidine impregnated paraffin gauze dressing.
Outcomes	Time to complete wound healing Level of pain Number of dressing changes Incidence of infections
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Varas 2005**

Methods	RCT with randomisation technique and allocation concealment described. Blinding of subjects and investigators (including outcome assessors) not reported.
Participants	14 patients (mean age 41 years) with partial thickness burns (mean %TBSA: 14.6).
Interventions	Silver impregnated dressing (Acticoat) versus SSD application and removal twice daily.
Outcomes	Level of pain Incidence of infection
Notes	Schulz (1995) rating: randomisation A; allocation concealment A; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Low risk	A - adequate

**Wright 1993**

Methods	RCT Randomisation, allocation concealment and blinding of subjects and investigators (including outcome assessors) not reported.
Participants	98 patients (age, gender distribution, %TBSA not provided) with partial thickness burns presenting to an emergency department and seen within 48 hours of injury. Patients with injuries greater than 48 hours old, requiring management other than outpatient treatment such as skin grafting were excluded.

**Wright 1993** (Continued)

Interventions	Hydrocolloid dressing ( Granuflex, ConvaTec Ltd, UK) versus chlorhexidine impregnated paraffin gauze (Bactigras, Smith and Nephew Healthcare Limited).
Outcomes	Time to wound healing Level of pain Number of dressing changes Incidence of infection Quality of healing was measured using a 5 point scale.
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding B.

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

**Wyatt 1990**

Methods	RCT. Method of randomisation and allocation concealment not reported. Blinding at outcome assessment recorded.
Participants	50 patients with minor second degree burns who present to an emergency department and/or occupational medicine clinic. Burns which occurred more than 48 hours before presentation for treatment or burns to face, hands, feet or perineum, electrical and chemical burns and those participants with concomitant disease such as diabetes mellitus were excluded.
Interventions	Hydrocolloid dressing ( DuoDerm, Convatec, Squibb) versus SSD (Silvadene, Marion Laboratories).
Outcomes	Time to complete wound healing Number of dressing changes Level of pain
Notes	Schulz (1995) rating: randomisation B; allocation concealment B; selection bias B; blinding A.  Withdrawals: 8/50 (16%) Loss to follow-up: 8 /50 (16%)

**Risk of bias**

Bias	Authors' judgement	Support for judgement
Allocation concealment?	Unclear risk	B - Unclear

RCT: randomised controlled trial  
 %TBSA: percentage of total burn surface area  
 SSD: silver sulphadiazine

**Characteristics of excluded studies** [ordered by study ID]

Study	Reason for exclusion
<a href="#">Allen 1996</a>	Data for burns inseparable from results for other types of wounds.

Study	Reason for exclusion
<a href="#">Chang 1995</a>	Review of pressure garment therapy and of full thickness burns
<a href="#">Edstrom 1979</a>	Includes burns other than superficial or partial thickness burns and non-dressing interventions
<a href="#">Hermans 1984</a>	Includes burns other than superficial or partial thickness burns
<a href="#">Kedwards 1993</a>	Treatment for burn injuries of the hand
<a href="#">Levine 1976</a>	No outcome measures defined in the review protocol reported in this study
<a href="#">Sharma 1985</a>	Quasi-randomisation
<a href="#">Stair 1986</a>	Results for burn wounds not separable from abrasions.
<a href="#">Tredget 1998</a>	Includes burns other than superficial or partial thickness burns.
<a href="#">Waffle 1988</a>	Quasi-randomisation
<a href="#">Wayne 1985</a>	Not randomised trial, matched controls.
<a href="#">Witchell 1991</a>	Not a randomised trial
<a href="#">Yang 1989</a>	Unable to separate burn wounds from other burn types

### Characteristics of studies awaiting assessment *[ordered by study ID]*

#### [Frandsen 1978](#)

Methods	
Participants	
Interventions	
Outcomes	
Notes	paper requires translation

#### [Hauser 2007](#)

Methods	
Participants	
Interventions	
Outcomes	
Notes	paper requires translation

**Kuroyanagi 1995**

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Methods

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Participants

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Interventions

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Outcomes

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Notes

paper requires translation

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**Misterka 1991**

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Methods

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Participants

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Interventions

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Outcomes

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Notes

paper requires translation

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**Rosbach 1998**

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Methods

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Participants

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Interventions

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Outcomes

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Notes

paper requires translation

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**Schwarze 2008**

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Methods

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Participants

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Interventions

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Outcomes

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Notes

paper requires translation

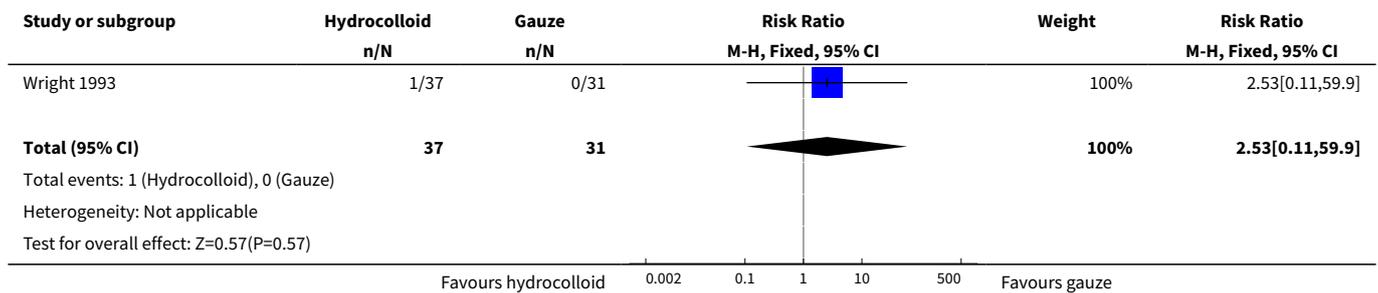
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**DATA AND ANALYSES**

**Comparison 1. Hydrocolloid dressing vs chlorhexidine impregnated gauze dressing**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Withdrawal due to wound infection	1	68	Risk Ratio (M-H, Fixed, 95% CI)	2.53 [0.11, 59.90]

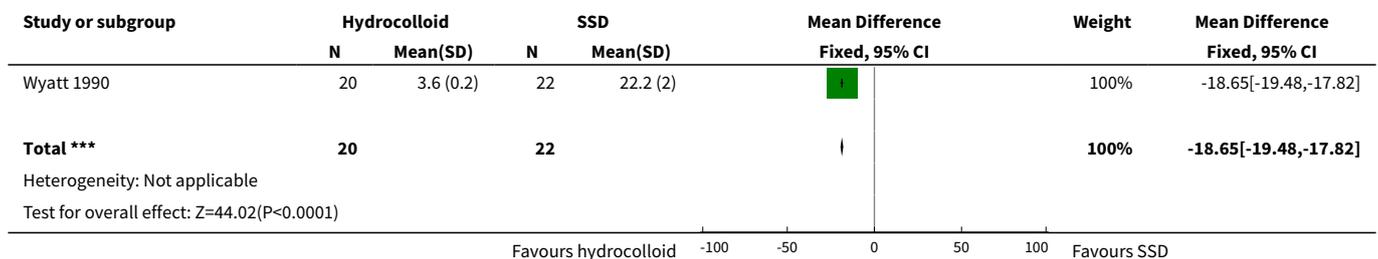
**Analysis 1.1. Comparison 1 Hydrocolloid dressing vs chlorhexidine impregnated gauze dressing, Outcome 1 Withdrawal due to wound infection.**



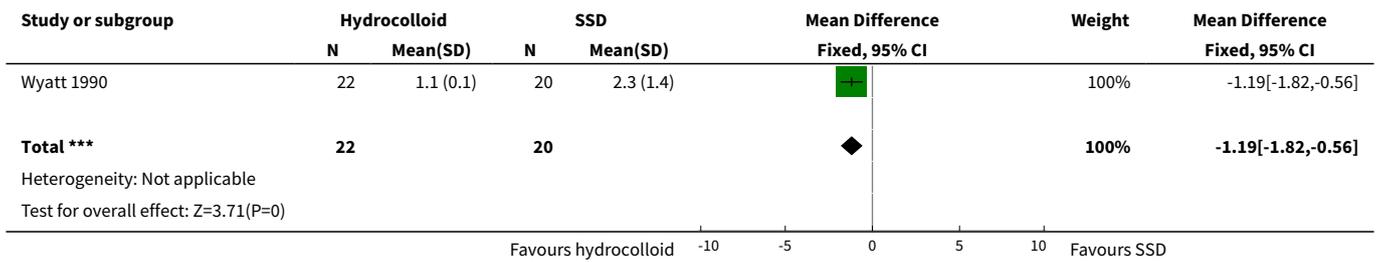
**Comparison 2. Hydrocolloid dressing vs silver sulphadiazine**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of dressing changes	1	42	Mean Difference (IV, Fixed, 95% CI)	-18.65 [-19.48, -17.82]
2 Level of pain	1	42	Mean Difference (IV, Fixed, 95% CI)	-1.19 [-1.82, -0.56]

**Analysis 2.1. Comparison 2 Hydrocolloid dressing vs silver sulphadiazine, Outcome 1 Number of dressing changes.**



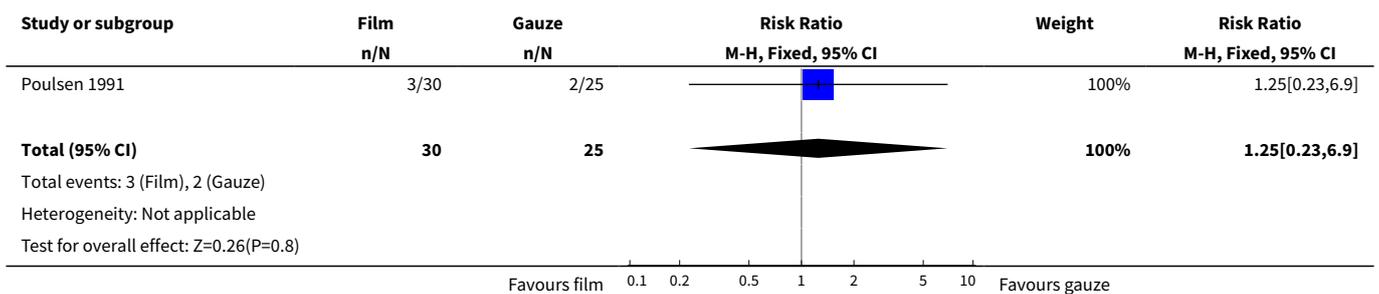
**Analysis 2.2. Comparison 2 Hydrocolloid dressing vs silver sulphadiazine, Outcome 2 Level of pain.**



**Comparison 3. Polyurethane film dressing vs paraffin gauze dressing**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Wound infection	1	55	Risk Ratio (M-H, Fixed, 95% CI)	1.25 [0.23, 6.90]

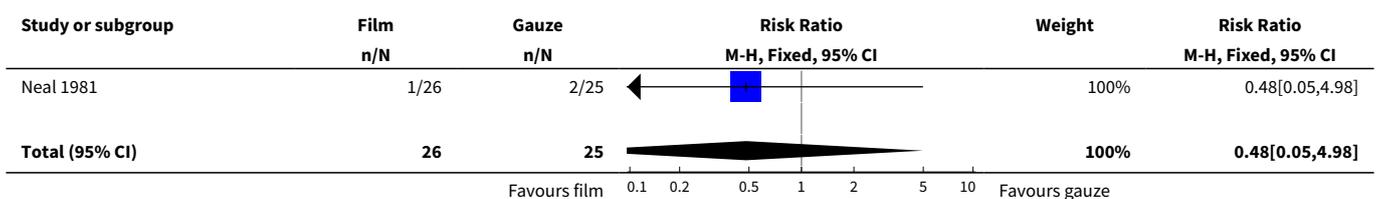
**Analysis 3.1. Comparison 3 Polyurethane film dressing vs paraffin gauze dressing, Outcome 1 Wound infection.**

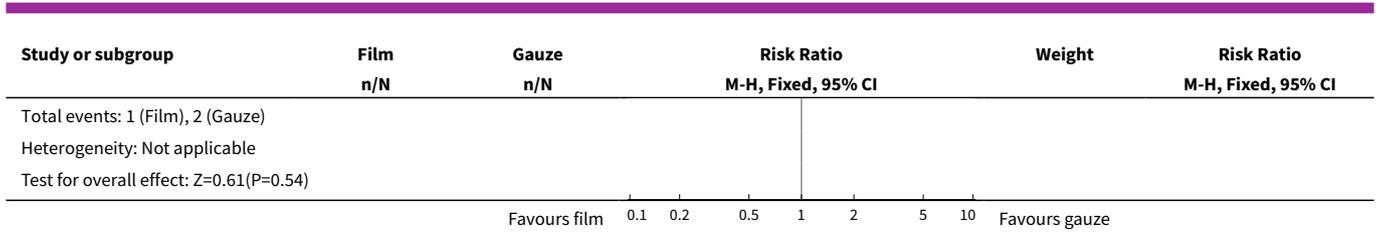


**Comparison 4. Polyurethane film dressing vs chlorhexidine impregnated paraffin gauze dressing**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Wound infection	1	51	Risk Ratio (M-H, Fixed, 95% CI)	0.48 [0.05, 4.98]

**Analysis 4.1. Comparison 4 Polyurethane film dressing vs chlorhexidine impregnated paraffin gauze dressing, Outcome 1 Wound infection.**

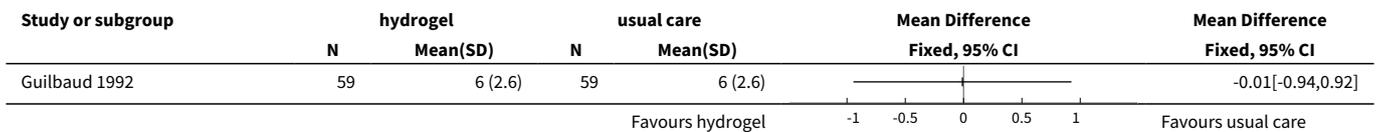




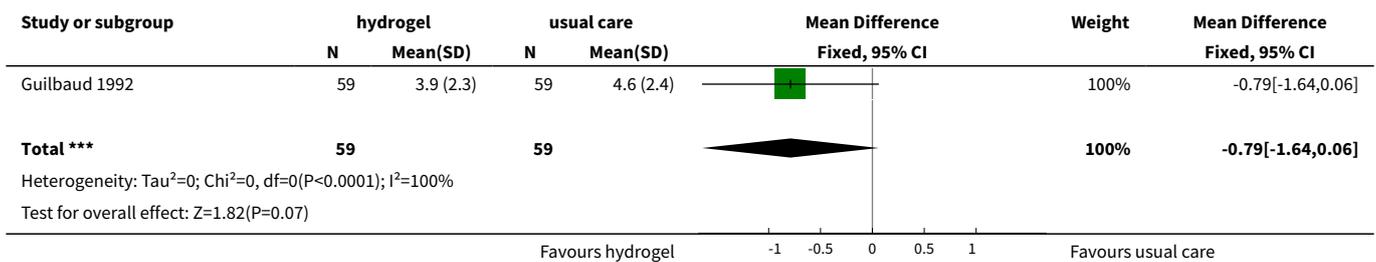
**Comparison 5. Hydrogel dressing vs usual care**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 assessment of pain at baseline	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2 pain 30 minutes after treatment	1	118	Mean Difference (IV, Fixed, 95% CI)	-0.79 [-1.64, 0.06]
3 overall assessment of pain at end of study	1	98	Mean Difference (IV, Fixed, 95% CI)	-1.31 [-2.37, -0.25]

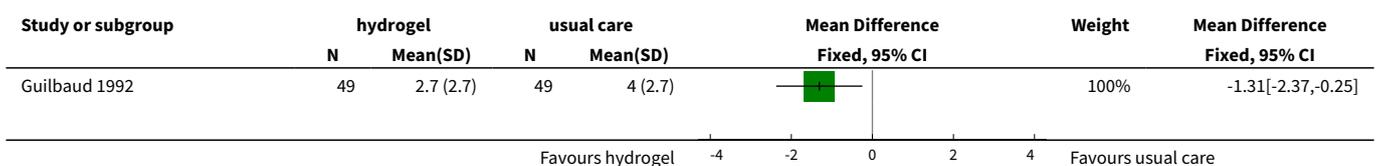
**Analysis 5.1. Comparison 5 Hydrogel dressing vs usual care, Outcome 1 assessment of pain at baseline.**

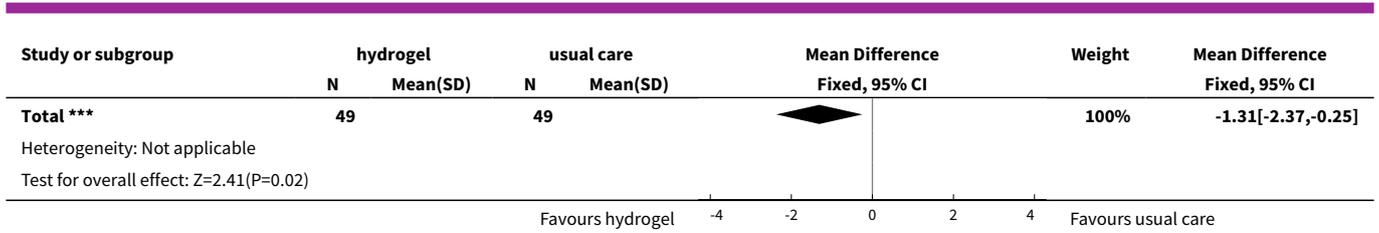


**Analysis 5.2. Comparison 5 Hydrogel dressing vs usual care, Outcome 2 pain 30 minutes after treatment.**



**Analysis 5.3. Comparison 5 Hydrogel dressing vs usual care, Outcome 3 overall assessment of pain at end of study.**

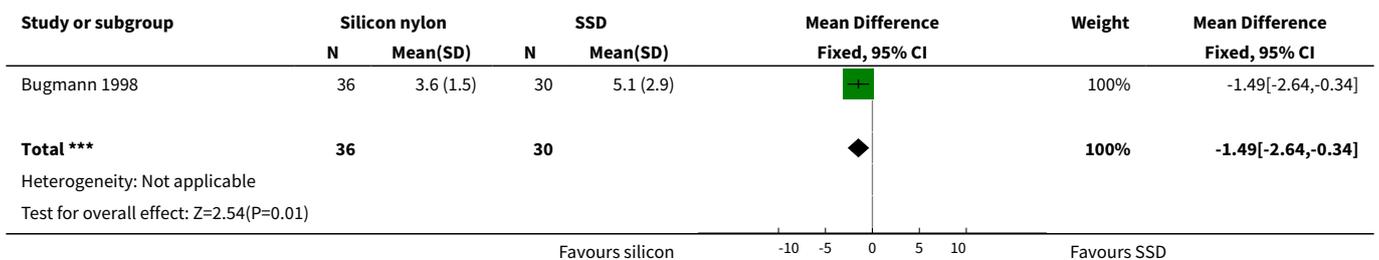




**Comparison 6. Silicon nylon dressing vs silver sulphadiazine**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of dressing changes	1	66	Mean Difference (IV, Fixed, 95% CI)	-1.49 [-2.64, -0.34]

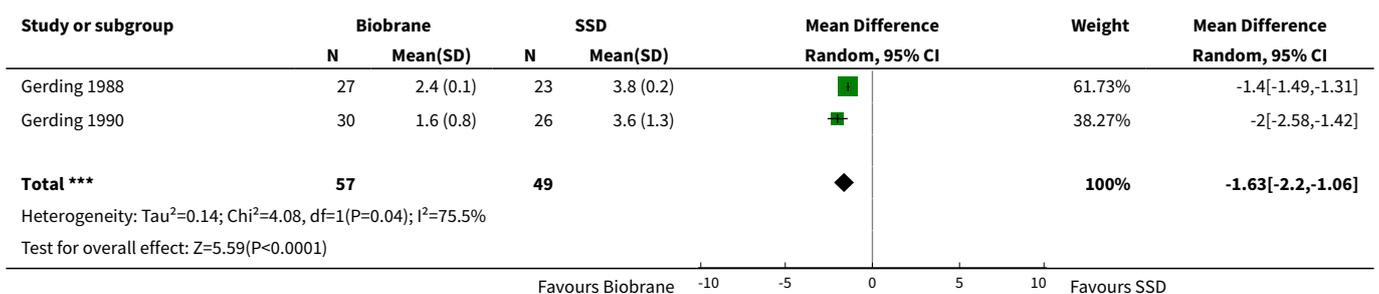
**Analysis 6.1. Comparison 6 Silicon nylon dressing vs silver sulphadiazine, Outcome 1 Number of dressing changes.**



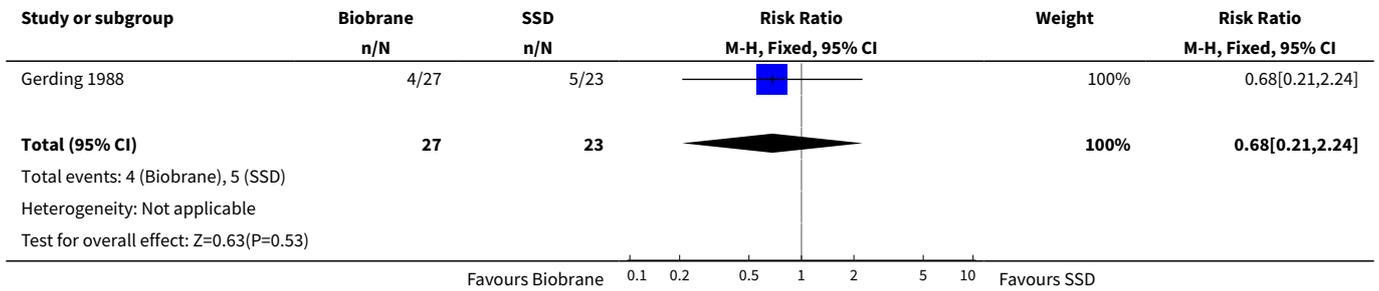
**Comparison 7. Biosynthetic skin substitute (Biobrane) vs silver sulphadiazine**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain	2	106	Mean Difference (IV, Random, 95% CI)	-1.63 [-2.20, -1.06]
2 Need for surgery	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.68 [0.21, 2.24]

**Analysis 7.1. Comparison 7 Biosynthetic skin substitute (Biobrane) vs silver sulphadiazine, Outcome 1 Pain.**



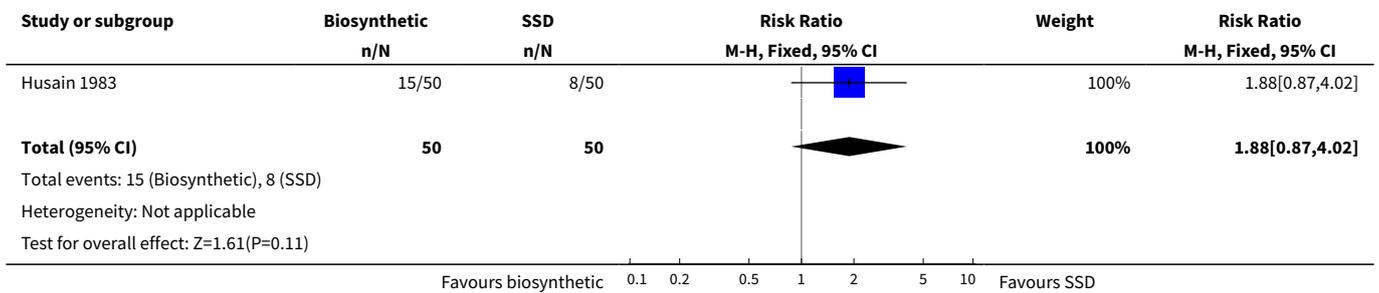
**Analysis 7.2. Comparison 7 Biosynthetic skin substitute (Biobrane) vs silver sulphadiazine, Outcome 2 Need for surgery.**



**Comparison 8. Antimicrobial releasing biosynthetic dressings vs silver sulphadiazine**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Wound infection	1	100	Risk Ratio (M-H, Fixed, 95% CI)	1.88 [0.87, 4.02]

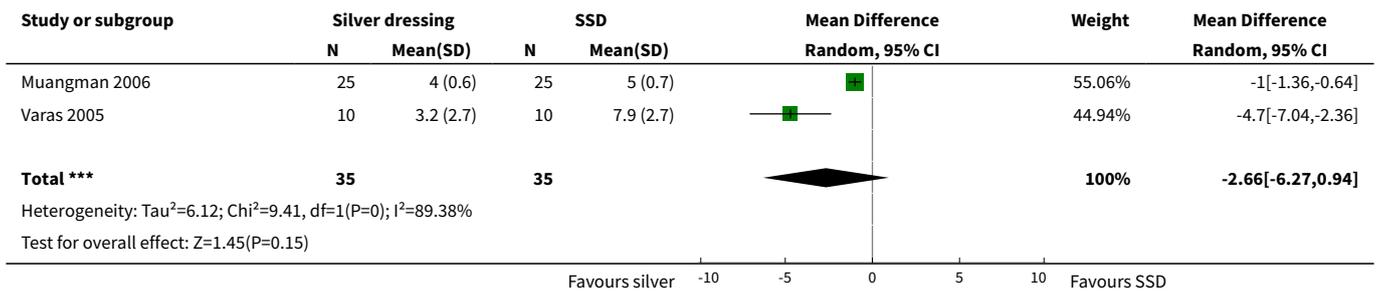
**Analysis 8.1. Comparison 8 Antimicrobial releasing biosynthetic dressings vs silver sulphadiazine, Outcome 1 Wound infection.**



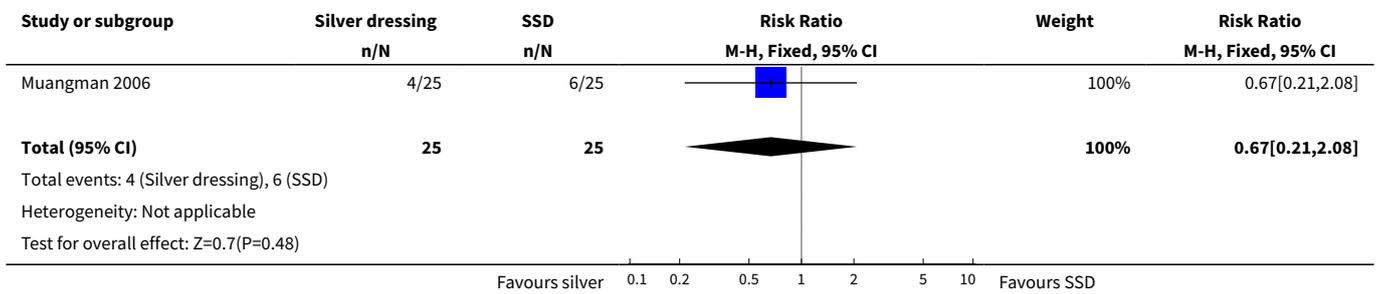
**Comparison 9. Silver impregnated dressing vs silver sulphadiazine**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Pain	2	70	Mean Difference (IV, Random, 95% CI)	-2.66 [-6.27, 0.94]
2 Need for surgery	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.67 [0.21, 2.08]

**Analysis 9.1. Comparison 9 Silver impregnated dressing vs silver sulphadiazine, Outcome 1 Pain.**



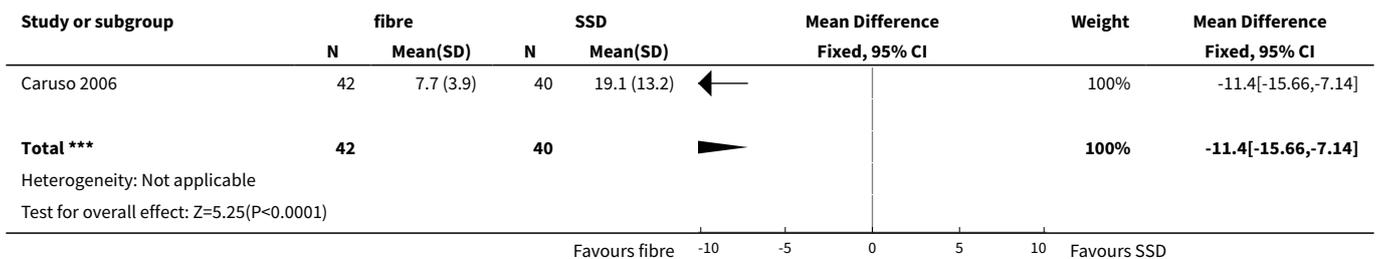
**Analysis 9.2. Comparison 9 Silver impregnated dressing vs silver sulphadiazine, Outcome 2 Need for surgery.**



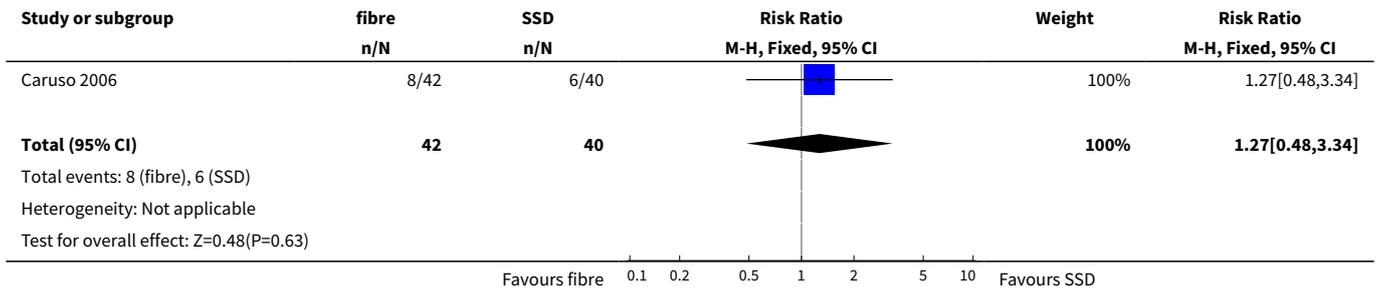
**Comparison 10. Fibre dressing vs silver sulphadiazine**

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of dressing changes	1	82	Mean Difference (IV, Fixed, 95% CI)	-11.40 [-15.66, -7.14]
2 Number of infections	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.27 [0.48, 3.34]
3 Need for surgery	1	82	Risk Ratio (M-H, Fixed, 95% CI)	0.68 [0.24, 1.97]

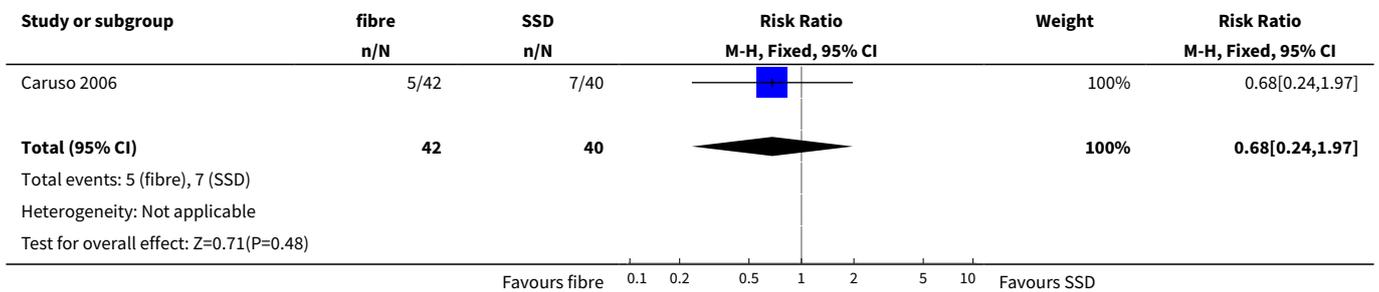
**Analysis 10.1. Comparison 10 Fibre dressing vs silver sulphadiazine, Outcome 1 Number of dressing changes.**



**Analysis 10.2. Comparison 10 Fibre dressing vs silver sulphadiazine, Outcome 2 Number of infections.**



**Analysis 10.3. Comparison 10 Fibre dressing vs silver sulphadiazine, Outcome 3 Need for surgery.**



**APPENDICES**

**Appendix 1. Ovid MEDLINE Search Strategy**

- 1 exp Bandages, Hydrocolloid/
- 2 (hydrocolloid\$ or askina or biofilm or combiderm or comfeel or cutinova or duoderm or duoderm or hydroactive gel\$ or granuflex or hydrocoll or replicare or tegasorb or sureskin or hydrofibre or hydrofiber or aquacel).mp.
- 3 exp Alginates/
- 4 alginate dressing\$.mp.
- 5 (alginate\$ or calcium or algosteril or kaltostat or melgisorb or seasorb or sorbalgon or sorbsan or tegagen or algisite M).mp.
- 6 foam dressing\$.mp.
- 7 (allevyn or avance or biatain or cavi-care or flexipore or lyofoam or spyrosorb or tielle or mepilex).mp.
- 8 exp Hydrogels/
- 9 (hydrogel\$ or aquaform or debrisan or geliperme or granugel or hydrosorb or novogel or nu-gel or purilon or sterigel).mp.
- 10 (film or films or arglaes or omiderm or polyurethane or tegaderm or opsite).mp. (48366)
- 11 exp Occlusive Dressings/
- 12 (paraffin adj10 gauze).mp.
- 13 (paranet or paratulle or unitulle or jelonet or bactigras or cuticerin or adaptic or atrauman).mp.
- 14 (retention tape or hypafix or mifix or fixamul).mp.
- 15 (biosynthetic adj10 substitute\$).mp.
- 16 (biosynthetic adj10 dressing\$).mp.
- 17 (biobrane or transcyte).mp.
- 18 (antimicrobial dressing\$ or acticoat).mp.
- 19 or/1-18
- 20 exp Burns/
- 21 (burn or burns or burned).ti,ab.
- 22 or/20-21
- 23 19 and 22

## WHAT'S NEW

Date	Event	Description
7 September 2010	Amended	Contact details updated.

## HISTORY

Protocol first published: Issue 2, 2000

Review first published: Issue 4, 2008

Date	Event	Description
12 November 2008	Amended	corrections made to data for 2 trials Wyatt and Caruso
28 May 2008	Amended	Converted to new review format.
6 April 2007	Amended	new protocol published 2007 issue 3. Title change.

## CONTRIBUTIONS OF AUTHORS

Jason Wasiak: Designed and coordinated the review. Extracted data and checked quality of data extraction. Undertook and checked quality assessment. Performed statistical analysis, interpreted data and checked the analysis. Completed first draft of the review and advised on subsequent drafts. Made an intellectual contribution to the review. Approved final review prior to submission. Performed previous work that was the foundation of the current review. Is guarantor of the review.

Heather Cleland: Designed the review. Checked quality of data extraction and interpreted data. Completed first draft of the review. Made an intellectual contribution to the review and approved final review prior to submission. Advised on the review. Performed previous work that was the foundation of the current review.

Fiona Campbell: Designed and coordinated the review. Examined all search results. Extracted data and checked quality of data extraction. Wrote to study author/experts/companies and handsearched journals. Undertook and checked quality assessment. Performed statistical analysis, interpreted data and checked the analysis. Completed first draft of the review and advised on subsequent drafts. Made an intellectual contribution to the review. Approved final review prior to submission. Performed previous work that was the foundation of the current review.

### Contributions of editorial base:

Nicky Cullum: Edited the review, advised on methodology, interpretation and review content. Undertook extensive redrafting. Approved the final review prior to submission.

Sally Bell-Syer: Coordinated the editorial process. Checked data extraction and quality assessment. Performed part of data analysis and interpretation. Advised on methodology, interpretation and content. Undertook extensive redrafting, editing and copy editing of the review.

Ruth Foxlee: Designed the search strategy and edited the search methods section.

## DECLARATIONS OF INTEREST

None

## SOURCES OF SUPPORT

### Internal sources

- No sources of support supplied

**External sources**

- Royal College of Nursing, UK.

**INDEX TERMS****Medical Subject Headings (MeSH)**

\*Wound Healing; Bandages [classification] [\*standards]; Bandages, Hydrocolloid; Burns [physiopathology] [\*therapy]; Randomized Controlled Trials as Topic; Silicon Compounds [therapeutic use]; Silver Sulfadiazine [therapeutic use]; Skin, Artificial

**MeSH check words**

Humans